LEARNE2I / PRIORITY PRACTICE

JEE Main 2026 Session 1

Physics
Chapter-wise practice collection

300 questions / NCERT chapter navigation
Chapter and topic priority guide, followed by questions and an answer key.

Start with the priority guide, then practise chapter by chapter. Enter a numerical value where no options are given; follow the units and precision specified in the question.

Solutions on your phone

Scan to choose a chapter or question. You can also download all three solutions PDFs together.

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Open the PDF bookmarks panel on the left to jump between chapters. The chapter links in the guide are clickable too.

YOUR PRACTICE ROADMAP

Chapter & topic priorities

For this Session 1 collection, begin with **Current Electricity; Ray Optics and Optical Instruments; Electromagnetic Induction**. These chapters have the largest share of the selected questions.

Practice weight = questions selected from a chapter / 300. Topic percentages use that chapter's question count. These are practice priorities from the prediction output, not guaranteed exam marks or probabilities.

NCERT chapter / leading topics	Priority	Questions	Weight
Units and Measurements Screw gauge: 5 (41.7%) / Dimensional analysis: 2 (16.7%) / Units and Measurements: 2 (16.7%) / More topics in chapter guide	Focus first	1-12 (12)	4.0%
Motion in a Straight Line Kinematics: 8 (61.5%) / Equations of motion: 4 (30.8%) / Uniformly accelerated motion: 1 (7.7%)	Focus first	13-25 (13)	4.3%
Motion in a Plane Equations of motion: 2 (40.0%) / Projectile motion: 2 (40.0%) / Kinematics: 1 (20.0%)	Consolidate	26-30 (5)	1.7%
Laws of Motion Newtonian mechanics: 8 (53.3%) / Newton's second law: 4 (26.7%) / Friction: 3 (20.0%)	Focus first	31-45 (15)	5.0%
Work, Energy and Power Work and energy: 8 (53.3%) / Work-energy theorem: 4 (26.7%) / Power: 1 (6.7%) / More topics in chapter guide	Focus first	46-60 (15)	5.0%
System of Particles and Rotational Motion Rotational dynamics: 8 (50.0%) / Momentum and rotation: 6 (37.5%) / Moment of inertia: 2 (12.5%)	Focus first	61-76 (16)	5.3%
Gravitation Satellite motion: 3 (75.0%) / Escape velocity: 1 (25.0%)	Consolidate	77-80 (4)	1.3%
Mechanical Properties of Solids Elasticity: 4 (66.7%) / Young's modulus: 2 (33.3%)	Next	81-86 (6)	2.0%
Mechanical Properties of Fluids Surface tension: 3 (50.0%) / Viscosity: 3 (50.0%)	Consolidate	87-92 (6)	2.0%
Thermal Properties of Matter Heat transfer: 3 (60.0%) / Calorimetry: 2 (40.0%)	Consolidate	93-97 (5)	1.7%
Thermodynamics First law of thermodynamics: 5 (62.5%) / Thermodynamic processes: 2 (25.0%) / Thermodynamics: 1 (12.5%)	Next	98-105 (8)	2.7%

NCERT chapter / leading topics	Priority	Questions	Weight
Kinetic Theory Kinetic molecular theory: 8 (66.7%) / Root-mean-square speed: 2 (16.7%) / Kinetic interpretation of pressure: 1 (8.3%) / More topics in chapter guide	Focus first	106-117 (12)	4.0%
Oscillations Simple harmonic motion: 3 (33.3%) / Spring-mass oscillation: 3 (33.3%) / Oscillatory motion: 2 (22.2%) / More topics in chapter guide	Next	118-126 (9)	3.0%
Waves Wave motion: 10 (100.0%)	Next	127-136 (10)	3.3%
Electric Charges and Fields Electric fields and forces: 6 (54.5%) / Electric field: 2 (18.2%) / Electric Charges and Fields: 1 (9.1%) / More topics in chapter guide	Focus first	137-147 (11)	3.7%
Electrostatic Potential and Capacitance Electric potential and capacitors: 8 (57.1%) / Capacitors with dielectrics: 2 (14.3%) / Parallel-plate capacitance: 2 (14.3%) / More topics in chapter guide	Focus first	148-161 (14)	4.7%
Current Electricity Electric circuits: 16 (51.6%) / Ohm's law: 8 (25.8%) / Circuit analysis: 2 (6.5%) / More topics in chapter guide	Focus first	162-192 (31)	10.3%
Moving Charges and Magnetism Magnetic force and field: 8 (53.3%) / Magnetic field due to currents: 3 (20.0%) / Biot-Savart law: 2 (13.3%) / More topics in chapter guide	Focus first	193-207 (15)	5.0%
Electromagnetic Induction Inductance and induced emf: 9 (52.9%) / Faraday's law: 5 (29.4%) / Electromagnetic Induction: 1 (5.9%) / More topics in chapter guide	Focus first	208-224 (17)	5.7%
Alternating Current Series LCR resonance: 5 (55.6%) / AC circuits: 3 (33.3%) / Transformer: 1 (11.1%)	Next	225-233 (9)	3.0%
Electromagnetic Waves Electromagnetic spectrum: 4 (50.0%) / Electromagnetic waves: 2 (25.0%) / Properties of electromagnetic waves: 2 (25.0%)	Next	234-241 (8)	2.7%
Ray Optics and Optical Instruments Lens formula: 20 (66.7%) / Geometrical optics: 3 (10.0%) / Mirror formula: 3 (10.0%) / More topics in chapter guide	Focus first	242-271 (30)	10.0%
Wave Optics Young's double-slit interference: 7 (77.8%) / Wave Optics: 1 (11.1%) / Young double-slit interference: 1 (11.1%)	Next	272-280 (9)	3.0%
Dual Nature of Radiation and Matter de Broglie wavelength: 7 (58.3%) / Photoelectric equation: 2 (16.7%) / Dual Nature of Radiation and Matter: 1 (8.3%) / More topics in chapter guide	Focus first	281-292 (12)	4.0%
Atoms Hydrogen spectrum: 1 (100.0%)	Consolidate	293-293 (1)	0.3%

NCERT chapter / leading topics	Priority	Questions	Weight
Semiconductor Electronics: Materials, Devices and Simple Circuits Energy bands in solids: 1 (33.3%) / Logic gates: 1 (33.3%) / Zener regulation: 1 (33.3%)	Consolidate	294-296 (3)	1.0%
Communication Systems Historical appendix / omitted source chapter Communication systems: 2 (50.0%) / Amplitude modulation: 1 (25.0%) / Omitted Chapter Communication System: 1 (25.0%)	Historical appendix	297-300 (4)	1.3%

How to use the priorities

1. Rank chapters by their selected question counts. Ties follow NCERT book order.
2. Focus first: chapters starting within the first 70% of selected, non-historical questions. Next: the following 20%. Consolidate: the remainder. A chapter crossing a threshold stays together.
3. Topic counts use the question's existing core concept, falling back to topic and then chapter. Each question is counted once. Full topic lists begin each chapter.
4. Historical/omitted chapters stay in a separate appendix. Their presence is not a recommendation that they are in the target examination syllabus.

Names follow NCERT Classes XI and XII. Practical chemistry is identified as a laboratory-manual section. Percentages are rounded and may not add to exactly 100.0%. Chapters with no selected questions are not listed; this does not mean they have no exam importance.

Chapter naming references: NCERT textbooks.

CHAPTER 01 / PHYSICS

Units and Measurements

Questions 1-12 / 12 selected / 4.0% practice weight / Focus first

Topics to prioritise in this collection

- Screw gauge: 5 questions / 41.7% of this chapter
- Dimensional analysis: 2 questions / 16.7% of this chapter
- Units and Measurements: 2 questions / 16.7% of this chapter
- Screw gauge least count: 1 question / 8.3% of this chapter
- Significant figures: 1 question / 8.3% of this chapter
- Vernier calipers: 1 question / 8.3% of this chapter

Open this chapter's solutions on mobile / Back to chapter guide

Question 1 View solution online

$\left(\mathrm{P}+\frac{\mathrm{a}}{\mathrm{V}^2}\right)(\mathrm{V}-\mathrm{b})=\mathrm{RT}$ represents the equation of state of some gases. Where P is the pressure, V is the volume, T is the temperature and a, b, R are the constants. The physical quantity, which has dimensional formula as that of $\frac{b^2}{a}$, will be:

A. Compressibility

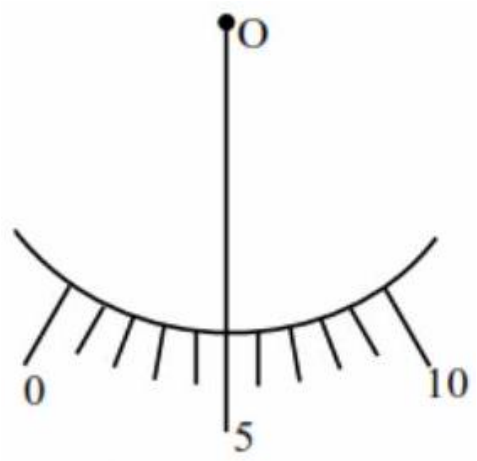
B. Energy density

C. Modulus of rigidity

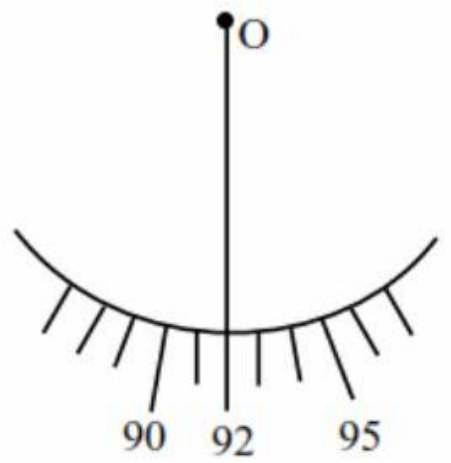
D. Bulk modulus

Question 2 View solution online

Student A and Student B used two screw gauges of equal pitch and 100 equal circular divisions to measure the radius of a given wire. The actual value of the radius of the wire is 0.322 cm. The absolute value of the difference between the final circular scale readings observed by the students A and B is ___. [Figure shows position of reference 'O' when jaws of screw gauge are closed] Given pitch $= \mathbf{0.1\ cm}$.



Screw gauge (A)



Screw gauge (B)

Numerical answer: _____

Enter the requested integer (0 decimal places).

Question 3 View solution online

There are 100 divisions on the circular scale of a screw gauge of pitch 1 mm . With no measuring quantity in between the jaws, the zero of the circular scale lies 5 divisions below the reference line. The diameter of a wire is then measured using this screw gauge. It is found the 4 linear scale divisions are clearly visible while 60 divisions on circular scale coincide with the reference line. The diameter of the wire is :

A. 4.65 mm

B. 4.55 mm

C. 4.60 mm

D. 3.35 mm

Question 4 View solution online

Assertion A : If in five complete rotations of the circular scale, the distance travelled on main scale of the screw gauge is 5 mm and there are 50 total divisions on circular scale, then least count is 0.001 cm. Reason R : Least Count $= \frac{\text{Pitch}}{\text{Total divisions on circular scale}}$ In the light of the above statements, choose the most appropriate answer from the options given below :

A. $\mathbf{A}$ is not correct but $\mathbf{R}$ is correct.

B. Both A and R are correct and R is the correct explanation of A.

C. A is correct but R is not correct.

D. Both A and R are correct and R is NOT the correct explanation of A.

Question 5 View solution online

Match List-I with List-II.

List-I (Number)	List-II (Significant figures)
(a) 1001	(i) 4
(b) 010.1	(ii) 3
(c) 100.100	(iii) 6
(d) 0.0010010	(iv) 5

Choose the correct answer from the options given below:

A. (A)-(III), (B)-(IV), (C)-(II), (D)-(I)

B. (A)-(IV), (B)-(III), (C)-(I), (D)-(II)

C. (A)-(II), (B)-(I), (C)-(IV), (D)-(III)

D. (A)-(I), (B)-(II), (C)-(III), (D)-(IV)

Question 6 View solution online

The pitch of the screw guage is 1 mm and there are 100 divisions on the circular scale. When nothing is put in between the jaws, the zero of the circular scale lines 8 divisions below the reference line. When a wire is placed between the jaws, the first linear scale division is clearly visible while 72nd division on circular scale coincides with the reference line. The radius of the wire is :

A. 1.64 mm

B. 1.80 mm

C. 0.82 mm

D. 0.90 mm

Question 7 View solution online

The least count of a screw guage is 0.01 mm . If the pitch is increased by 75% and number of divisions on the circular scale is reduced by 50%, the new least count will be $\times 10^{-3}$ mm.

Numerical answer: _____

Enter an integer (0 digits after the decimal point). Round to the nearest integer where requested; enter the coefficient of any power of ten shown in the question.

Question 8 View solution online

A screw gauge has 50 divisions on its circular scale. The circular scale is 4 units ahead of the pitch scale marking, prior to use. Upon one complete rotation of the circular scale, a displacement of 0.5 mm is noticed on the pitch scale. The nature of zero error involved and the least count of the screw gauge, are respectively :

A. Positive, 0.1 mm

B. Positive, 0.1μ m

C. Positive, 10μ m

D. Negative, 2μ m

Question 9 View solution online

Match List-I with List-II.

List-I	List-II
(a) h (Planck's constant)	(i) $[ML^2I^{-1}T^{-3}]$
(b) E (kinetic energy)	(ii) $[ML^2T^{-2}]$
(c) V (electric potential)	(iii) $[ML^2T^{-1}]$
(d) P (linear momentum)	(iv) $[MLT^{-1}]$

Choose the correct answer from the options given below:

A. (a) → (ii), (b) → (iii), (c) → (iv), (d) → (i)

B. (a) → (i), (b) → (ii), (c) → (iv), (d) → (iii)

C. (a) → (iii), (b) → (ii), (c) → (iv), (d) → (i)

D. (a) → (iii), (b) → (iv), (c) → (ii), (d) → (i)

Question 10 View solution online

The pitch and the number of divisions, on the circular scale, for a given screw gauge are 0.5 mm and 100 respectively. When the screw gauge is fully tightened without any object, the zero of its circular scale lies 3 divisions below the mean line.The readings of the main scale and the circular scale, for a thin sheet, are 5.5 mm and 48 respectively, the thickness of this sheet is :

A. 5.755 m

B. 5.725 mm

C. 5.740 m

D. 5.950 mm

Question 11 View solution online

Given below are two statements : one is labelled as Assertion(A) and the other is labelled as Reason (R).Assertion (A) : In Vernier calliper if positive zero error exists, then while taking measurements, the reading taken will be more than the actual reading.Reason (R) : The zero error in Vernier Calliper might have happened due to manufacturing defect or due to rough handling.In the light of the above statements, choose the correct answer from the options given below :

A. Both (A) and (R) are correct and (R) is the correct explanation of (A)

B. Both (A) and (R) are correct but (R) is not the correct explanation of (A)

C. (A) is true but (R) is false

D. (A) is false but (R) is true

Question 12 View solution online

A screw gauge advances by 3 mm in 6 rotations. There are 50 divisions on circular scale. Find least count of screw gauge?

A. 0.002 cm

B. 0.001 cm

C. 0.01 cm

D. 0.02 cm

CHAPTER 02 / PHYSICS

Motion in a Straight Line

Questions 13-25 / 13 selected / 4.3% practice weight / Focus first

Topics to prioritise in this collection

- Kinematics: 8 questions / 61.5% of this chapter
- Equations of motion: 4 questions / 30.8% of this chapter
- Uniformly accelerated motion: 1 question / 7.7% of this chapter

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Question 13 View solution online

A particle excutes S.H.M with amplitude 'a' and time period T. The displacement of the particle when its speed is half of maximum speed is $\frac{\sqrt{x}a}{2}$. The value of x is

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 14 View solution online

A balloon was moving upwards with a uniform velocity of 10 m/s. An object of finite mass is dropped from the balloon when it was at a height of 75 m from the ground level. The height of the balloon from the ground when object strikes the ground was around : (takes the value of g as $10\ \mathrm{m/s^2}$)

A. 300 m

B. 200 m

C. 125 m

D. 250 m

Question 15 View solution online

A body is moving with constant speed, in a circle of radius 10 m . The body completes one revolution in 4 s . At the end of 3rd second, the displacement of body (in m) from its starting point is:

A. 15π

B. $10\sqrt{2}$

C. 30

D. 5π

Question 16 View solution online

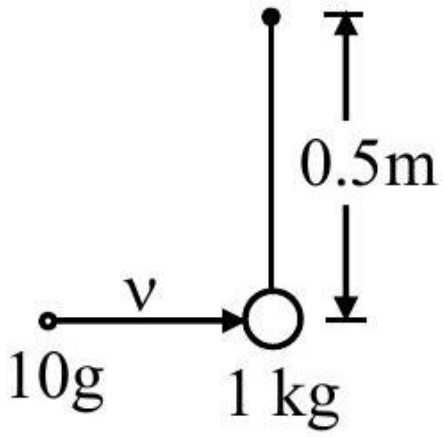
A body of mass 2 kg is initially at rest. It starts moving unidirectionally under the influence of a source of constant power P. Its displacement in 4 s is $\frac{1}{3}\alpha^2\sqrt{P}m$. The value of α will be .

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 17 View solution online

A bullet of 10 g , moving with velocity v, collides head-on with the stationary bob of a pendulum and recoils with velocity $100\ \mathrm{m/s}$. The length of the pendulum is 0.5 m and mass of the bob is 1 kg . The minimum value of $v =$ $\mathrm{m/s}$ so that the pendulum describes a circle. (Assume the string to be inextensible and $g = 10\ \mathrm{m/s^2}$)



Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 18 View solution online

A ball is thrown vertically upwards with a velocity of $19.6\ \mathrm{ms}^{-1}$ from the top of a tower. The ball strikes the ground after 6 s . The height from the ground up to which the ball can rise will be $\left(\frac{k}{5}\right)\mathrm{m}$. The value of k is ..... (use $g = 9.8\ \mathrm{m/s^2}$)

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 19 View solution online

A ball of mass 0.5 kg is dropped from the height of 10 m . The height, at which the magnitude of velocity becomes equal to the magnitude of acceleration due to gravity, is m. (Use $g = 10\ \mathrm{m/s^2}$).

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 20 View solution online

A ball is thrown vertically upward with an initial velocity of $150\ \mathrm{m/s}$. The ratio of velocity after 3 s and 5 s is $\frac{x+1}{x}$. The value of x is ..... .Take ($g = 10\ \mathrm{m/s^2}$).

A. 6

B. 5

C. -5

D. 10

Question 21 View solution online

A body is projected from the ground at an angle of $45°$ with the horizontal. Its velocity after 2 s is $20\ \mathrm{ms}^{-1}$. The maximum height reached by the body during its motion is m . (use $g = 10\ \mathrm{ms}^{-2}$)

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 22 View solution online

Two balls A and B are placed at the top of 180 m tall tower. Ball A is released from the top at $\mathbf{t = 0}$ s. Ball B is thrown vertically down with an initial velocity ' u ' at $t = 2$ s. After a certain time, both balls meet 100 m above the ground. Find the value of ' u ' in $\mathbf{ms^{-1}}$. [use $\mathbf{g = 10\ ms^{-2}}$] :

A. 10

B. 15

C. 20

D. 30

Question 23 View solution online

A small toy starts moving from the position of rest under a constant acceleration. If it travels a distance of 10 m in t s ,. the distance travelled by the toy in the next t s will be :

A. 10 m

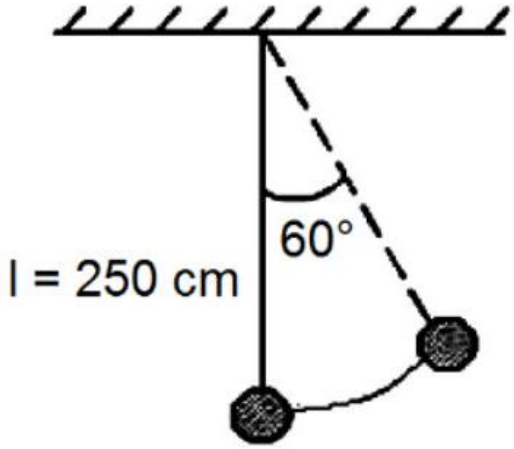
B. 20 m

C. 30 m

D. 40 m

Question 24 View solution online

A pendulum is suspended by a string of length 250 cm . The mass of the bob of the pendulum is 200 g . The bob is pulled aside until the string is at $60°$ with vertical as shown in the figure. After releasing the bob. the maximum velocity attained by the bob will be ms^{-1}.
(if $g = 10\ m/s^2$)



Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 25 View solution online

An object is thrown vertically upwards. At its maximum height, which of the following quantity becomes zero ?

A. Momentum

B. Potential energy

C. Acceleration

D. Force

CHAPTER 03 / PHYSICS

Motion in a Plane

Questions 26-30 / 5 selected / 1.7% practice weight / Consolidate

Topics to prioritise in this collection

- Equations of motion: 2 questions / 40.0% of this chapter
- Projectile motion: 2 questions / 40.0% of this chapter
- Kinematics: 1 question / 20.0% of this chapter

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Question 26

View solution online

A body is projected at $t = 0$ with a velocity $10\ ms^{-1}$ at an angle of $60°$ with the horizontal. The radius of curvature of its trajectory at $t = 1\ s$ is R . Neglecting air resistance and taking acceleration due to gravity $g = 10\ ms^{-2}$, the value of R is :

A. 2.5 m

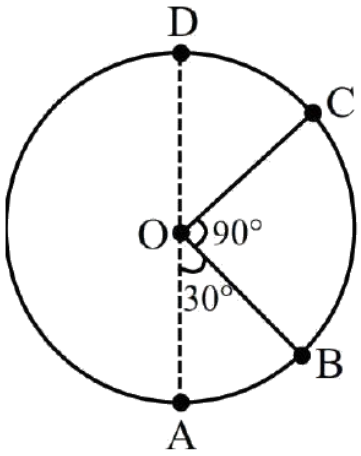
B. 10.3 m

C. 2.8 m

D. 5.1 m

Question 27 View solution online

A body of mass 100 g is moving in circular path of radius 2 m on vertical plane as shown in figure. The velocity of the body at point A is $10\ \mathbf{m/s}$. The ratio of its kinetic energies at point B and C is :(Take acceleration due to gravity as $10\ \mathbf{m/s^2}$)



A. $\frac{2+\sqrt{3}}{3}$

B. $\frac{2+\sqrt{2}}{3}$

C. $\frac{3+\sqrt{3}}{2}$

D. $\frac{3-\sqrt{2}}{2}$

Question 28 View solution online

A block of mass M slides down on a rough inclined plane with constant velocity. The angle made by the incline plane with horizontal is θ. The magnitude of the contact force will be :

A. Mg

B. $\mathrm{Mg}\cos\theta$

C. $\sqrt{\mathrm{Mg}\sin\theta+\mathrm{Mg}\cos\theta}$

D. $\mathrm{Mg}\sin\theta\sqrt{1+\mu}$

Question 29 View solution online

A projectile is projected at $30°$ from horizontal with initial velocity $40\ \mathrm{ms}^{-1}$. The velocity of the projectile at $t = 2\ \mathrm{s}$ from the start will be:(Given $g = 10\ \mathrm{m/s^2}$)

A. $20\sqrt{3}\ \mathrm{ms}^{-1}$

B. $40\sqrt{3}\ \mathrm{ms}^{-1}$

C. $20\ \mathrm{ms}^{-1}$

D. Zero

Question 30 View solution online

A projectile fired at $30°$ to the ground is observed to be at same height at time 3 s and 5 s after projection, during its flight. The speed of projection of the projectile is ms^{-1}
(Given $g = 10\ \mathrm{m\ s}^{-2}$)

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

CHAPTER 04 / PHYSICS

Laws of Motion

Questions 31-45 / 15 selected / 5.0% practice weight / Focus first

Topics to prioritise in this collection

- Newtonian mechanics: 8 questions / 53.3% of this chapter
- Newton's second law: 4 questions / 26.7% of this chapter
- Friction: 3 questions / 20.0% of this chapter

Open this chapter's solutions on mobile / Back to chapter guide

Question 31 View solution online

A body of mass ' m ' is launched up on a rough inclined plane making an angle of 30° with the horizontal. The coefficient of friction between the body and plane is $\frac{\sqrt{x}}{5}$ if the time of ascent is half of the time of descent. The value of x is ___.

Numerical answer: _____

Enter the requested integer (0 decimal places).

Question 32 View solution online

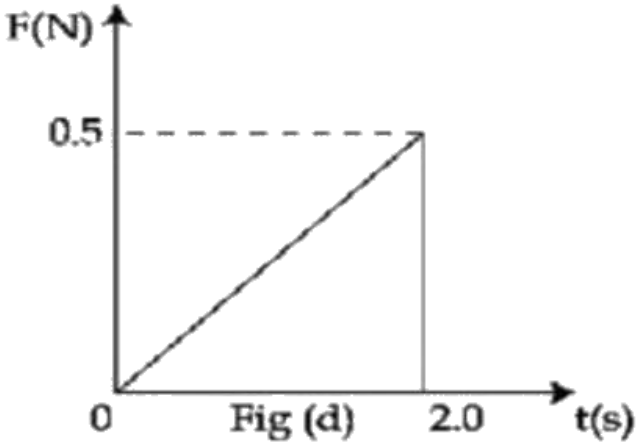
A block is fastened to a horizontal spring. The block is pulled to a distance $x = 10\ \text{cm}$ from its equilibrium position (at $x = 0$) on a frictionless surface from rest. The energy of the block at $x = 5\ \text{cm}$ is 0.25 J . The spring constant of the spring is Nm^{-1}

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 33 View solution online

Figures (a), (b), (c) and (d) show variation of force with time.The impulse is highest in figure.



A. Fig (c)

B. Fig (b)

C. Fig (d)

D. Fig (a)

Question 34 View solution online

A force acts for 20 s on a body of mass 20 kg , starting from rest, after which the force ceases and then body describes 50 m in the next 10 s . The value of force will be:

A. 40 N

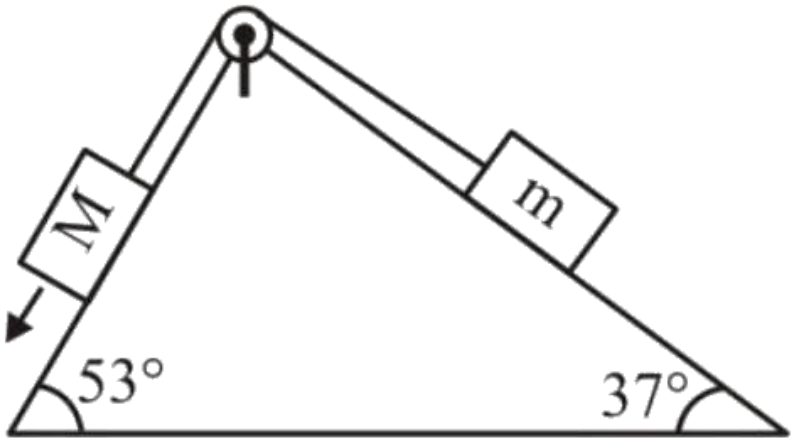
B. 5 N

C. 20 N

D. 10 N

Question 35 View solution online

In the given arrangement of a doubly inclined plane two blocks of masses M and m are placed. The blocks are connected by a light string passing over an ideal pulley as shown. The coefficient of friction between the surface of the plane and the blocks is 0.25 . The value of m , for which $\mathbf{M = 10}$ kg will move down with an acceleration of $\mathbf{2\ m/s^2}$, is : (take $\mathbf{g = 10\ m/s^2}$ and $\mathbf{\tan 37^\circ = 3/4}$)



A. 9 kg

B. 4.5 kg

C. 6.5 kg

D. 2.25 kg

Question 36 View solution online

A uniform rod AB of mass 2 kg and Length 30 cm at rest on a smooth horizontal surface. An impulse of force 0.2 Ns is applied to end B . The time taken by the rod to turn through at right angles will be $\frac{\pi}{\mathbf{x}}\mathbf{s}$, where $\mathbf{x} =$.

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 37 View solution online

A steel rod has a radius of 20 mm and a length of 2.0 m . A force of 62.8 kN stretches it along its length. Young's modulus of steel is $\mathbf{2.0 \times 10^{11}\ N/m^2}$. The longitudinal strain produced in the wire is $\times 10^{-5}$

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 38 View solution online

A bullet of mass 0.1 kg moving horizontally with speed $400\ ms^{-1}$ hits a wooden block of mass 3.9 kg kept on a horizontal rough surface. The bullet gets embedded into the block and moves 20 m before coming to rest. The coefficient of friction between the block and the surface is ..... .(Given $g = 10\ ms^2$)

A. 0.50

B. 0.90

C. 0.65

D. 0.25

Question 39 View solution online

A mass of 10 kg is suspended vertically by a rope of length 5 m from the roof. A force of 30 N is applied at the middle point of rope in horizontal direction. The angle made by upper half of the rope with vertical is $\theta = \tan^{-1}\left(x \times 10^{-1}\right)$. The value of x is .
(Given $g = 10\ m/s^2$)

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 40 View solution online

A body of mass 500 g moves along x -axis such that it's velocity varies with displacement x according to the relation $v = 10\sqrt{x}m/s$ the force acting on the body is:-

A. 166 N

B. 25 N

C. 125 N

D. 5 N

Question 41 View solution online

An object of mass 5 kg is thrown vertically upwards from the ground. The air resistance produces a constant retarding force of 10 N throughout the motion. The ratio of time of ascent to the time of descent will be equal to : [Use $\mathbf{g = 10\ ms^{-2}}$]

A. $\mathbf{1 : 1}$

B. $\mathbf{\sqrt{2} : \sqrt{3}}$

C. $\mathbf{\sqrt{3} : \sqrt{2}}$

D. $\mathbf{2 : 3}$

Question 42 View solution online

A rectangular block of mass 5 kg attached to a horizontal spiral spring executes simple harmonic motion of amplitude 1 m and time period 3.14 s . The maximum force exerted by spring on block is N.

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 43 View solution online

A force on an object of mass 100 g is $\mathbf{(10\hat{i} + 5\hat{j})N}$. The position of that object at $\mathbf{t = 2}$ s is $\mathbf{(a\hat{i} + b\hat{j})m}$ after starting from rest. The value of $\frac{a}{b}$ will be

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 44 View solution online

A block of mass 10 kg starts sliding on a surface with an initial velocity of $\mathbf{9.8\ ms^{-1}}$. The coefficient of friction between the surface and bock is 0.5 . The distance covered by the block before coming to rest is : [use $\mathbf{g = 9.8\ ms^{-2}}$]

A. 4.9 m

B. 9.8 m

C. 12.5 m

D. 19.6 m

Question 45 View solution online

Mercury is filled in a tube of radius 2 cm up to a height of 30 cm . The force exerted by mercury on the bottom of the tube is N.
(Given, atmospheric pressure $= 10^5 \mathrm{Nm}^{-2}$, density of mercury $= 1.36 \times 10^4\ \mathrm{kg\ m}^{-3},\ \mathrm{g} = 10\ \mathrm{ms}^{-2}$, $\pi = \frac{22}{7}$)

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

CHAPTER 05 / PHYSICS

Work, Energy and Power

Questions 46-60 / 15 selected / 5.0% practice weight / Focus first

Topics to prioritise in this collection

- Work and energy: 8 questions / 53.3% of this chapter
- Work-energy theorem: 4 questions / 26.7% of this chapter
- Power: 1 question / 6.7% of this chapter
- Power on inclined plane: 1 question / 6.7% of this chapter
- Work Energy and Power: 1 question / 6.7% of this chapter

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Question 46 View solution online

A body at rest is moved along a horizontal straight line by a machine delivering a constant power. The distance moved by the body in time 't' is proportional to :

A. $t^{\frac{3}{2}}$

B. $t^{\frac{1}{2}}$

C. $t^{\frac{1}{4}}$

D. $t^{\frac{3}{4}}$

Question 47 View solution online

A body of mass 2 kg moving with a speed of 4 m/s. makes an elastic collision with another body at rest and continues to move in the original direction but with one fourth of its initial speed. The speed of the two body centre of mass is $\frac{x}{10}$ m/s. Then the value of x is ___.

Numerical answer: _____

Enter the requested integer (0 decimal places).

Question 48 View solution online

A body of mass 4 kg is placed on a plane at a point P having coordinate $(3, 4)\mathrm{m}$. Under the action of force $\vec{F} = (2\hat{i} + 3\hat{j})\mathrm{N}$, it moves to a new point Q having coordinates $(6, 10)\mathrm{m}$ in 4 sec . The average power and instantaneous power at the end of 4 sec are in the ratio of :

A. $13 : 6$

B. $6 : 13$

C. $1 : 2$

D. $4 : 3$

Question 49 View solution online

A spherical body of mass 2 kg starting from rest acquires a kinetic energy of 10000 J at the end of 5th second. The force acted on the body is N.

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 50 View solution online

A block of mass 5 kg is placed at rest on a table of rough surface. Now, if a force of 30 N is applied in the direction parallel to surface of the table, the block slides through a distance of 50 m in an interval of time 10 s . Coefficient of kinetic friction is (given, $g = 10\ \mathrm{ms}^{-2}$):

A. 0.60

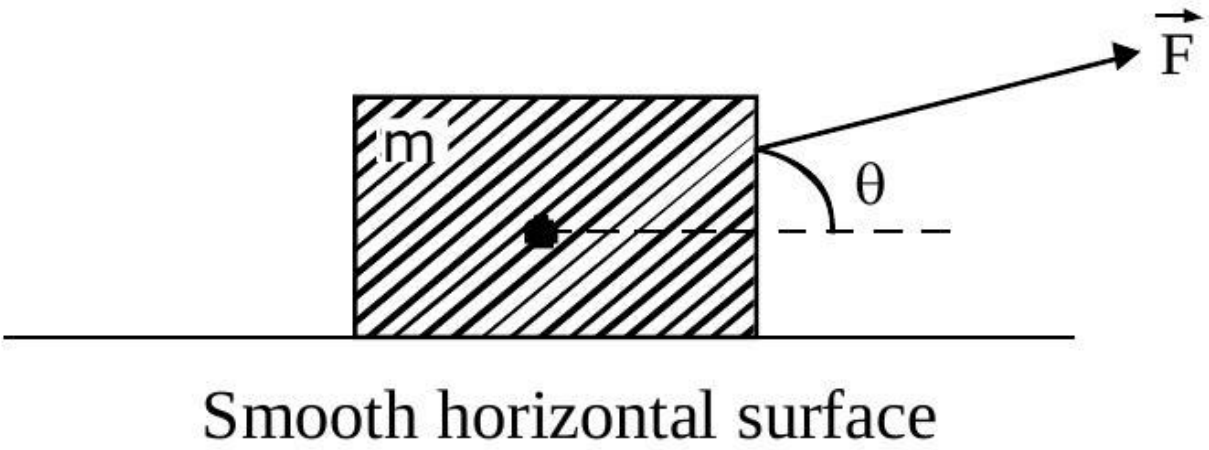
B. 0.25

C. 0.75

D. 0.50

Question 51 View solution online

An object of mass 'm' initially at rest on a smooth horizontal plane starts moving under the action of force $F = 2$ N. In the process of its linear motion, the angle θ (as shown in figure) between the direction of force and horizontal varies as $\theta = kx$, where k is constant and x is the distance covered by the object from the initial positon. The expression of kinetic energy of the object will be $E = \frac{n}{k}\sin\theta$, The value of n is .



Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 52 View solution online

The bob of a pendulum was released from a horizontal position. The length of the pendulum is 10 m. If it dissipates 10% of its initial energy against air resistance, the speed with which the bob arrives at the lowest point is : [Use, $g : 10\ ms^{-2}$]

A. $6\sqrt{5}\ ms^{-1}$

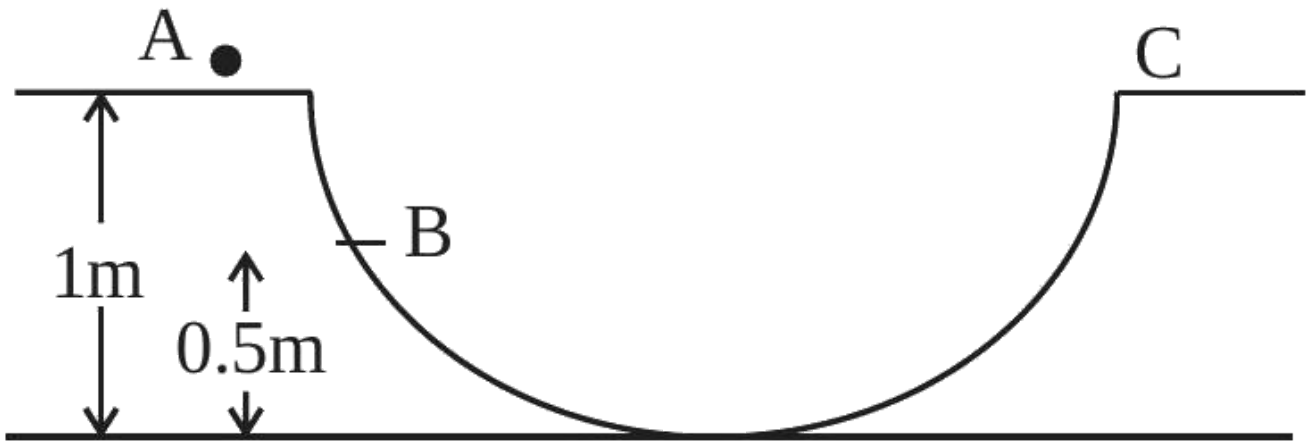
B. $5\sqrt{6}\ ms^{-1}$

C. $5\sqrt{5}\ ms^{-1}$

D. $2\sqrt{5}\ ms^{-1}$

Question 53 View solution online

A particle is placed at the point A of a frictionless track ABC as shown in figure. It is gently pushed toward right. The speed of the particle when it reaches the point B is : (Take $\mathbf{g = 10\ m/s^2}$).



A. $20\ \mathrm{m/s}$

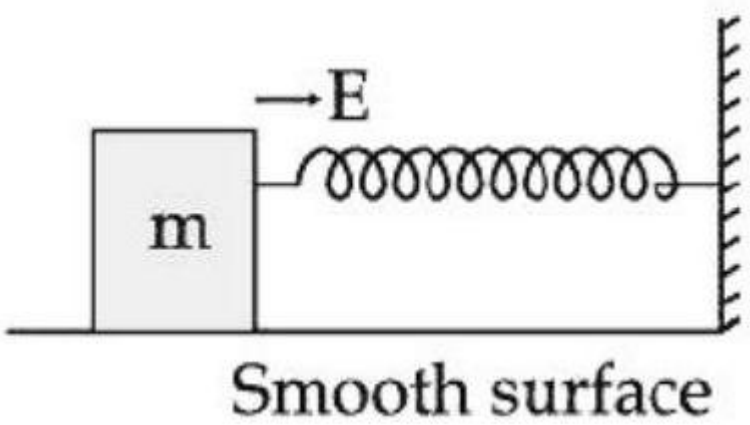
B. $\sqrt{10}\ \mathrm{m/s}$

C. $2\sqrt{10}\ \mathrm{m/s}$

D. $10\ \mathrm{m/s}$

Question 54 View solution online

A block of mass ' m ' (as shown in figure) moving with kinetic energy E compresses a spring through a distance 25 cm when, its speed is halved. The value of spring constant of used spring will be $\mathbf{nENm^{-1}}$ for $\mathbf{n =}$.



Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 55 View solution online

A uniform chain of length 3 meter and mass 3 kg overhangs a smooth table with 2 meter laying on the table. If k is the kinetic energy of the chain in joule as it completely slips off the table, then the value of k is (Take $g = 10\ m/s^2$)

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 56 View solution online

A body of mass 2 kg is driven by an engine delivering a constant power of $1\ J/s$. The body starts from rest and moves in a straight line. After 9 seconds, the body has moved a distance (in m)

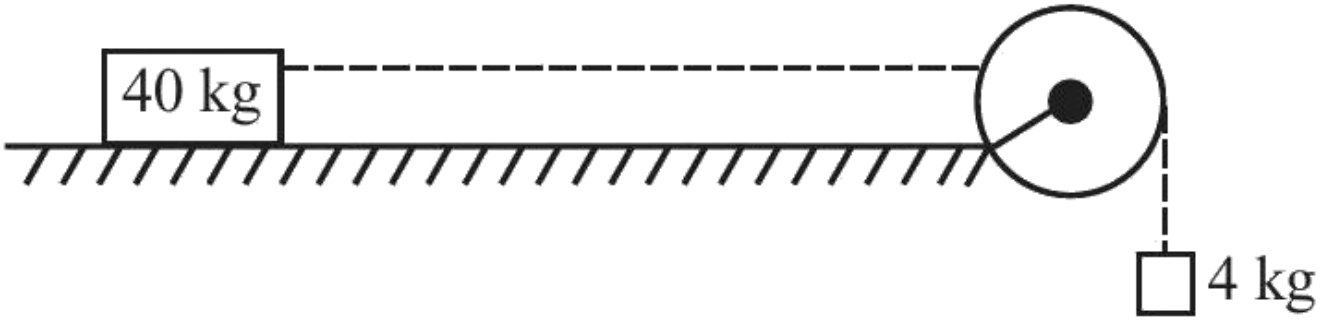
.

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 57 View solution online

A block of mass 40 kg slides over a surface, when a mass of 4 kg is suspended through an inextensible massless string passing over frictionless pulley as shown below. The coefficient of kinetic friction between the surface and block is 0.02 . The acceleration of block is. (Given $g = 10\ ms^{-2}$.)



A. $1\ ms^{-2}$

B. $1/5\ ms^{-2}$

C. $4/5\ ms^{-2}$

D. $8/11\ ms^{-2}$

Question 58 View solution online

A block of mass 5 kg starting from rest pulled up on a smooth incline plane making an angle of 30° with horizontal with an affective acceleration of 1 ms^{-2}. The power delivered by the pulling force at $t = 10\ s$ from the start is W.
[Use $g = 10\ \mathrm{ms}^{-2}$]
(calculate the nearest integer value)

Numerical answer: _____

Enter the requested value or coefficient rounded to the nearest integer (0 decimal places).

Question 59 View solution online

The pressure and volume of an ideal gas are related as $PV^{3/2} = K$ (Constant). The work done when the gas is taken from state $A\,(P_1,\ V_1,\ T_1)$ to state $B\,(P_2,\ V_2,\ T_2)$ is :

A. $2\,(P_1\,V_1 - P_2\,V_2)$

B. $2\,(P_2\,V_2 - P_1\,V_1)$

C. $2\left(\sqrt{P_1}\,V_1 - \sqrt{P_2}\,V_2\right)$

D. $2\left(P_2\sqrt{V_2} - P_1\sqrt{V_1}\right)$

Question 60 View solution online

A bi convex lens of focal length 10 cm is cut in two identical parts along a plane perpendicular to the principal axis. The power of each lens after cut is D.

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

CHAPTER 06 / PHYSICS

System of Particles and Rotational Motion

Questions 61-76 / 16 selected / 5.3% practice weight / Focus first

Topics to prioritise in this collection

- Rotational dynamics: 8 questions / 50.0% of this chapter
- Momentum and rotation: 6 questions / 37.5% of this chapter
- Moment of inertia: 2 questions / 12.5% of this chapter

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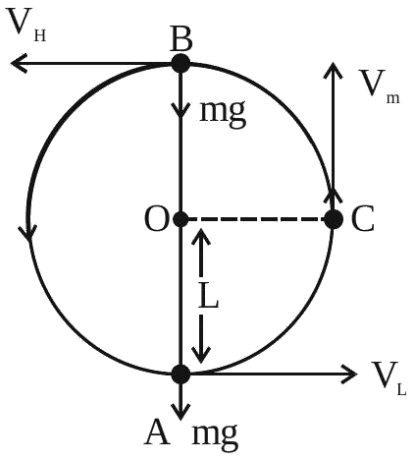
Question 61 View solution online

A bob of mass ' m ' is suspended by a light string of length ' L '. It is imparted a minimum horizontal velocity at the lowest point A such that it just completes half circle reaching the top most position B. The ratio of kinetic energies $\frac{(\text{K.E.})_A}{(\text{K.E.})_B}$ is :



A. $3:2$

B. $5:1$

C. $2:5$

D. $1:5$

Question 62 View solution online

A block of mass 10 kg is suspended from a string of length 4 m . When pulled by a force F along horizontal from the midpoint. The upper half of the string makes 45° with the vertical, value of F is

A. $100\ \mathrm{N}$

B. 90 N

C. $75\ \mathrm{N}$

D. 70 N

Question 63 View solution online

Let the moment of inertia of a hollow cylinder of length 30 cm (inner radius 10 cm and outer radius 20 cm), about its axis be I . The radius of a thin cylinder of the same mass such that its moment of inertia about its axis is also I, is:

A. 12 cm

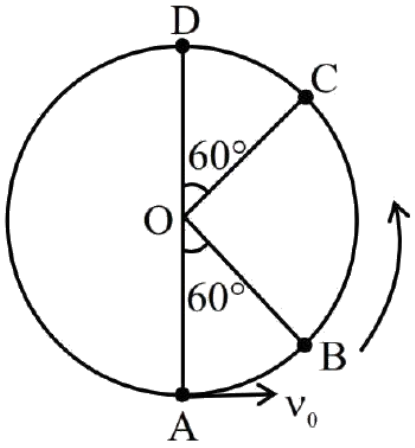
B. 18 cm

C. 16 cm

D. 14 cm

Question 64 View solution online

A bob of mass m is suspended at a point O by a light string of length l and left to perform vertical motion (circular) as shown in figure. Initially, by applying horizontal velocity v_0 at the point ' A '. the string becomes slack when, the bob reaches at the point ' D '. The ratio of the kinetic energy of the bob at the points B and C is ..... .



A. 2

B. 1

C. 4

D. 3

Question 65 View solution online

A body of mass ' m ' connected to a massless and unstretchable string goes in verticle circle of radius ' R ' under gravity g . The other end of the string is fixed at the center of circle. If velocity at top of circular path is $n\sqrt{gR}$, where, $n \geq 1$, then ratio of kinetic energy of the body at bottom to that at top of the circle is

A. $\frac{n}{n+4}$

B. $\frac{n+4}{n}$

C. $\frac{n^2}{n^2+4}$

D. $\frac{n^2+4}{n^2}$

Question 66 View solution online

A tube of length 1 m is filled completely with an ideal liquid of mass 2 M , and closed at both ends. The tube is rotated uniformly in horizontal plane about one of its ends. If the force exerted by the liquid at the other end is F then angular velocity of the tube is $\sqrt{\frac{F}{\alpha M}}$ in SI unit. The value of α is

.

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 67 View solution online

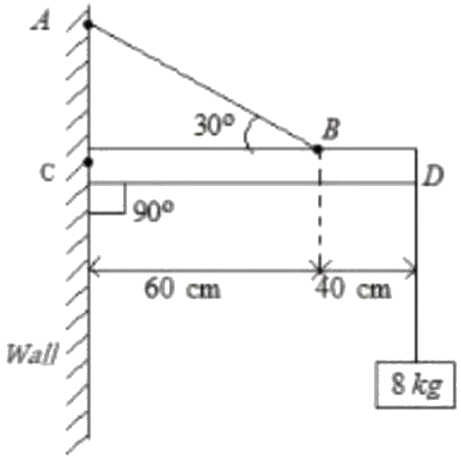
A rod of mass M and length L is lying on a horizontal frictionless surface. A particle of mass 'm' travelling along the surface hits at one end of the rod with a velocity 'u' in a direction perpendicular to the rod. The collision is completely elastic. After collision, particle comes to rest. The ratio of masses $\left(\frac{m}{M}\right)$ is $\frac{1}{x}$. The value of 'x' will be ___.

Numerical answer: _____

Enter the requested integer (0 decimal places).

Question 68 View solution online

An object of mass 8 kg hanging from one end of a uniform rod CD of mass 2 kg and length 1 m pivoted at its end C on a vertical walls as shown in figure. It is supported by a cable AB such that the system is in equilibrium. The tension in the cable is:(Take $\mathbf{g = 10\ m/s^2}$)



A. 90 N

B. 30 N

C. 300 N

D. 240 N

Question 69 View solution online

A 2 kg steel rod of length 0.6 m is clamped on a table vertically at its lower end and is free to rotate in vertical plane. The upper end is pushed so that the rod falls under gravity, Ignoring the friction due to clamping at its lower end, the speed of the free end of rod when it passes through its lowest position is ___ $\mathbf{ms^{-1}}$. (Take $\mathbf{g = 10\ ms^{-2}}$)

Numerical answer: _____

Enter the requested integer (0 decimal places).

Question 70 View solution online

A string of area of cross-section $4\ \mathrm{mm}^2$ and length 0.5 is connected with a rigid body of mass 2 kg . The body is rotated in a vertical circular path of radius 0.5 m . The body acquires a speed of $5\ \mathrm{m/s}$ at the bottom of the circular path. Strain produced in the string when the body is at the bottom of the circle is $\times 10^{-5}$. (Use Young's modulus $10^{11}\ \mathrm{N/m^2}$ and $g = 10\ \mathrm{m/s^2}$)

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 71 View solution online

A stone of mass 900 g is tied to a string and moved in a vertical circle of radius 1 m making 10 rpm . The tension in the string, when the stone is at the lowest point is (if $\pi^2 = 9.8$ and $g = 9.8\ \mathrm{m/s^2}$)

A. 97 N

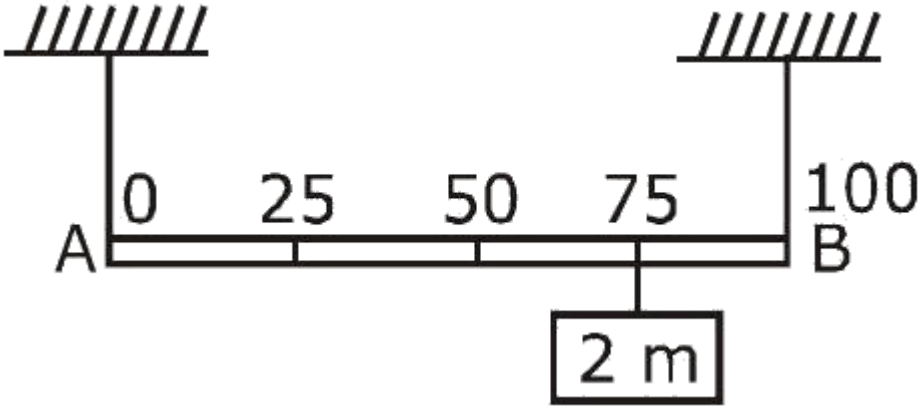
B. 9.8 N

C. 8.82 N

D. 17.8 N

Question 72 View solution online

Shown in the figure is rigid and uniform one meter long rod AB held in horizontal position by two strings tied to its ends and attached to the ceiling. The rod is of mass ' m ' and has another weight of mass 2 m hung at a distance of 75 cm from A. The tension in the string at A is:



A. 0.75 mg

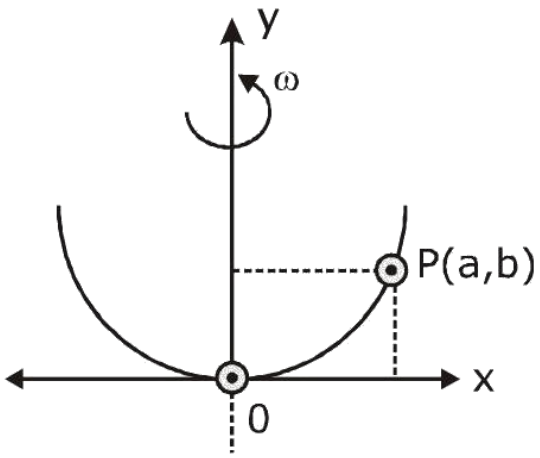
B. 0.5 mg

C. 1 mg

D. 2 mg

Question 73 View solution online

A bead of mass m stays at point $P(a, b)$ on a wire bent in the shape of a parabola $y = 4Cx^2$ and rotating with angular speed ω (see figure). The value of ω is (neglect friction):



A. $\sqrt{\frac{2g}{C}}$

B. $2\sqrt{gC}$

C. $\sqrt{\frac{2gC}{ab}}$

D. $2\sqrt{2gC}$

Question 74 View solution online

A thin rod of mass 0.9 kg and length 1 m is suspended, at rest, from one end so that it can freely oscillate in the vertical plane. A particle of mass 0.1 kg moving in a straight line with velocity $80\ \mathrm{m/s}$ hits the rod at its bottom most point and sticks to it (see figure). The angular speed (in rad/s) of the rod immediately after the collision will be .



Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 75 View solution online

A hollow sphere is rolling on a plane surface about its axis of symmetry. The ratio of rotational kinetic energy to its total kinetic energy is $\frac{x}{5}$. The value of x is .

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 76

View solution online

Match List-I with List-II.

List-I	List-II
(A) Moment of inertia of solid sphere of radius R about any tangent	(I) $\frac{5}{3}MR^2$
(B) Moment of inertia of hollow sphere of radius R about any tangent	(II) $\frac{7}{5}MR^2$
(C) Moment of inertia of circular ring of radius R about its diameter	(III) $\frac{1}{4}MR^2$
(D) Moment of inertia of circular disc of radius R about any diameter	(IV) $\frac{1}{2}MR^2$

Question: Choose the correct answer from the options given below.

A. A-II, B-II, C-IV, D-III

B. A-I, B-II, C-IV, D-III

C. A-II, B-I, C-III, D-IV

D. A-I, B-II, C-III, D-IV

CHAPTER 07 / PHYSICS

Gravitation

Questions 77-80 / 4 selected / 1.3% practice weight / Consolidate

Topics to prioritise in this collection

- Satellite motion: 3 questions / 75.0% of this chapter
- Escape velocity: 1 question / 25.0% of this chapter

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Question 77

View solution online

Given below are two statements :Statement I: For a planet, if the ratio of mass of the planet to its radius increases, the escape velocity from the planet also increases.Statement II: Escape velocity is independent of the radius of the planet.In the light of above statements, choose the most appropriate answer from the options given belowOption :}

A. Both Statement I and Statement II are incorrect

B. Statement I is correct but statement II is incorrect

C. Statement I is incorrect but statement II is correct

D. Both Statement I and Statement II are correct

Question 78 View solution online

Match List-I with List-II.

List-I	List-II
(a) AM Broadcast	(i) 540–1600 kHz
(b) FM Broadcast	(ii) 88–108 MHz
(c) Television	(iii) 54–890 MHz
(d) Satellite Communication	(iv) 3.7–4.2 GHz

Choose the correct answer from the options given below:

A. A-II, B-II, C-III, D-IV

B. A-I, B-III, C-II, D-IV

C. A-IV, B-III, C-I, D-II

D. A-II, B-III, C-I, D-IV

Question 79 View solution online

Choose the incorrect statement from the following:

A. The speed of satellite in a given circular orbit remains constant.

B. For a planet revolving around the sun in an elliptical orbit, the total energy of the planet remains constant.

C. When a body fall towards earth, the displacement of earth towards the body is negligible.

D. The linear speed of a planet revolving around the sun remains constant.

Question 80 View solution online

A satellite is moving in a low nearly circular orbit around the earth. Its radius is roughly equal to that of the earth's radius $\mathbf{R_e}$. By firing rockets attached to it, its speed is instantaneously increased in the direction of its motion so that it become $\sqrt{\frac{3}{2}}$ times larger. Due to this the farthest distance from the centre of the earth that the satellite reaches is $\boldsymbol{R}$. Value of $\boldsymbol{R}$ is :

A. $2R_e$

B. $3R_e$

C. $4R_e$

D. $2.5\mathrm{R_e}$

CHAPTER 08 / PHYSICS

Mechanical Properties of Solids

Questions 81-86 / 6 selected / 2.0% practice weight / Next

Topics to prioritise in this collection

- Elasticity: 4 questions / 66.7% of this chapter
- Young's modulus: 2 questions / 33.3% of this chapter

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Question 81 View solution online

A 3 m long wire of radius 3 mm shows an extension of 0.1 mm when loaded vertically by a mass of 50 kg in an experiment to determine Young's modulus. The value of Young's modulus of the wire as per this experiment is $\mathbf{P \times 10^{11} Nm^{-2}}$, where the value of P is : (Take $\mathbf{g = 3\pi\ m/s^2}$)

A. 5

B. 10

C. 25

D. 2.5

Question 82 View solution online

A uniform heavy rod of mass 20 kg . Cross sectional area $\mathbf{0.4\ m^2}$ and length 20 m is hanging from a fixed support. Neglecting the lateral contraction, the elongation in the rod due to its own weight is $\mathbf{x \times 10^{-9}\ m}$. The value of x is .
:(Given. Young's modulus $\mathbf{Y = 2 \times 10^{11} Nm^{-2}}$ and $\mathbf{g = 10\ ms^{-2}}$)

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 83 View solution online

An object of mass m is suspended at the end of a massless wire of length L and area of crosssection A. Young modulus of the material of the wire is Y. If the mass is pulled down slightly its frequency of oscillation along the vertical direction is:

A. $f = \frac{1}{2\pi}\sqrt{\frac{YA}{mL}}$

B. $f = \frac{1}{2\pi}\sqrt{\frac{\mathrm{mL}}{\mathrm{YA}}}$

C. $f = \frac{1}{2\pi}\sqrt{\frac{YL}{mA}}$

D. $f = \frac{1}{2\pi}\sqrt{\frac{mA}{YL}}$

Question 84 View solution online

In a Young's double slit experiment, the intensity at a point is $\left(\frac{1}{4}\right)^{\mathrm{th}}$ of the maximum intensity, the minimum distance of the point from the central maximum is $\mu\mathrm{m}$.
(Given : $\lambda = 600\ \mathrm{nm},\ \mathrm{d} = 1.0\ \mathrm{mm}, \mathrm{D} = 1.0\ \mathrm{m}$)

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 85 View solution online

In a Young's double slit experiment, the slits are separated by 0.3 mm and the screen is 1.5 m away from the plane of slits. Distance between fourth bright fringes on both sides of central bright is 2.4 cm . The frequency of light used is $\times 10^{14}\ \mathrm{Hz}$.

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 86 View solution online

Match List-I with List-II.

List-I	List-II
(a) Young's Modulus (Y)	(i) $[\mathrm{M L^{-1} T^{-2}}]$
(b) Co-efficient of Viscosity (\eta)	(ii) $[\mathrm{M L^{-1} T^{-1}}]$
(c) Planck's Constant (h)	(iii) $[\mathrm{M L^{2} T^{-1}}]$
(d) Work Function (\varphi)	(iv) $[\mathrm{M L^{2} T^{-2}}]$

Choose the correct answer from the options given below:

A. A-I, B-II, C-III, D-IV

B. A-II, B-III, C-IV, D-I

C. A-I, B-III, C-IV, D-II

D. A-III, B-I, C-II, D-IV

CHAPTER 09 / PHYSICS

Mechanical Properties of Fluids

Questions 87-92 / 6 selected / 2.0% practice weight / Consolidate

Topics to prioritise in this collection

- Surface tension: 3 questions / 50.0% of this chapter
- Viscosity: 3 questions / 50.0% of this chapter

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Question 87 View solution online

The surface tension of soap solution is $3.5 \times 10^{-2}\ \mathrm{Nm}^{-1}$. The amount of work done required to increase the radius of soap bubble from 10 cm to 20 cm is $\quad \times 10^{-4}$ J.

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 88 View solution online

Match List-I with List-II.

List-I	List-II
(A) Coefficient of viscosity	(IV) $[\mathrm{M L^{-1} T^{-1}}]$
(B) Intensity of wave	(II) $[\mathrm{M L^{-2} T^{-2}}]$
(C) Pressure gradient	(I) $[\mathrm{M L^{0} T^{-3}}]$
(D) Compressibility	(III) $[\mathrm{M^{-1} L T^{2}}]$

Choose the correct answer from the options given below:

A. (A)-(I), (B)-(IV), (C)-(III), (D)-(II)

B. (A)-(IV), (B)-(I), (C)-(II), (D)-(III)

C. (A)-(IV), (B)-(II), (C)-(I), (D)-(III)

D. (A)-(II), (B)-(III), (C)-(IV), (D)-(I)

Question 89 View solution online

Match List-I with List-II.

List-I	List-II
(A) Coefficient of viscosity	(III) $[M L^{-1} T^{-1}]$
(B) Surface tension	(IV) $[M L^{0} T^{-2}]$
(C) Angular momentum	(II) $[M L^{2} T^{-1}]$
(D) Rotational kinetic energy	(I) $[M L^{2} T^{-2}]$

Choose the correct answer from the options given below:

A. A-II, B-I, C-IV, D-III

B. A-I, B-II, C-III, D-IV

C. A-III, B-IV, C-II, D-I

D. A-IV, B-III, C-II, D-I

Question 90 View solution online

Match List-I with List-II.

List-I	List-II
(a) Surface tension	(i) $kg\,m^{-1}\,s^{-2}$
(b) Pressure	(ii) $kg\,m^{-1}\,s^{-2}$
(c) Viscosity	(iii) $kg\,m^{-1}\,s^{-1}$
(d) Impulse	(iv) $kg\,m\,s^{-1}$

Choose the correct answer from the options given below:

A. A-II, B-I, C-III, D-IV

B. A-IV, B-III, C-I, D-II

C. A-III, B-IV, C-I, D-II

D. A-IV, B-III, C-II, D-I

Question 91 View solution online

Match List-I with List-II.

List-I	List-II
(a) Torque	(i) ML^2T^{-2}
(b) Stress	(ii) $ML^{-1}T^{-2}$
(c) Pressure gradient	(iii) $ML^{-2}T^{-2}$
(d) Coefficient of viscosity	(iv) $ML^{-1}T^{-1}$

Choose the correct answer from the options given below:

A. A-III, B-IV, C-I, D-II

B. A-IV, B-II, C-III, D-I

C. A-II, B-IV, C-I, D-III

D. A-II, B-I, C-IV, D-III

Question 92 View solution online

Match List-I with List-II.

List-I	List-II
(a) R_H (Rydberg constant)	(i) m^{-1}
(b) h (Planck's constant)	(ii) $\mathrm{kg\,m^2\,s^{-1}}$
(c) μ_B (Magnetic field energy density)	(iii) $\mathrm{kg\,m^{-1}\,s^{-2}}$
(d) η (Coefficient of viscosity)	(iv) $\mathrm{kg\,m^{-1}\,s^{-1}}$

Choose the most appropriate answer from the options given below:

A. (a)-(ii), (b)-(iii), (c)-(iv), (d)-(i)

B. (a)-(iii), (b)-(ii), (c)-(iv), (d)-(i)

C. (a)-(iv), (b)-(ii), (c)-(i), (d)-(iii)

D. (a)-(iii), (b)-(ii), (c)-(i), (d)-(iv)

CHAPTER 10 / PHYSICS

Thermal Properties of Matter

Questions 93-97 / 5 selected / 1.7% practice weight / Consolidate

Topics to prioritise in this collection

- Heat transfer: 3 questions / 60.0% of this chapter
- Calorimetry: 2 questions / 40.0% of this chapter

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Question 93 View solution online

The pressure (P) and temperature (T) relationship of an ideal gas obeys the equation $PT^2 =$ constant. The volume expansion coefficient of the gas will be :

A. $\frac{3}{T^3}$

B. $\frac{3}{T^2}$

C. $3\,T^2$

D. $\frac{3}{T}$

Question 94 View solution online

A bicycle tyre is filled with air having pressure of 270 kPa at $27^\circ C$. The approximate pressure of the air in the tyre when the temperature increases to $36^\circ C$ is

A. 270 kPa

B. 262 kPa

C. 360 kPa

D. 278 kPa

Question 95 View solution online

Match List-I with List-II.

List-I	List-II
(a) Troposphere	(i) Approximate 10 km over Earth's surface
(b) E-Part of Stratosphere	(ii) Approximate 65–75 km over Earth's surface
(c) F2-Part of Thermosphere	(iii) Approximate 300 km over Earth's surface
(d) D-Part of Stratosphere	(iv) Approximate 100 km over Earth's surface

Choose the correct answer from the options given below:

A. A-III, B-IV, C-II, D-I

B. A-III, B-II, C-I, D-IV

C. A-I, B-IV, C-III, D-II

D. A-I, B-II, C-IV, D-III

Question 96 View solution online

When M_1 gram of ice at $-10^\circ C$ (specific heat $= 0.5 cal g^{-1} {}^\circ C^{-1}$) is added to M_2 gram of water at $50^\circ C$, finally no ice is left and the water is at $0^\circ C$. The value of latent heat of ice, in cal g^{-1} is :

A. $\frac{50M_2}{M_1} - 5$

B. $\frac{5M_1}{M_2} - 50$

C. $\frac{50M_2}{M_1}$

D. $\frac{5M_2}{M_1} - 5$

Question 97 View solution online

The specific heat of water $= 4200\ J\ kg^{-1}\ K^{-1}$ and the latent heat of ice $= 3.4 \times 10^5\ J\ kg^{-1}$.100 grams of ice at $0^\circ C$ is placed in 200 g of water at $25^\circ C$. The amount of ice that will melt as the temperature of water reaches $0^\circ C$ is close to (in grams):

A. 63.8

B. 64.6

C. 61.7

D. 69.3

CHAPTER 11 / PHYSICS

Thermodynamics

Questions 98-105 / 8 selected / 2.7% practice weight / Next

Topics to prioritise in this collection

- First law of thermodynamics: 5 questions / 62.5% of this chapter
- Thermodynamic processes: 2 questions / 25.0% of this chapter
- Thermodynamics: 1 question / 12.5% of this chapter

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Question 98 View solution online

The amount of heat needed to raise the temperature of 4 moles of a rigid diatomic gas from 0°C to 50°C when no work is done is ___. (R is the universal gas constant)

A. 250 R

B. 750 R

C. 175 R

D. 500 R

Question 99 View solution online

1 g of a liquid is converted to vapour at 3×10^5 Pa pressure. If 10% of the heat supplied is used for increasing the volume by $1600\ \text{cm}^3$ during this phase change, then the increase in internal energy in the process will be:

A. 432000 J

B. 4320 J

C. 4800 J

D. 4.32×10^8 J

Question 100 View solution online

Heat is given to an ideal gas in an isothermal process.A. Internal energy of the gas will decrease.B. Internal energy of the gas will increase.C. Internal energy of the gas will not change.D. The gas will do positive work.E. The gas will do negative work.Choose the correct answer from the options given below :

A. C and D only

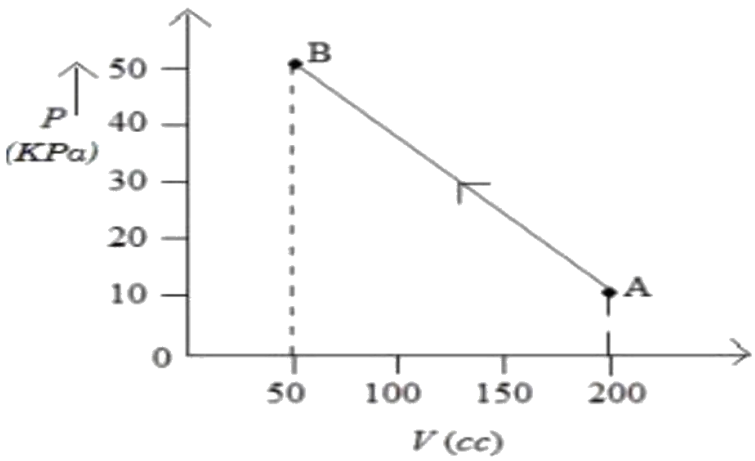
B. C and E only

C. A and E only

D. B and D only

Question 101 View solution online

The pressure of a gas changes linearly with volume from A to B as shown in figure. If no heat is supplied to or extracted from the gas then change in the internal energy of the gas will be



A. -4.5 J

B. zero

C. 4.5 J

D. 6 J

Question 102 View solution online

1 kg of water at $100^\circ C$ is converted into steam at $100^\circ C$ by boiling at atmospheric pressure. The volume of water changes from $1.00 \times 10^{-3}\ m^3$ as a liquid to $1.671\ m^3$ as steam. The change in internal energy of the system during the process will be (Given latent heat of vaporisaiton $= 2257\ kJ/kg$. Atmospheric pressure $= 1 \times 10^5\ Pa$)

A. +2090 kJ

B. -2090 kJ

C. - 2426 kJ

D. +2476 kJ

Question 103 View solution online

Match List-I with List-II.

List-I	List-II
(a) Isothermal	(i) Pressure constant
(b) Isochoric	(ii) Temperature constant
(c) Adiabatic	(iii) Volume constant
(d) Isobaric	(iv) Heat content is constant

Choose the correct answer from the options given below:

A. (a) - (ii), (b) - (iv), (c) - (iii), (d) - (i)

B. (a) - (ii), (b) - (iii), (c) - (iv), (d) - (i)

C. (a) - (i), (b) - (iii), (c) - (ii), (d) - (iv)

D. (a) - (iii), (b) - (ii), (c) - (i), (d) - (iv)

Question 104 View solution online

Match List-I with List-II.

List-I	List-II
(A) Pressure varies inversely with volume of an ideal gas	(III) Isothermal process
(B) Heat absorbed goes partly to increase internal energy and partly to do work	(IV) Isobaric process
(C) Heat is neither absorbed nor released by a system	(I) Adiabatic process
(D) No work is done on or by a gas	(II) Isochoric process

Choose the correct answer from the options given below:

A. A-I, B-IV, C-II, D-III

B. A-III, B-I, C-IV, D-II

C. A-I, B-III, C-II, D-IV

D. A-III, B-IV, C-I, D-II

Question 105 View solution online

Match List-I with List-II.

List-I	List-II
(A) Isothermal	(IV) $\Delta U = 0$
(B) Adiabatic	(II) $\Delta Q = 0$
(C) Isobaric	(III) $\Delta U \neq 0$
(D) Isochoric	(I) $\Delta W = 0$

Choose the correct answer from the options given below:

A. (A)-(III), (B)-(II), (C)-(I), (D)-(IV)

B. (A)-(IV), (B)-(I), (C)-(III), (D)-(II)

C. (A)-(IV), (B)-(II), (C)-(III), (D)-(I)

D. (A)-(II), (B)-(IV), (C)-(I), (D)-(III)

CHAPTER 12 / PHYSICS

Kinetic Theory

Questions 106-117 / 12 selected / 4.0% practice weight / Focus first

Topics to prioritise in this collection

- Kinetic molecular theory: 8 questions / 66.7% of this chapter
- Root-mean-square speed: 2 questions / 16.7% of this chapter
- Kinetic interpretation of pressure: 1 question / 8.3% of this chapter
- Kinetic Theory of Gases: 1 question / 8.3% of this chapter

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Question 106 View solution online

Two gases Ar (40) and Xe (131) at equal temperature have the same number density. Their diameters are 0.07 nm and 0.10 nm respectively. Find the ratio of their mean free time

A. 1.03

B. 2.04

C. 2.09

D. 2.49

Question 107 View solution online

A gas mixture consists of 8 moles of argon and 6 moles of oxygen at temperature T. Neglecting all vibrational modes, the total internal energy of the system is

A. 29 RT

B. 20 RT

C. 27 RT

D. 21 RT

Question 108 View solution online

The average translational kinetic energy of $\mathbf{N_2}$ gas molecules at ___ °C becomes equal to the K.E. of an electron accelerated from rest through a potential difference of 0.1 volt. (Given $\mathbf{k_B = 1.38 \times 10^{-23}\ J/K}$) (Fill the nearest integer).

Numerical answer: _____

Enter the requested integer (0 decimal places).

Question 109 View solution online

Given below are two statements :Statement I : The temperature of a gas is $\mathbf{-73^\circ C}$. When the gas is heated to $\mathbf{527^\circ C}$, the root mean square speed of the molecules is doubled.Statement II : The product of pressure and volume of an ideal gas will be equal to translational kinetic energy of the molecules.In the light of the above statements, choose the correct answer from the options given below:

A. Statement I is false but Statement II is true

B. Both Statement I and Statement II are false

C. Statement I is true but Statement II is false

D. Both Statement I and Statement II are true

Question 110 View solution online

The average kinetic energy of a molecule of the gas is

A. proportional to absolute temperature

B. proportional to pressure

C. proportional to volume

D. dependent on the nature of the gas

Question 111 View solution online

Heat energy of 735 J is given to a diatomic gas allowing the gas to expand at constant pressure. Each gas molecule rotates around an internal axis but do not oscillate. The increase in the internal energy of the gas will be :

A. 525 J

B. 441 J

C. 572 J

D. 735 J

Question 112 View solution online

(A flask contains Hydrogen and Argon in the ratio $\mathbf{2:1}$ by mass. The temperature of the mixture is $\mathbf{30^{\circ}C}$. The ratio of average kinetic energy per molecule of the two gases (K argon $/\mathbf{K}$ hydrogen) is: (Given: Atomic Weight of $\mathbf{Ar = 39.9}$)

A. 1

B. 2

C. $\frac{39.9}{2}$

D. 39.9

Question 113 View solution online

The temperature at which the kinetic energy of oxygen molecules becomes double than its value at $\mathbf{27^{\circ}C}$ is

A. $\mathbf{1227^{\circ}C}$

B. $\mathbf{927^{\circ}C}$

C. $\mathbf{327^{\circ}C}$

D. $\mathbf{627^{\circ}C}$

Question 114 View solution online

The rms speed of oxygen molecule in a vessel at particular temperature is $\left(1+\frac{5}{x}\right)^{\frac{1}{2}}v$, where v is the average speed of the molecule. The value of x will be:(Take $\pi = \frac{22}{7}$)

A. 28

B. 27

C. 8

D. 4

Question 115 View solution online

If the r.m.s. speed of chlorine molecule is $490\ \mathrm{m/s}$ at $27^\circ\mathrm{C}$, the r.m.s. speed of argon molecules at the same temperature will be (Atomic mass of argon $= 39.9\mathrm{u}$, molecular mass of chlorine $= 70.9\mathrm{u}$)

A. $751.7\ \mathrm{m/s}$

B. $451.7\ \mathrm{m/s}$

C. $651.7\ \mathrm{m/s}$

D. $551.7\ \mathrm{m/s}$

Question 116 View solution online

The number of air molecules per cm^3 increased from 3×10^{19} to 12×10^{19}. The ratio of collision frequency of air molecules before and after the increase in number respectively is

A. 1.25

B. 0.25

C. 0.75

D. 0.50

Question 117 View solution online

A cup of coffee cools from $90^\circ\mathrm{C}$ to $80^\circ\mathrm{C}$ in t minutes when the room temperature is $20^\circ\mathrm{C}$. The time taken by the similar cup of coffee to cool from $80^\circ\mathrm{C}$ to $60^\circ\mathrm{C}$ at the same room temperature is :

A. $\frac{13}{5}\mathrm{t}$

B. $\frac{10}{13}\mathrm{t}$

C. $\frac{13}{10}\mathrm{t}$

D. $\frac{5}{13}\mathrm{t}$

CHAPTER 13 / PHYSICS

Oscillations

Questions 118-126 / 9 selected / 3.0% practice weight / Next

Topics to prioritise in this collection

- Simple harmonic motion: 3 questions / 33.3% of this chapter
- Spring-mass oscillation: 3 questions / 33.3% of this chapter
- Oscillatory motion: 2 questions / 22.2% of this chapter
- Simple pendulum: 1 question / 11.1% of this chapter

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Question 118 View solution online

A rod of mass ' M ' and length ' 2 L ' is suspended at its middle by a wire. It exhibits torsional oscillations; If two masses each of ' m ' are attached at distance ' $L/2$ ' from its centre on both sides, it reduces the oscillation frequency by 20%. The value of ratio m/M is close to :

A. 0.17

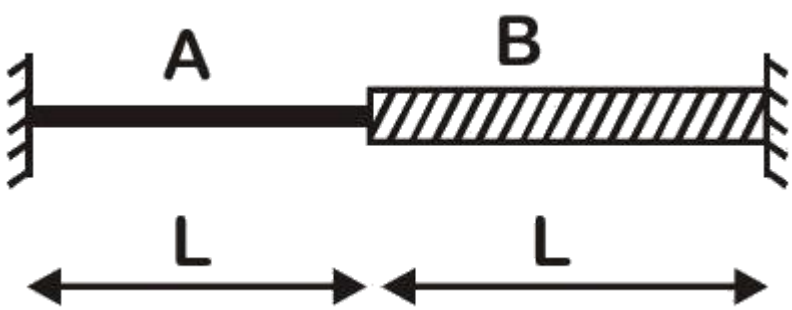
B. 0.37

C. 0.57

D. 0.77

Question 119 View solution online

It is vibrating at a frequency such that the joint of the two wires forms a node. If the number of antinodes in wire A is p and that in B is q then the ratio $p:q$ is



A. $4:9$

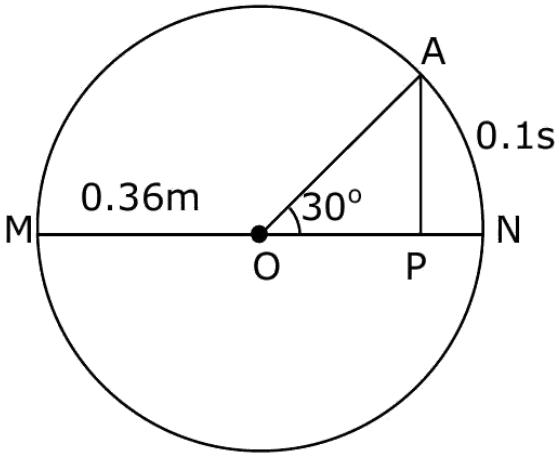
B. $1:2$

C. $3:5$

D. $1:4$

Question 120 View solution online

The point A moves with a uniform speed along the circumference of a circle of radius 0.36 m and cover $30°$ in 0.1 s . The perpendicular projection ' P ' form ' A ' on the diameter MN represents the simple harmonic motion of ' P '. The restoration force per unit mass when P touches M will be:



A. 100 N

B. 50 N

C. 9.87 N

D. 0.49 N

Question 121 View solution online

Two bodies A and B of equal mass are suspended from two massless springs of spring constant k_1 and k_2, respectively. If the bodies oscillate vertically such that their amplitudes are equal, the ratio of the maximum velocity of A to the maximum velocity of B is

A. $\sqrt{\frac{k_1}{k_2}}$

B. $\frac{k_1}{k_2}$

C. $\frac{k_2}{k_1}$

D. $\sqrt{\frac{k_2}{k_1}}$

Question 122 View solution online

A block of mass 2 kg is attached to one end of a massless spring whose other end is fixed at a wall. The spring-mass system moves on a frictionless horizontal table. The spring's natural length is 2 m and spring constant is $200\ \mathrm{N/m}$. The block is pushed such that the length of the spring becomes 1 m and then released. At distance $x\mathrm{m}(x < 2)$ from the wall. the speed of the block will be :

A. $10[1-(2-x)]^{3/2}\ \mathrm{m/s}$

B. $10\left[1-(2-x)^2\right]^{1/2}\ \mathrm{m/s}$

C. $10\left[1-(2-x)^2\right]\mathrm{m/s}$

D. $10\left[1-(2-x)^2\right]^2\ \mathrm{m/s}$

Question 123 View solution online

A mass 0.9 kg , attached to a horizontal spring, executes SHM with an amplitude A_1. When this mass passes through its mean position, then a smaller mass of 124 g is placed over it and both masses move together with amplitude A_2. If the ratio $\frac{A_1}{A_2}$ is $\frac{\alpha}{\alpha-1}$, then the value of α will be .

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 124 View solution online

A simple pendulum of length 1 m has a wooden bob of mass 1 kg . It is struck by a bullet of mass $10^{-2}\ \mathbf{kg}$ moving with a speed of $2 \times 10^{2}\ \mathbf{ms}^{-1}$. The bullet gets embedded into the bob. The height to which the bob rises before swinging back is. (use $\mathbf{g} = 10\ \mathbf{m/s^2}$)

A. 0.30 m

B. 0.20 m

C. 0.35 m

D. 0.40 m

Question 125 View solution online

A block of mass m attached to a massless spring is performing oscillatory motion of amplitude ' A ' on a frictionless horizontal plane. If half of the mass of the block breaks off when it is passing through its equilibrium point, the amplitude of oscillation for the remaining system become fA. The value of f is :

A. $\frac{1}{\sqrt{2}}$

B. $\frac{1}{2}$

C. 1

D. $\sqrt{2}$

Question 126 View solution online

A pendulum of length 2 m consists of a wooden bob of mass 50 g . A bullet of mass 75 g is fired towards the stationary bob with a speed v. The bullet emerges out of the bob with a speed $\frac{v}{3}$ and the bob just completes the vertical circle. The value of v is $\mathbf{ms}^{-1}$. (if $\mathbf{g} = 10\ \mathbf{m/s^2}$)

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

CHAPTER 14 / PHYSICS

Waves

Questions 127-136 / 10 selected / 3.3% practice weight / Next

Topics to prioritise in this collection

- Wave motion: 10 questions / 100.0% of this chapter

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Question 127 View solution online

Sodium light of wavelengths 650 nm and 655 nm is used to study diffraction at a single slit of aperture 0.5 mm . The distance between the slit and the screen is 2.0 m . The separation between the positions of the first maxima of diffraction pattern obtained in the two cases is $\times 10^{-5}\ \mathrm{m}$.

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 128 View solution online

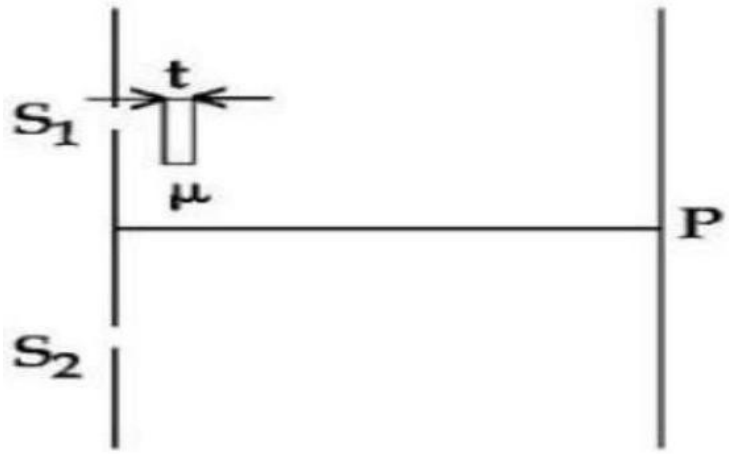
In a Young's double slit experiment, an angular width of the fringe is 0.35° on a screen placed at 2 m away for particular wavelength of 450 nm . The angular width of the fringe, when whole system is immersed in a medium of refractive index $7/5$, is $\frac{1}{\alpha}$. The value of α is

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 129 View solution online

As shown in the figure, in Young's double slit experiment, a thin plate of thickness $t = 10\mu$ m and refractive index $\mu = 1.2$ is inserted infront of slit S_1. The experiment is conducted in air ($\mu = 1$) and uses a monochromatic light of wavelength $\lambda = 500$ nm. Due to the insertion of the plate, central maxima is shifted by a distance of $x\beta_0$. β_0 is the fringe-width befor the insertion of the plate. The value of the x is .



Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 130 View solution online

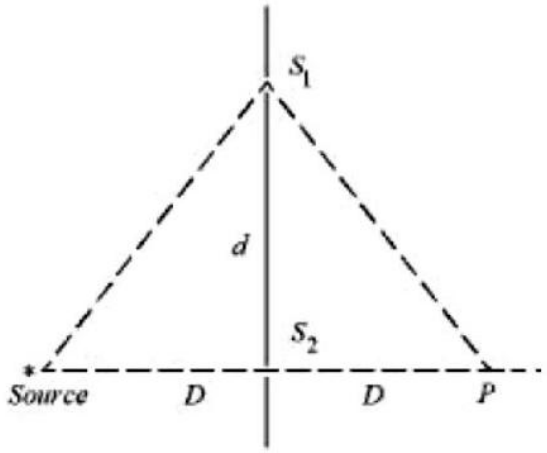
In a Young's double slit experiment, the intensities at two points, for the path differences $\frac{\lambda}{4}$ and $\frac{\lambda}{3}$ (λ being the wavelength of light used) are I_1 and I_2 respectively. If I_0 denotes the intensity produced by each one of the individual slits, then $\frac{I_1+I_2}{I_0} =$.

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 131 View solution online

In a double slit experiment shown in figure, when light of wavelength 400 nm is used, dark fringe is observed at P . If $\mathbf{D = 0.2\ m}$ the minimum distance between the slits S_1 and S_2 is mm .



Numerical answer: _____

Enter the requested value to 1 decimal places. Use the units and scaling stated in the question.

Question 132 View solution online

In Young's double slit experiment, carried out with light of wavelength $\mathbf{5000\AA}$, the distance between the slits is 0.3 mm and the screen is at 200 cm from the slits. The central maximum is at $\mathbf{x = 0\ cm}$. The value of x for third maxima is mm .

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 133 View solution online

In a YDSE interference pattern obtained with light of wavelength $\lambda_1 = 500\ \mathbf{nm}, 15$ fringes are obtained on a certain segment of screen. If number of fringes for light of wavelength λ_2 on same segment of screen is 10 , then the value of λ_2 (in nm) is

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 134 View solution online

In a Young's double slit experiment, two slits are located 1.5 mm apart. The distance of screen from slits is 2 m and the wavelength of the source is 400 nm . If the 20 maxima of the double slit pattern are contained within the centre maximum of the single slit diffraction pattern, then the width of each slit is $\mathbf{x} \times 10^{-3}$ cm, where x -value is .

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 135 View solution online

A beam of light consisting of two wavelengths $7000\AA$ and $5500\AA$ is used to obtain interference pattern in Young's double slit experiment. The distance between the slits is 2.5 mm and the distance between the plane of slits and the screen is 150 cm . The least distance from the central fringe, where the bright fringes due to both the wavelengths coincide, is $\mathbf{n} \times 10^{-5}$ m. The value of n is .

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 136 View solution online

Two slits are 1 mm apart and the screen is located 1 m away from the slits. A light wavelength 500 nm is used. The width of each slit to obtain 10 maxima of the double slit pattern within the central maximum of the single slit pattern is $\ldots\ldots\ldots\ldots \times 10^{-4}$ m.

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

CHAPTER 15 / PHYSICS

Electric Charges and Fields

Questions 137-147 / 11 selected / 3.7% practice weight / Focus first

Topics to prioritise in this collection

- Electric fields and forces: 6 questions / 54.5% of this chapter
- Electric field: 2 questions / 18.2% of this chapter
- Electric Charges and Fields: 1 question / 9.1% of this chapter
- Electric dipole field: 1 question / 9.1% of this chapter
- Electrostatic charge and fields: 1 question / 9.1% of this chapter

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Question 137 View solution online

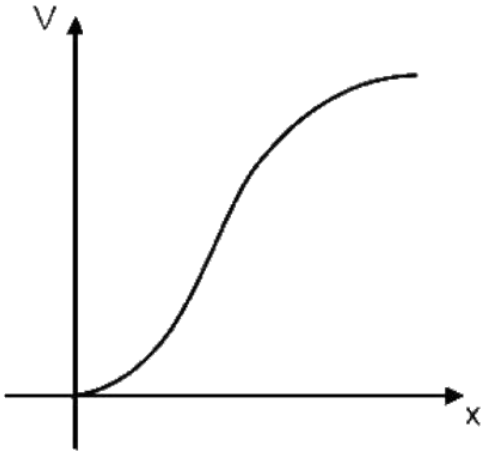
Two small spheres each of mass 10 mg are suspended from a point by threads 0.5 m long. They are equally charged and repel each other to a distance of 0.20 m . Then charge on each of the sphere is $\frac{a}{21} \times 10^{-8}\mathrm{C}$. The value of 'a' will be .

Numerical answer: _____

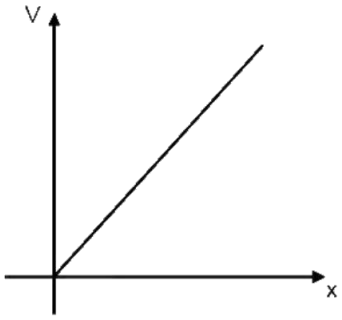
Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 138 View solution online

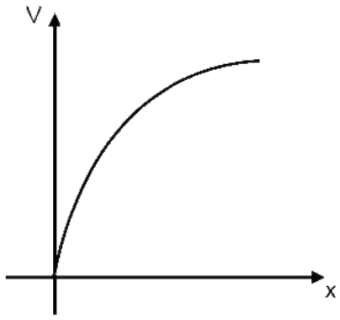
A charge particle of mass m and charge q is released from rest in uniform electric fiel(4) Its graph between velocity (v) and distance (x) will be :



A.

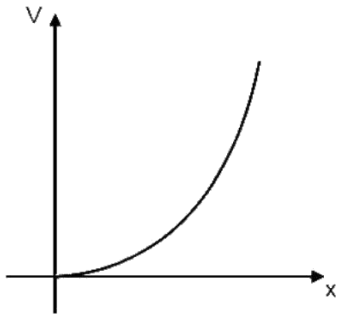


B.



C.

D.



Question 139 View solution online

A proton is moving undeflected in a region of crossed electric and magnetic fields at a constant speed of $2 \times 10^5\ \mathrm{ms}^{-1}$. When the electric field is switched off, the proton moves along a circular path of radius 2 cm . The magnitude of electric field is $x \times 10^4\ \mathrm{N/C}$. the value of x is .
Take the mass of the proton $= 1.6 \times 10^{-27}\ \mathrm{kg}$.

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 140 View solution online

Two uniformly charged spherical conductors A and B of radii 5 mm and 10 mm are separated by a distance of 2 cm . If the spheres are connected by a conducting wire, then in equilibrium condition, the ratio of the magnitudes of the electric fields at the surface of the sphere A and B will be :

A. $1:2$

B. $2:1$

C. $1:1$

D. $1:4$

Question 141 View solution online

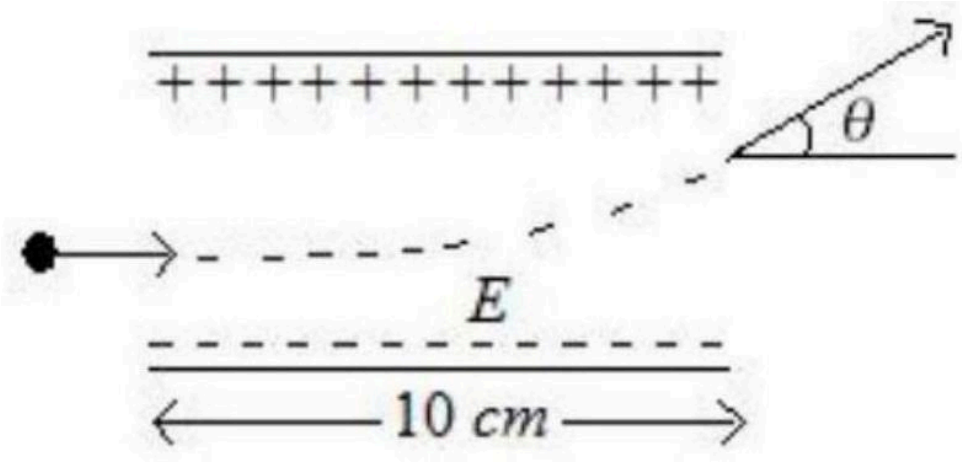
A particle of mass 1 mg and charge q is lying at the mid-point of two stationary particles kept at distance '2 m' when each is carrying same charge 'q'. If the free charged particle is displaced from its equilibrium position through distance 'x' $(x \ll 1\ \mathrm{m})$. The particle executes SHM. Its angular frequency of oscillation will be ___ $\times 10^5 \mathrm{rad/s}$ if $q^2 = 10\mathrm{C}^2$

Numerical answer: _____

Enter the requested integer (0 decimal places).

Question 142 View solution online

A uniform electric field of $10\ \mathrm{N/C}$ is created between two parallel charged pates (as shown in figure). An electron enters the field symmetrically between the plates with a kinetic energy 0.5 eV . The length of each pate is 10 cm . The angle (θ) of deviation of the path of electron as it comes out of the field is (in degree).

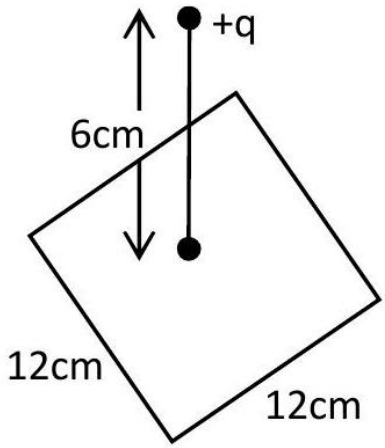


Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 143 View solution online

A point charge of $+12\mu\mathrm{C}$ is at a distance 6 cm vertically above the centre of a square of side 12 cm as shown in figure. The magnitude of the electric flux through the square will be $\times 10^3\ \mathrm{Nm^2/C}$.

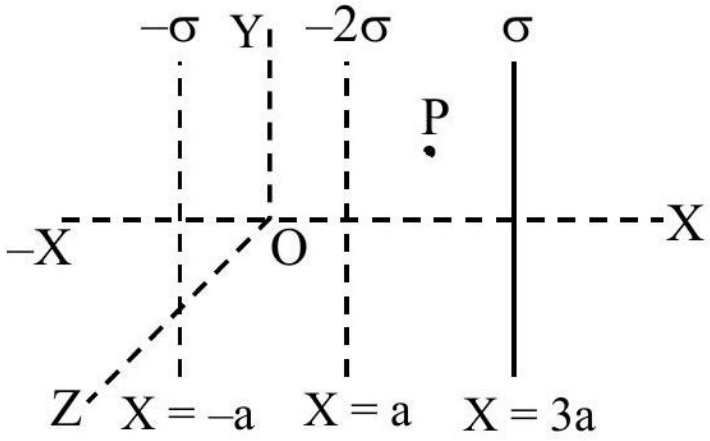


Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 144 View solution online

Three infinitely long charged thin sheets are placed as shown in figure. The magnitude of electric field at the point P is $\frac{x\sigma}{\epsilon_0}$. The value of x is (all quantities are measured in SI units).



Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 145 View solution online

An electric dipole of dipole moment is $6.0 \times 10^{-6}\text{Cm}$ placed in a uniform electric field of $1.5 \times 10^{3}\text{NC}^{-1}$ in such a way that dipole moment is along electric field. The work done in rotating dipole by $180°$ in this field will be mJ

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 146 View solution online

An electric field of $1000\ \text{V/m}$ is applied to an electric dipole at angle of $45°$. The value of electric dipole moment is 10^{-29}C.m. What is the potential energy of the electric dipole ?

A. $-9 \times 10^{-20}\ \text{J}$

B. $-7 \times 10^{-27}\ \text{J}$

C. $-10 \times 10^{-29}\ \text{J}$

D. $-20 \times 10^{-18}\ \text{J}$

Question 147 View solution online

An electric dipole of dipole moment $6 \times 10^{-6}\text{Cm}$ is placed in uniform electric field of magnitude $10^6\ \text{V/m}$. Initially, the dipole moment is parallel to electric field. The work that needs to be done on the dipole to make its dipole moment opposite to the field, will be J.

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

CHAPTER 16 / PHYSICS

Electrostatic Potential and Capacitance

Questions 148-161 / 14 selected / 4.7% practice weight / Focus first

Topics to prioritise in this collection

- Electric potential and capacitors: 8 questions / 57.1% of this chapter
- Capacitors with dielectrics: 2 questions / 14.3% of this chapter
- Parallel-plate capacitance: 2 questions / 14.3% of this chapter
- Electric potential and capacitance: 1 question / 7.1% of this chapter
- Series and parallel capacitors: 1 question / 7.1% of this chapter

Open this chapter's solutions on mobile / Back to chapter guide

Question 148 View solution online

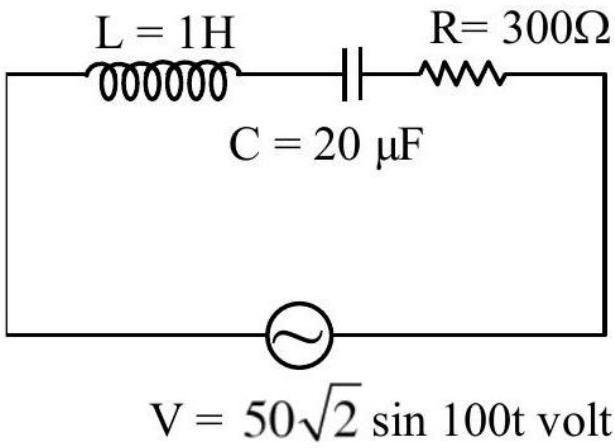
A parallel plate capacitor consisting of two circular plates of radius 10 cm is being charged by a constant current of 0.15 A . If the rate of change of potential difference between the plates is $7 \times 10^8\ \mathrm{V/s}$ then the integer value of the distance between the parallel plates is -
$\left(\text{Take, } \epsilon_0 = 9 \times 10^{-12}\ \frac{\mathrm{F}}{\mathrm{m}}, \pi = \frac{22}{7}\right)$ $\mu\mathrm{m}$.

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 149 View solution online

An ac source is connected in given series LCR circuit. The rms potential difference across the capacitor of $20\mu\ \mathbf{F}$ is V.



Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 150 View solution online

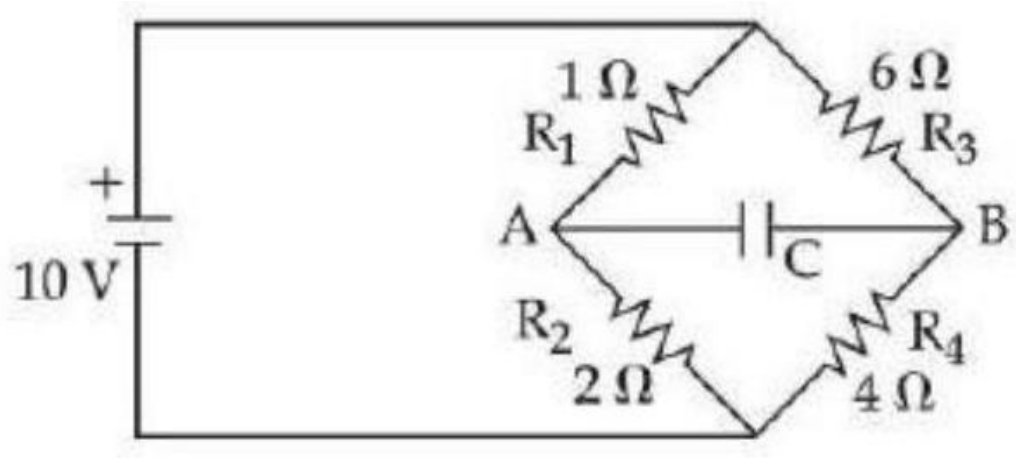
An alternating emf $\mathbf{E} = 110\sqrt{2}\sin 100\mathbf{t}$ volt is applied to a capacitor of $2\mu\ \mathbf{F}$, the rms value of current in the circuit is mA .

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 151 View solution online

The charge accumulated on the capacitor connected in the following circuit is μC (Given $C = 150\mu\ F$)



Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 152 View solution online

If q_f is the magnitude of the free charge on a capacitor plate and q_b is the magnitude of bound charge on the adjacent face of a dielectric slab of dielectric constant k fully filling the gap, then q_b can be expressed as:

A. $q_b = q_f\left(1 - \frac{1}{\sqrt{k}}\right)$

B. $q_b = q_f\left(1 - \frac{1}{k}\right)$

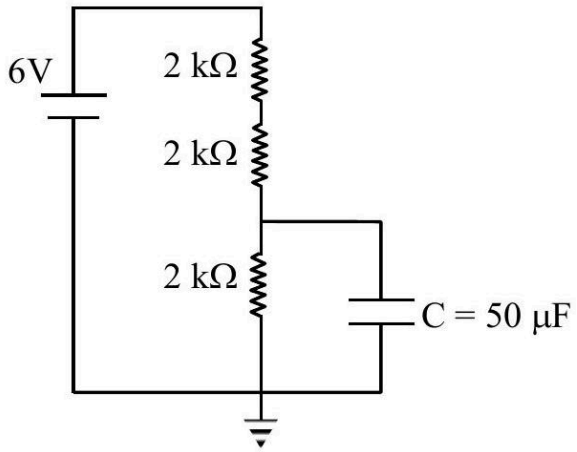
C. $q_b = q_f\left(1 + \frac{1}{\sqrt{k}}\right)$

D. $q_b = q_f\left(1 + \frac{1}{k}\right)$

Corrected practice version: Corrected the word bound to free for charge on the metal plates. The original worked expression identifies option 2; the source key 0 was invalid. The original wording and worked answer are retained in the review package.

Question 153 View solution online

A capacitor of $50\mu\ \mathrm{F}$ is connected in a circuit as shown in figure. The charge on the upper plate of the capacitor is $\mu\mathrm{C}$.



Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 154 View solution online

A parallel plate capacitor was made with two rectangular plates, each with a length of $l = 3\ \mathrm{cm}$ and breath of $\mathrm{b} = 1\ \mathrm{cm}$. The distance between the plates is $3\mu\ \mathrm{m}$. Out of the following, which are the ways to increase the capacitance by a factor of 10 ?A. $l = 30\ \mathrm{cm},\ \mathrm{b} = 1\ \mathrm{cm},\ \mathrm{d} = 1\mu\ \mathrm{m}$B. $l = 3\ \mathrm{cm},\ \mathrm{b} = 1\ \mathrm{cm},\ \mathrm{d} = 30\mu\ \mathrm{m}$C. $l = 6\ \mathrm{cm},\ \mathrm{b} = 5\ \mathrm{cm},\ \mathrm{d} = 3\mu\ \mathrm{m}$D. $l = 1\ \mathrm{cm},\ \mathrm{b} = 1\ \mathrm{cm},\ \mathrm{d} = 10\mu\ \mathrm{m}$E. $l = 5\ \mathrm{cm},\ \mathrm{b} = 2\ \mathrm{cm},\ \mathrm{d} = 1\mu\ \mathrm{m}$
Choose the correct answer from the options given below:

A. C and E only

B. B and D only

C. A only

D. C only

Question 155 View solution online

A parallel plate capacitor was made with two rectangular plates, each with a length of $l = 3\ \text{cm}$ and breath of $\text{b} = 1\ \text{cm}$. The distance between the plates is $3\mu\ \text{m}$. Out of the following, which are the ways to increase the capacitance by a factor of 10 ?A. $l = 30\ \text{cm},\ \text{b} = 1\ \text{cm},\ \text{d} = 1\mu\ \text{m}$B. $l = 3\ \text{cm},\ \text{b} = 1\ \text{cm},\ \text{d} = 30\mu\ \text{m}$C. $l = 6\ \text{cm},\ \text{b} = 5\ \text{cm},\ \text{d} = 3\mu\ \text{m}$D. $l = 1\ \text{cm},\ \text{b} = 1\ \text{cm},\ \text{d} = 10\mu\ \text{m}$E. $l = 5\ \text{cm},\ \text{b} = 2\ \text{cm},\ \text{d} = 1\mu\ \text{m}$ Choose the correct answer from the options given below:

A. C and E only

B. B and D only

C. A only

D. C only

Question 156 View solution online

A parallel plate capacitor has charge $5 \times 10^{-6}\text{C}$. A dielectric slab is inserted between the plates and almost fills the space between the plates. If the induced charge on one face of the slab is $4 \times 10^{-6}\text{C}$ then the dielectric constant of the slab is .

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 157 View solution online

A parallel plate capacitor with square plates is filled with four dielectrics of dielectric constants K_1, K_2, K_3, K_4 arranged as shown in the figure. The effective dielectric constant K will be:

$$\begin{vmatrix} K_1 & K_2 \\ K_3 & K_4 \end{vmatrix}$$

$$\text{Plate side } = L, \qquad \text{Thickness } = d$$

$$\leftarrow \frac{d}{2} \rightarrow \quad \leftarrow \frac{d}{2} \rightarrow$$

A. $K = \frac{(K_1+K_2)(K_3+K_4)}{2(K_1+K_2+K_3+K_4)}$

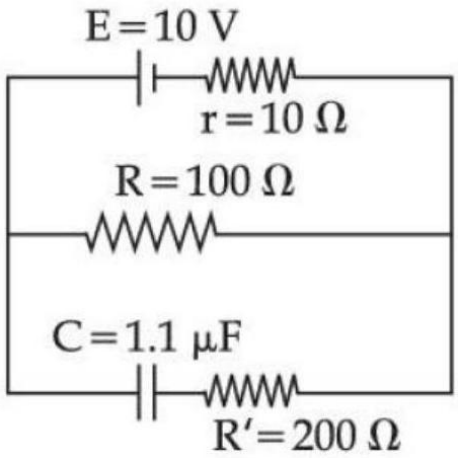
B. $K = \frac{(K_1+K_2)(K_3+K_4)}{(K_1+K_2+K_3+K_4)}$

C. $K = \frac{(K_1+K_4)(K_2+K_3)}{2(K_1+K_2+K_3+K_4)}$

D. $K = \frac{(K_1+K_3)(K_2+K_4)}{K_1+K_2+K_3+K_4}$

Question 158 View solution online

As show in the figure, in steady state, the charge stored in the capacitor is $\times 10^{-6}$C.



Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 159 View solution online

A dipole with two electric charges of $2\mu C$ magnitude each, with separation distance 0.5μ m, is placed between the plates of a capacitor such that its axis is parallel to an electric field established between the plates when a potential difference of 5 V is applied. Separation between the plates is 0.5 mm . If the dipole is rotated by $30°$ from the axis, it tends to realign in the direction due to a torque. The value of torque is :

A. $5 \times 10^{-9} Nm$

B. $2.5 \times 10^{-12} Nm$

C. (2) $5 \times 10^{-3} Nm$

D. $2.5 \times 10^{-9} Nm$

Question 160 View solution online

For changing the capacitance of a given parallel plate capacitor, a dielectric material of dielectric constant K is used, which has the same area as the plates of the capacitor. The thickness of the dielectric slab is $\frac{3}{4}$ d, where ' d ' is the separation between the plates of parallel plate capacitor. The new capacitance (C ') in terms of original capacitance (C_0) is given by the following relation :

A. $C' = \frac{3+K}{4K} C_0$

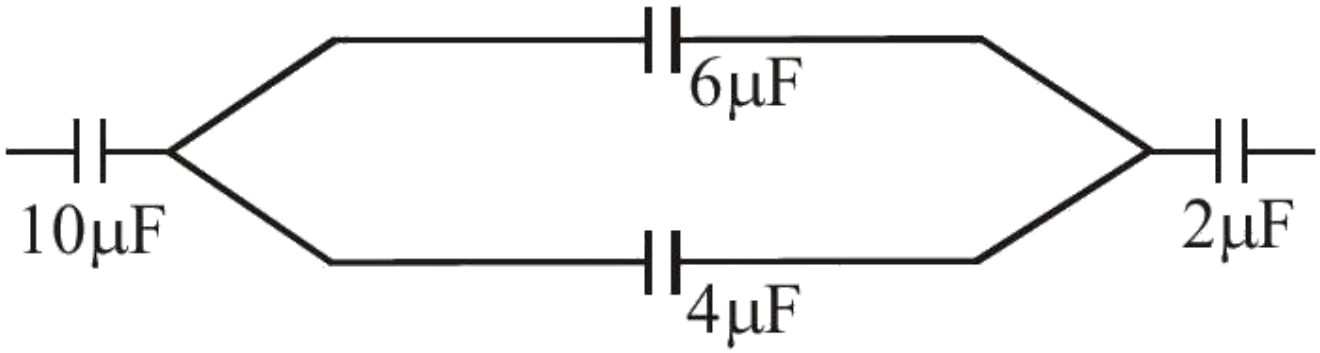
B. $C' = \frac{4+K}{3} C_0$

C. $C' = \frac{4K}{K+3} C_0$

D. $C' = \frac{4}{3+K} C_0$

Question 161 View solution online

In the figure shown below, the charge on the left plate of the $10\mu\ \mathbf{F}$ capacitor is $-30\mu\mathbf{C}$. ?The charge on the right plate of the $6\mu\ \mathbf{F}$ capacitor is :



A. $-18\mu\mathrm{C}$

B. $-12\mu\mathrm{C}$

C. $+12\mu\mathrm{C}$

D. $+18\mu\mathrm{C}$

CHAPTER 17 / PHYSICS

Current Electricity

Questions 162-192 / 31 selected / 10.3% practice weight / Focus first

Topics to prioritise in this collection

- Electric circuits: 16 questions / 51.6% of this chapter
- Ohm's law: 8 questions / 25.8% of this chapter
- Circuit analysis: 2 questions / 6.5% of this chapter
- Cells in series and parallel: 1 question / 3.2% of this chapter
- Current & Electricity: 1 question / 3.2% of this chapter
- Equivalent resistance: 1 question / 3.2% of this chapter
- Meter bridge: 1 question / 3.2% of this chapter
- Resistivity and resistance: 1 question / 3.2% of this chapter

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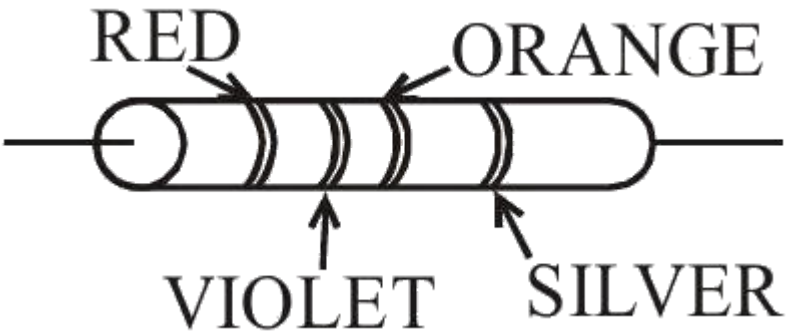
Question 162

View solution online

A resistance is shown in the figure. Its value and tolerance are given respectively by:



A. $27\ \text{K}\Omega, 20\%$

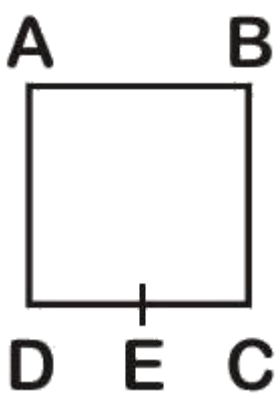
B. $270\ \text{K}\Omega, 5\%$

C. $270\ \text{K}\Omega, 10\%$

D. $27\ \text{K}\Omega, 10\%$

Question 163 View solution online

A wire of resistance R is bent to form a square $ABCD$ as shown in the figure. The effective resistance between E and C is(E is mid-point of arm CD)



A. $\frac{3}{4}R$

B. R

C. $\frac{1}{16}R$

D. $\frac{7}{64}\mathrm{R}$

Question 164 View solution online

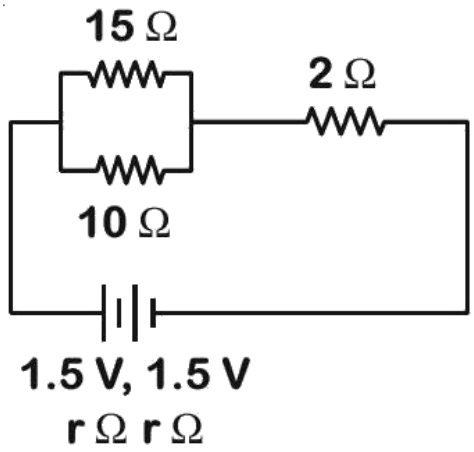
A battery of unknown emf connected to a potentiometer has balancing length 560 cm . If a resistor of resistance 10Ω is connected in parallel with the cell the balancing length change by 60 cm . If the internal resistance of the cell is $\frac{n}{10}\Omega$, the value of ' n ' is

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 165 View solution online

In the given circuit, an ideal voltmeter connected across the 10Ω resistance reads 2 V . The internal resistance r, of each cell is :



A. 0.5Ω

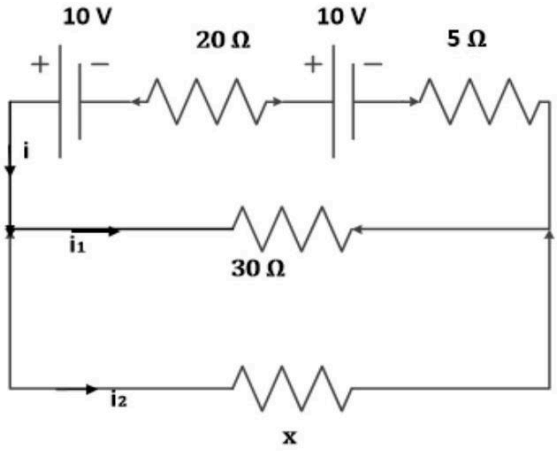
B. 0Ω

C. 1.5Ω

D. 1Ω

Question 166 View solution online

Two batteries (connected in series) of same emf 10 V of internal resistances 20Ω and 5Ω are connected to a load resistance of 30Ω. Now an unknown resistance x is connected in parallel to the load resistance. Find value of x so that potential drop of battery having internal resistance 20Ω becomes zero.



Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 167 View solution online

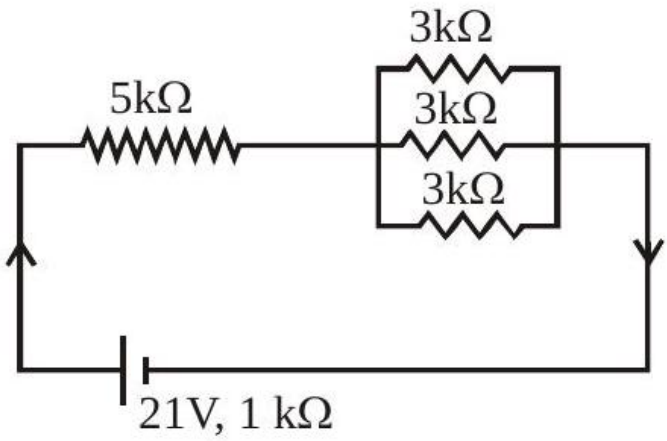
The energy dissipated by a resistor is 10 mJ in 1 s when an electric current of 2 mA flows through it. The resistance is Ω.
(Round off to the Nearest Integer)

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 168 View solution online

In the figure given, the electric current flowing through the 5kΩ resistor is ' x ' mA .



The value of x to the nearest integer is

.

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 169 View solution online

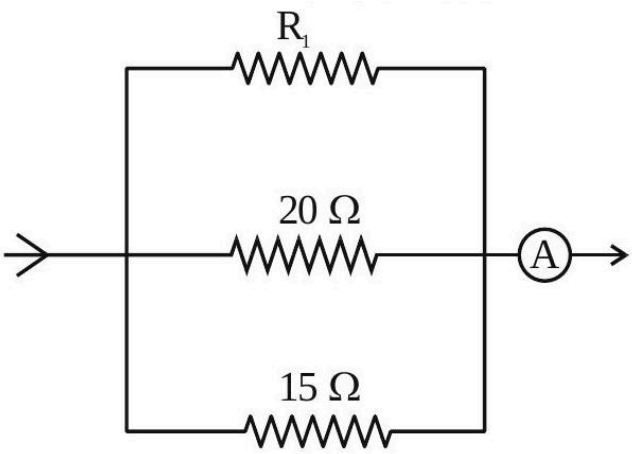
A uniform conducting wire of length is 24 a , and resistance R is wound up as a current carrying coil in the shape of an equilateral triangle of side ' a ' and then in the form of a square of side ' a '. The coil is connected to a voltage source V_0. The ratio of magnetic moment of the coils in case of equilateral triangle to that for square is $1 : \sqrt{y}$ where y is

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 170 View solution online

In the given circuit, the current flowing through the resistance 20Ω is 0.3 A , while the ammeter reads 0.9 A . The value of R_1 is Ω.



Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 171 View solution online

First, a set of n equal resistors of 10Ω each are connected in series to a battery of emf 20 V and internal resistance 10Ω. A current I is observed to flow. Then, the n resistors are connected in parallel to the same battery. It is observed that the current is increased 20 times, then the value of n is

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 172 View solution online

A resistor dissipates 192 J of energy in 1 s when a current of 4A is passed through it. Now, when the current is doubled, the amount of thermal energy dissipated in 5 s in J.

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 173 View solution online

A wire of length 25 m and cross-sectional area $5\ \text{mm}^2$ having resistivity of $2 \times 10^{-6}\Omega\ \text{m}$ is bent into a complete circle. The resistance between diametrically opposite points will be

A. 12.5Ω

B. 50Ω

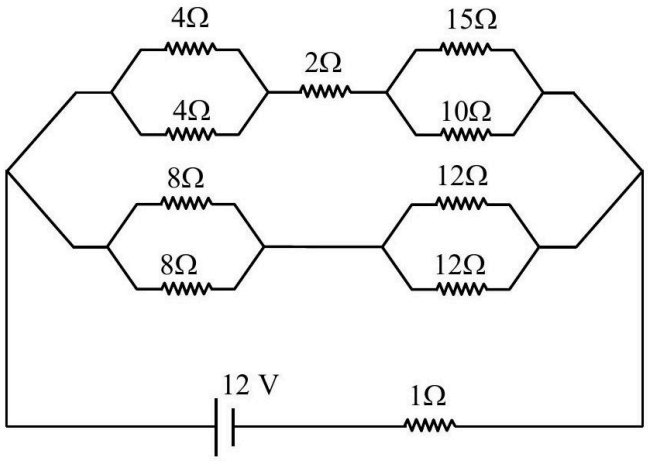
C. 100Ω

D. $2.5\ \Omega$

This question was incorrect in the original exam paper and ALLEN marked it BONUS because the correct value was missing from the options. For practice, option 4 has been corrected from 25 ohm to 2.5 ohm. Select the correct option.

Question 174 View solution online

The voltage drop across 15Ω resistance in the given figure will be V.



Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 175 View solution online

A wire of length 10 cm and radius $\sqrt{7} \times 10^{-4}$ m connected across the right gap of a meter bridge. When a resistance of 4.5Ω is connected on the left gap by using a resistance box, the balance length is found to be at 60 cm from the left end. If the resistivity of the wire is $R \times 10^{-7} \Omega$ m, then value of R is :

A. 63

B. 70

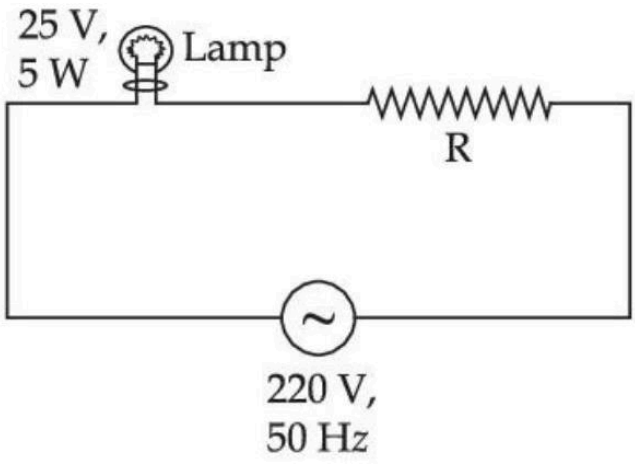
C. 66

D. 35

Question 176 View solution online

A $220\ V, 50\ Hz$ AC source is connected to a 25 V , 5 W lamp and an additional resistance R in series (as shown in figure) to run the lamp at its peak brightness, then the value of R (in ohm) will be

.



Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 177 View solution online

Two identical cells each of emf 1.5 V are connected in parallel across a parallel combination of two resistors each of resistance 20Ω. A voltmeter connected in the circuit measures 1.2 V . The internal resistance of each cell is

A. 2.5Ω

B. 4Ω

C. 5Ω

D. 10Ω

Question 178 View solution online

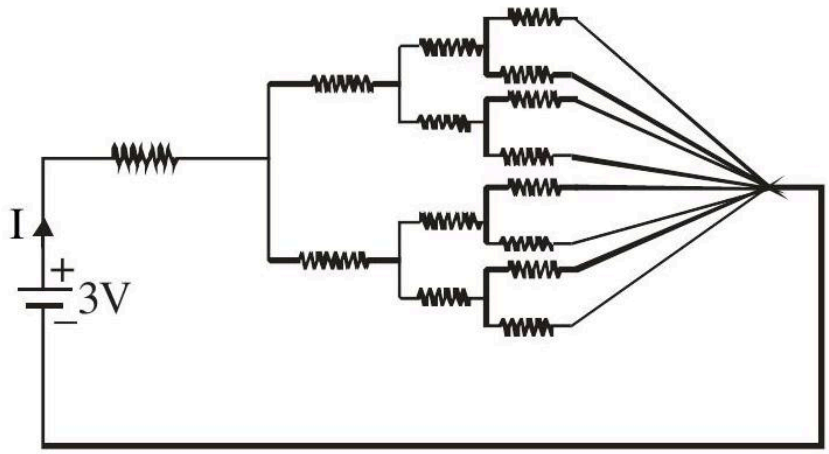
A potentiometer wire of length 10 m and resistance 20Ω is connected in series with a 25 V battery and an external resistance 30Ω. A cell of emf E in secondary circuit is balanced by 250 cm long potentiometer wire. The value of E (in volt) is $\frac{x}{10}$. The value of x is .

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 179 View solution online

All resistances in figure are 1Ω each. The value of current ' I ' is $\frac{a}{5}$ A. The value of a is

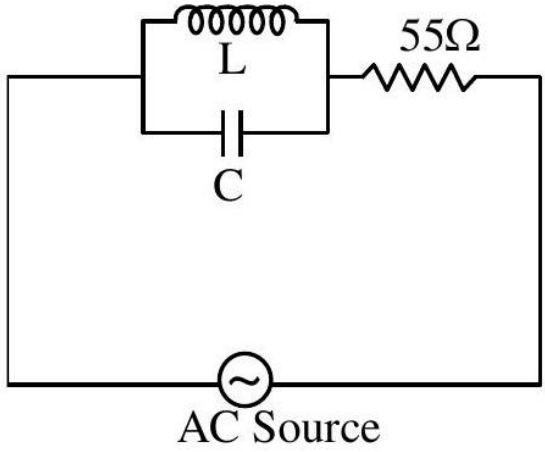


Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 180 View solution online

A $110\ V, 50\ Hz, AC$ source is connected in the circuit (as shown in figure). The current through the resistance 55Ω, at resonance in the circuit, will be A.

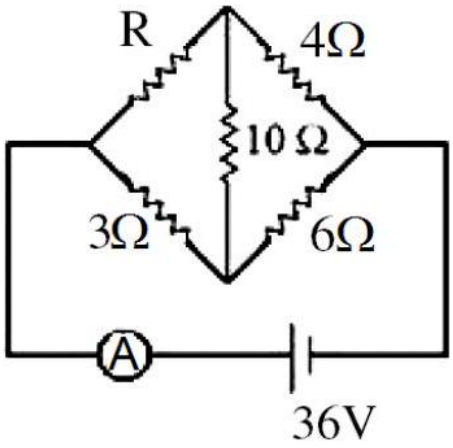


Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 181 View solution online

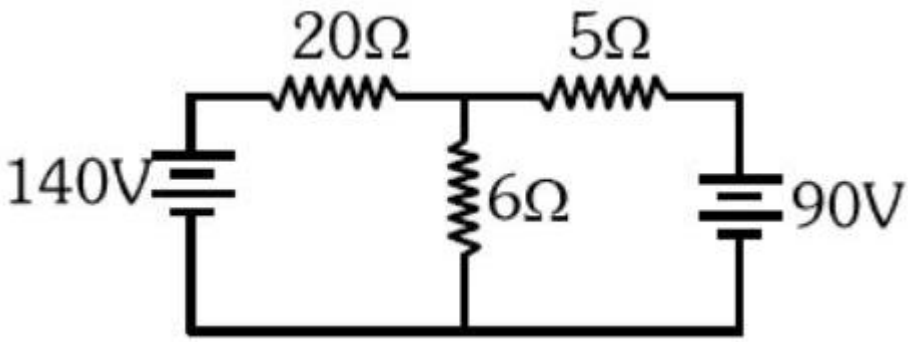
Current measured by the ammeter (A) in the reported circuit when no current flows through 10Ω resistance. will be A.



Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 182 View solution online



The value of current in the 6Ω resistance is:

A. 4A

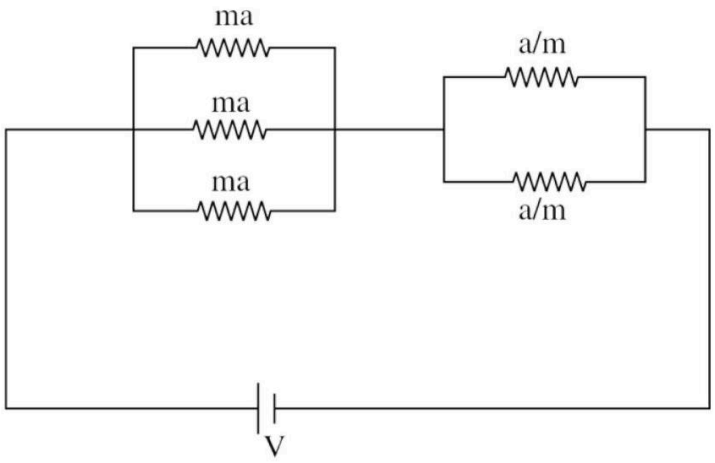
B. 8A

C. 10A

D. 6A

Question 183 View solution online

In the given circuit ' a ' is an arbitrary constant. The value of m for which the equivalent circuit resistance is minimum, will be $\sqrt{\frac{x}{2}}$. The value of x is .



Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 184 View solution online

A wire of resistance 160Ω is melted and drawn in wire of one-fourth of its length. The new resistance of the wire will be

A. 10Ω

B. 640Ω

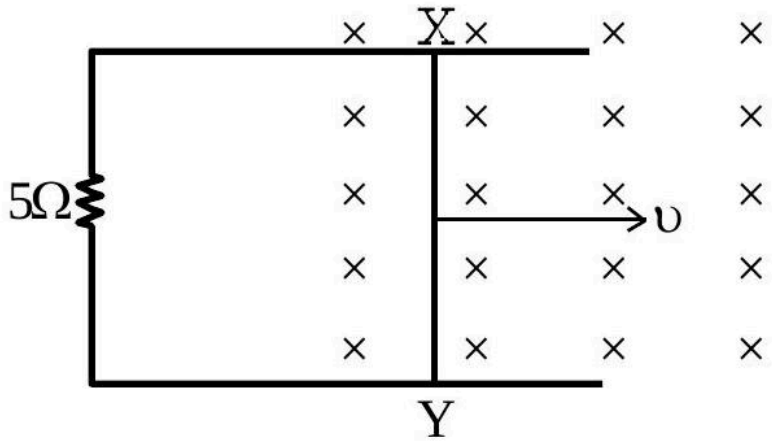
C. 40Ω

D. 16Ω

Question 185 View solution online

A 1 m long metal rod XY completes the circuit as shown in figure. The plane of the circuit is perpendicular to the magnetic field of flux density 0.15 T . If the resistance of the circuit is 5Ω, the force needed to move the rod in direction, as indicated, with a constant speed of $4\ \mathrm{m/s}$ will be

10^{-3} N.

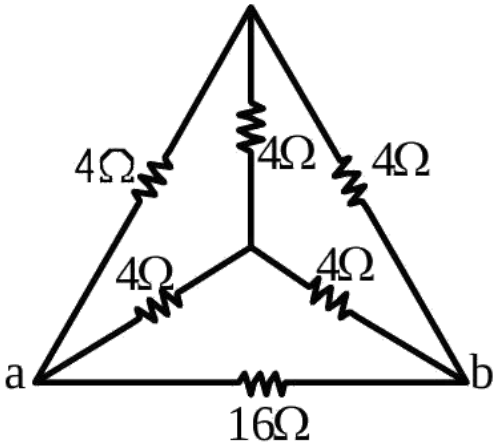


Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 186 View solution online

The equivalent resistance of the circuit shown below between points a and b is :



A. 24Ω

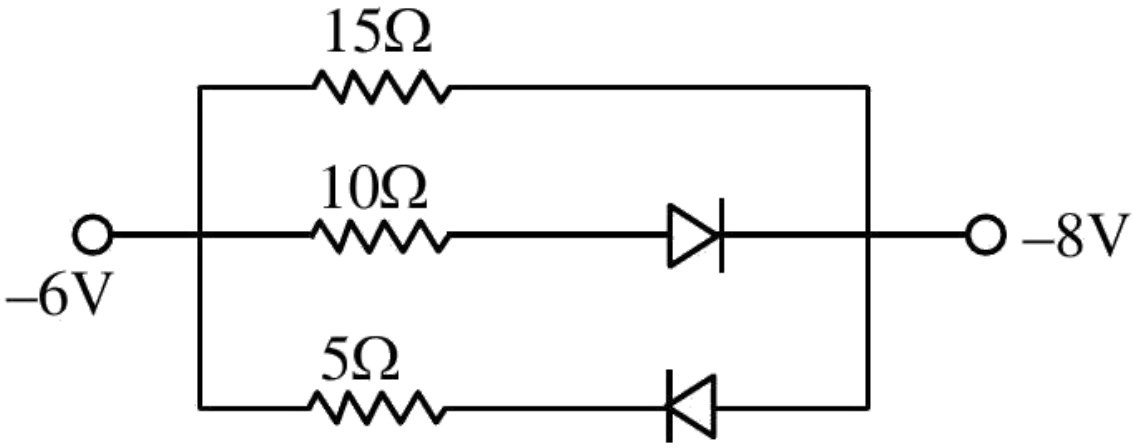
B. 3.2Ω

C. 20Ω

D. 16Ω

Question 187 View solution online

The value of net resistance of the network as shown in the given figure is :



A. $\left(\frac{5}{2}\right)\Omega$

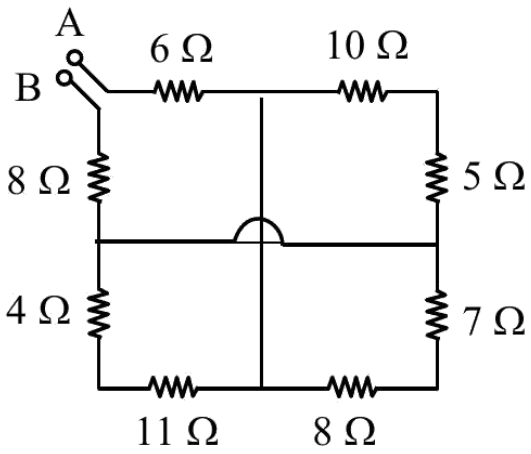
B. $\left(\frac{15}{4}\right)\Omega$

C. 6Ω

D. $\left(\frac{30}{11}\right)\Omega$

Question 188 View solution online

The equivalent resistance between A and B is:



A. 18Ω

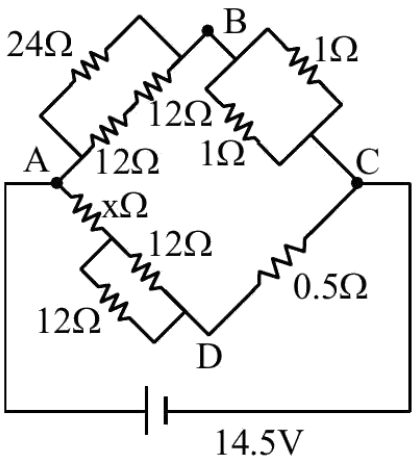
B. 25Ω

C. 27Ω

D. 19Ω

Question 189 View solution online

The value of unknown resistance (x) for which the potential difference between B and D will be zero in the arrangement shown, is :



A. 3Ω

B. 9Ω

C. 6Ω

D. 42Ω

Question 190 View solution online

A wire of resistance 20Ω is divided into 10 equal parts. A combination of two parts are connected in parallel and so on. Now resulting pairs of parallel combination are connected in series. The equivalent resistance of final combination is

Ω.

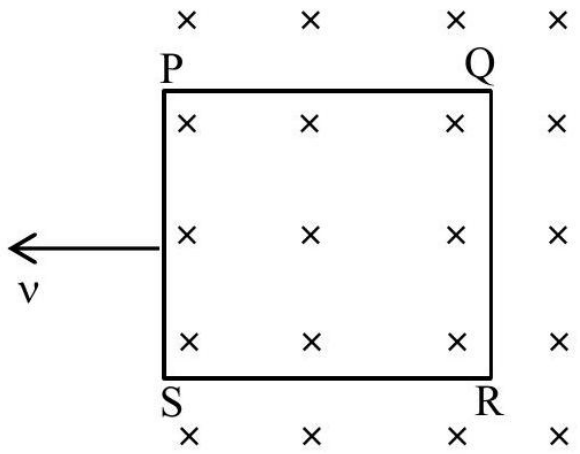
Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 191 View solution online

A square loop PQRS having 10 turns, area $3.6\times 10^{-3}\ \mathrm{m}^2$ and resistance 100Ω is slowly and uniformly being pulled out of a uniform magnetic field of magnitude $\mathrm{B} = 0.5\ \mathrm{T}$ as shown. Work done in pulling the loop out of the field in 1.0 s is

$\times 10^{-6}\ \mathrm{J}$.



Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 192 View solution online

If n represents the actual number of deflections in a converted galvanometer of resistance G and shunt resistance S . Then the total current I when its figure of merit is K will be :

A. $\frac{KS}{(S+G)}$

B. $\frac{(G+S)}{nKS}$

C. $\frac{nKS}{(G+S)}$

D. $\frac{nK(G+S)}{S}$

CHAPTER 18 / PHYSICS

Moving Charges and Magnetism

Questions 193-207 / 15 selected / 5.0% practice weight / Focus first

Topics to prioritise in this collection

- Magnetic force and field: 8 questions / 53.3% of this chapter
- Magnetic field due to currents: 3 questions / 20.0% of this chapter
- Biot-Savart law: 2 questions / 13.3% of this chapter
- Ampere's circuital law: 1 question / 6.7% of this chapter
- Magnetic dipole moment of a current loop: 1 question / 6.7% of this chapter

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Question 193 View solution online

A solenoid of 1200 turns is wound uniformly in a single layer on a glass tube 2 m long and 0.2 m in diameter. The magnetic intensity at the center of the solenoid when a current of 2 A flows through it is?

A. $2.4 \times 10^3\ \mathrm{A\ m^{-1}}$

B. $1.2 \times 10^3\ \mathrm{A\ m^{-1}}$

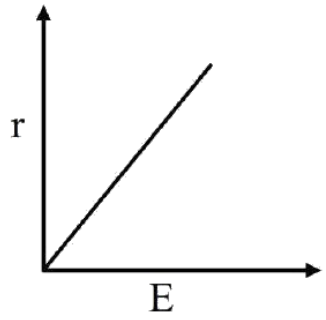
C. $2.4 \times 10^{-3}\ \mathrm{A\ m^{-1}}$

D. $1\ \mathrm{A\ m^{-1}}$

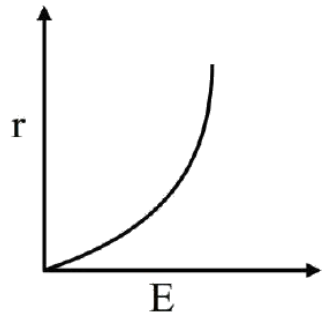
Question 194 View solution online

A particle of charge q , mass m and kinetic energy E enters in magnetic field perpendicular to its velocity and undergoes a circular arc of radius(r). Which of the following curves represents the variation of r with E ?

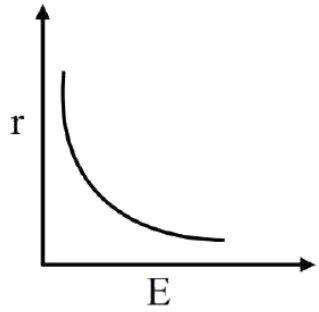
A.



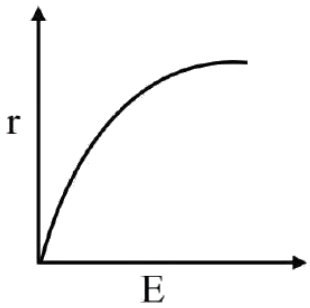
B.



C.



D.



Question 195 View solution online

Two particles X and Y having equal charges are being accelerated through the same potential difference. Thereafter they enter normally in a region of uniform magnetic field and describes circular paths of radii R_1 and R_2 respectively. The mass ratio of X and Y is :

A. $\left(\frac{R_2}{R_1}\right)^2$

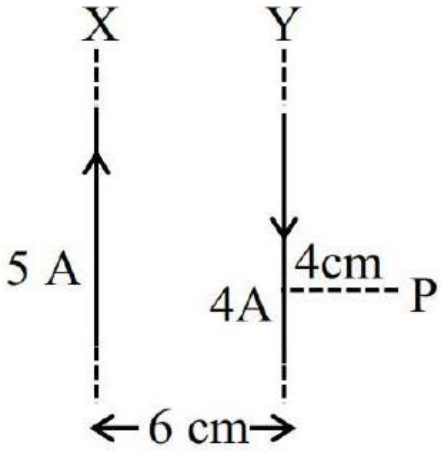
B. $\left(\frac{R_1}{R_2}\right)^2$

C. $\left(\frac{R_1}{R_2}\right)$

D. $\left(\frac{R_2}{R_1}\right)$

Question 196 View solution online

Two long parallel wires X and Y, separated by a distance of 6 cm , carry currents of 5 A and 4 A , respectively, in opposite directions as shown in the figure. Magnitude of the resultant magnetic field at point P at a distance of 4 cm from wire Y is $x \times 10^{-5}$ T. The value of x is . Take permeability of free space as $\mu_0 = 4\pi \times 10^{-7}$ SI units.



Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 197 View solution online

A sing1y ionized magnesium atom (A24) ion is accelerated to kinetic energy 5 keV and is projected perpendicularly into a magnetic field B of the magnitude 0.5 T . The radius of path formed will be cm.

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 198 View solution online

A 4.0 cm long straight wire carrying a current of 8 A is placed perpendicular to an uniform magnetic field of strength 0.15 T . The magnetic force on the wire is mN .

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 199 View solution online

A uniform magnetic field B exists in a direction perpendicular to the plane of a square loop made of a metal wire. The wire has a diameter of 4 mm and a total length of 30 cm . The magnetic field changes with time at a steady rate $\mathrm{dB/dt = 0.032 Ts^{-1}}$. The induced current in the loop is close to (Resistivity of the metal wire is $\mathrm{1.23 \times 10^{-8} \Omega\, m}$)

A. 0.53 A

B. 0.61 A

C. 0.34 A

D. 0.43 A

Question 200 View solution online

A moving coil galvanometer has 100 turns and each turn has an area of $\mathrm{2.0\ cm^2}$. The magnetic field produced by the magnet is 0.01 T and the deflection in the coil is 0.05 radian when a current of 10 mA is passed through it. The torsional constant of the suspension wire is $x \times 10^{-5}\ \mathrm{N-m/rad}$. The value of x is

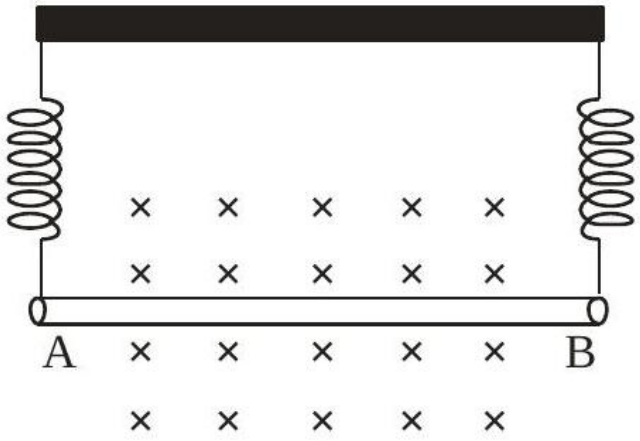
.

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 201 View solution online

A straight wire AB of mass 40 g and length 50 cm is suspended by a pair of flexible leads in uniform magnetic field of magnitude 0.40 T as shown in the figure. The magnitude of the current required in the wire to remove the tension in the supporting leads is A. (Take $\mathbf{g = 10\ ms^{-2}}$).



Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 202 View solution online

An emf of 0.08 V is induced in a metal rod of length 10 cm held normal to a uniform magnetic field of 0.4 T , when moves with a velocity of:

A. $\mathbf{2\ ms^{-1}}$

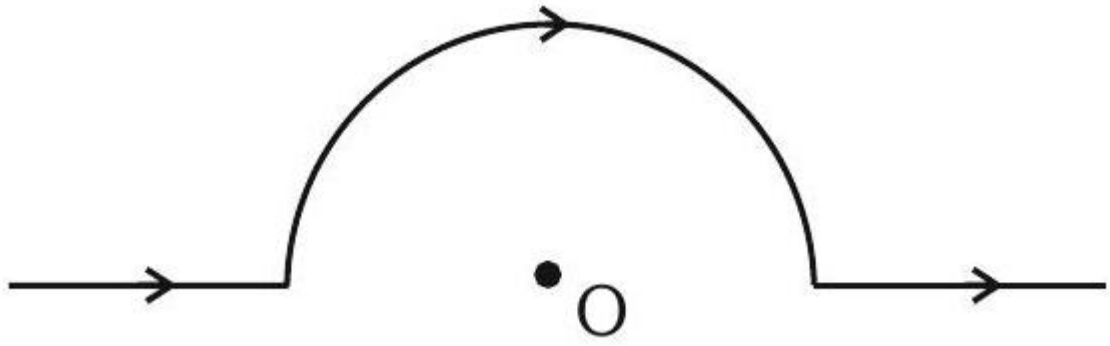
B. $\mathbf{3.2\ ms^{-1}}$

C. $\mathbf{0.5\ ms^{-1}}$

D. $\mathbf{20\ ms^{-1}}$

Question 203 View solution online

A straight wire carrying a current of 14 A is bent into a semicircular are of radius 2.2 cm as shown in the figure. The magnetic field produced by the current at the centre (O) of the arc. is $\times 10^{-4}\ \mathrm{T}$



Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 204 View solution online

A coil having 100 turns, area of $5 \times 10^{-3}\ \mathrm{m}^2$, carrying current of 1 mA is placed in uniform magnetic field of 0.20 T such a way that plane of coil is perpendicular to the magnetic field. The work done in turning the coil through $90°$ is $\mu\mathrm{J}$.

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 205 View solution online

The current sensitivity of a galvanometer can be increased by :
(A) decreasing the number of turns
(B) increasing the magnetic field
(C) decreasing the area of the coil
(D) decreasing the torsional constant of the spring

Choose the most appropriate answer from the options given below :

A. (B) and (C) only

B. (C) and (D) only

C. (A) and (C) only

D. (B) and (D) only

Question 206 View solution online

Match List-I with List-II.

List-I	**List-II**
(A) Torque	(I) $[M^1 L^1 T^{-2} A^{-2}]$
(B) Magnetic field	(II) $[L^2 A^1]$
(C) Magnetic moment	(III) $[M^1 T^{-2} A^{-1}]$
(D) Permeability of free space	(IV) $[M^1 L^2 T^{-2}]$

Choose the correct answer from the options given below:

A. A-I, B-III, C-II, D-IV

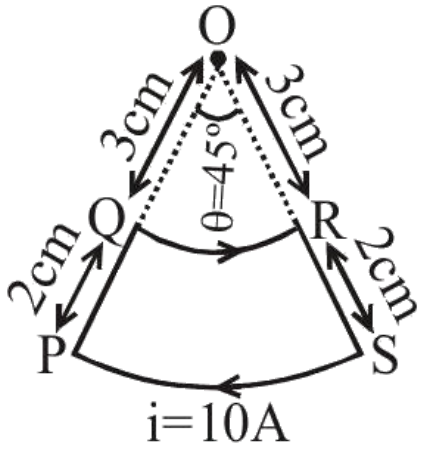
B. A-IV, B-III, C-II, D-I

C. A-III, B-I, C-II, D-IV

D. A-IV, B-II, C-III, D-I

Question 207 View solution online

A current loop, having two circular arcs joined by two radial lines is shown in the figure. It carries a current of 10 A . The magnetic field at point O will be close to :



A. 1.0×10^{-5} T

B. 1.5×10^{-5} T

C. 1.0×10^{-7} T

D. 1.0×10^{-7} T

CHAPTER 19 / PHYSICS

Electromagnetic Induction

Questions 208-224 / 17 selected / 5.7% practice weight / Focus first

Topics to prioritise in this collection

- Inductance and induced emf: 9 questions / 52.9% of this chapter
- Faraday's law: 5 questions / 29.4% of this chapter
- Electromagnetic Induction: 1 question / 5.9% of this chapter
- Electromagnetic induction: 1 question / 5.9% of this chapter
- Self-inductance: 1 question / 5.9% of this chapter

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Question 208 View solution online

A transmitting station releases waves of wavelength 960 m . A capacitor of $256\mu\ \mathrm{F}$ is used in the resonant circuit. The self inductance of coil necessary for resonance is $\quad\times 10^{-8}\mathrm{H}$.

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 209 View solution online

A square loop of area $25\ \mathrm{cm}^2$ has a resistance of 10Ω. The loop is placed in uniform magnetic field of magnitude 40.0 T. The plane of loop is perpendicular to the magnetic field. The work done in pulling the loop out of the magnetic field slowly and uniformly in 1.0 sec , will be

A. $1.0 \times 10^{-3}\ \mathrm{J}$

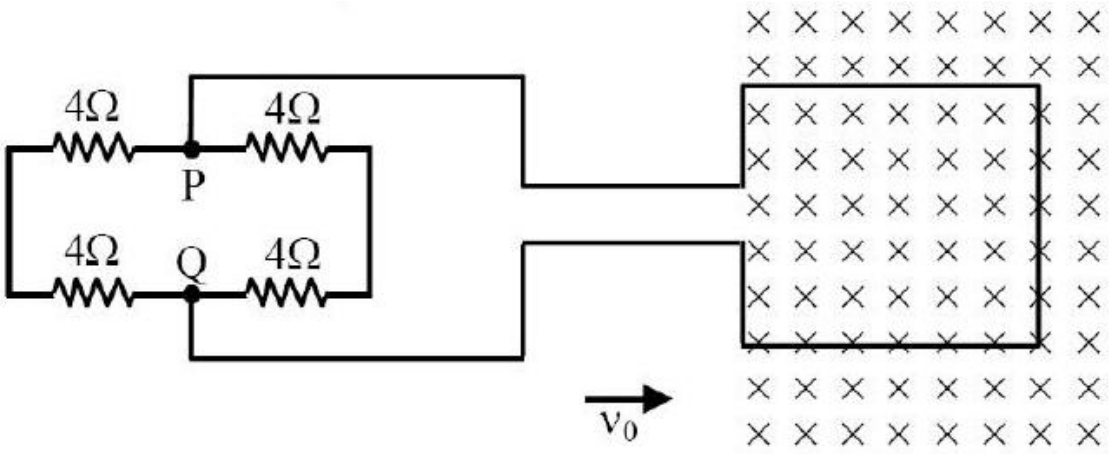
B. $2.5 \times 10^{-3}\ \mathrm{J}$

C. $5 \times 10^{-3}\ \mathrm{J}$

D. $1.0 \times 10^{-4}\ \mathrm{J}$

Question 210 View solution online

A square loop of side 20 cm and resistance 1Ω is moved towards right with a constant speed v_0. The right arm of the loop is in a uniform magnetic field of 5T. The field is perpendicular to the plane of the loop and is going into it. The loop is connected to a network of resistors each of value 4Ω. What should be the value of v_0 so that a steady current of 2 mA flows in the loop ?



A. 1 m/s

B. 1 cm/s

C. 10^2 m/s

D. 10^{-2} cm/s

Question 211 View solution online

A square loop of side 10 cm and resistance 0.7Ω is placed vertically in east-west plane. A uniform magnetic field of 0.20 T is set up across the plane in north east direction. The magnetic field is decreased to zero in 1 s at a steady rate. Then, magnitude of induced emf is $\sqrt{x} \times 10^{-3}$ V. The value of x is .

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 212 View solution online

An LCR series circuit of capacitance 62.5 nF and resistance of 50Ω, is connected to an A.C. source of frequency 2.0 kHz . For maximum value of amplitude of current in circuit, the value of inductance is mH .
Take $\pi^2 = 10$)

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 213 View solution online

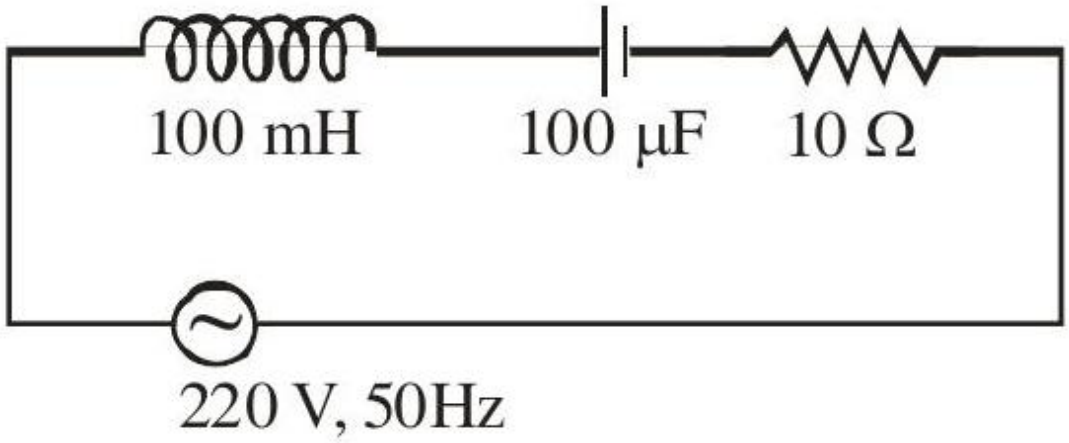
An inductor of 0.5 mH , a capacitor of $20\mu\ \mathrm{F}$ and resistance of 20Ω are connected in series with a 220 V ac source. If the current is in phase with the emf, the amplitude of current of the circuit is $\sqrt{x}\ \mathrm{A}$. The value of x is-

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 214 View solution online

In a series LCR circuit, the inductance, capacitance and resistance are $\mathrm{L} = 100\mathrm{mH}, \mathrm{C} = 100\mu\ \mathrm{F}$ and $\mathrm{R} = 10\Omega$ respectively. They are connected to an AC source of voltage 220 V and frequency of 50 Hz . The approximate value of current in the circuit will be A.

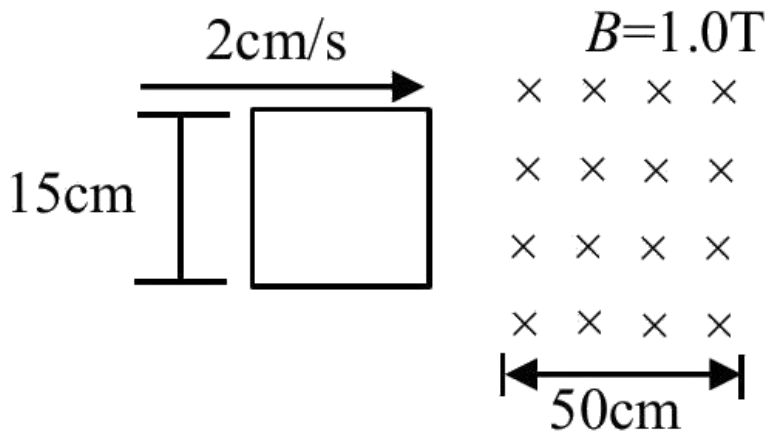


Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 215 View solution online

A square loop of side 15 cm being moved towards right at a constant speed of $\mathbf{2\ cm/s}$ as shown in figure. The front edge enters the 50 cm wide magnetic field at $t = 0$. The value of induced emf in the loop at $\mathbf{t = 10\ s}$ will be :



A. 0.3 mV

B. 4.5 mV

C. zero

D. 3 mV

Question 216 View solution online

When a dc voltage of 100 V is applied to an inductor, a dc current of 5 A flows through it. When an ac voltage of 200 V peak value is connected to inductor, its inductive reactance is found to be $\mathbf{20\sqrt{3}\Omega}$. The power dissipated in the circuit is W.

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 217 View solution online

For a given series LCR circuit it is found that maximum current is drawn when value of variable capacitance is 2.5 nF . If resistance of $\mathbf{200\Omega}$ and 100 mH inductor is being used in the given circuit. The frequency of ac source is $\times\mathbf{10^3\ Hz}$. (given $\pi^2 = 10$)

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 218 View solution online

When a coil is connected across a 20 V dc supply, it draws a current of 5 A. When connected across a 20 V, 50 Hz ac supply, it draws a current of 4 A. The self-inductance of the coil is _____ mH. (Take $\pi = 3$.)

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 219 View solution online

The current in an inductor is given by $I = (3t + 8)$ where t is in second. The magnitude of induced emf produced in the inductor is 12 mV . The selfinductance of the inductor mH .

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 220 View solution online

In a coil, the current changes from -2 A to +2 A in 0.2 s and induces an emf of 0.1 V . The selfinductance of the coil is :

A. 5 mH

B. 1 mH

C. 2.5 mH

D. 4 mH

Question 221 View solution online

Match List-I with List-II.

List-I	List-II
(A) Gauss's law of magnetostatics	(II) $\oint \vec{B} \cdot \vec{da} = 0$
(B) Faraday's law of electromagnetic induction	(III) $\oint \vec{E} \cdot \vec{dl} = -\frac{d}{dt} \int \vec{B} \cdot \vec{da}$
(C) Ampere's law	(IV) $\oint \vec{B} \cdot \vec{dl} = \mu_0 I$
(D) Gauss's law of electrostatics	(I) $\oint \vec{E} \cdot \vec{da} = \frac{1}{\varepsilon_0} \int \rho \, dV$

Choose the correct answer from the options given below:

A. A-I, B-III, C-IV, D-II

B. A-III, B-IV, C-I, D-II

C. A-IV, B-II, C-III, D-I

D. A-II, B-III, C-IV, D-I

Question 222

View solution online

Match List-I with List-II.

List-I	List-II
(a) Gauss's Law in Electrostatics	(i) $\oint \vec{E} \cdot d\vec{s} = \frac{q}{\epsilon_0}$
(b) Faraday's Law	(ii) $\oint \vec{E} \cdot d\vec{l} = -\frac{d\phi_B}{dt}$
(c) Gauss's Law in Magnetism	(iii) $\oint \vec{B} \cdot d\vec{A} = 0$
(d) Ampere-Maxwell Law	(iv) $\oint \vec{B} \cdot d\vec{l} = \mu_0 i_c + \mu_0 \epsilon_0 \frac{d\phi_E}{dt}$

Choose the correct answer from the options given below:

A. A-IV, B-I, C-II, D-III

B. A-II, B-III, C-IV, D-I

C. A-III, B-IV, C-I, D-II

D. A-I, B-II, C-III, D-IV

Question 223 View solution online

Match List-I with List-II.

List-I	List-II
(A) $\oint \vec{B} \cdot \vec{dl} = \mu_0 i_c + \mu_0 \varepsilon_0 \frac{d\phi_E}{dt}$	(IV) Ampere–Maxwell law
(B) $\oint \vec{E} \cdot \vec{dl} = \frac{d\phi_B}{dt}$	(III) Faraday law
(C) $\oint \vec{E} \cdot \vec{dA} = \frac{Q}{\varepsilon_0}$	(I) Gauss' law for electricity
(D) $\oint \vec{B} \cdot \vec{dA} = 0$	(II) Gauss' law for magnetism

Choose the correct answer from the options given below:

A. A-IV, B-I, C-III, D-II

B. A-II, B-III, C-I, D-IV

C. A-IV, B-III, C-I, D-II

D. A-I, B-II, C-III, D-IV

Question 224

View solution online

Match List I with List II

List-I		List-II	
A.	Gauss's law of magnetostatics	I.	$\oint \vec{E} \cdot \vec{da} = \frac{1}{\varepsilon_0} \int \rho dV$
B.	Faraday's law of electro magnetic induction	II.	$\oint \vec{B} \cdot \vec{da} = -0$
C.	Ampere's law	III.	$\oint \vec{E} \cdot \vec{dl} = \frac{-d}{dt} \int \vec{B} \cdot \vec{da}$
D.	Gauss's law of electrostatics	IV.	$\oint \vec{B} \cdot \vec{d} = -\mu_0 I$

Choose the correct answer from the options given below:

A. A-I, B-III, C-IV, D-II

B. A-III, B-IV, C-I, D-II

C. A-IV, B-II, C-III, D-I

D. A-II, B-III, C-IV, D-I

CHAPTER 20 / PHYSICS

Alternating Current

Questions 225-233 / 9 selected / 3.0% practice weight / Next

Topics to prioritise in this collection

- Series LCR resonance: 5 questions / 55.6% of this chapter
- AC circuits: 3 questions / 33.3% of this chapter
- Transformer: 1 question / 11.1% of this chapter

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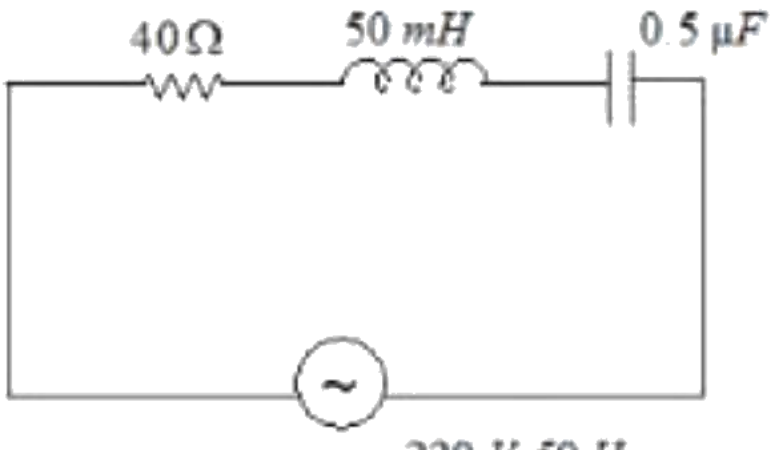
Question 225

View solution online

For the given figures, choose the correct options:(a)(b) $\mathbf{220\ V, 50\ Hz}$



A. At resonance, current in (b) is less than that in (a)

B. The rms current in circuit (b) can never be larger than that in (a)

C. The rms current in figure(a) is always equal to that in figure (b)

D. The rms current in circuit (b) can be larger than that in (a)

Question 226 View solution online

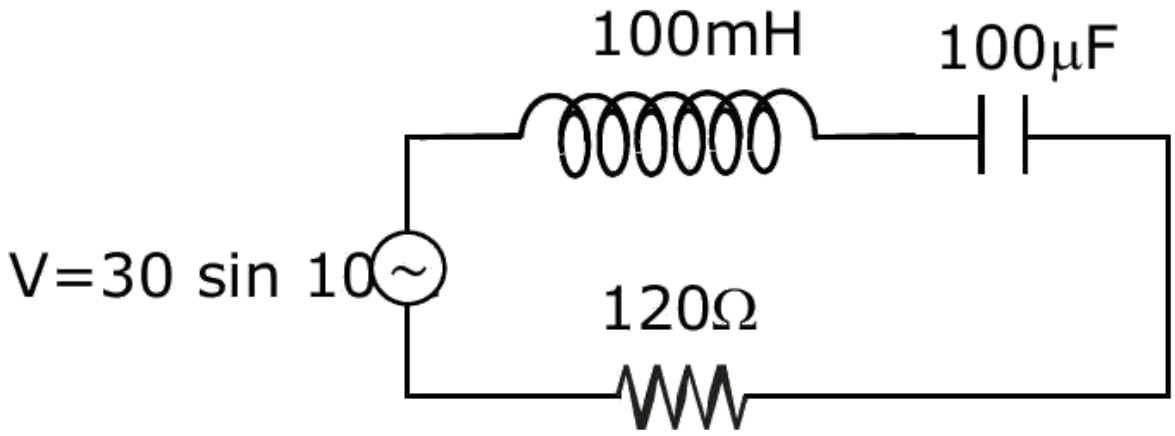
A thin uniform rod of length 2 m , cross sectional area ' A ' and density ' d ' is rotated about an axis passing through the centre and perpendicular to its length with angular velocity ω. If value of ω in terms of its rotational kinetic energy E is $\sqrt{\frac{\alpha E}{Ad}}$ then value of α is

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 227 View solution online

Find the peak current and resonant frequency of the following circuit (as shown in figure)



A. 0.2 A and 100 Hz

B. 2 A and 50 Hz

C. 2 A and 100 Hz

D. 0.2 A and 50 Hz

Question 228 View solution online

A series LCR circuit consists of $R = 80\Omega, X_L = 100\Omega$, and $X_C = 40\Omega$. The input voltage is 2500 $\cos(100\pi t)V$. The amplitude of current, in the circuit, is A.

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 229 View solution online

Match List-I with List-II.

List-I	List-II
(a) AC generator	(i) Presence of both L and C
(b) Transformer	(ii) Electromagnetic Induction
(c) Resonance phenomenon to occur	(iii) Quality factor
(d) Sharpness of resonance	(iv) Mutual Induction

Choose the correct answer from the options given below:

A. A-IV, B-III, C-I, D-II

B. A-IV, B-II, C-I, D-III

C. A-II, B-IV, C-I, D-III

D. A-II, B-I, C-III, D-IV

Question 230 View solution online

A series LCR circuit is subjected to an AC signal of $200\ V, 50\ Hz$. If the voltage across the inductor $(L = 10mH)$ is 31.4 V , then the current in this circuit is ..... :

A. 68 A

B. 63 A

C. 10 A

D. 10 mA

Question 231 View solution online

A LCR circuit is at resonance for a capacitor C , inductance L and resistance R . Now the value of resistance is halved keeping all other parameters same. The current amplitude at resonance will be now:

A. Zero

B. double

C. same

D. halved

Question 232 View solution online

A alternating current at any instant is given by $\mathbf{i} = \left[6 + \sqrt{56}\sin\left(100\pi t + \frac{\pi}{3}\right)\right]$ A. The rms value of the current is A.

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 233 View solution online

Given below are two statements :Statement I: In an LCR series circuit, current is maximum at resonance.Statement II : Current in a purely resistive circuit can never be less than that in a series LCR circuit when connected to same voltage source.In the light of the above statements, choose the correct from the options given below :

A. Statement I is true but Statement II is false

B. Statement I is false but Statement II is true

C. Both Statement I and Statement II are true

D. Both Statement I and Statement II are false

CHAPTER 21 / PHYSICS

Electromagnetic Waves

Questions 234-241 / 8 selected / 2.7% practice weight / Next

Topics to prioritise in this collection

- Electromagnetic spectrum: 4 questions / 50.0% of this chapter
- Electromagnetic waves: 2 questions / 25.0% of this chapter
- Properties of electromagnetic waves: 2 questions / 25.0% of this chapter

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Question 234 View solution online

A plane electromagnetic wave with frequency of 30 MHz travels in free space. At particular point in space and time, electric field is $6\ \mathrm{V/m}$. The magnetic field at this point will be $x \times 10^{-8}\ \mathrm{T}$. The value of x is .

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 235 View solution online

The electric field in an electromagnetic wave is given by $\mathrm{E} = \left(50\mathrm{NC}^{-1}\right) \sin\omega(\mathrm{t} - \mathrm{x}/\mathrm{c})$
The energy contained in a cylinder of volume V is $5.5 \times 10^{-12}\ \mathrm{J}$. The value of V is cm^3.

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 236 View solution online

An antenna is mounted on a 400 m tall building. What will be the wavelength of signal of signal that can be radiated effectively by the transmission tower upto a range of 44 km ?

A. 37.8 m

B. 605 m

C. 75.6 m

D. 302 m

Question 237 View solution online

Match List-I with List-II.

List-I	List-II
(a) Microwaves	(i) Klystron valve
(b) Gamma rays	(ii) Radioactive decay of the nucleus
(c) Radio waves	(iii) Rapid acceleration and deceleration of electron in aerials
(d) X-rays	(iv) Inner shell electrons

Choose the correct answer from the options given below:

A. A-I, B-III, C-IV, D-II

B. A-IV, B-I, C-II, D-III

C. A-IV, B-III, C-II, D-I

D. A-I, B-II, C-III, D-IV

Question 238 View solution online

Match List-I with List-II.

List-I	List-II
(a) Microwaves	(i) Aircraft navigation
(b) UV rays	(ii) Lasik eye surgery
(c) Infra-red light	(iii) Physiotherapy
(d) X-ray	(iv) Treatment of cancer

Choose the correct answer from the options given below:

A. A - IV, B - III, C - I, D - II

B. A - IV, B - I, C - II, D - III

C. A - III, B - II, C - I, D - IV

D. A - II, B - IV, C - III, D - I

Question 239 View solution online

The electric field in an electromagnetic wave is given by $\vec{E} = \hat{i}40\cos\omega\left(t - \frac{z}{c}\right)\mathrm{NC}^{-1}$. The magnetic field induction of this wave is (in SI unit):

A. $\vec{B} = \hat{i}\frac{40}{c}\cos\omega\left(t - \frac{z}{c}\right)$

B. $\vec{B} = \hat{j}40\cos\omega\left(t - \frac{z}{c}\right)$

C. $\overrightarrow{\mathrm{B}} = \hat{\mathrm{k}}\frac{40}{\mathrm{c}}\cos\omega\left(\mathrm{t} - \frac{\mathrm{z}}{\mathrm{c}}\right)$

D. $\vec{B} = \hat{j}\frac{40}{c}\cos\omega\left(t - \frac{z}{c}\right)$

Question 240 View solution online

Match List-I with List-II.

List-I	List-II
(a) Source of microwave frequency	(i) Radioactive decay of nucleus
(b) Source of infrared frequency	(ii) Magnetron
(c) Source of Gamma Rays	(iii) Inner shell electrons
(d) Source of X-rays	(iv) Vibration of atoms and molecules
	(v) LASER
	(vi) RC circuit

Choose the correct answer from the options given below:

A. (a)-(ii),(b)-(iv),(c)-(i),(d)-(iii)

B. (a)-(vi),(b)-(iv),(c)-(i),(d)-(v)

C. (a)-(ii),(b)-(iv),(c)-(vi),(d)-(iii)

D. (a)-(vi),(b)-(v),(c)-(i),(d)-(iv)

Question 241 View solution online

The magnetic field of an electromagnetic wave is given by:

$$\vec{B} = 1.6 \times 10^{-6} \cos\left(2 \times 10^{7} z + 6 \times 10^{15} t\right)(2\hat{i} + \hat{j}) \frac{Wb}{m^2}$$

The associated electric field will be:

A. $\vec{E} = 4.8 \times 10^{2} \cos\left(2 \times 10^{7} z + 6 \times 10^{15} t\right)(-\hat{i} + 2\hat{j}) \frac{V}{m}$

B. $\vec{E} = 4.8 \times 10^{2} \cos\left(2 \times 10^{7} z - 6 \times 10^{15} t\right)(2\hat{i} + \hat{j}) \frac{V}{m}$

C. $\vec{E} = 4.8 \times 10^{2} \cos\left(2 \times 10^{7} z - 6 \times 10^{15} t\right)(-2\hat{j} + \hat{i}) \frac{V}{m}$

D. $\vec{E} = 4.8 \times 10^{2} \cos\left(2 \times 10^{7} z + 6 \times 10^{15} t\right)(\hat{i} - 2\hat{j}) \frac{V}{m}$

CHAPTER 22 / PHYSICS

Ray Optics and Optical Instruments

Questions 242-271 / 30 selected / 10.0% practice weight / Focus first

Topics to prioritise in this collection

- Lens formula: 20 questions / 66.7% of this chapter
- Geometrical optics: 3 questions / 10.0% of this chapter
- Mirror formula: 3 questions / 10.0% of this chapter
- Snell's law: 3 questions / 10.0% of this chapter
- Total internal reflection: 1 question / 3.3% of this chapter

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Question 242

View solution online

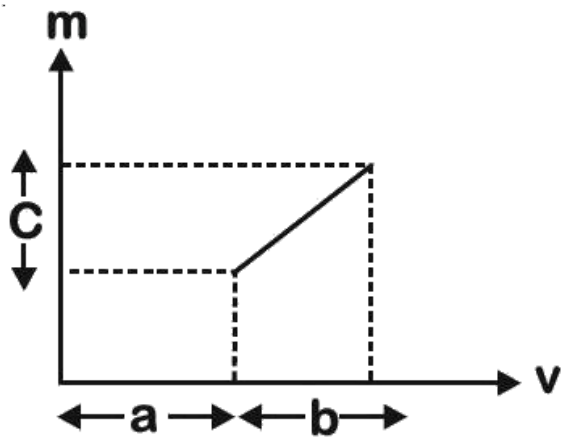
A thin cylindrical rod of length 10 cm is placed horizontally on the principle axis of a concave mirror of focal length 20 cm . The rod is placed in a such a way that mid point of the rod is at 40 cm from the pole of mirror. The length of the image formed by the mirror will be $\frac{x}{3}$ cm. The value of x is .

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 243 View solution online

The graph shows how the magnification m produced by a thin lens varies with image distance v. What is the focal length of the lens used?



A. $\frac{b^2}{ac}$

B. $\frac{b^2c}{a}$

C. $\frac{a}{c}$

D. $\frac{b}{c}$

Question 244 View solution online

Consider a light ray travelling in air is incident into a medium of refractive index $\sqrt{2n}$. The incident angle is twice that of refracting angle. Then, the angle of incidence will be :

A. $\sin^{-1}(\sqrt{n})$

B. $\cos^{-1}\left(\sqrt{\frac{n}{2}}\right)$

C. $\sin^{-1}(\sqrt{2n})$

D. $2\cos^{-1}\left(\sqrt{\frac{n}{2}}\right)$

Question 245 View solution online

The speed of light in media ' A ' and ' B ' are $2.0\times 10^{10}\ \mathrm{cm/s}$ and $1.5\times 10^{10}\mathrm{chm/s}$ respectively. A ray of light enters from the medium B to A at an incident angle ' θ '. If the ray suffers total internal reflection, then

A. $\theta = \sin^{-1}\left(\frac{3}{4}\right)$

B. $\theta > \sin^{-1}\left(\frac{2}{3}\right)$

C. $\theta < \sin^{-1}\left(\frac{3}{4}\right)$

D. $\theta > \sin^{-1}\left(\frac{3}{4}\right)$

Question 246 View solution online

A plano convex lens of refractive index μ_1 and focal length f_1 is kept in contact with another plano concave lens of refractive index μ_2 and focal length f_2. If the radius of curvature of their spherical faces is R each and $f_1 = 2f_2$, then μ_1 and μ_2 are related as :

A. $\mu_1 + \mu_2 = 3$

B. $2\mu_1 - \mu_2 = 1$

C. $2\mu_2 - \mu_1 = 1$

D. $3\mu_2 - 2\mu_1 = 1$

Question 247 View solution online

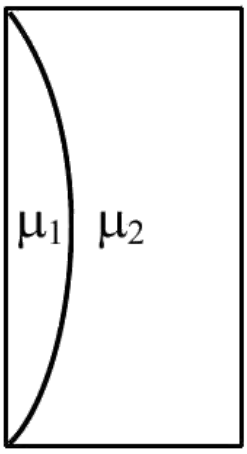
A plano-convex lens of radius of curvature 30 cm and refractive index 1.5 is kept in air. Find its focal length (in cm).

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 248 View solution online

Curved surfaces of a plano-convex lens of refractive index μ_1 and a plano-concave lens of refractive index μ_2 have equal radius of curvature as shown in figure. Find the ratio of radius of curvature to the focal length of the combined lenses.



A. $\frac{1}{\mu_2 - \mu_1}$

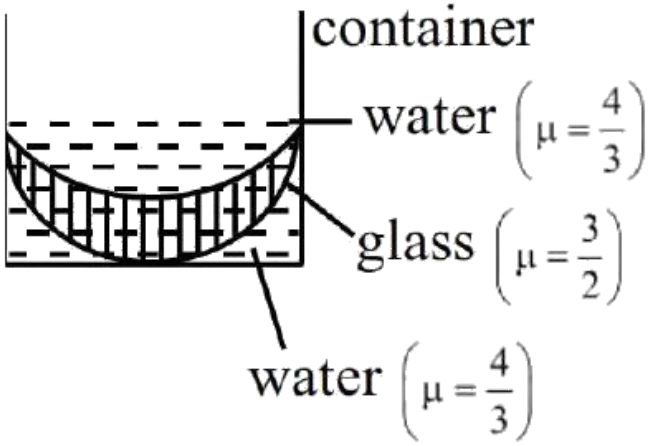
B. $\mu_1 - \mu_2$

C. $\frac{1}{\mu_1 - \mu_2}$

D. $\mu_2 - \mu_1$

Question 249 View solution online

In the diagram given below, there are three lenses formed. Considering negligible thickness of each of them as compared to $[R_1]$ and $[R_2]$, i.e., the radii of curvature for upper and lower surfaces of the glass lens, the power of the combination is



A. $-\frac{1}{6}\left(\frac{1}{|R_1|}+\frac{1}{|R_2|}\right)$

B. $-\frac{1}{6}\left(\frac{1}{|R_1|}-\frac{1}{|R_2|}\right)$

C. $\frac{1}{6}\left(\frac{1}{|R_1|}+\frac{1}{|R_2|}\right)$

D. $\frac{1}{6}\left(\frac{1}{|R_1|}-\frac{1}{|R_2|}\right)$

Question 250 View solution online

A concave-convex lens of refractive index 1.5 and the radii of curvature of its surfaces are 30 cm and 20 cm , respectively. The concave surface is upwards and is filled with a liquid of refractive index 1.3. The focal length of the liquid-glass combination will be

A. $\frac{500}{11}$ cm

B. $\frac{800}{11}$ cm

C. $\frac{700}{11}$ cm

D. $\frac{600}{11}$ cm

Question 251 View solution online

The radii of curvature for a thin convex lens are 10 cm and 15 cm respectively. The focal length of the lens is 12 cm . The refractive index of the lens material is

A. 1.2

B. 1.4

C. 1.5

D. 1.8

Question 252 View solution online

A plano-convex lens (focal length f_2, refractive index μ_2, radius of curvature R) fits exactly into a plano-concave lens (focal length f_1, refractive index μ_1, radius of curvature R). Their plane surfaces are parallel to each other. Then, the focal length of the combination will be :

A. $f_1 - f_2$

B. $f_1 + f_2$

C. $\frac{R}{\mu_2 - \mu_1}$

D. $\frac{2f_1 f_2}{f_1 + f_2}$

Question 253 View solution online

A plano-convex lens having radius of curvature of first surface 2 cm exhibits focal length of f_1 in air. Another plano-convex lens with first surface radius of curvature 3 cm has focal length of f_2 when it is immersed in a liquid of refractive index 1.2. If both the lenses are made of same glass of refractive index 1.5, the ratio of f_1 and f_2 will be :-

A. $3:5$

B. $1:3$

C. $1:2$

D. $2:3$

Question 254 View solution online

For the thin convex lens, the radii of curvature are at 15 cm and 30 cm respectively. The focal length the lens is 20 cm . The refractive index of the material is :

A. 1.2

B. 1.4

C. 1.5

D. 1.8

Question 255 View solution online

A thin plano convex lens made of glass of refractive index 1.5 is immersed in a liquid of refractive index 1.2. When the plane side of the lens is silver coated for complete reflection, the lens immersed in the liquid behaves like a concave mirror of focal length 0.2 m . The radius of curvature of the curved surface of the lens is :-

A. 0.15 m

B. 0.10 m

C. 0.20 m

D. 0.25 m

Question 256 View solution online

A convex lens is put 10 cm from a light source and it makes a sharp image on a screen, kept 10 cm from the lens. Now a glass block (refractive index 1.5) of 1.5 cm thickness is placed in contact with the light source. To get the sharp image again, the screen is shifted by a distance d . Then d is :

A. 0.55 cm away from the lens

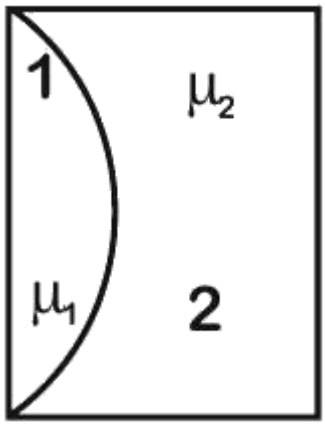
B. 1.1 cm away from the lens

C. 0.55 cm towards the lens

D. 0

Question 257 View solution online

One plano-convex and one plano-concave lens of same radius of curvature ' R ' but of different materials are joined side by side as shown in the figure. If the refractive index of the material of 1 is μ_1 and that of 2 is μ_2, then the focal length of the combination is :



A. $\frac{R}{2(\mu_1-\mu_2)}$

B. $\frac{R}{2-(\mu_1-\mu_2)}$

C. $\frac{R}{\mu_1-\mu_2}$

D. $\frac{2R}{\mu_1-\mu_2}$

Question 258 View solution online

The thickness at the centre of a plano convex lens is 3 mm and the diameter is 6 cm . If the speed of light in the material of the lens is $2 \times 10^8\ ms^{-1}$. The focal length of the lens is..... .

A. 0.30 cm

B. 15 cm

C. 1.5 cm

D. 30 cm

Question 259 View solution online

In a long glass tube, mixture of two liquids A and B with refractive indices 1.3 and 1.4 respectively, forms a convex refractive meniscus towards A . If an object placed at 13 cm from the vertex of the meniscus in A forms an image with a magnification of ' -2 ' then the radius of curvature of meniscus is :

A. 1 cm

B. $\frac{1}{3}$ cm

C. $\frac{2}{3}$ cm

D. $\frac{4}{3}$ cm

Question 260 View solution online

A bi-convex lens has radius of curvature of both the surfaces same as $1/6$ cm. If this lens is required to be replaced by another convex lens having different radii of curvatures on both sides ($R_1 \neq R_2$), without any change in lens power then possible combination of R_1 and R_2 is :

A. $\frac{1}{3}$ cm and $\frac{1}{3}$ cm

B. $\frac{1}{5}$ cm and $\frac{1}{7}$ cm

C. $\frac{1}{3}$ cm and $\frac{1}{7}$ cm

D. $\frac{1}{6}$ cm and $\frac{1}{9}$ cm

Question 261 View solution online

The refractive index of a converging lens is 1.4. What will be the focal length of this lens if it is placed in a medium of same refractive index ? (Assume the radii of curvature of the faces of lens are R_1 and R_2 respectively)

A. 1

B. Infinite

C. $\frac{R_1 R_2}{R_1 - R_2}$

D. Zero

Question 262 View solution online

A convex lens of focal length 30 cm is placed in contact with a concave lens of focal length 20 cm . An object is placed at 20 cm to the left of this lens system. The distance of the image from the lens in cm is .....

A. 30

B. 45

C. $\frac{60}{7}$

D. 15

Question 263 View solution online

The focal length f is related to the radius of curvature r of the spherical convex mirror by -

A. $f = r$

B. $f = -\frac{1}{2}r$

C. $f = +\frac{1}{2}r$

D. $f = -r$

Question 264 View solution online

Given is a thin convex lens of glass (refractive index μ) and each side having radius of curvature R. One side is polished for complete reflection. At what distance from the lens, an object be placed on the optic axis so that the image gets formed on the object itself.

A. R/μ

B. $R/(2\mu - 3)$

C. $\mu \mathrm{R}$

D. $R/(2\mu - 1)$

Question 265 View solution online

A spherical surface of radius of curvature R, separates air from glass (refractive index $= 1.5$). The centre of curvature is in the glass medium. A point object ' O ' placed in air on the optic axis of the surface, so that its real image is formed at 'I' inside glass. The line OI intersects the spherical surface at P and $PO = PI$. The distance PO equals to-

A. 5 R

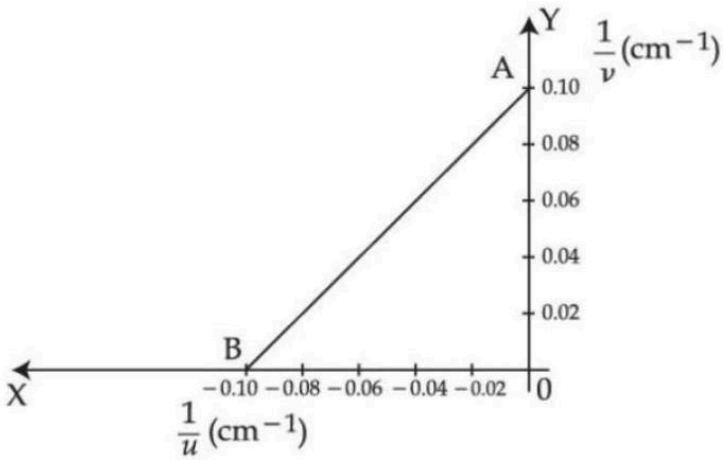
B. 3 R

C. $2R$

D. 1.5 R

Question 266 View solution online

The graph between $\frac{1}{u}$ and $\frac{1}{v}$ for a thin convex lens in order to determine its focal length is plotted as shown in the figure. The refractive index of length is 1.5 and its both the surfaces have same radius of curvatures R . The value of R will be cm.
(Where $u =$ object distance , $v =$ image distance)



Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 267 View solution online

A transparent film of refractive index, 2.0 is coated on a glass slab of refractive index, 1.45. What is the minimum thickness of transparent film to be coated for the maximum transmission of Green light of wavelength 550 nm . [Assume that the light is incident nearly perpendicular to the glass surface.]

A. 94.8 nm

B. 68.7 nm

C. 137.5 nm

D. 275 nm

Question 268 View solution online

What is the relative decrease in focal length of a lens for an increase in optical power by 0.1 D from 2.5 D ? ['D' stands for dioptre]

A. 0.04

B. 0.40

C. 0.1

D. 0.01

Question 269 View solution online

The power of a lens (biconvex) is $\mathbf{1.25\ m^{-1}}$ in particular medium. Refractive index of the lens is 1.5 and radii of curvature are 20 cm and 40 cm respectively. The refractive index of surrounding medium :

A. 1.0

B. $\frac{9}{7}$

C. $\frac{3}{2}$

D. $\frac{4}{3}$

Question 270 View solution online

What is the lateral shift of a ray refracted through a parallel-sided glass slab of thickness ' h ' in terms of the angle of incidence ' i ' and angle of refraction ' r ', if the glass slab is placed in air medium ?

A. $\frac{\mathrm{h}\tan(\mathrm{i}-\mathrm{r})}{\tan \mathrm{r}}$

B. $\frac{h\cos(i-r)}{\sin r}$

C. h

D. $\frac{\mathrm{h}\sin(\mathrm{i}-\mathrm{r})}{\cos \mathrm{r}}$

Question 271 View solution online

A concave mirror produces an image of an object such that the distance between the object and image is 20 cm . If the magnification of the image is ' -3 ', then the magnitude of the radius of curvature of the mirror is :

A. 3.75 cm

B. 30 cm

C. 7.5 cm

D. 15 cm

CHAPTER 23 / PHYSICS

Wave Optics

Questions 272-280 / 9 selected / 3.0% practice weight / Next

Topics to prioritise in this collection

- Young's double-slit interference: 7 questions / 77.8% of this chapter
- Wave Optics: 1 question / 11.1% of this chapter
- Young double-slit interference: 1 question / 11.1% of this chapter

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Question 272 View solution online

Given below are two statements : one is labelled as Assertion (A) and the other is labelled as Reason (R).Assertion (A) : If Young's double slit experiment is performed in an optically denser medium than air, then the consecutive fringes come closer.Reason (R) : The speed of light reduces in an optically denser medium than air while its frequency does not change.In the light of the above statements, choose the most appropriate answer from the options given below:

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. (A) is false but (R) is true.

C. Both (A) and (R) are true but (R) is not the correct explanation of (A)

D. (A) is true but (R) is false.

Question 273 View solution online

In a double slit experiment, when a thin film of thickness t having refractive index μ is introduced in front of one of the slits, the maximum at the centre of the fringe pattern shifts by one fringe width. The value of t is (λ is the wavelength of the light used) :

A. $\frac{2\lambda}{(\mu-1)}$

B. $\frac{\lambda}{2(\mu-1)}$

C. $\frac{\lambda}{(2\mu-1)}$

D. $\frac{\lambda}{(\mu-1)}$

Question 274 View solution online

In a Young's double slit experiment, 16 fringes are observed in a certain segment of the screen when light of wavelength 700 nm is used. If the wavelength of light is changed to 400 nm , the number of fringes observed in the same segment of the screen would be:

A. 28

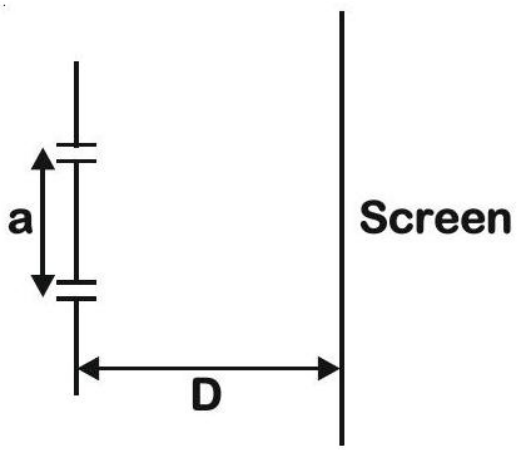
B. 24

C. 30

D. 18

Question 275 View solution online

The figure shows a Young's double slit experimental setup. It is observed that when a thin transparent sheet of thickness t and refractive index μ is put in front of one of the slits, the central maximum gets shifted by a distance equal to n fringe widths. If the wavelength of light used is λ, t will be



A. $\frac{n\lambda}{\mu-1}$

B. $\frac{2D\lambda}{a(\mu-1)}$

C. $\frac{nD\lambda}{a(\mu-1)}$

D. $\frac{D\lambda}{a(\mu-1)}$

The original exam question had no correct option and was marked BONUS. For this corrected practice version, option 1 has been replaced with the correct value; the original statement and the other three options are retained.

Question 276 View solution online

In young's double slit experiment performed using a monochromatic light of wavelength λ, when a glass plate $(\mu = 1.5)$ of thickness $x\lambda$ is introduced in the path of the one of the interfering beams, the intensity at the position where the central maximum occurred previously remains unchanged. The value of x will be:

A. 3

B. 2

C. 1.5

D. 0.5

Question 277 View solution online

In the Young's double slit experiment, the distance between the slits varies in time as $d(t) = d_0 + a_0 \sin \omega t$; where d_0, ω and a_0 are constants. The difference between the largest fringe width and the smallest fringe width obtained over time is given as :

A. $\frac{2\lambda D(d_0)}{(d_0^2 - a_0^2)}$

B. $\frac{2\lambda D a_0}{(d_0^2 - a_0^2)}$

C. $\frac{\lambda D}{d_0^2} a_0$

D. $\frac{\lambda D}{d_0 + a_0}$

Question 278 View solution online

Given below are two statements. On is labelled as Assertion (A) and the other is labelled as Reason (R). Assertion (A) : In Young's double slit experiment, the fringes produced by red light are closer as compared to those produced by blue light.Reason (R) : The fringe width is directly proportional to the wavelength of light.In the light of above statements, choose the correct answer from the options given below :

A. Both (A) and (R) are true and (R) is the correct explanation of (A)

B. (A) is false but (R) is true.

C. Both (A) and (R) are true but (R) is NOT the correct explanation of (A).

D. (A) is true but (R) is false.

Question 279 View solution online

In a Young's double slit experiment with slit separation 0.1 mm , one observes a bright fringe at angle $\frac{1}{40}$ rad by using light of wavelength λ_1. When the light of wavelength λ_2 is used a bright fringe is seen at the same angle in the same set up. Given that λ_1 and λ_2 are in visible range (380 nm to 740 nm), their values are :

A. $380\ \text{nm}, 500\ \text{nm}$

B. $625\ \text{nm}, 500\ \text{nm}$

C. $380\ \text{nm}, 525\ \text{nm}$

D. $400\ \text{nm}, 500\ \text{nm}$

Question 280 View solution online

In Young's double slit experiment, light from two identical sources are superimposing on a screen. The path difference between the two lights reaching at a point on the screen is $\frac{7\lambda}{4}$. The ratio of intensity of fringe at this point with respect to the maximum intensity of the fringe is :

A. $1/2$

B. $3/4$

C. $1/3$

D. $1/4$

CHAPTER 24 / PHYSICS

Dual Nature of Radiation and Matter

Questions 281-292 / 12 selected / 4.0% practice weight / Focus first

Topics to prioritise in this collection

- de Broglie wavelength: 7 questions / 58.3% of this chapter
- Photoelectric equation: 2 questions / 16.7% of this chapter
- Dual Nature of Radiation and Matter: 1 question / 8.3% of this chapter
- Photon energy and momentum: 1 question / 8.3% of this chapter
- Quantum nature of radiation: 1 question / 8.3% of this chapter

Open this chapter's solutions on mobile / Back to chapter guide

Question 281

View solution online

A light beam of wavelength 500 nm is incident on a metal having work function of 1.25 eV, placed in a magnetic field of intensity B. The electrons emitted perpendicular to the magnetic field B, with maximum kinetic energy are bent into circular arc of radius 30 cm. The value of B is ___ $\times 10^{-7}$ T

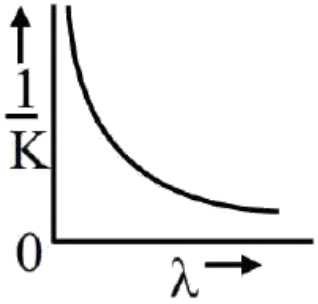
Numerical answer: _____

Enter the requested integer (0 decimal places).

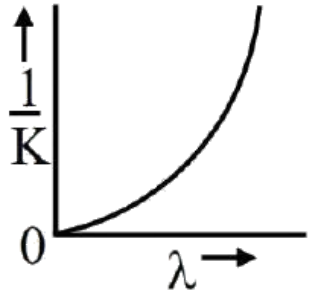
Question 282 View solution online

If λ and K are de Broglie Wavelength and kinetic energy, respectively, of a particle with constant mass. The correct graphical representation for the particle will be :-

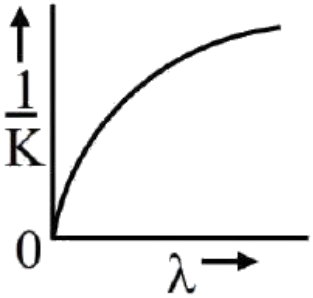
A.



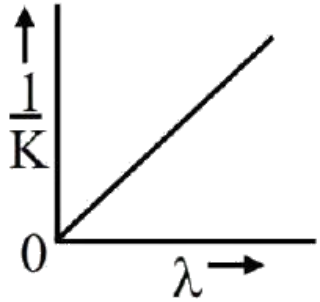
B.



C.



D.



Question 283 View solution online

A metal plate of area $1 \times 10^{-4}\ \mathrm{m}^2$ is illuminated by a radiation of intensity $16\ \mathrm{mW/m}^2$. The work function of the metal is 5 eV . The energy of the incident photons is 10 eV and only 10% of it produces photo electrons. The number of emitted photo electrons per second and their maximum energy, respectively, will be : $\left[1\mathrm{eV} = 1.6 \times 10^{-19}\ \mathrm{J}\right]$

A. 10^{10} and 5 eV

B. 10^{14} and 10 eV

C. 10^{12} and 5 eV

D. 10^{11} and 5 eV

Question 284 View solution online

Two stream of photons, possessing energies equal to twice and ten times the work function of metal are incident on the metal surface successively. The value of ratio of maximum velocities of the photoelectrons emitted in the two respective cases is $x : y$. The value of x is .

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 285 View solution online

An α particle and a carbon 12 atom has same kinetic energy K . The ratio of their de-Broglie wavelength $(\lambda_a : \lambda_{C12})$ is :

A. $1 : \sqrt{3}$

B. $\sqrt{3} : 1$

C. $3 : 1$

D. $2 : \sqrt{3}$

Question 286 View solution online

Kinetic energy of the particle is E and it's De-Broglie wavelength is λ. On increasing it's K.E by ΔE, it's new De-Broglie wavelength becomes $\frac{\lambda}{2}$. Then ΔE is

A. 3 E

B. E

C. 2E

D. 4 E

Question 287 View solution online

The de Broglie wavelength of an electron having kinetic energy E is λ. If the kinetic energy of electron becomes $\frac{E}{4}$, then its de-Broglie wavelength will be :

A. $\frac{\lambda}{\sqrt{2}}$

B. $\frac{\lambda}{2}$

C. 2λ

D. $\sqrt{2}\lambda$

Question 288 View solution online

Consider an electron in a hydrogen atom, revolving in its second excited state (having radius $4.65\AA$). The de-Broglie wavelength of this electron is :

A. $3.5\AA$

B. $12.9\AA$

C. $9.7\AA$

D. $6.6\AA$

Question 289 View solution online

The de Brogue wavelengths for an electron and a photon are λ_e and λ_p respectively. For the same kinetic energy of electron and photon. which of the following presents the correct relation between the de Brogue wavelengths of two ?

A. $\lambda_p \propto \lambda_e^2$

B. $\lambda_p \propto \lambda_e$

C. $\lambda_p \propto \sqrt{\lambda_e}$

D. $\lambda_p \propto \sqrt{\frac{1}{\lambda_e}}$

Question 290 View solution online

The kinetic energy of an electron, α-particle and a proton are given as $4\ K, 2\ K$ and K respectively. The de-Broglie wavelength associated with electron (λ e) α-particle ($\lambda\alpha$) and the proton (λ p) are as follows :

A. $\lambda\alpha = \lambda p < \lambda e$

B. $\lambda\alpha > \lambda p > \lambda e$

C. $\lambda\alpha < \lambda p < \lambda e$

D. $\lambda\alpha = \lambda p > \lambda e$

Question 291 View solution online

In photoelectric effect an em-wave is incident on a metal surface and electrons are ejected from the surface. If the work function of the metal is 2.14 eV and stopping potential is 2 V , what is the wavelength of the em-wave?(Given hc $= 1242 \mathrm{eVnm}$ where h is the Planck's constant and c is the speed of light in vaccum.)

A. 400 nm

B. 600 nm

C. 200 nm

D. 300 nm

Question 292 View solution online

A photo-emissive substance is illuminated with a radiation of wavelength λ_i so that it releases electrons with de-Broglie wavelength λ_e. The longest wavelength of radiation that can emit photoelectron is λ_0. Expression for de-Broglie wavelength is given by :(m : mass of the electron, h : Planck's constant and c : speed of light)

A. $\lambda_e = \sqrt{\frac{h}{2mc\left(\frac{1}{\lambda_i} - \frac{1}{\lambda_0}\right)}}$

B. $\lambda_e = \sqrt{\frac{h\lambda_0}{2mc}}$

C. $\lambda_e = \frac{h}{\sqrt{2mc\left(\frac{1}{\lambda_i} - \frac{1}{\lambda_0}\right)}}$

D. $\lambda_e = \sqrt{\frac{h\lambda_i}{2mc}}$

CHAPTER 25 / PHYSICS

Atoms

Questions 293-293 / 1 selected / 0.3% practice weight / Consolidate

Topics to prioritise in this collection

- Hydrogen spectrum: 1 question / 100.0% of this chapter

Open this chapter's solutions on mobile / Back to chapter guide

Question 293 View solution online

Hydrogen atom from excited state comes to the ground by emitting a photon of wavelength λ. The value of principal quantum number ' n ' of the excited state will be :(R : Rydberg constant)

A. $\sqrt{\frac{\lambda R}{\lambda-1}}$

B. $\sqrt{\frac{\lambda R}{\lambda R-1}}$

C. $\sqrt{\frac{\lambda}{\lambda R-1}}$

D. $\sqrt{\frac{\lambda R^2}{\lambda R-1}}$

CHAPTER 26 / PHYSICS

Semiconductor Electronics: Materials, Devices and Simple Circuits

Questions 294-296 / 3 selected / 1.0% practice weight / Consolidate

Topics to prioritise in this collection

- Energy bands in solids: 1 question / 33.3% of this chapter
- Logic gates: 1 question / 33.3% of this chapter
- Zener regulation: 1 question / 33.3% of this chapter

Open this chapter's solutions on mobile / Back to chapter guide

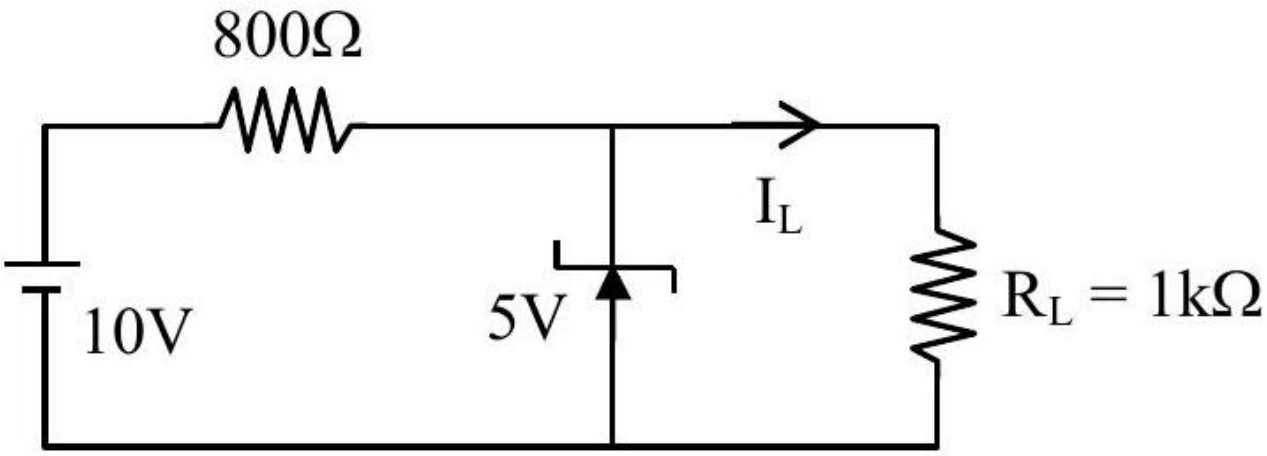
Question 294

View solution online

In the given circuit- the value of current $\mathbf{I_L}$ will be

mA .

(When $\mathbf{R_L = 1k\Omega}$)



Numerical answer: _____

Enter the requested value or coefficient rounded to the nearest integer (0 decimal places).

Question 295 View solution online

Match List-I with List-II.

List-I	List-II
(a) Intrinsic semiconductor	(i) Fermi-level in the middle of valence and conduction band
(b) n-type semiconductor	(ii) Fermi-level near the conduction band
(c) p-type semiconductor	(iii) Fermi-level near the valence band
(d) Metals	(iv) Fermi-level inside the conduction band

Choose the correct answer from the options given below:

A. A-II, B-III, C-I, D-IV

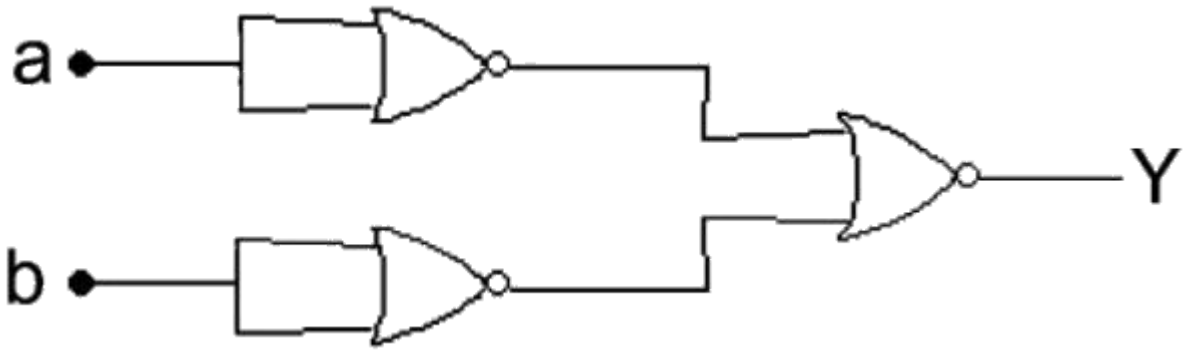
B. A-I, B-II, C-III, D-IV

C. A-II, B-I, C-III, D-IV

D. A-III, B-I, C-II, D-IV

Question 296 View solution online

The logic performed by the circuit shown in figure is equivalent to :



A. AND

B. NAND

C. OR

D. NOR

CHAPTER 27 / PHYSICS / HISTORICAL APPENDIX

Communication Systems

Questions 297-300 / 4 selected / 1.3% practice weight / Historical appendix

Topics to prioritise in this collection

- Communication systems: 2 questions / 50.0% of this chapter
- Amplitude modulation: 1 question / 25.0% of this chapter
- Omitted Chapter Communication System: 1 question / 25.0% of this chapter

Open this chapter's solutions on mobile / Back to chapter guide

Question 297 View solution online

A carrier wave with amplitude of 250 V is amplitude modulated by a sinusoidal base band signal of amplitude 150 V. The ratio of minimum amplitude to maximum amplitude for the amplitude modulated wave is 50 : x, then value of x is ___

Numerical answer: _____

Enter the requested integer (0 decimal places).

Question 298 View solution online

A transmitting antenna has a height of 320 m and that of receiving antenna is 2000 m . The maximum distance between them for satisfactory communication in line of sight mode is ' d '. The value of ' $\boldsymbol{d}$ ' is km .

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 299 View solution online

Match List-I with List-II.

List-I	List-II
(a) Attenuation	(i) Loss of strength of a signal while propagating through a medium
(b) Transducer	(ii) Converts one form of energy into another
(c) Demodulation	(iii) Process of retrieval of information from the carrier wave at receiver
(d) Repeater	(iv) Combination of a receiver and transmitter

Choose the correct answer from the options given below:

A. A-IV, B-III, C-I, D-II

B. A-I, B-II, C-III, D-IV

C. A-IV, B-III, C-II, D-I

D. A-II, B-III, C-IV, D-I

Question 300

View solution online

Match List I with List II:

List I	List II
A. Attenuation	I. Combination of a receiver and transmitter.
B. Transducer	II. process of retrieval of information from the carrier wave at receiver
C. Demodulation	III. converts one form of energy into another
D. Repeater	IV. Loss of strength of a signal while propogating through a medium.

Choose the correct answer from the options given below:

A. A-IV, B-III, C-I, D-II

B. A-I, B-II, C-III, D-IV

C. A-IV, B-III, C-II, D-I

D. A-II, B-III, C-IV, D-I

QUICK CHECK

Answer key

For numerical questions the stored answer value is shown. Follow the question's precision and units.

1. A	**2.** 13	**3.** B	**4.** A	**5.** C
6. C	**7.** 35	**8.** C	**9.** A	**10.** B
11. B	**12.** B	**13.** 3	**14.** C	**15.** B
16. 4	**17.** 400	**18.** 392	**19.** 5	**20.** B
21. 20	**22.** D	**23.** C	**24.** 5	**25.** A
26. C	**27.** C	**28.** A	**29.** A	**30.** 80
31. 3	**32.** 50	**33.** B	**34.** B	**35.** B
36. 4	**37.** 25	**38.** D	**39.** 3	**40.** B
41. B	**42.** 20	**43.** 2	**44.** B	**45.** 177
46. A	**47.** 25	**48.** B	**49.** 40	**50.** D
51. 2	**52.** A	**53.** B	**54.** 24	**55.** 40
56. 18	**57.** D	**58.** 300	**59.** A	**60.** 5
61. B	**62.** A	**63.** C	**64.** A	**65.** D
66. 1	**67.** 4	**68.** C	**69.** 6	**70.** 30
71. B	**72.** C	**73.** D	**74.** 20	**75.** 2
76. A	**77.** B	**78.** A	**79.** D	**80.** B
81. A	**82.** 25	**83.** A	**84.** 200	**85.** 5
86. D	**87.** 264	**88.** B	**89.** C	**90.** B
91. C	**92.** B	**93.** D	**94.** D	**95.** A
96. A	**97.** C	**98.** D	**99.** B	**100.** A
101. C	**102.** A	**103.** B	**104.** D	**105.** C
106. A	**107.** C	**108.** 500	**109.** C	**110.** A
111. A	**112.** A	**113.** C	**114.** A	**115.** C
116. B	**117.** A	**118.** B	**119.** B	**120.** C
121. A	**122.** B	**123.** 16	**124.** B	**125.** D
126. 10	**127.** 3	**128.** 4	**129.** 4	**130.** 3
131. 0.2	**132.** 10	**133.** 750	**134.** 15	**135.** 462
136. 2	**137.** 20	**138.** B	**139.** 2	**140.** B
141. 6	**142.** 45	**143.** 226	**144.** 2	**145.** 18
146. B	**147.** 12	**148.** 1320	**149.** 50	**150.** 22

151. 400 **152.** B **153.** 100 **154.** A **155.** A

156. 5 **157.** D **158.** 10 **159.** A **160.** C

161. D **162.** D **163.** D **164.** 12 **165.** A

166. 30 **167.** 2500 **168.** 3 **169.** 3 **170.** 30

171. 20 **172.** 3840 **173.** D **174.** 6 **175.** C

176. 975 **177.** C **178.** 25 **179.** 8 **180.** 0

181. 10 **182.** C **183.** 3 **184.** A **185.** 18

186. B **187.** C **188.** D **189.** C **190.** 5

191. 3 **192.** D **193.** B **194.** D **195.** B

196. 1 **197.** 10 **198.** 48 **199.** B **200.** 4

201. 2 **202.** A **203.** 2 **204.** 100 **205.** D

206. B **207.** A **208.** 10 **209.** A **210.** B

211. 2 **212.** 100 **213.** 242 **214.** 22 **215.** C

216. 250 **217.** 10 **218.** 10 **219.** 4 **220.** A

221. D **222.** A **223.** C **224.** D **225.** B

226. 3 **227.** D **228.** 25 **229.** C **230.** C

231. B **232.** 8 **233.** C **234.** 2 **235.** 500

236. B **237.** B **238.** A **239.** D **240.** A

241. A **242.** 32 **243.** D **244.** D **245.** D

246. B **247.** 60 **248.** B **249.** B **250.** D

251. C **252.** C **253.** B **254.** C **255.** B

256. A **257.** C **258.** D **259.** C **260.** B

261. B **262.** D **263.** C **264.** D **265.** A

266. 10 **267.** C **268.** A **269.** B **270.** D

271. D **272.** A **273.** D **274.** A **275.** A

276. B **277.** B **278.** B **279.** B **280.** A

281. 125 **282.** B **283.** D **284.** 1 **285.** B

286. A **287.** C **288.** C **289.** A **290.** C

291. D **292.** A **293.** B **294.** 5 **295.** A

296. A **297.** 200 **298.** 224 **299.** B **300.** C

LEARNE2I / PRIORITY PRACTICE

JEE Main 2026 Session 1

Chemistry
Chapter-wise practice collection

300 questions / NCERT chapter navigation
Chapter and topic priority guide, followed by questions and an answer key.

Start with the priority guide, then practise chapter by chapter. Enter a numerical value where no options are given; follow the units and precision specified in the question.

Solutions on your phone

Scan to choose a chapter or question. You can also download all three solutions PDFs together.

learne2i.com/jee-main/revision-archive/2026-session-1/

Open the PDF bookmarks panel on the left to jump between chapters. The chapter links in the guide are clickable too.

YOUR PRACTICE ROADMAP

Chapter & topic priorities

For this Session 1 collection, begin with **Hydrocarbons; Alcohols, Phenols and Ethers; Haloalkanes and Haloarenes**. These chapters have the largest share of the selected questions.

Practice weight = questions selected from a chapter / 300. Topic percentages use that chapter's question count. These are practice priorities from the prediction output, not guaranteed exam marks or probabilities.

NCERT chapter / leading topics	Priority	Questions	Weight
Some Basic Concepts of Chemistry Mole concept and stoichiometry: 5 (62.5%) / Mole calculations and concentrations: 1 (12.5%) / Mole concept: 1 (12.5%) / More topics in chapter guide	Next	1-8 (8)	2.7%
Classification of Elements and Periodicity in Properties Periodic trends: 3 (42.9%) / Classification of Elements and Periodicity in Properties: 2 (28.6%) / Electron gain enthalpy trend: 1 (14.3%) / More topics in chapter guide	Next	9-15 (7)	2.3%
Chemical Bonding and Molecular Structure Chemical bonding: 5 (62.5%) / Molecular orbital theory: 2 (25.0%) / Hybridisation: 1 (12.5%)	Next	16-23 (8)	2.7%
Thermodynamics Thermodynamics: 2 (100.0%)	Consolidate	24-25 (2)	0.7%
Equilibrium Chemical and ionic equilibrium: 10 (66.7%) / Chemical equilibrium: 2 (13.3%) / Basic buffer: 1 (6.7%) / More topics in chapter guide	Focus first	26-40 (15)	5.0%
Redox Reactions Oxidation-reduction principles: 2 (50.0%) / Oxidation states and redox reactions: 1 (25.0%) / Redox Reactions: 1 (25.0%)	Consolidate	41-44 (4)	1.3%
Organic Chemistry - Some Basic Principles and Techniques Organic reaction mechanisms: 5 (55.6%) / Organic Chemistry - Some Basic Principles and Techniques: 2 (22.2%) / Reaction intermediates: 1 (11.1%) / More topics in chapter guide	Next	45-53 (9)	3.0%
Hydrocarbons Reactions of hydrocarbons: 116 (93.5%) / Hydrocarbons: 3 (2.4%) / Acid-catalysed alkene reaction: 1 (0.8%) / More topics in chapter guide	Focus first	54-177 (124)	41.3%
Solutions Freezing point depression: 2 (33.3%) / Solution properties: 2 (33.3%) / Boiling point elevation: 1 (16.7%) / More topics in chapter guide	Consolidate	178-183 (6)	2.0%
Electrochemistry Electrochemical cells: 1 (50.0%) / Electrode potentials and electrolysis: 1 (50.0%)	Consolidate	184-185 (2)	0.7%

NCERT chapter / leading topics	Priority	Questions	Weight
Chemical Kinetics Initial-rate method: 1 (50.0%) / Integrated rate laws: 1 (50.0%)	Consolidate	186-187 (2)	0.7%
The p-Block Elements Main group element chemistry: 3 (60.0%) / Gas-evolution reactions: 1 (20.0%) / Group 16 properties: 1 (20.0%)	Consolidate	188-192 (5)	1.7%
The d- and f-Block Elements Properties of transition elements: 5 (62.5%) / The d- and f- Block Elements: 2 (25.0%) / Magnetic properties of transition ions: 1 (12.5%)	Next	193-200 (8)	2.7%
Coordination Compounds Coordination chemistry: 7 (70.0%) / Coordination Compounds: 1 (10.0%) / Coordination number and geometry: 1 (10.0%) / More topics in chapter guide	Next	201-210 (10)	3.3%
Haloalkanes and Haloarenes Nucleophilic substitution: 11 (68.8%) / Haloalkanes and Haloarenes: 2 (12.5%) / Reactivity of aryl halides: 2 (12.5%) / More topics in chapter guide	Focus first	211-226 (16)	5.3%
Alcohols, Phenols and Ethers Reactions of alcohols, phenols and ethers: 19 (59.4%) / Reactions of alcohols and phenols: 4 (12.5%) / Acid-catalysed dehydration: 2 (6.3%) / More topics in chapter guide	Focus first	227-258 (32)	10.7%
Aldehydes, Ketones and Carboxylic Acids Aldehydes, Ketones and Carboxylic Acids: 4 (44.4%) / Cannizzaro reaction: 1 (11.1%) / Carbonyl compounds and carboxylic acids: 1 (11.1%) / More topics in chapter guide	Next	259-267 (9)	3.0%
Amines Amines: 5 (45.5%) / Reactions of amines: 3 (27.3%) / Diazotisation and azo coupling: 1 (9.1%) / More topics in chapter guide	Focus first	268-278 (11)	3.7%
Biomolecules Carbohydrates: 8 (57.1%) / Structure and function of biomolecules: 3 (21.4%) / Biomolecules: 2 (14.3%) / More topics in chapter guide	Focus first	279-292 (14)	4.7%
Practical Chemistry (NCERT Laboratory Manual) Practical and qualitative chemistry: 1 (33.3%) / Qualitative chemical analysis: 1 (33.3%) / Qualitative inorganic analysis: 1 (33.3%)	Consolidate	293-295 (3)	1.0%
Hydrogen Historical appendix / omitted source chapter Hydrogen and its compounds: 1 (50.0%) / Hydrogen and water chemistry: 1 (50.0%)	Historical appendix	296-297 (2)	0.7%
The s-Block Elements Historical appendix / omitted source chapter Uses of alkali metals: 1 (100.0%)	Historical appendix	298-298 (1)	0.3%
Surface Chemistry Historical appendix / omitted source chapter Adsorption: 1 (50.0%) / Adsorption isotherms: 1 (50.0%)	Historical appendix	299-300 (2)	0.7%

How to use the priorities

1. Rank chapters by their selected question counts. Ties follow NCERT book order.
2. Focus first: chapters starting within the first 70% of selected, non-historical questions. Next: the following 20%. Consolidate: the remainder. A chapter crossing a threshold stays together.
3. Topic counts use the question's existing core concept, falling back to topic and then chapter. Each question is counted once. Full topic lists begin each chapter.
4. Historical/omitted chapters stay in a separate appendix. Their presence is not a recommendation that they are in the target examination syllabus.

Names follow NCERT Classes XI and XII. Practical chemistry is identified as a laboratory-manual section. Percentages are rounded and may not add to exactly 100.0%. Chapters with no selected questions are not listed; this does not mean they have no exam importance.

Chapter naming references: NCERT textbooks.

CHAPTER 01 / CHEMISTRY

Some Basic Concepts of Chemistry

Questions 1-8 / 8 selected / 2.7% practice weight / Next

Topics to prioritise in this collection

- Mole concept and stoichiometry: 5 questions / 62.5% of this chapter
- Mole calculations and concentrations: 1 question / 12.5% of this chapter
- Mole concept: 1 question / 12.5% of this chapter
- Solution preparation: 1 question / 12.5% of this chapter

Open this chapter's solutions on mobile / Back to chapter guide

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Question 1 View solution online

A solution containing 2 g of a non-volatile solute in 20 g of water boils at 373.52 K . The molecular mass of the solute is $\mathbf{g mol^{-1}}$. (Nearest integer)
Given, water boils at $\mathbf{373\ K,\ K_b}$ for water $= \mathbf{0.52\ K\ kg\ mol^{-1}}$

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 2 View solution online

The molarity of the solution prepared by dissolving 6.3 g of oxalic acid $\mathbf{(H_2C_2O_4 \cdot 2H_2O)}$ in 250 mL of water in $\mathbf{molL^{-1}}$ is $\mathbf{x \times 10^{-2}}$. The value of x is
. (Nearest integer)
[Atomic mass : $\mathbf{H : 1.0, C : 12.0, O : 16.0}$]

Numerical answer: _____

Enter the requested integer (0 decimal places).

Question 3 View solution online

Quantitative analysis of an organic compound (X) shows following % composition.

C : 14.5%

Cl : 64.46%

H : 1.8%

(Empirical formula mass of the compound (X) is

$\times 10^{-1}$

(Given molar mass in $gmol^{-1}$ of $C : 12, H : 1, O : 16, Cl : 35.5$)

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 4 View solution online

Match List I with List II

LIST I (molecules/ions)		LIST II (No. of lone pairs of e^- on central atom)	
A.	IF_7	I.	Three
B.	ICl_4^-	II.	One
C.	XeF_6	III.	Two
D.	XeF_2	IV.	Zero

Choose the correct answer from the options given below:

A. A - II, B - III, C - IV, D - I

B. A - II, B - I, C - IV, D - III

C. A - IV, B - I, C - II, D - III

D. A - IV, B - III, C - II, D - I

Question 5 View solution online

Number of molecules having bond order 2 from the following molecule is .

$C_2, O_2, Be_2, Li_2, Ne_2, N_2, He_2$

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 6 View solution online

Number of molecules from the following which are exceptions to octet rule is .

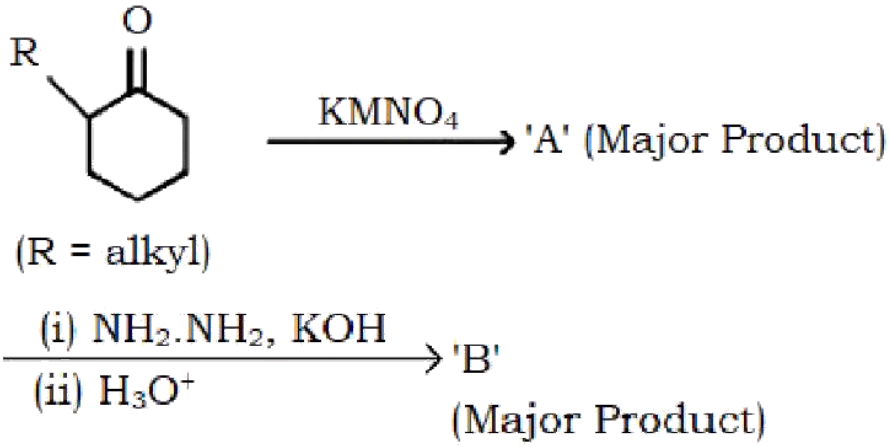
$CO_2, NO_2, H_2SO_4, BF_3, CH_4, SiF_4, ClO_2, PCl_5, BeF_2, C_2H_6, CHCl_3, CBr_4$

Numerical answer: _____

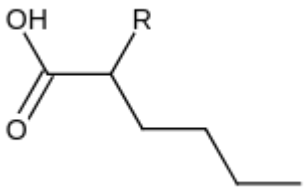
Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 7 View solution online

A' and 'B' in the below reactions are :



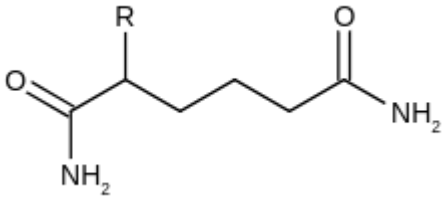
A. $= A$,
$B =$



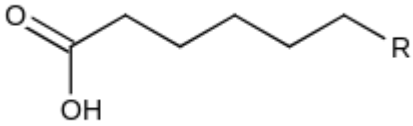
B. =A,
$B =$



C. $B =$



D. = A,
$B =$



Question 8 View solution online

Match List-I with List-II :

	List-I (Species)		List-II (Maximum allowed concentration in ppm in drinking water)
A.	F^-	I.	$< 50ppm$
B.	SO_4^{2-}	II.	$< 5ppm$
C.	NO_3^-	III.	$< 2ppm$
D.	Zn	IV.	$< 500ppm$

A. A-II, B-I, C-III, D-IV

B. A-IV, B-III, C-II, D-I

C. A-I, B-II, C-III, D-IV

D. A-III, B-II, C-I, D-IV

CHAPTER 02 / CHEMISTRY

Classification of Elements and Periodicity in Properties

Questions 9-15 / 7 selected / 2.3% practice weight / Next

Topics to prioritise in this collection

- Periodic trends: 3 questions / 42.9% of this chapter
- Classification of Elements and Periodicity in Properties: 2 questions / 28.6% of this chapter
- Electron gain enthalpy trend: 1 question / 14.3% of this chapter
- Periodic properties of elements: 1 question / 14.3% of this chapter

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Question 9 View solution online

Which of the following reaction is correct?

A. $4LiNO_3 \xrightarrow{\Delta} 2Li_2O + 2\,N_2O_4 + O_2$

B. $2LiNO_3 \xrightarrow{\Delta} 2NaNO_2 + O_2$

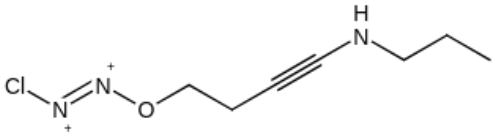
C. $2LiNO_3 \rightarrow 2Li + 2NO_2 + O_2$

D. $4LiNO_3 \xrightarrow{\Delta} 2Li_2O + 4NO_2 + O_2$

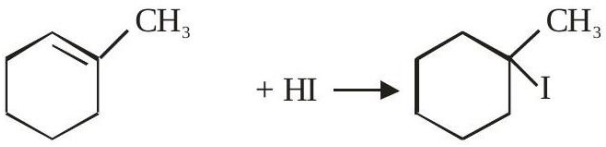
Question 10 View solution online

Which of the following reaction is correct ?

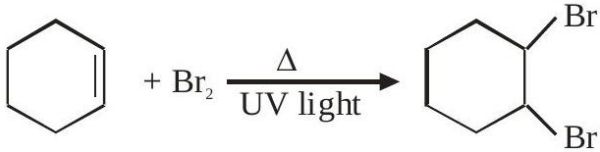
A.



B.



C.



D. $C_2H_5CONH_2 + Br_2 + NaOH \rightarrow C_2H_5CH_2NH_2 + Na_2CO_3 + NaBr + H_2O$

Question 11 View solution online

Given below are two statements :

Statement I : Both $CaCl_2 \cdot 6H_2O$ and $MgCl_2 \cdot 8H_2O$ undergo dehydration on heating.
Statement II : BeO is amphoteric whereas the oxides of other elements in the same group are acidic.

In the light of the above statements, choose the correct answer from the options given below :

A. Statement I is false but statement II is true

B. Both statement I and statement II are false

C. Both statement I and statement II are true

D. Statement I is true but statement II is false

TEST PAPER WITH ANSWER & SOLUTION

Question 12 View solution online

Match the LIST-I with LIST-II.

LIST-I	Family	LIST-II	Symbol
A.	Pnictogen (Group 15)	*I.*	Ts
B.	Chalcogen	*II.*	Og
C.	Halogen	*III.*	Lv
D.	Noble Gas	*IV.*	Mc

Choose the correct answer from the options given below.

A. A-IV, B-I, C-II, D-III

B. A-IV, B-III, C-I, D-II

C. A-III, B-I, C-IV, D-II

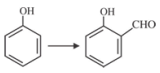
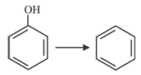
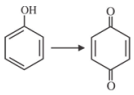
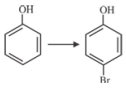
D. A-II, B-III, C-IV, D-I

Question 13

View solution online

Match List I with List II

Choose the correct answer from the options given below:

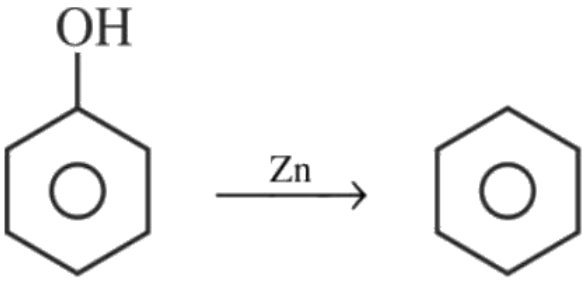
List I	List II
A. 	I. Br_2 in CS_2
B. 	II. $Na_2Cr_2O_7/H_2SO_4$
C. 	III. Zn
D. 	IV. $CHCl_3$/NaOH

A. A-IV, B-III, C-II, D-I

B. A-IV, B-III, C-I, D-II

C. A-II, B-III, C-I, D-IV

D. A-IV, B-II, C-III, D-I



Question 14

View solution online

Match List I with List II

List-I		List-II	
A.	Melting point [K]	I.	$\mathbf{Tl > In > Ga > Al > B}$
B.	Ionic Radius [$\mathbf{M^{+3}/pm}$]	II.	$\mathbf{B > Tl > Al \approx Ga > In}$
C.	$\mathbf{\Delta_i H_1}$ [$\mathbf{kJmol^{-1}}$]	III.	$\mathbf{Tl > In > Al > Ga > B}$
D	Atomic Radius [pm]	IV.	$\mathbf{B > Al > Tl > In > Ga}$

Choose the correct answer from the options given below:

A. A-III, B-IV, C-I, D-II

B. A-II, B-III, C-IV, D-I

C. A-IV, B-I, C-II, D-III

D. A-I, B-II, C-III, D-IV

Question 15

View solution online

Match List-I with List-II.

List-I	Elements
A	Cl, S
B	Ge, As
C	Fr, Ra
D	F, O

List-II	Properties
I	Highest electronegativity
II	Largest atomic size
III	Properties of both metals and non-metals
IV	Highest negative electron gain enthalpy

Choose the correct answer from the options given below.

A. A-II, B-III, C-IV, D-I

B. A-III, B-II, C-I, D-IV

C. A-IV, B-III, C-II, D-I

D. A-II, B-I, C-IV, D-III

CHAPTER 03 / CHEMISTRY

Chemical Bonding and Molecular Structure

Questions 16-23 / 8 selected / 2.7% practice weight / Next

Topics to prioritise in this collection

- Chemical bonding: 5 questions / 62.5% of this chapter
- Molecular orbital theory: 2 questions / 25.0% of this chapter
- Hybridisation: 1 question / 12.5% of this chapter

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Question 16 View solution online

Total number of species from the following with central atom utilising $2p^2$ hybrid orbitals for bonding is

.

$NH_3, SO_2, SiO_2, BeCl_2, C_2H_2, C_2H_4, BCl_3, HCHO, C_6H_6, BF_3, C_2H_4Cl_2$

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 17

View solution online

Match List-I with List-II

List-I (Molecule/Ion)	List-II (Hybridisation)
A. PF_5	*I*. dsp^2
B. SF_6	*II*. sp^3d
C. $Ni(CO)_4$	*III*. sp^3d^2
D. $[PtCl_4]^{2-}$	*IV*. sp^3

Choose the correct answer from the options given below.

A. A-II, B-III, C-IV, D-I

B. A-IV, B-I, C-II, D-III

C. A-I, B-II, C-III, D-IV

D. A-III, B-I, C-IV, D-II

Question 18 View solution online

Match List-I with List-II

List-I (Molecule)	**List-II** (Bond order)
(a) Ne_2	(i) 1
(b) N_2	(ii) 2
(c) F_2	(iii) 0
(d) O_2	(iv) 3

Choose the correct answer from the options given below.

A. (a)-(iii), (b)-(iv), (c)-(i), (d)-(ii)

B. (a)-(i), (b)-(ii), (c)-(iii), (d)-(iv)

C. (a)-(ii), (b)-(i), (c)-(iv), (d)-(iii)

D. (a)-(iv), (b)-(iii), (c)-(ii), (d)-(i)

Question 19 View solution online

Match List-I with List-II

List-I	List-II
A. Molecules obeying octet rule	*I*. NO, NO_2
B. Molecules with incomplete octet	*II*. BCl_3, $AlCl_3$
C. Molecules with odd electron	*III*. H_2SO_4, PCl_5
D. Molecules with expanded octet	*IV*. CCl_4, CO_2

Choose the correct answer from the options given below :

A. A-IV, B-II, C-I, D-III

B. A-III, B-II, C-I, D-IV

C. A-IV, B-I, C-III, D-II

D. A-II, B-IV, C-III, D-I

Question 20 View solution online

Match List-I with List-II

List-I	List-II
A. SO_2Cl_2	*I*. Paramagnetic
B. NO	*II*. Diamagnetic
C. NO_2^-	*III*. Tetrahedral
D. I_3^-	*IV*. Linear

Choose the correct answer from the options given below :

A. A-IV, B-I, C-III, D-II

B. A-III, B-I, C-II, D-IV

C. A-II, B-III, C-I, D-IV

D. A-III, B-IV, C-II, D-I

Question 21 View solution online

Match List I with List II :

List-I (molecule)	List-II (hybridization; shape)
A. XeO_3	I. $sp^3\ d$; linear
B. XeF_2	II. sp^3; pyramidal
C. $XeOF_4$	III. $sp^3\ d^3$; distorted octahedral
D. XeF_6	IV. $sp^3\ d^2$; square pyramidal

Choose the correct answer from the options given below:

A. A-II, B-I, C-IV, D-III

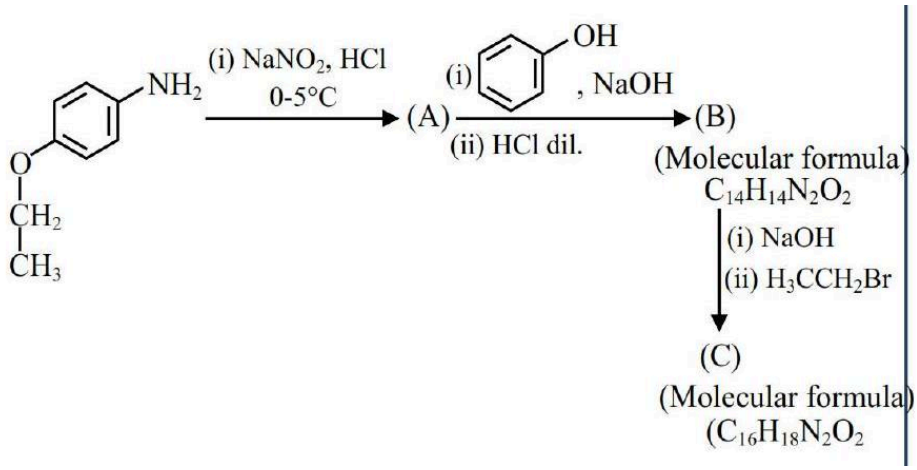
B. A-II, B-IV, C-III, D-I

C. A-IV, B-II, C-III, D-I

D. A-IV, B-II, C-I, D-III

Question 22 View solution online

Consider the following sequence of reactions.



Total number of sp^3 hybridised carbon atoms in the major product C formed is .

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 23

View solution online

Match List-I with List-II

List-I

(A) $\Psi_{MO} = \Psi_A - \Psi_B$
(B) $\mu = Q \times r$
(C) $\frac{N_b - N_a}{2}$
(D) $\Psi_{MO} = \Psi_A + \Psi_B$

List-II

(I) Dipole moment
(II) Bonding molecular orbital
(III) Anti-bonding molecualr orbital
(IV) Bond order

A. -(II), (B)-(I), (C)-(IV), (D)-(III)

B. (A)-(III), (B)-(IV), (C)-(I), (D)-(II)

C. (A)-(III), (B)-(I), (C)-(IV), (D)-(II)

D. (A)-(III), (B)-(IV), (C)-(II), (D)-(I)

CHAPTER 04 / CHEMISTRY

Thermodynamics

Questions 24-25 / 2 selected / 0.7% practice weight / Consolidate

Topics to prioritise in this collection

- Thermodynamics: 2 questions / 100.0% of this chapter

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Question 24 View solution online

For the reaction $2NO_2(g) \rightleftharpoons N_2O_4(g)$, when $\Delta S = -176.0 JK^{-1}$ and $\Delta H = -57.8\ kJ\ mol^{-1}$, the magnitude of ΔG at 298 K for the reaction is ___ $kJmol^{-1}$. (Nearest integer)

Numerical answer: _____

Enter the requested integer (0 decimal places).

Question 25 View solution online

For the reaction at $298\ K, 2\ A + B \rightarrow C$. $\Delta H = 400\ kJ\ mol^{-1}$ and $\Delta S = 0.2\ kJ\ mol^{-1}\ K^{-1}$. The reaction will become spontaneous above K.

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

CHAPTER 05 / CHEMISTRY

Equilibrium

Questions 26-40 / 15 selected / 5.0% practice weight / Focus first

Topics to prioritise in this collection

- Chemical and ionic equilibrium: 10 questions / 66.7% of this chapter
- Chemical equilibrium: 2 questions / 13.3% of this chapter
- Basic buffer: 1 question / 6.7% of this chapter
- Heterogeneous equilibrium: 1 question / 6.7% of this chapter
- Le Chatelier's principle: 1 question / 6.7% of this chapter

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Question 26 View solution online

For the reaction,
$\mathbf{2SO_2(g) + O_2(g) \rightleftharpoons 2SO_3(g)}$,
$\mathbf{\Delta H = -57.2\ kJ\ mol^{-1}}$ and $\mathbf{K_c = 1.7 \times 10^{16}}$.
Which of the following statement is INCORRECT?

A. The equilibrium constant is large suggestive of reaction going to completion and so no catalyst is required.

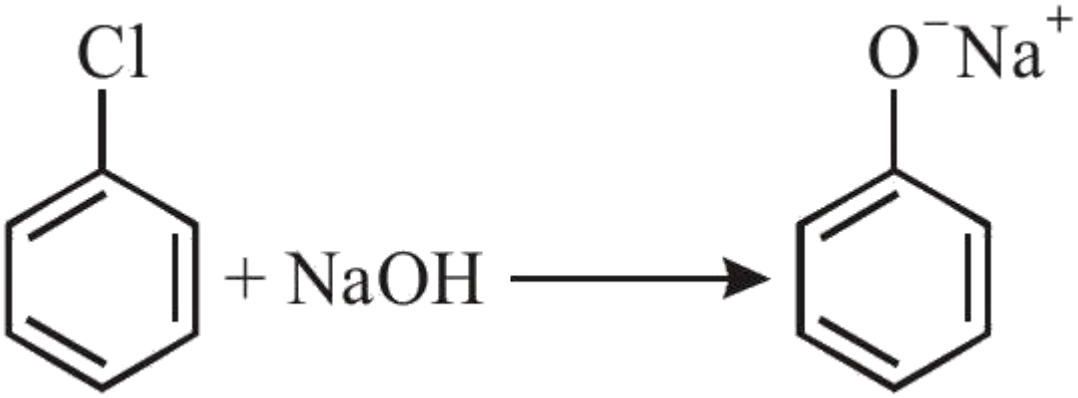
B. The addition of inert gas at constant volume will not affect the equilibrium constant.

C. The equilibrium will shift in forward direction as the pressure increases.

D. The equilibrium constant decreases as the temperature increases.

Question 27 View solution online

The above reaction requires which of the following reaction conditions?



A. $573\ \mathrm{K}, \mathrm{Cu}, 300\ \mathrm{atm}$

B. $623\ \mathrm{K}, \mathrm{Cu}, 300\ \mathrm{atm}$

C. $573\ \mathrm{K}, 300\ \mathrm{atm}$

D. $623\ \mathrm{K}, 300\ \mathrm{atm}$

Question 28 View solution online

When 5.1 g of solid $\mathrm{NH_4HS}$ is introduced into a two litre evacuated flask at $27^\circ\mathrm{C}, 20\%$ of the solid decomposes into gaseous ammonia and hydrogen sulphide. The $\mathrm{K_p}$ for the reaction at $27^\circ\mathrm{C}$ is $\mathrm{x} \times 10^{-2}$. The value of x is . (Integer answer)
[Given $\mathrm{R} = 0.082\ \mathrm{L\ atm\ K^{-1}\ mol^{-1}}$]

Numerical answer: _____

Enter the requested integer (0 decimal places).

Question 29 View solution online

At $-20^\circ\mathrm{C}$ and 1 atm pressure, a cylinder is filled with equal number of $\mathrm{H_2}.\ \mathrm{I_2}$ and HI molecules for the reaction
$\mathrm{H_2(g) + I_2(g) \rightleftharpoons 2HI(g)}$, the $\mathrm{K_P}$ for the process is $\mathrm{x} \times 10^{-1}$. $\mathrm{x} =$ ..... .
[Given : $\mathrm{R} = 0.082\ \mathrm{L\ atm\ K^{-1}\ mol^{-1}}$]

A. 2

B. 1

C. 10

D. 0.01

Question 30 View solution online

The OH^- concentration in a mixture of 5.0 mL of $0.0504 M NH_4Cl$ and 2 mL of $0.0210 M NH_3$ solution is $x \times 10^{-6} M$. The value of x is .
(Nearest integer)
[Given $K_w = 1 \times 10^{-14}$ and $K_b = 1.8 \times 10^{-5}$]

Numerical answer: _____

Enter the requested integer (0 decimal places).

Question 31 View solution online

The equilibrium constant K_c at 298 K for the reaction $A + B \rightleftharpoons C + D$ is 100 . Starting with an equimolar solution with concentrations of A, B, C and D all equal to 1 M , the equilibrium concentration of D is $\times 10^{-2}$ M. (Nearest integer)

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 32

View solution online

Match List I with List II

LIST I		LIST II	
A.	Chlorophyll	I.	Na_2CO_3
B.	Soda ash	II.	$CaSO_4$
C.	Dentistry, Ornamental work	III.	Mg^{2+}
D.	Used in white washing	IV.	$Ca(OH)_2$

Choose the correct answer from the options given below:

A. A-II, B-I, C-III, D-IV

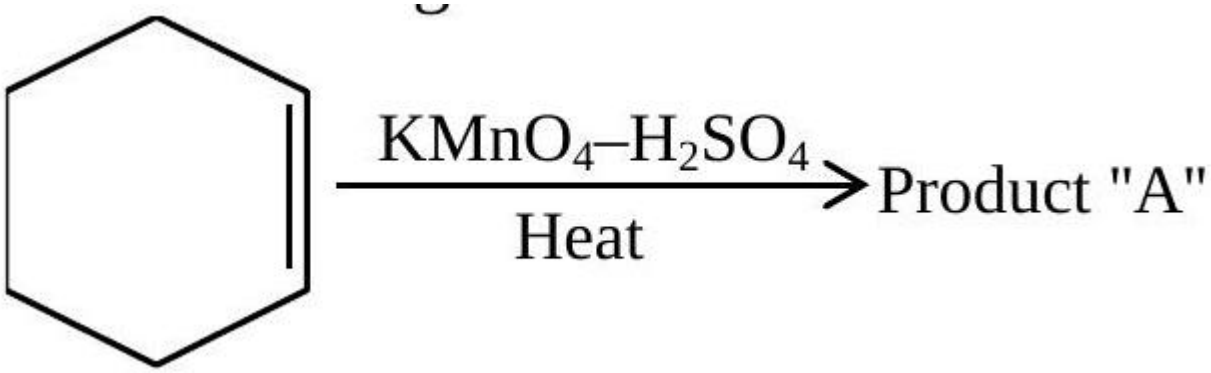
B. A-III, B-I, C-II, D-IV

C. A-II, B-III, C-IV, D-I

D. A-III, B-IV, C-I, D-II

Question 33 View solution online

Consider the given chemical reaction :



Product " A " is :

A. picric acid

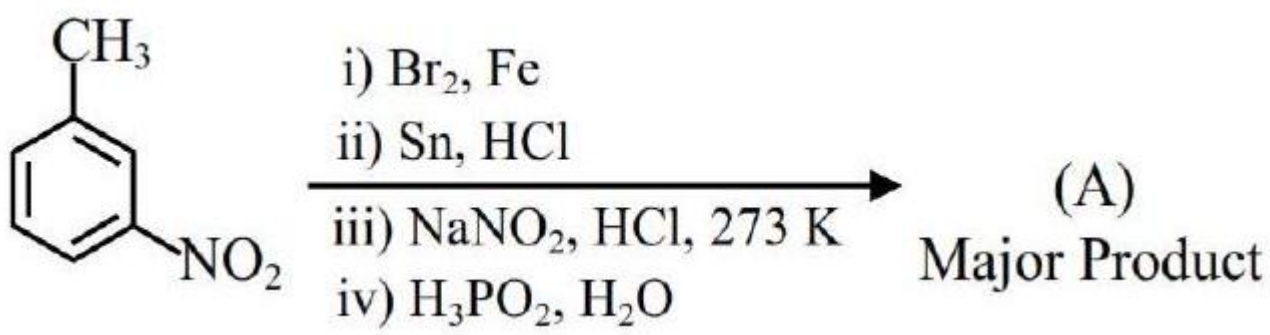
B. oxalic acid

C. acetic acid

D. adipic acid

Question 34 View solution online

Consider the following sequence of reactions to produce major product (A)



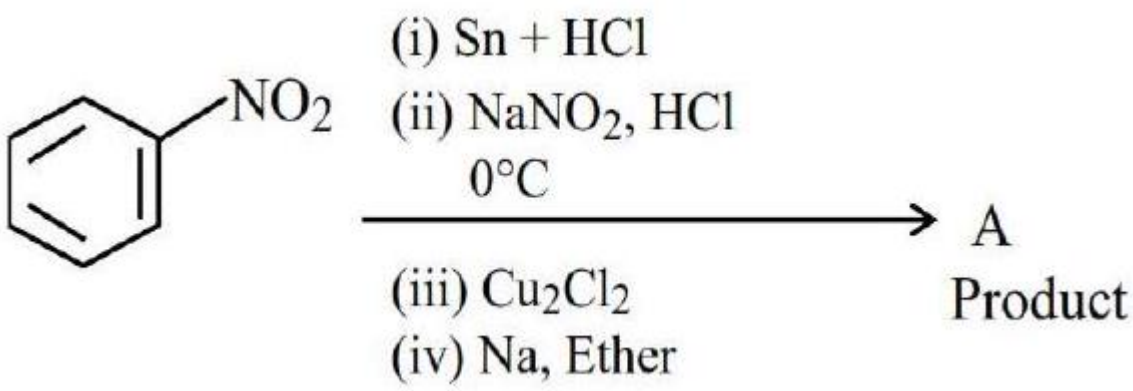
Molar mass of product (A) is gmol^{-1}. (Given molar mass in gmol^{-1} of $\text{C} : 12, \text{H} : 1$, $\text{O} : 16, \text{Br} : 80, \text{N} : 14, \text{P} : 31$)

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 35 View solution online

Consider the following sequence of reactions :



Molar mass of the product formed (A) is

$gmol^{-1}$.

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 36 View solution online

Match List-I with List-II

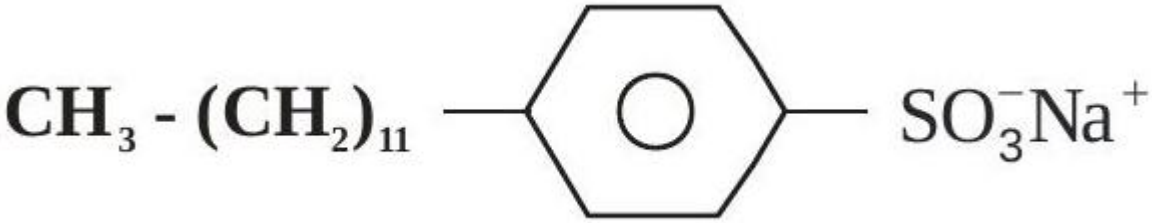
List-I

(A)



Br^-

(B)



(C) $C_{17}H_{35}COO^-Na^+ + Na_2CO_3 +$ Rosinate

(D) $CH_3(CH_2)_{16}COO(CH_2CH_2O)_nCH_2CH_2OH$

List-II

(I) Dishwashing powder
(II) Toothpaste
(III) Laundry soap
(IV) Hair conditioner

A. - (III), (B) - (II), (C) - (IV), (D) - (I)

B. (A) - (IV), (B) - (II), (C) - (III), (D) - (I)

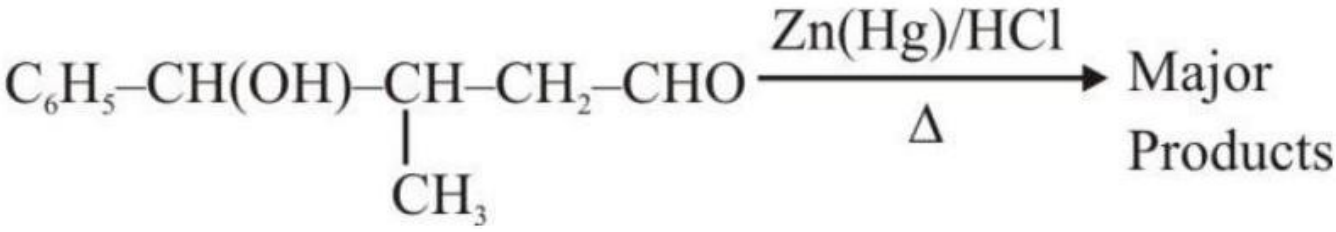
C. (A) - (IV), (B) - (III), (C) - (II), (D) - (I)

D. (A) - (III), (B) - (IV), (C) - (I), (D) - (II)

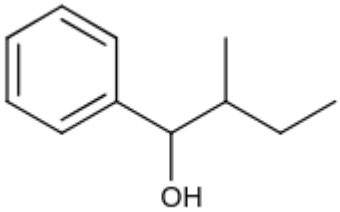
Question 37

View solution online

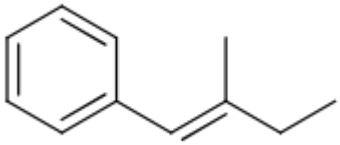
The major product formed in the following reaction is:



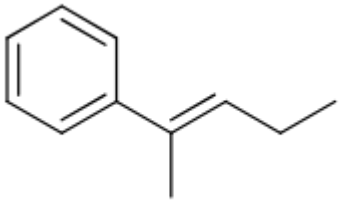
(A)



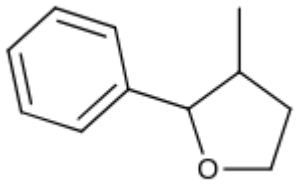
(B)



(C)



(D)



Choose the correct answer from the options given below:

A. A only

B. B only

C. C only

D. D only

Question 38

View solution online

Match List-I with List-II :

List-I

Name of oxo acid
(a) Hypophosphorous acid
(b) Orthophosphoric acid
(c) Hypophosphoric acid
(d) Orthophosphorous acid given below :

A. (a)-(v), (b)-(i), (c)-(ii), (d)-(iii)

B. (a)-(iv), (b)-(i), (c)-(ii), (d)-(iii)

C. (a)-(iv), (b)-(v), (c)-(ii), (d)-(iii)

D. (a)-(v), (b)-(iv), (c)-(ii), (d)-(iii)

Question 39

View solution online

Match List-I with List-II.

List-I (Oxide)		List-II (Nature)	
(A)	Cl_2O_7	(I)	Amphoteric
(B)	Na_2O	(II)	Basic
(C)	Al_2O_3	(III)	Neutral
(D)	N_2O	(IV)	Acidic

Choose the correct answer from the options given below:

A. - (IV), (B) - (III), (C) - (I), (D) - (II)

B. (A) - (IV), (B) - (II), (C) - (I), (D) - (III)

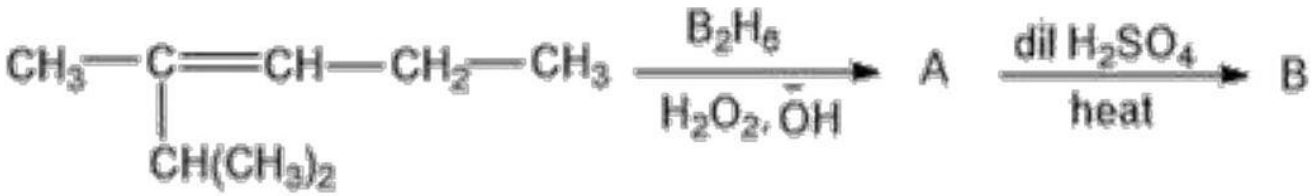
C. (A) - (II), (B) - (IV), (C) - (III), (D) - (I)

D. (A) - (I), (B) - (II), (C) - (IIII), (D) - (IV)

Question 40

View solution online

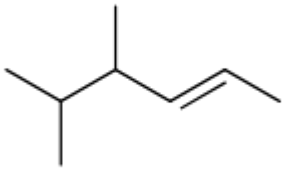
Find the final major product of the following reactions?



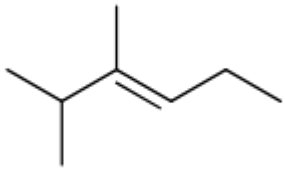
A.



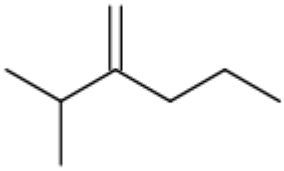
B.



C.



D.



CHAPTER 06 / CHEMISTRY

Redox Reactions

Questions 41-44 / 4 selected / 1.3% practice weight / Consolidate

Topics to prioritise in this collection

- Oxidation-reduction principles: 2 questions / 50.0% of this chapter
- Oxidation states and redox reactions: 1 question / 25.0% of this chapter
- Redox Reactions: 1 question / 25.0% of this chapter

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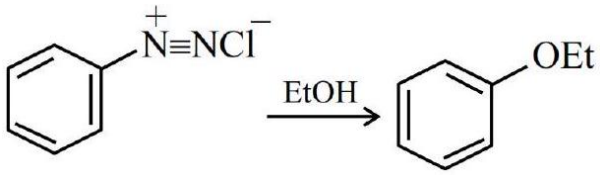
Question 41

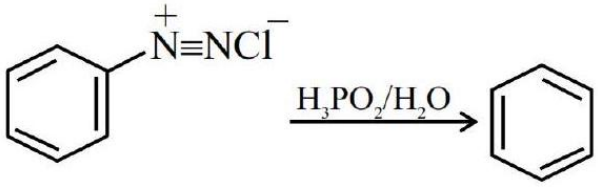
View solution online

In the following reactions, which one is NOT correct?

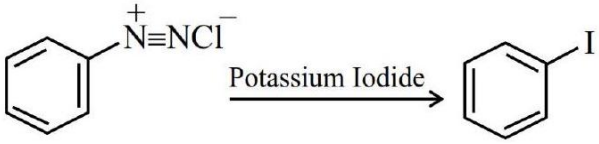
A.



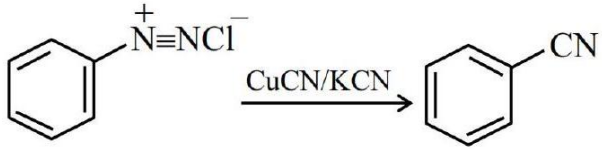
B.



C.



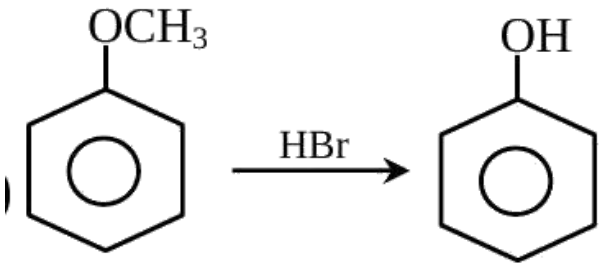
D.



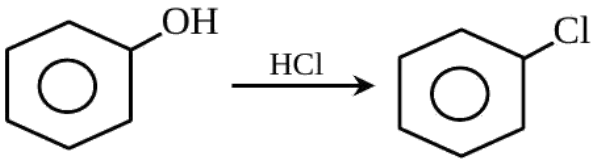
Question 42 View solution online

Which one of the following reactions is NOT possible?

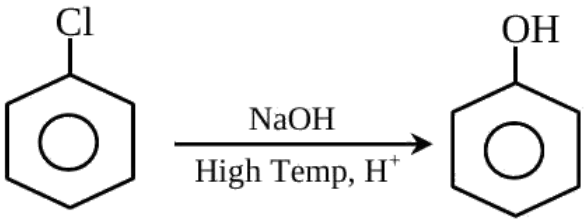
A.



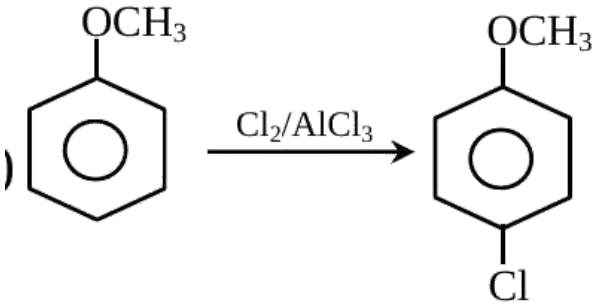
B.



C.



D.



Question 43 View solution online

The species given below that does NOT show disproportionation reaction is :

A. BrO_4^-

B. BrO^-

C. BrO_2^-

D. BrO_3^-

Question 44

View solution online

Match List-I with the List-II

List-I}
Reaction}
(A) $\mathrm{N_{2(g)} + O_{2(g)} \rightarrow 2NO_{(g)}}$
(B) $\mathrm{2\,Pb(NO_3)_{2(s)} \rightarrow 2PbO_{(s)} + 4NO_{2(g)} + O_{2(g)}}$
(C) $\mathrm{2Na_{(s)} + 2H_2O_{(l)} \rightarrow 2NaOH_{(aq.)} + H_{2(g)}}$
(D) $\mathrm{2NO_{2(g)} + 2^{-}OH_{(aq.)} \rightarrow NO^{-}_{2\,(aq.)} + NO^{-}_{3\,(aq.)} + H_2O_{(1)}}$
Choose the correct answer from the options given below:

A. (A)-(I), (B)-(II), (C)-(III), (D)-(IV)

B. (A)-(III), (B)-(II), (C)-(I), (D)-(IV)

C. (A)-(II), (B)-(III), (C)-(IV), (D)-(I)

D. (A)-(IV), (B)-(I), (C)-(II), (D)-(III)

CHAPTER 07 / CHEMISTRY

Organic Chemistry - Some Basic Principles and Techniques

Questions 45-53 / 9 selected / 3.0% practice weight / Next

Topics to prioritise in this collection

- Organic reaction mechanisms: 5 questions / 55.6% of this chapter
- Organic Chemistry - Some Basic Principles and Techniques: 2 questions / 22.2% of this chapter
- Reaction intermediates: 1 question / 11.1% of this chapter
- Reactions of hydrocarbons: 1 question / 11.1% of this chapter

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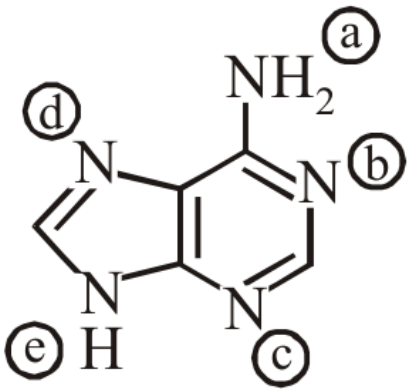
Question 45

View solution online

In the following compound,
the favourable site/s for protonation is/are :-



A. (b), (c) and (d)

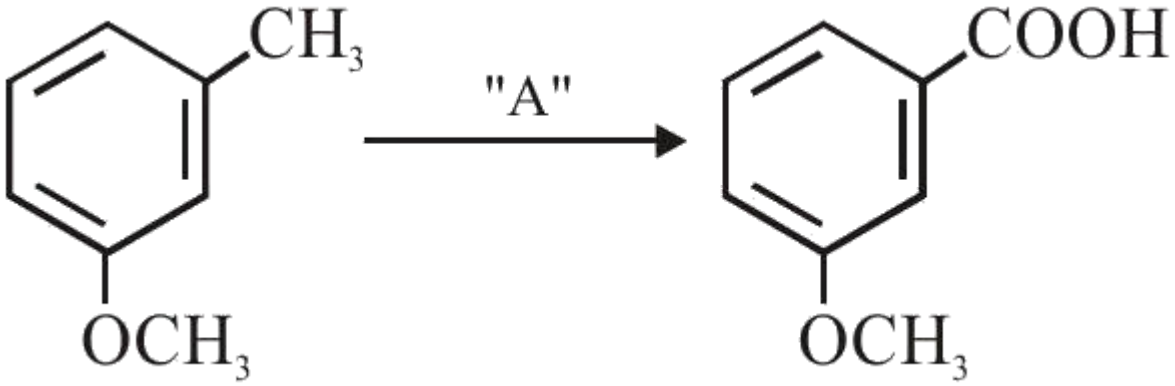
B. (a)

C. (a) and (e)

D. (a) and (d)

Question 46 View solution online

In the above reaction, the reagent " A " is :



A. $NaBH_4, H_3O^+$

B. $LiAlH_4$

C. Alkaline $KMnO_4, H^+$

D. $HCl, Zn - Hg$

Question 47

View solution online

Match List - I with List - II

	List - I	
(A)	$\mathbf{N_2(g) + 3H_2(g) \rightarrow 2NH_3(g)}$	(I)
(B)	$\mathbf{CO(g) + 3H_2(g) \rightarrow CH_4(g) + H_2O(g)}$	(II) $\mathbf{Cu/ZnO - Cr_2O_3}$
(C) $\mathbf{CO(g) + H_2(g) \rightarrow HCHO(g)}$	(III) $\mathbf{Fe_xO_y + K_2O + Al_2O_3}$	
(D) $\mathbf{CO(g) + 2H_2(g) \rightarrow CH_3OH(g)}$	(IV) Ni	

Choose the correct answer from the options given below:

A. - (II), (B) - (IV), (C) - (I), (D) - (III)

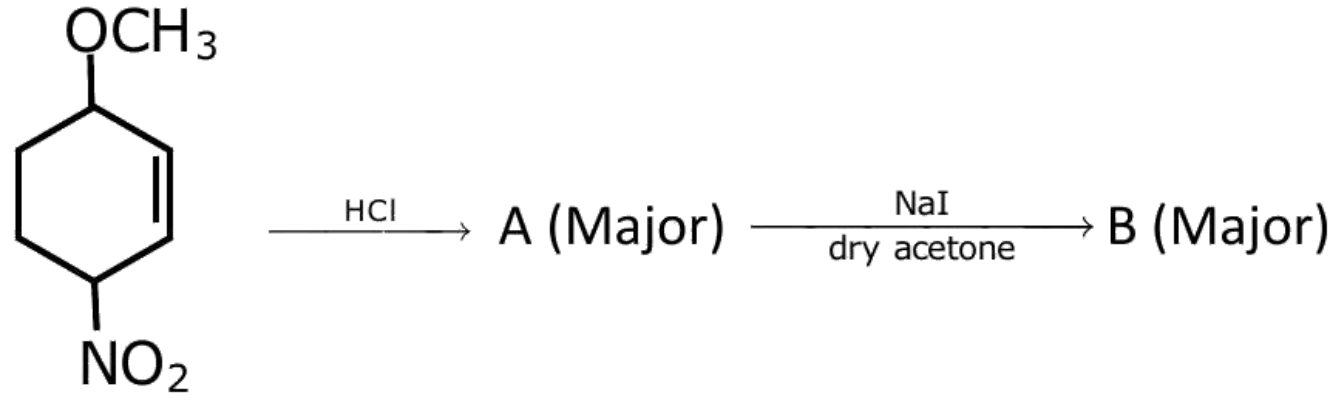
B. (A) - (II), (B) - (I), (C) - (IV), (D) - (III)

C. (A) - (III), (B) - (IV), (C) - (I), (D) - (II)

D. (A) - (III), (B) - (I), (C) - (IV), (D) - (II)

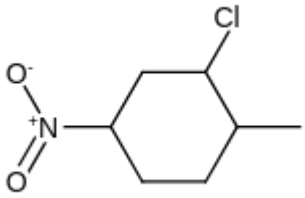
Question 48 View solution online

Identify A and B in the chemical reaction.

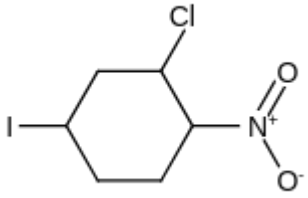


A. $A =$

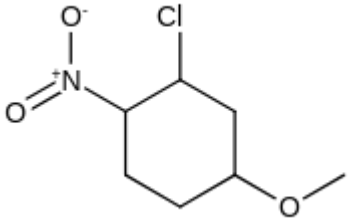
$B =$



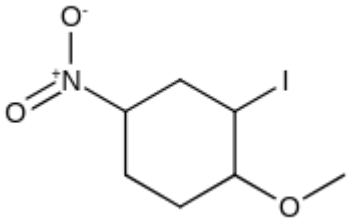
B. $B =$



C. $B =$



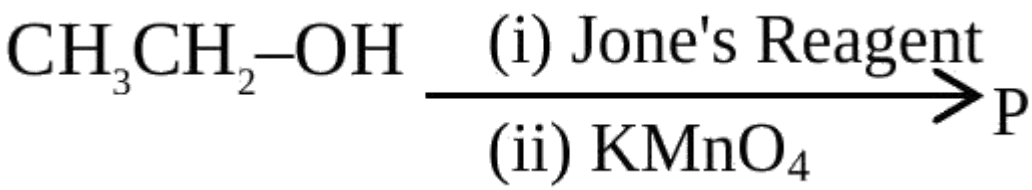
D. $B =$



Question 49 View solution online

(iii) $\mathbf{NaOH, CaO, \Delta}$

Consider the above reaction sequence and identify the major product P .



A. Methane

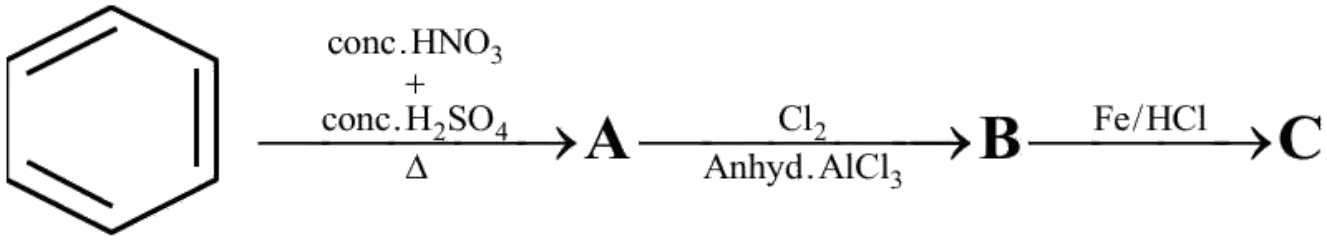
B. Methanal

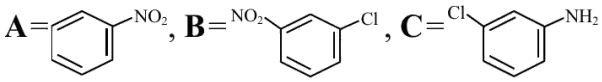
C. Methoxymethane

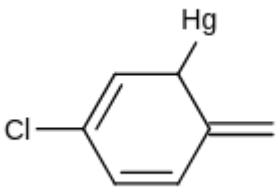
D. Methanoic acid

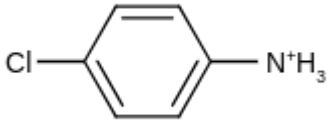
Question 50 View solution online

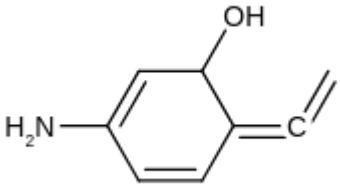
Identify correct $\mathbf{A, B}$ and $\mathbf{C}$ in the reaction sequence given below :



A. 

B. 

C. 

D. 

Question 51

View solution online

Match the LIST-I with LIST-II

LIST-I		LIST-II	
A.	Carbocation	I.	Species that can supply a pair of electrons.
B.	C-Free radical	II.	Species that can receive a pair of electrons.
C.	Nucleophile	III.	sp^2 hybridized carbon with empty p-orbital.
D.	Electrophile	IV	sp^2/sp^3 hybridized carbon with one unpaired electron.

Choose the correct answer from the options given below:

A. A-IV, B-II, C-III, D-I

B. A-II, B-III, C-I, D-IV

C. A-III, B-IV, C-II, D-I

D. A-III, B-IV, C-I, D-II

Question 52 View solution online

Match List I with List II :

LIST I (Precipitating reagent and conditions)		LIST II (Cation)	
A.	$NH_4Cl + NH_4OH$	I.	Mn^{2+}
B.	$NH_4OH + Na_2CO_3$	II.	Pb^{2+}
C.	$NH_4OH + NH_4Cl + H_2S$ gas	III.	Al^{3+}
D.	dilute HCl	IV.	Sr^{2+}

Choose the correct answer from the options given below:

A. A-IV, B-III, C-II, D-I

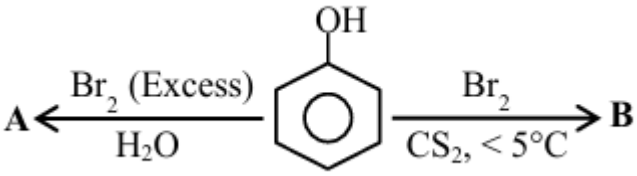
B. A-IV, B-III, C-I, D-II

C. A-III, B-IV, C-I, D-II

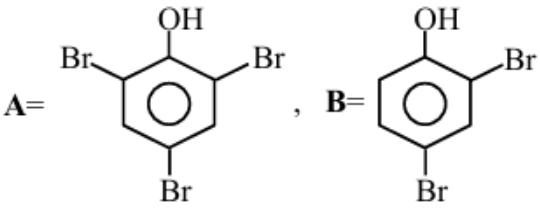
D. A-III, B-IV, C-II, D-I

Question 53 View solution online

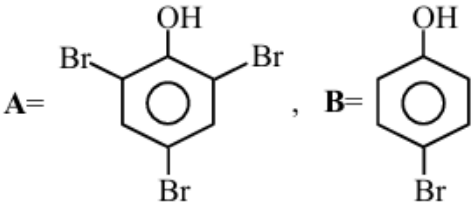
The correct options for the products **A** and **B** of the following reactions are :



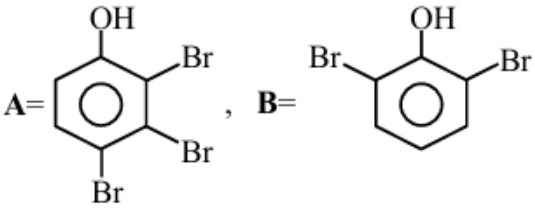
A.



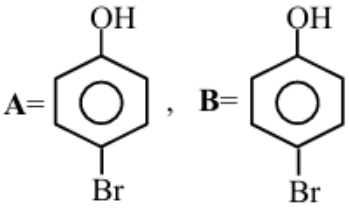
B.



C.



D.



CHAPTER 08 / CHEMISTRY

Hydrocarbons

Questions 54-177 / 124 selected / 41.3% practice weight / Focus first

Topics to prioritise in this collection

- Reactions of hydrocarbons: 116 questions / 93.5% of this chapter
- Hydrocarbons: 3 questions / 2.4% of this chapter
- Acid-catalysed alkene reaction: 1 question / 0.8% of this chapter
- Alkyne reduction and alkene oxidation: 1 question / 0.8% of this chapter
- Aromaticity: 1 question / 0.8% of this chapter
- Ozonolysis: 1 question / 0.8% of this chapter
- Reactions of alcohols and phenols: 1 question / 0.8% of this chapter

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Question 54

View solution online

Match List I with List II.

	List I	List II
	Reaction	Reagents
	(A) Hoffmann Degradation	(I) Conc.KOH, Δ
	(B) Clemenson reduction	(II) $CHCl_3, NaOH/H_3O^{\oplus}$
	(C) Cannizaro reaction	(III) $Br_2, NaOH$
	(D) Reimer-Tiemann Reaction	(IV) $Zn - Hg/HCl$

Choose the correct answer from the options given below:

A. (A) -III , (B) -IV , (C) -I , (D) -II

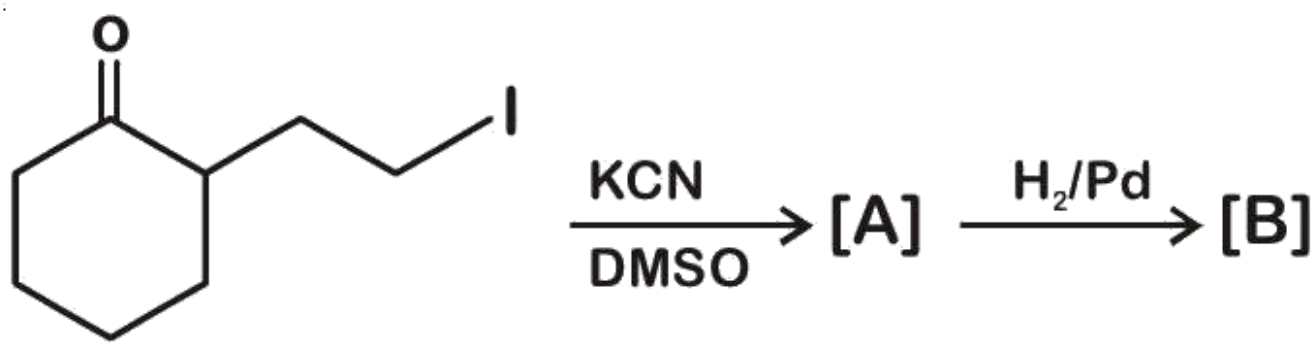
B. (A) - II, (B) -I, (C) - III, (D) - IV

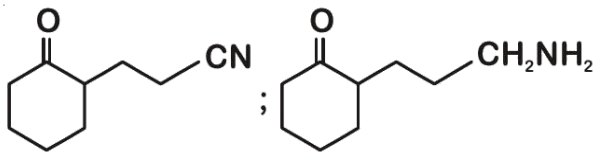
C. (A) - III, (B) - IV, (C) - II, (D) - I

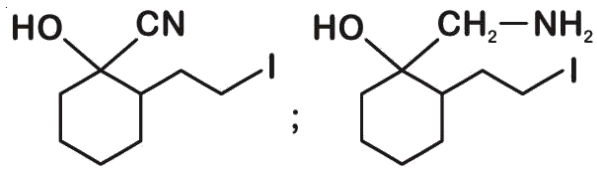
D. (A) -II , (B) -IV , (C) -I , (D) -III

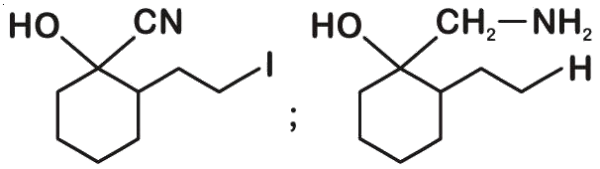
Question 55 View solution online

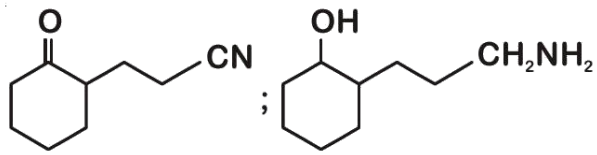
The major products A and B for the following reactions are, respectively



A. 

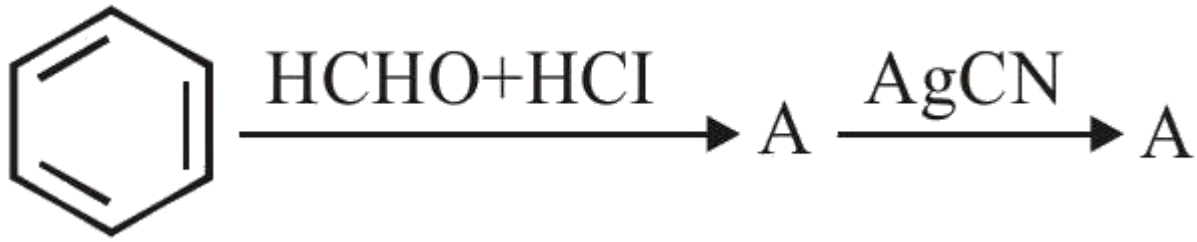
B. 

C. 

D. 

Question 56 View solution online

The compounds A and B in the following reaction are, respectively:



A. $\mathbf{A}$ = Benzyl alcohol, $\mathbf{B}$ = Benzyl isocyanide

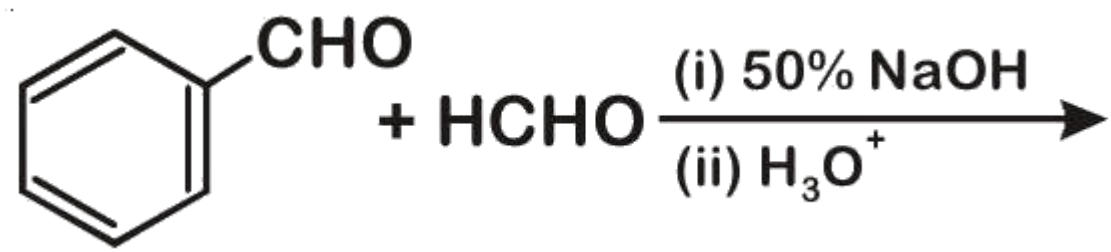
B. $\mathbf{A}$ = Benzyl alcohol, $\mathbf{B}$ = Benzyl cyanide

C. $\mathbf{A}$ = Benzyl chloride, $\mathbf{B}$ = Benzyl cyanide

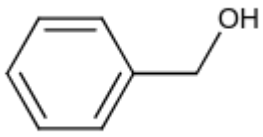
D. A = Benzyl chloride, B = Benzyl isocyanide

Question 57 View solution online

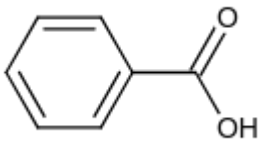
Major products of the following reaction are :



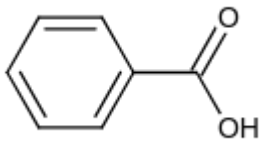
A. HCOOH and



B.



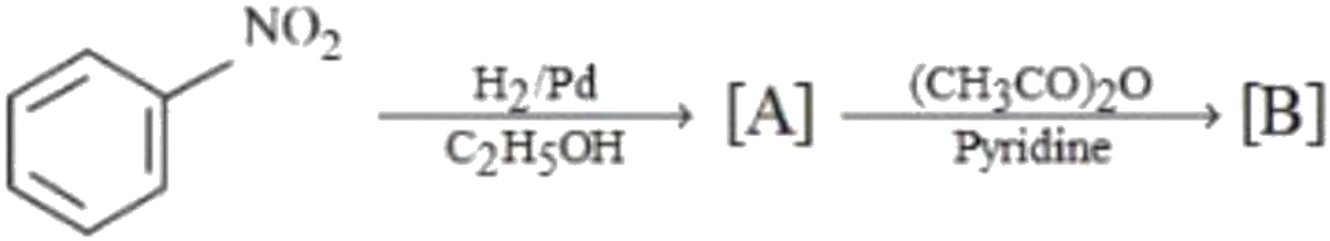
C. $\mathbf{CH_3OH}$ and



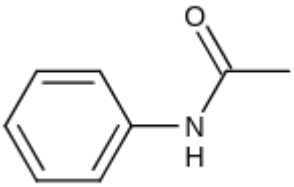
D. $\mathbf{CH_3OH}$ and $\mathbf{HCO_2H}$

Question 58 View solution online

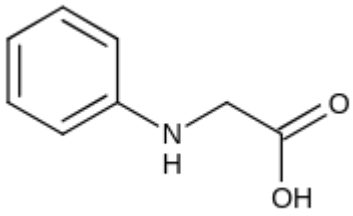
Consider the above reaction and identify the product B. Options



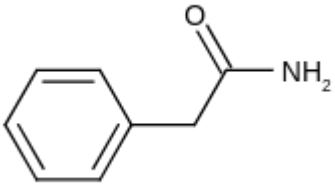
A.



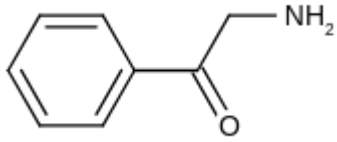
B.



C.

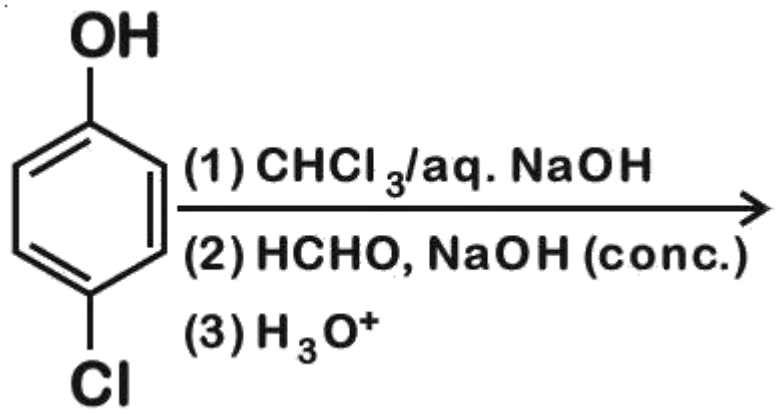


D.

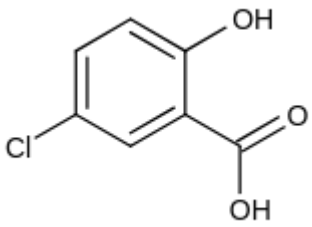


Question 59 View solution online

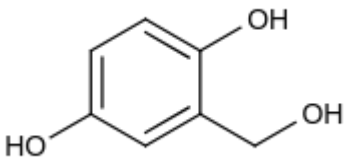
The major products of the following reaction are :



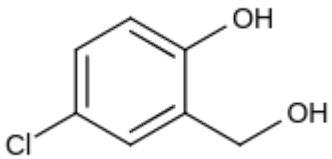
A.



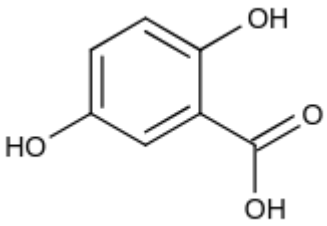
B.



C.

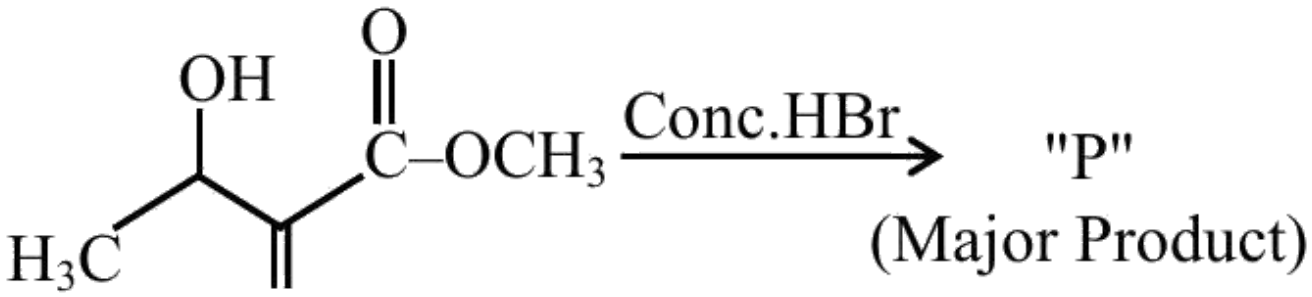


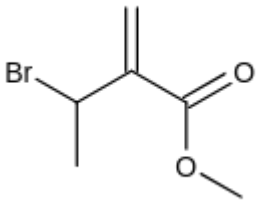
D.



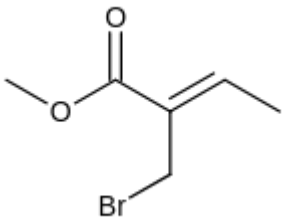
Question 60 View solution online

Consider the above reaction, the major product "P" formed is :-

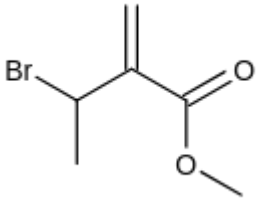




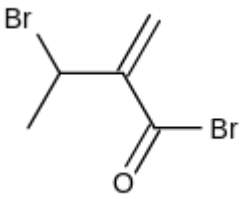
A.



B.



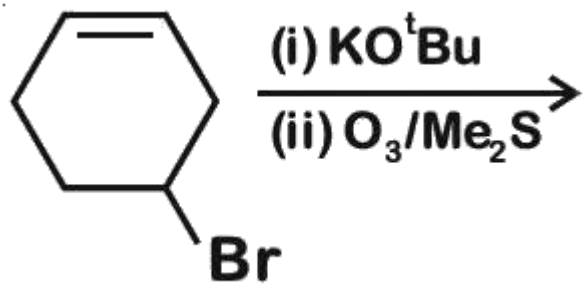
C.



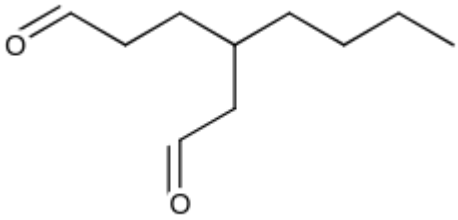
D.

Question 61 View solution online

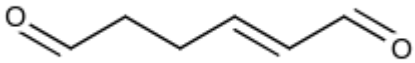
The major product(s) obtained in the following reaction is/are



A. 

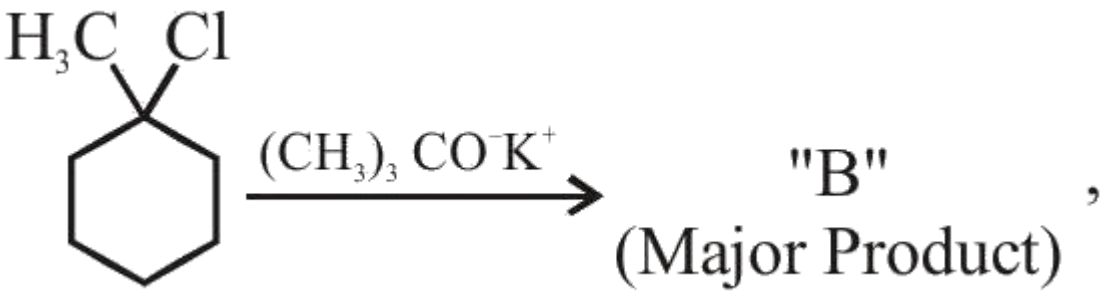
B. 

C. 

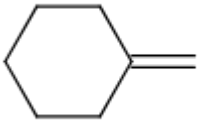
D. 

Question 62 View solution online

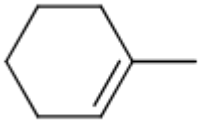
The product " A " and " B " formed in above reactions are :

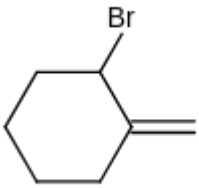


A. B-

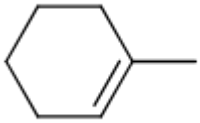


B. B-





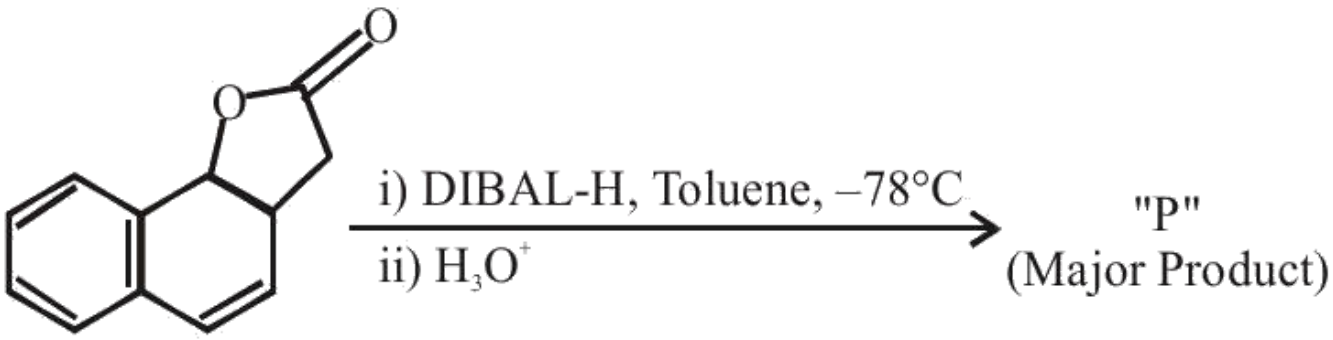
C.



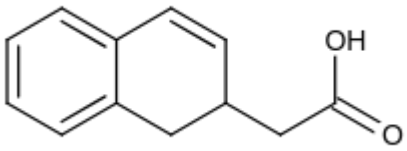
D.

Question 63 View solution online

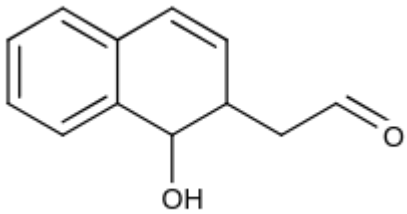
The product " P " in the above reaction is :



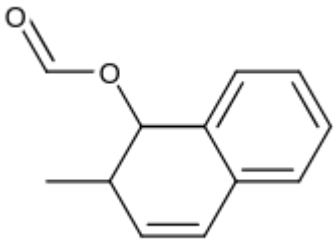
A.



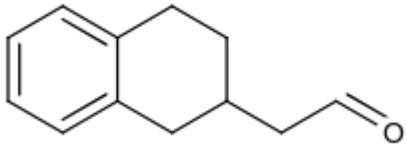
B.



C.



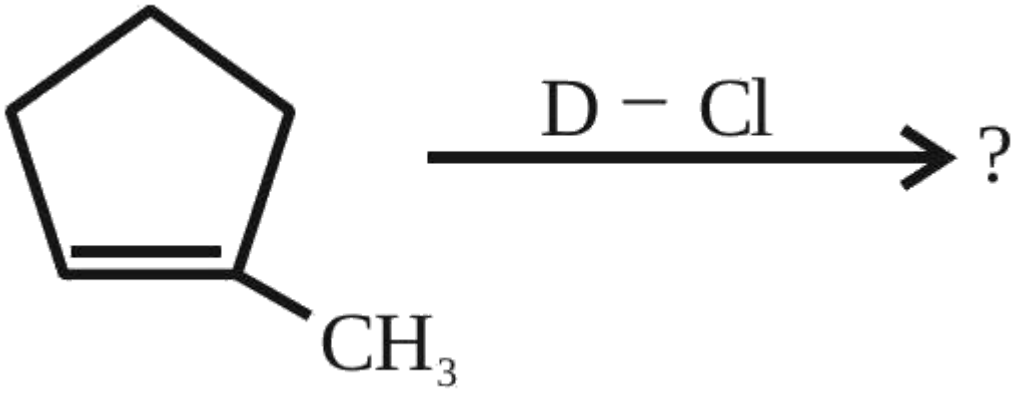
D.



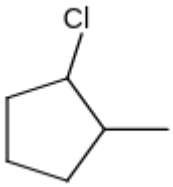
Question 64

View solution online

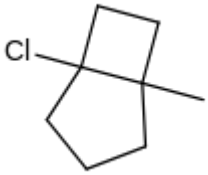
Major product of the following reaction is -



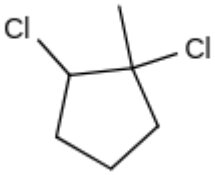
A.



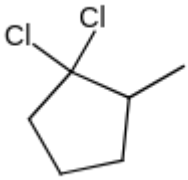
B.



C.



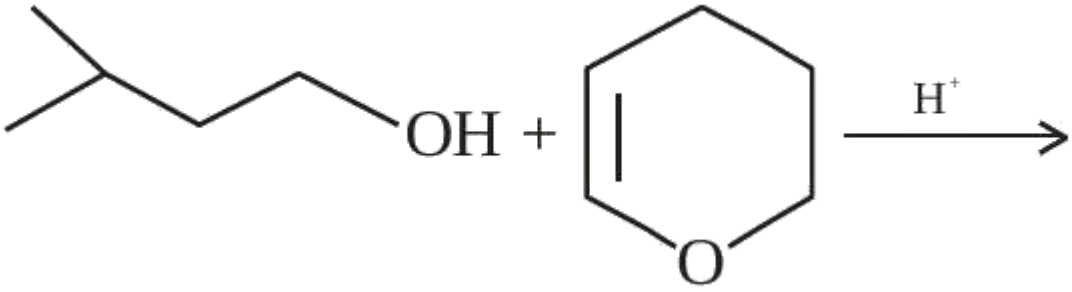
D.



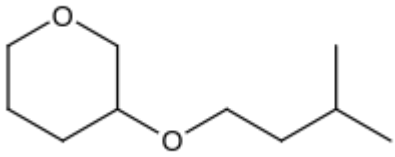
Question 65

View solution online

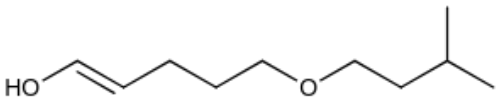
The major product formed in the following reaction, is



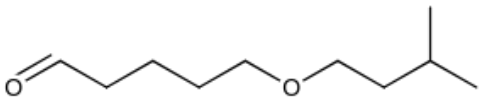
A.



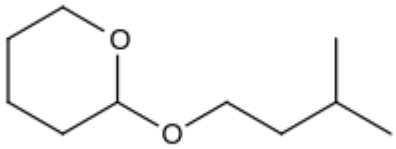
B.



C.



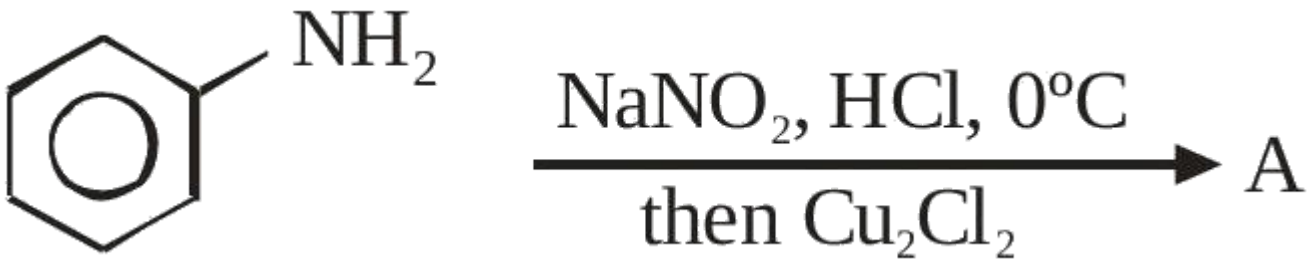
D.

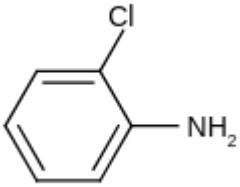


Question 66

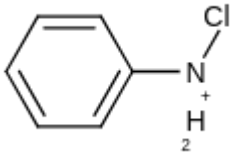
View solution online

The product A formed in the following reaction is:

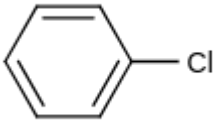




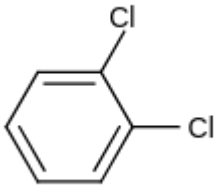
A.



B.



C.

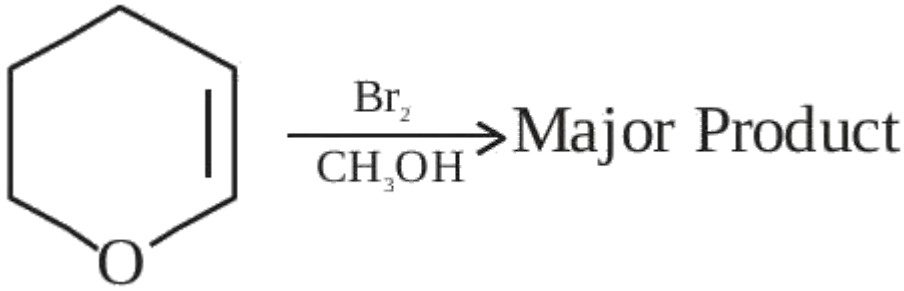


D.

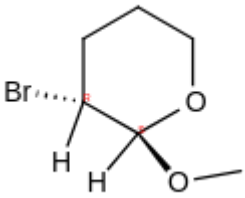
Question 67

View solution online

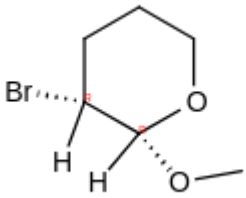
Amongst the following, the major product of the given chemical reaction is



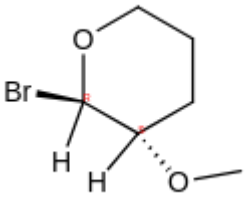
A.



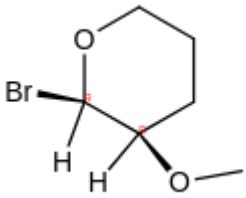
B.



C.



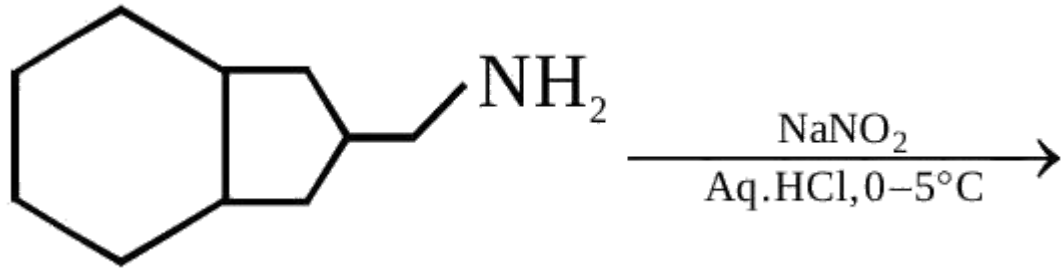
D.



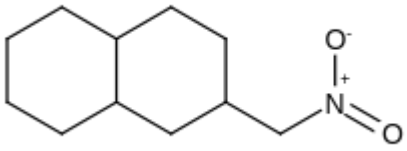
Question 68

View solution online

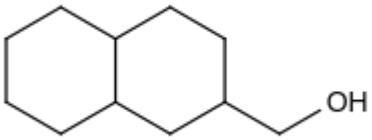
The major product formed in the reaction given below will be :



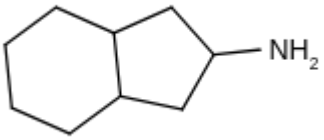
A.



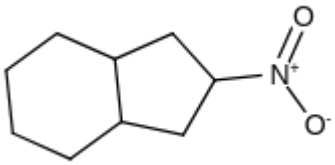
B.



C.



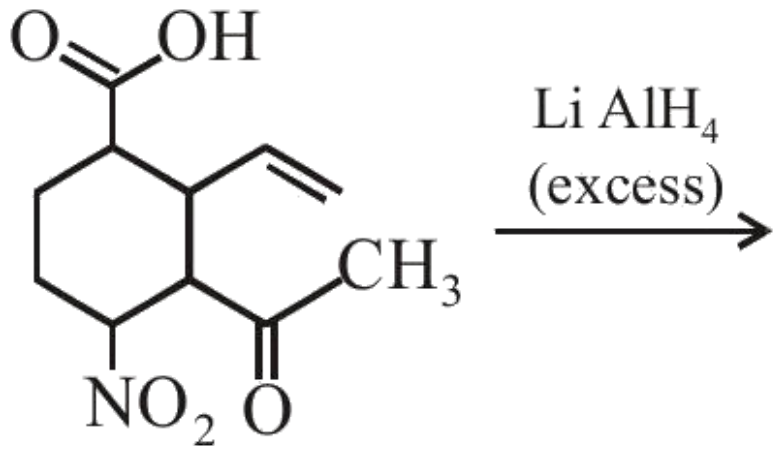
D.



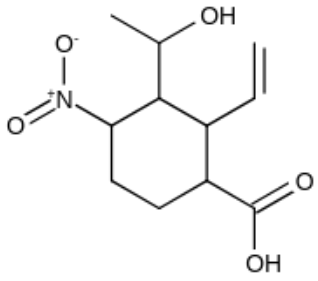
Question 69

View solution online

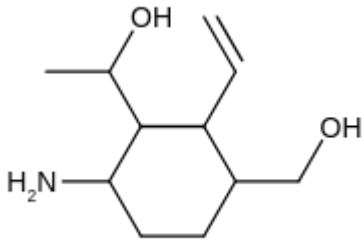
The major product obtained in the following reaction is :-



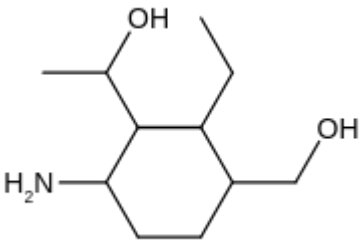
A.



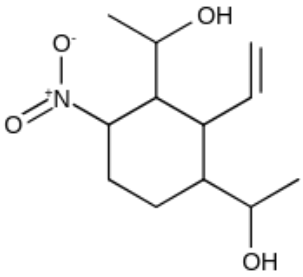
B.



C.

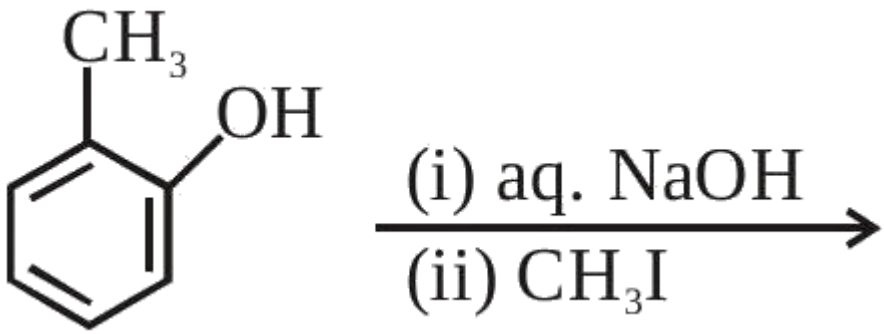


D.

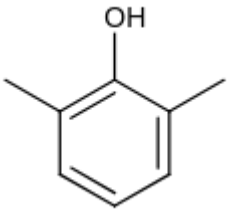


Question 70 View solution online

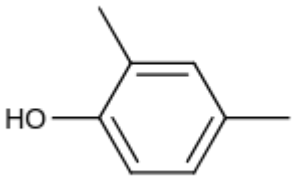
The major product of the following reaction is:



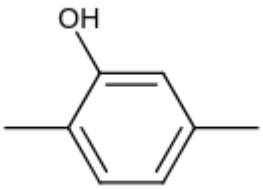
A.



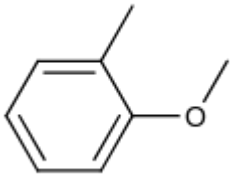
B.



C.

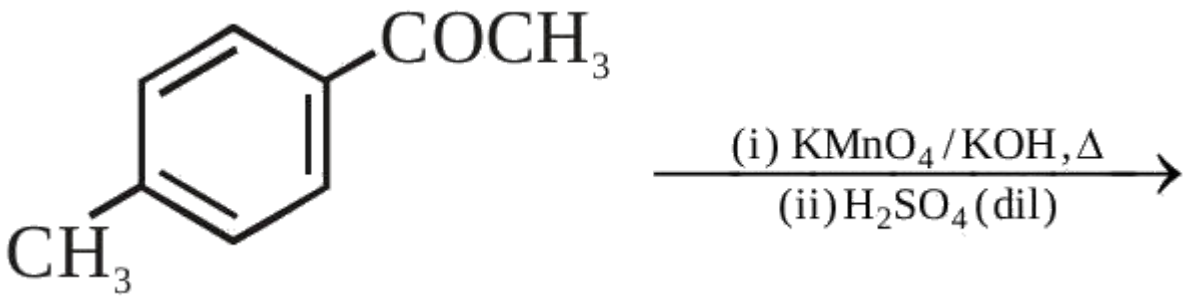


D.

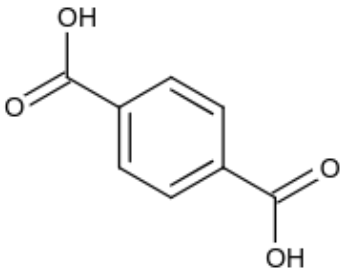


Question 71 View solution online

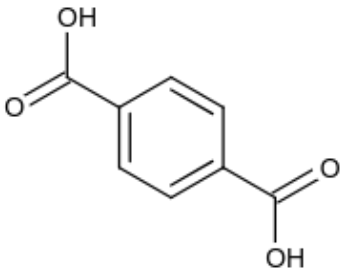
The major product of the following reaction is :



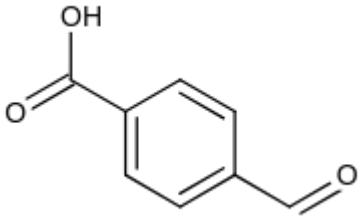
A.



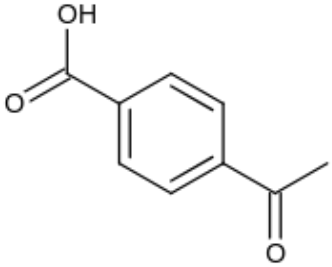
B.



C.



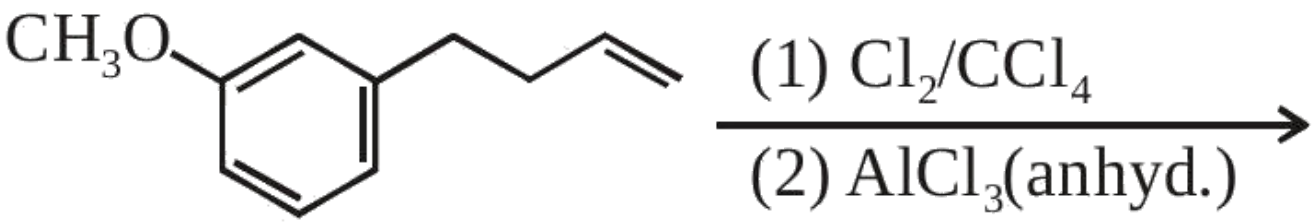
D.



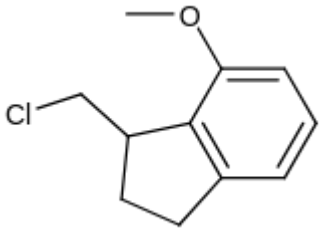
Question 72

View solution online

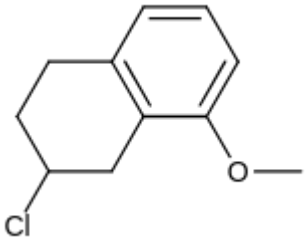
The major product of the following reaction is:



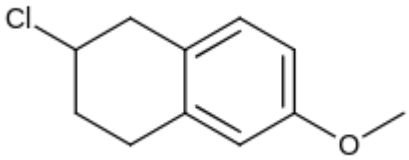
A.



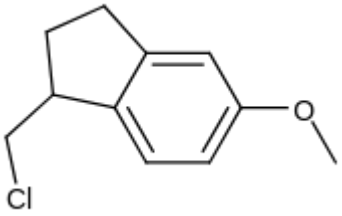
B.



C.

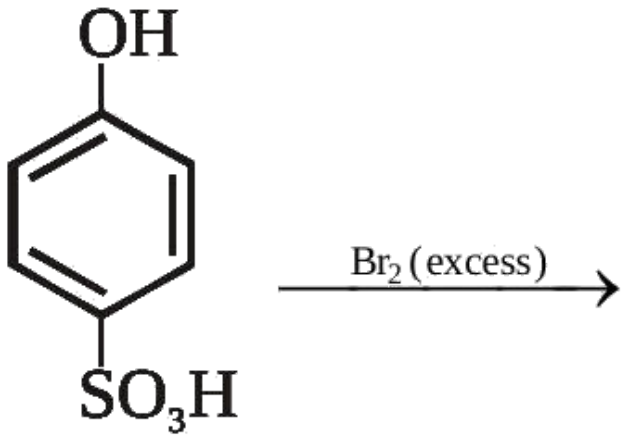


D.

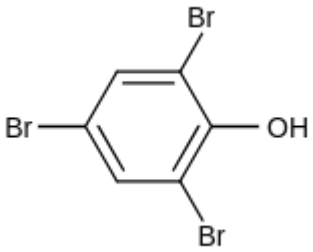


Question 73 View solution online

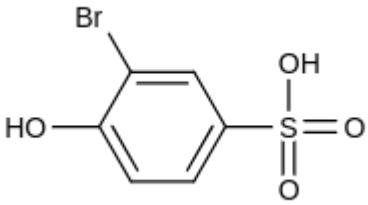
The major product of the following reaction is :



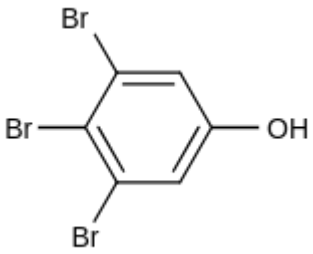
A.



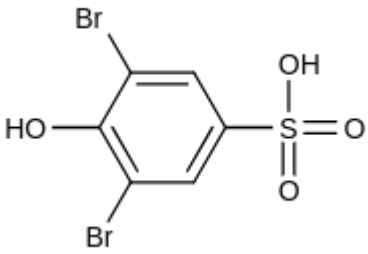
B.



C.



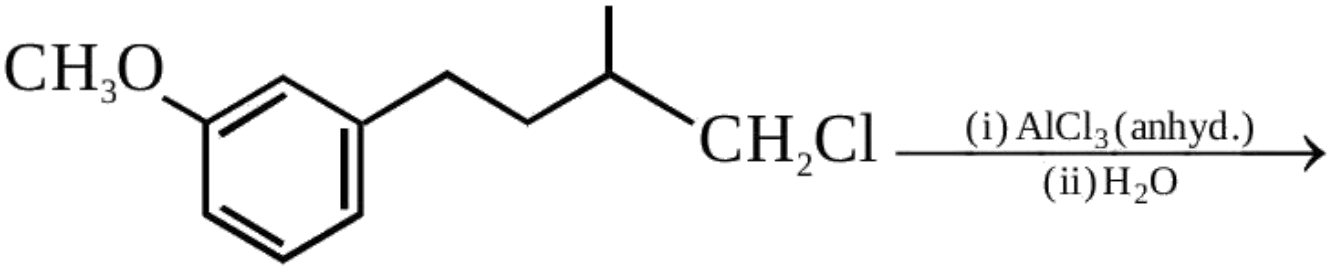
D.



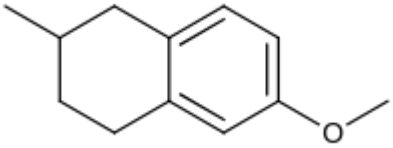
Question 74

View solution online

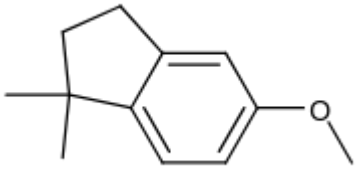
The major product of the following reaction is:



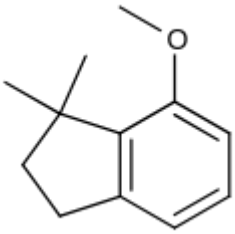
A.



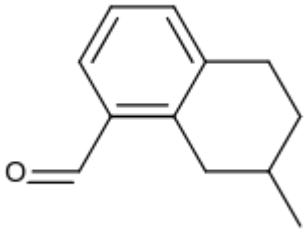
B.



C.



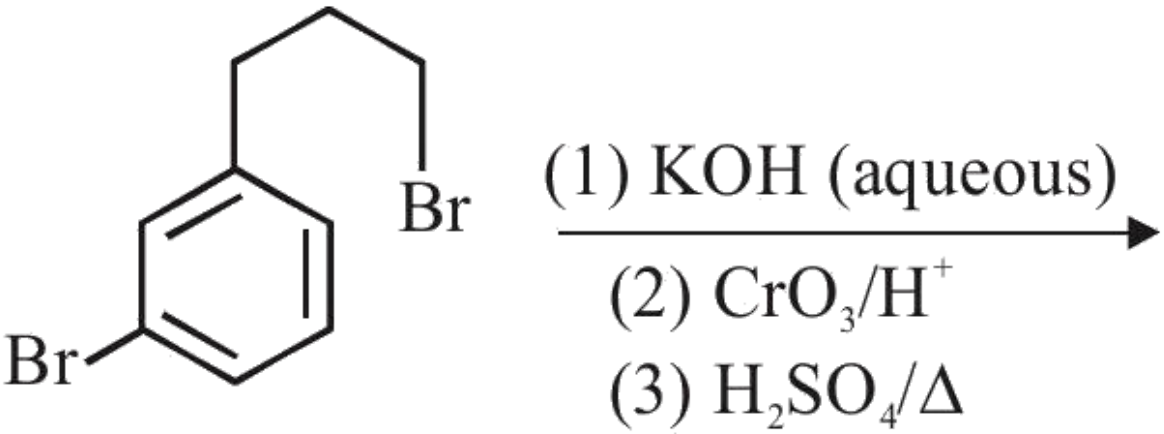
D.

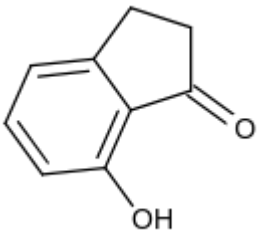


Question 75

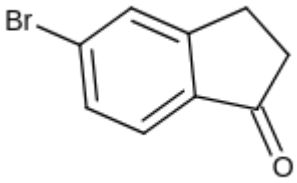
View solution online

The major product of the following reaction is:

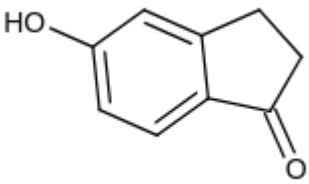




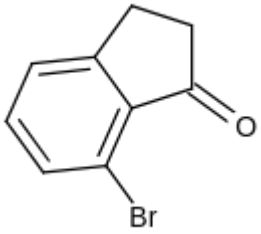
A.



B.



C.

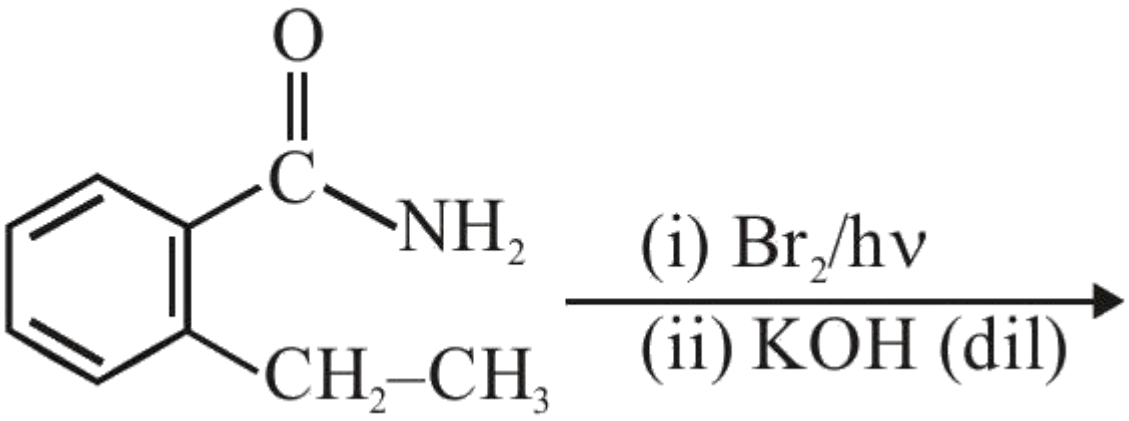


D.

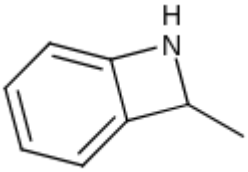
Question 76

View solution online

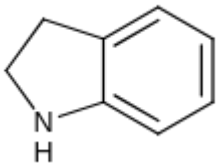
The major product of the following reaction is :



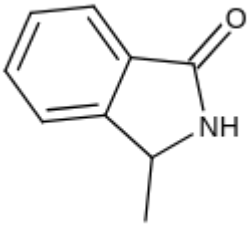
A.



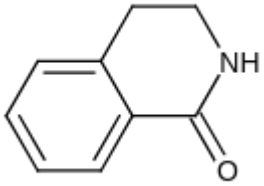
B.



C.



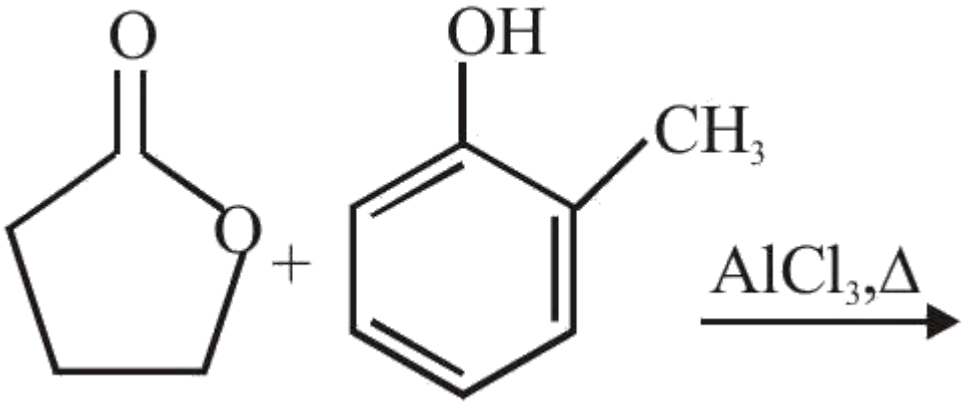
D.



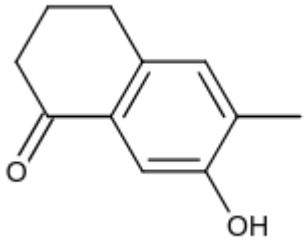
Question 77

View solution online

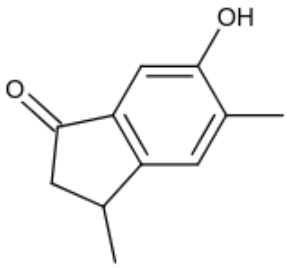
The major product of the following reaction is:



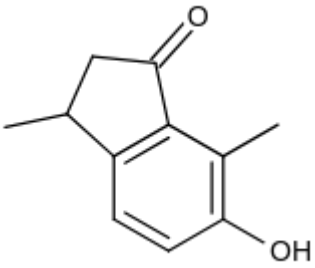
A.



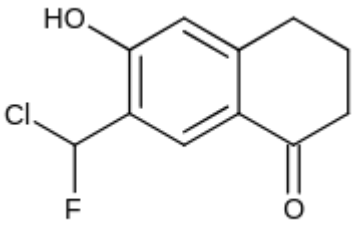
B.



C.

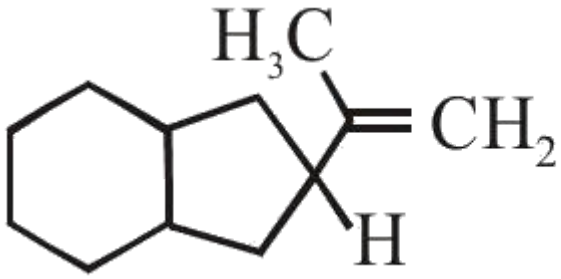


D.



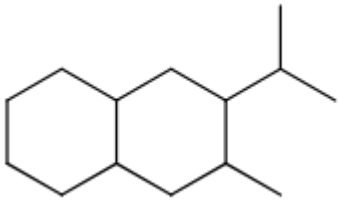
Question 78 View solution online

The major product of the following reaction is:

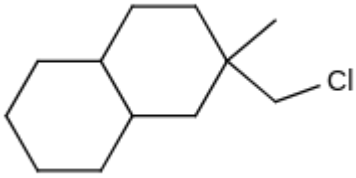


$\xrightarrow{HCl}$

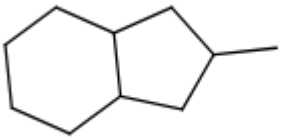
A.



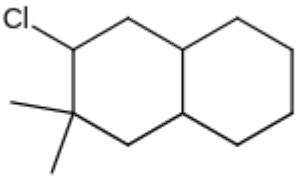
B.



C.

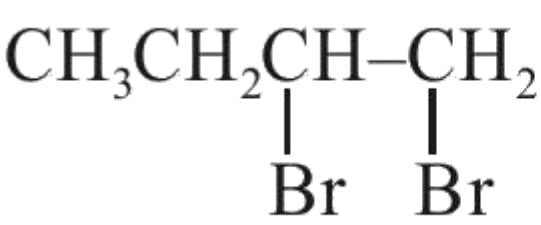


D.



Question 79 View solution online

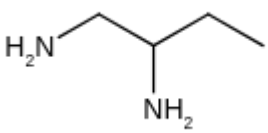
The major product of the following reaction is:



$\xrightarrow[\text{(ii) } NaNH_2 \text{ in liq } NH_3]{\text{(i) KOH alc.}}$

A. $CH_3CH_2C \equiv CH$

B.



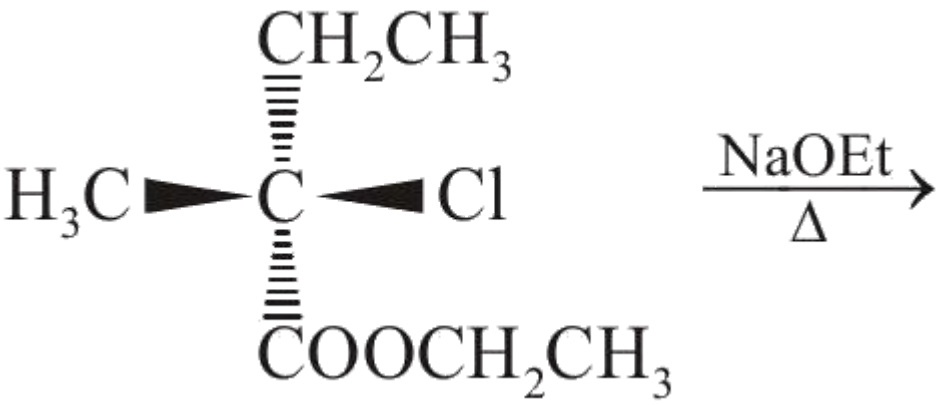
C. $CH_3CH = C = CH_2$

D. $CH_3CH = CHCH_2NH_2$

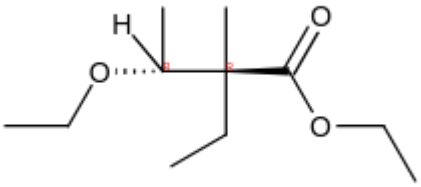
Question 80

View solution online

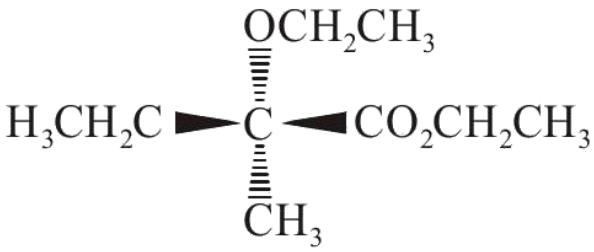
The major product of the following reaction is:



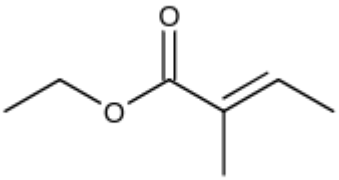
A.



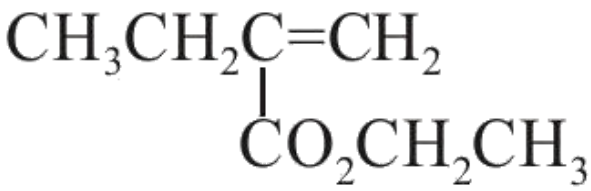
B.



C.



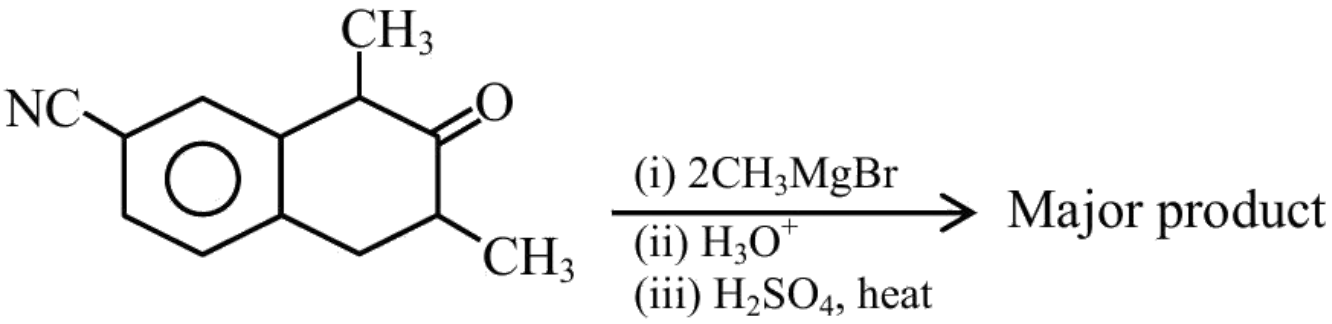
D.



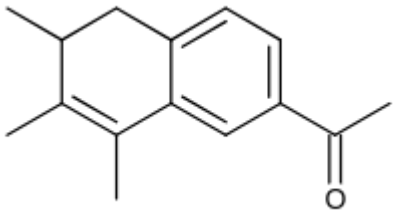
Question 81

View solution online

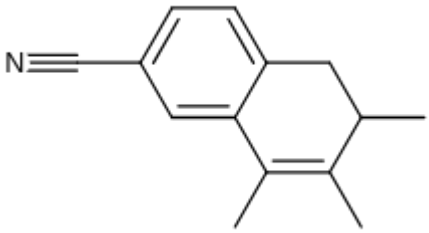
Which one of the following is the major product of the given reaction?



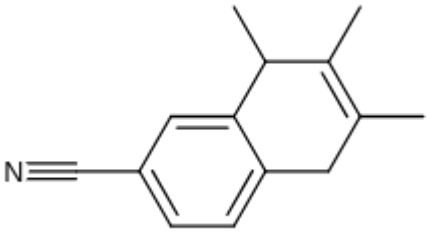
A.



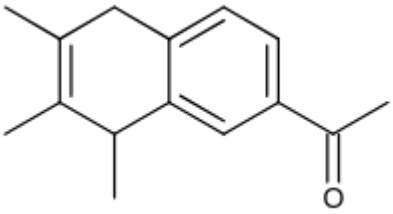
B.



C.



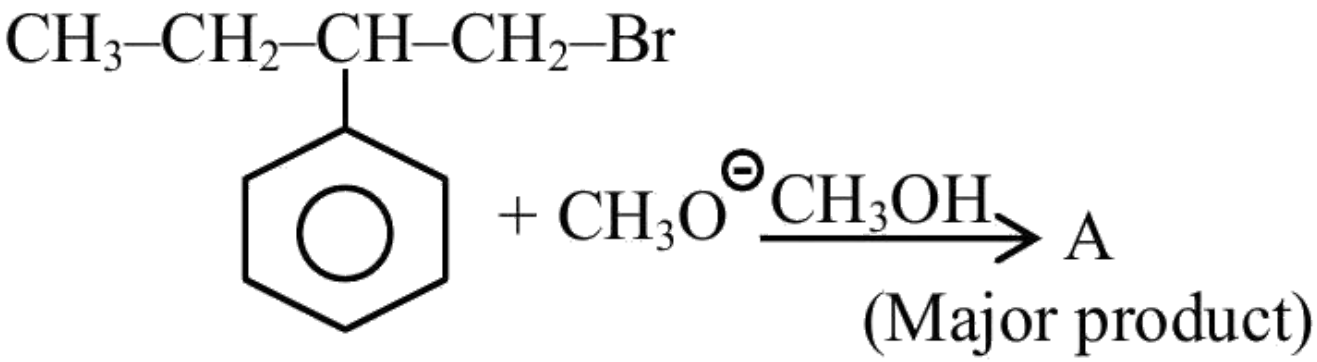
D.



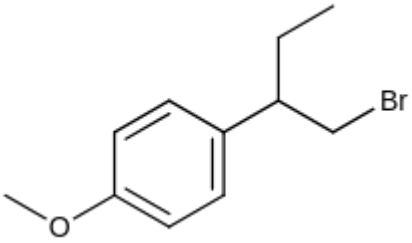
Question 82

View solution online

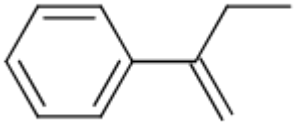
The major product (A) formed in the reaction given below is :



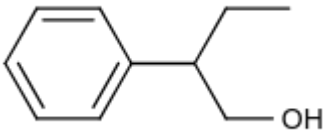
A.



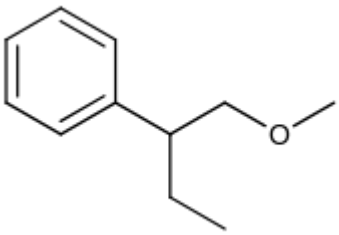
B.



C.

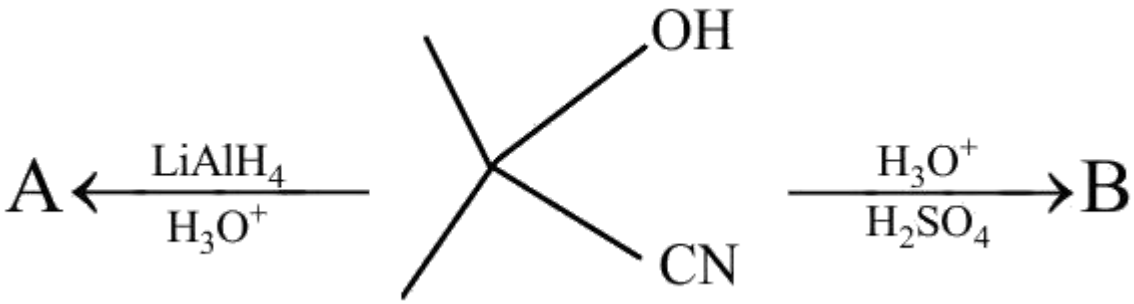


D.

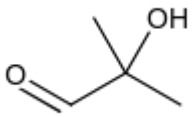


Question 83 View solution online

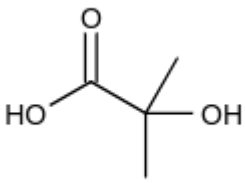
The major products A and B in the following set of reactions are :



A.



B.



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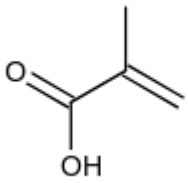
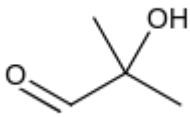
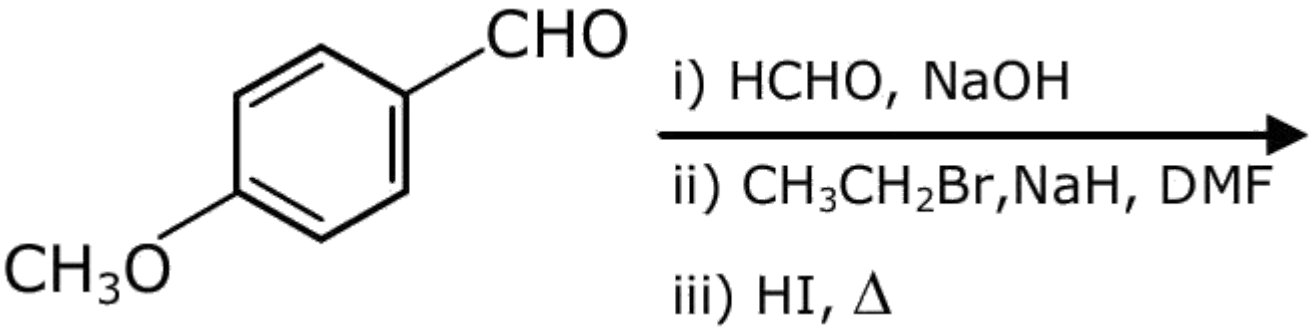


D.

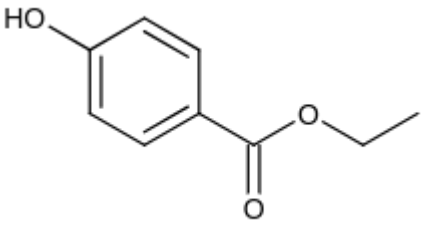


Question 84 View solution online

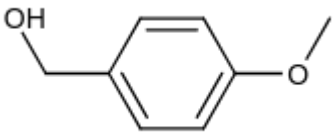
Identify A in the following chemical reaction.



A.



B.



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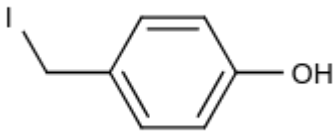
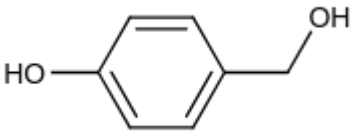


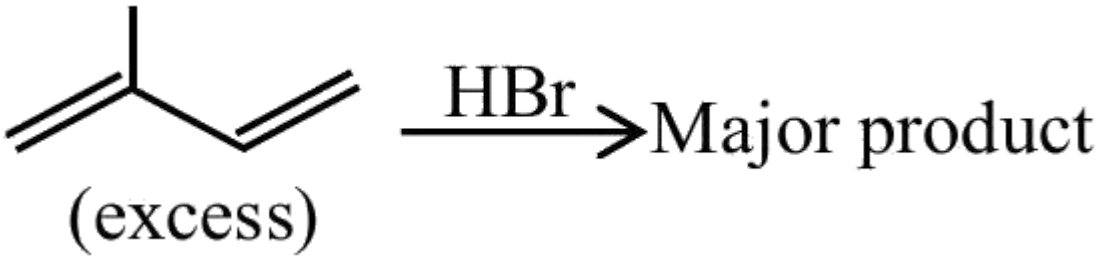
D.



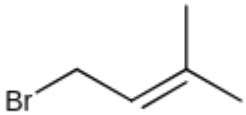
Question 85

View solution online

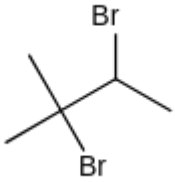
The major product formed in the following reaction is :



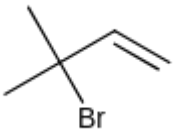
A.



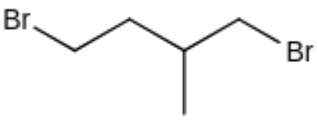
B.



C.

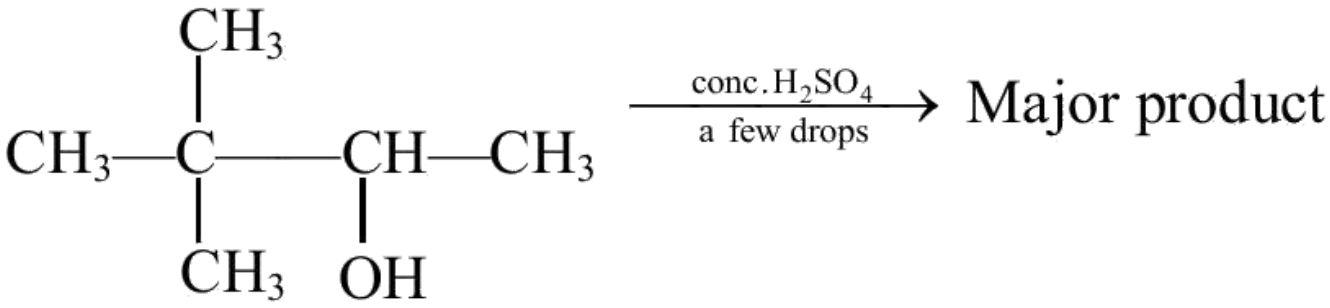


D.

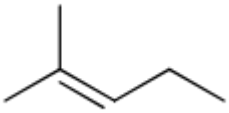


Question 86 View solution online

The major product formed in the following reaction is :



A.



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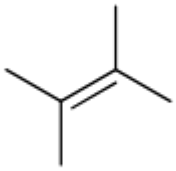

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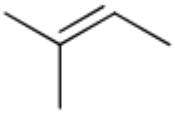
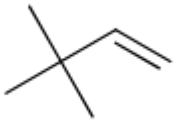


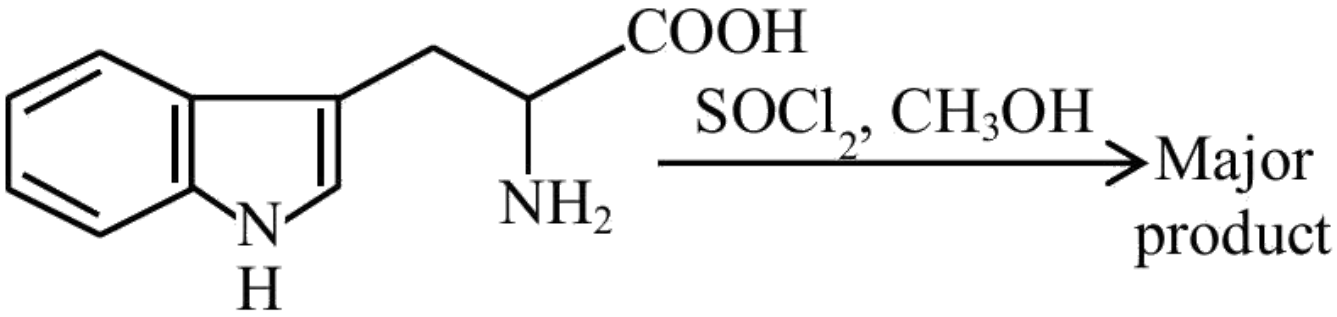
D.

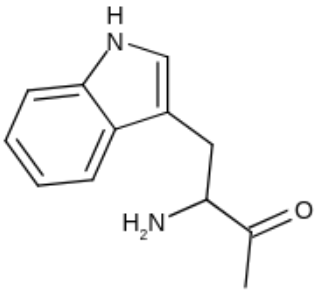


Question 87

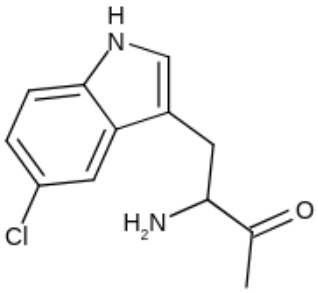
View solution online

The major product formed in the following reaction is :

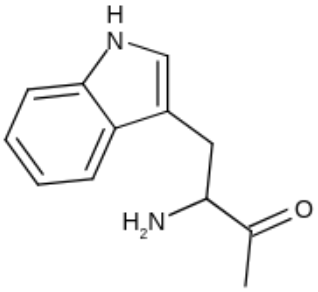




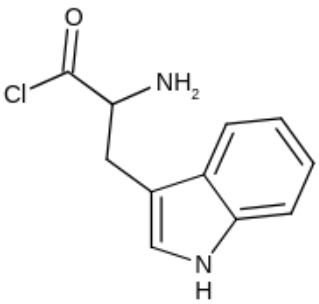
A.



B.



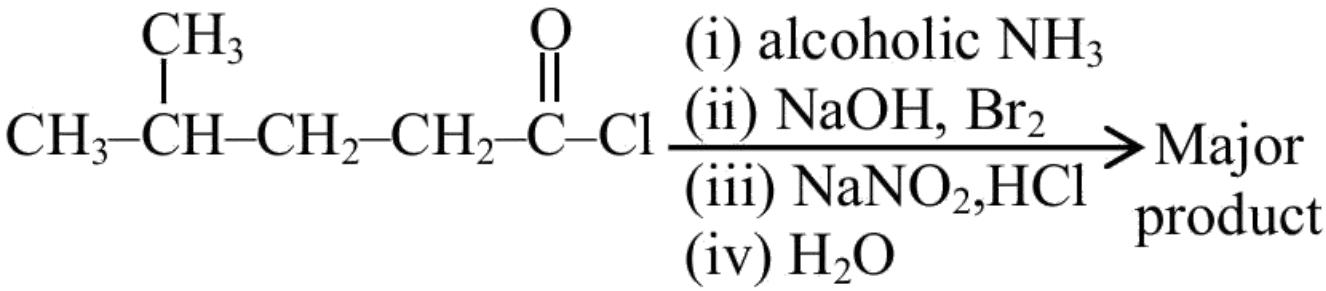
C.

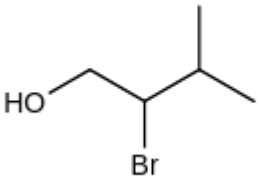


D.

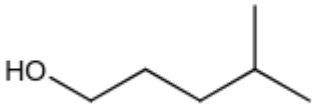
Question 88 View solution online

The major product of the following reaction is :

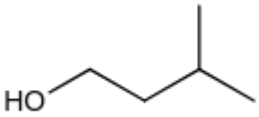




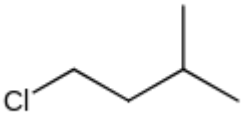
A.



B.



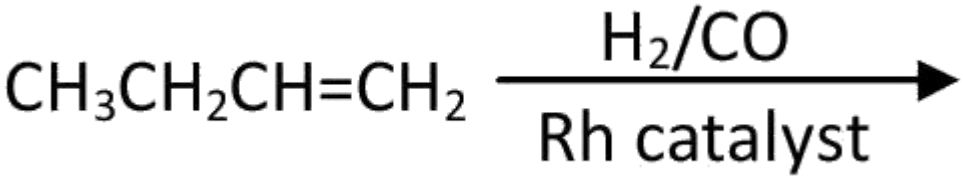
C.



D.

Question 89 View solution online

The major product of the following reaction is :



A. $CH_3CH_2CH_2CHO$

B. $CH_3CH_2CH = CH - CHO$

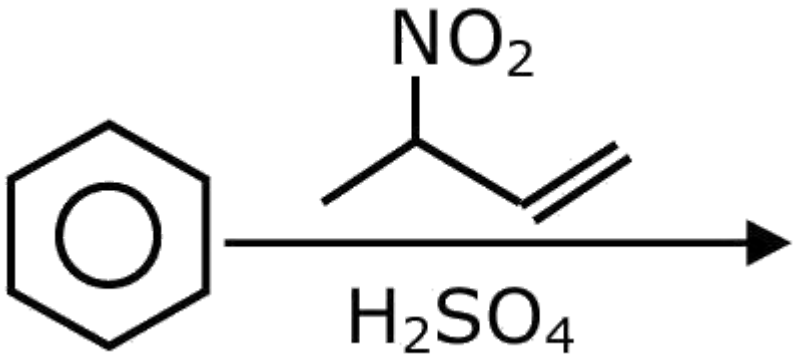
C. $CH_3CH_2CH_2CH_2CHO$

D. $CH_3CH_2C = CH_2$

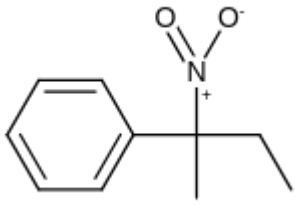
Question 90

View solution online

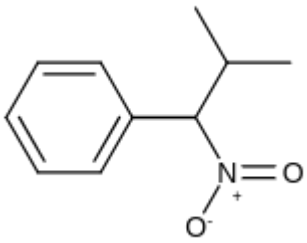
The major product of the following reaction is :



A.



B.



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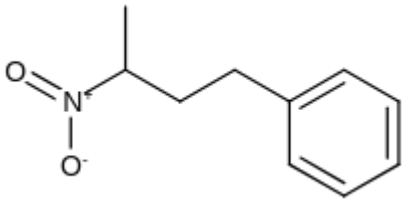
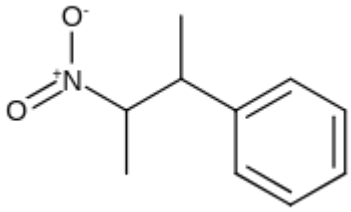
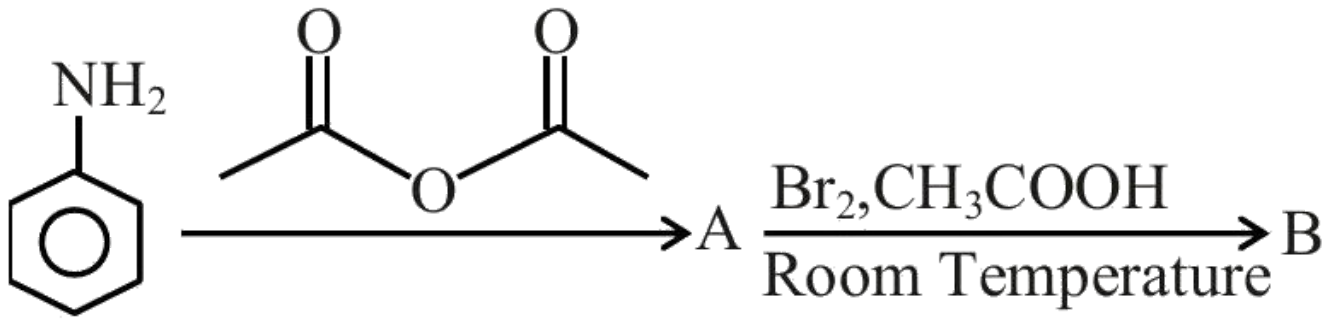


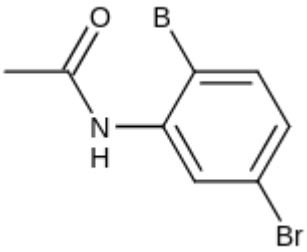
D.



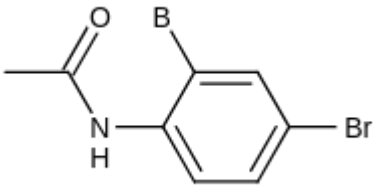
Question 91 View solution online

The major products A and B formed in the following reaction sequence are :



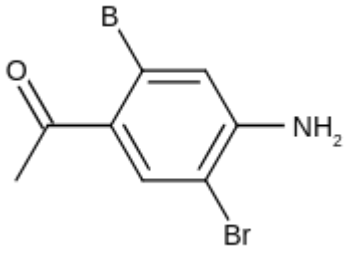


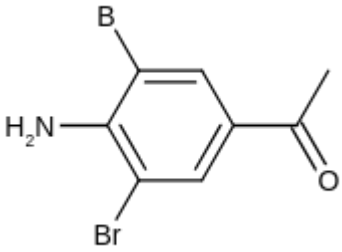
A.



B.

C. ,

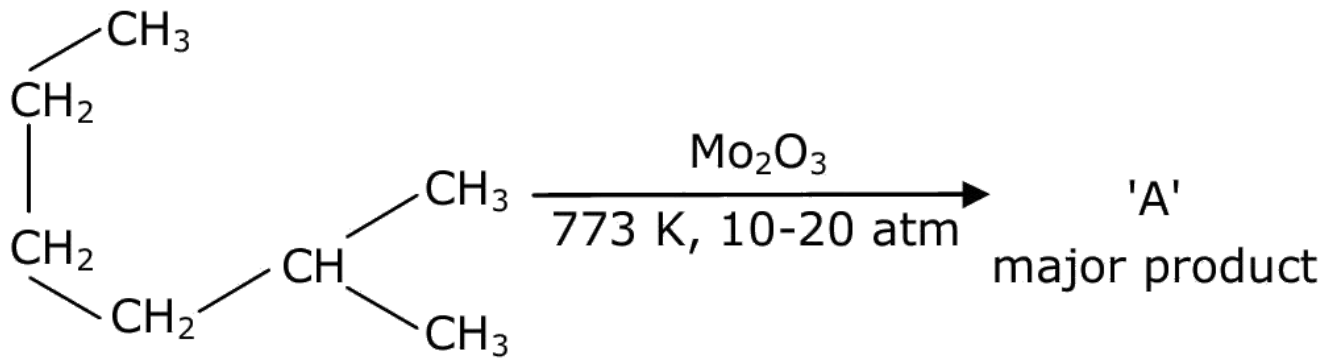




D.

Question 92 View solution online

Identify A in the given chemical reaction.



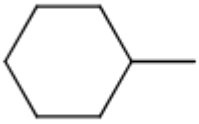
A.



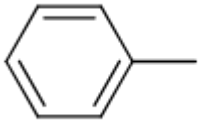
B.



C.

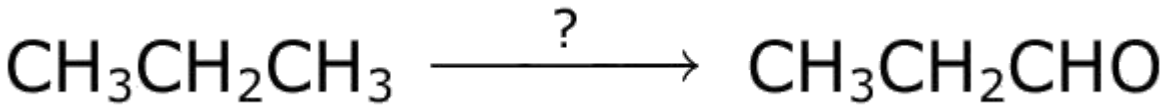


D.



Question 93 View solution online

Which of the following reagent is used for the following reaction?



A. Potassium permanganate

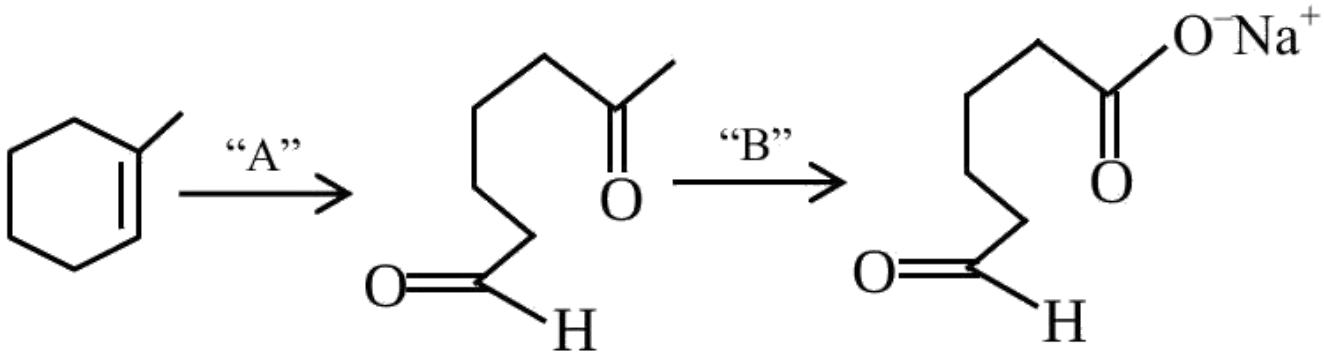
B. Molybdenum oxide

C. Copper at high temperature and pressure

D. Manganese acetate

Question 94 View solution online

In the above chemical reaction sequence "A" and " B " respectively are :



A. $O_3, Zn/H_2O$ and $NaOH_{(alc.)}$ /I_2

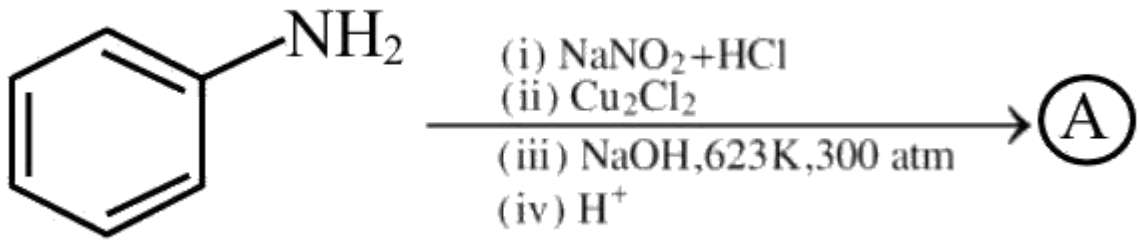
B. $H_2O, H^+$and $NaOH_{(alc.)}$ /I_2

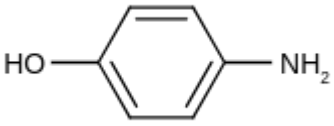
C. $H_2O, H^+$and $KMnO_4$

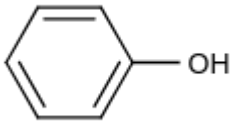
D. $O_3, Zn/H_2O$ and $KMnO_4$

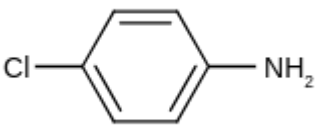
Question 95 View solution online

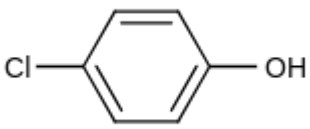
Identify the product (A) in the following reaction.



A. 

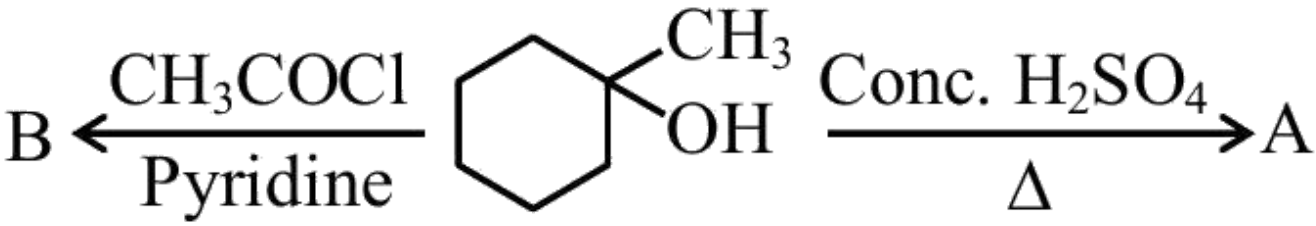
B. 

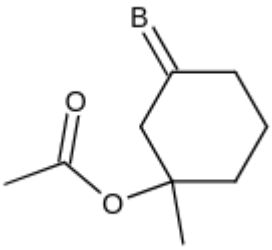
C. 

D. 

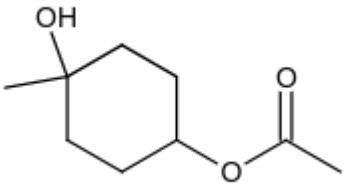
Question 96 View solution online

Identify the major products A and B respectively in the following set of reactions.

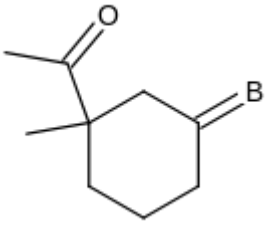




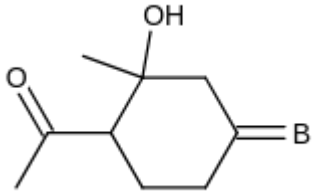
A.



B.



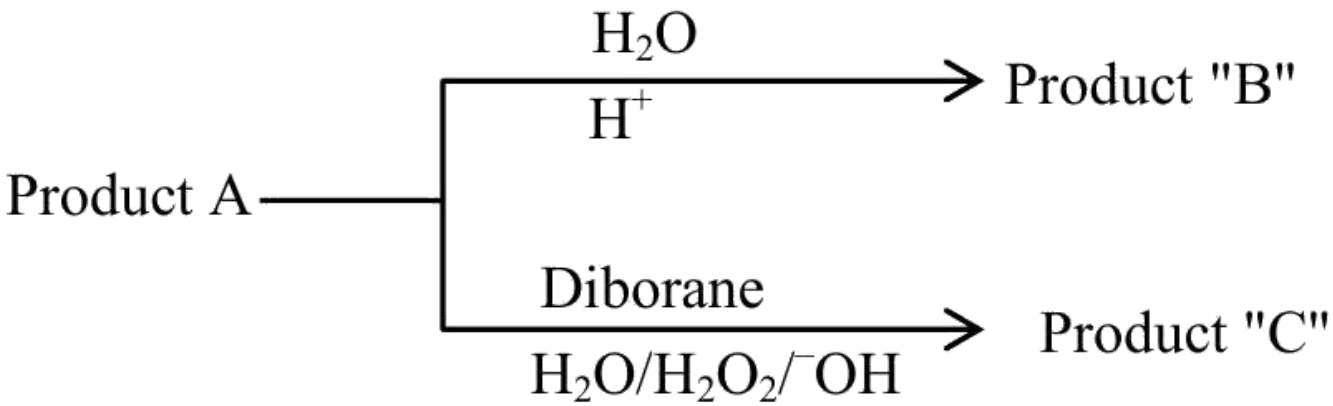
C.



D.

Question 97 View solution online

Consider the above reactions, identify product B and product C .



A. B = C = 2-Propanol

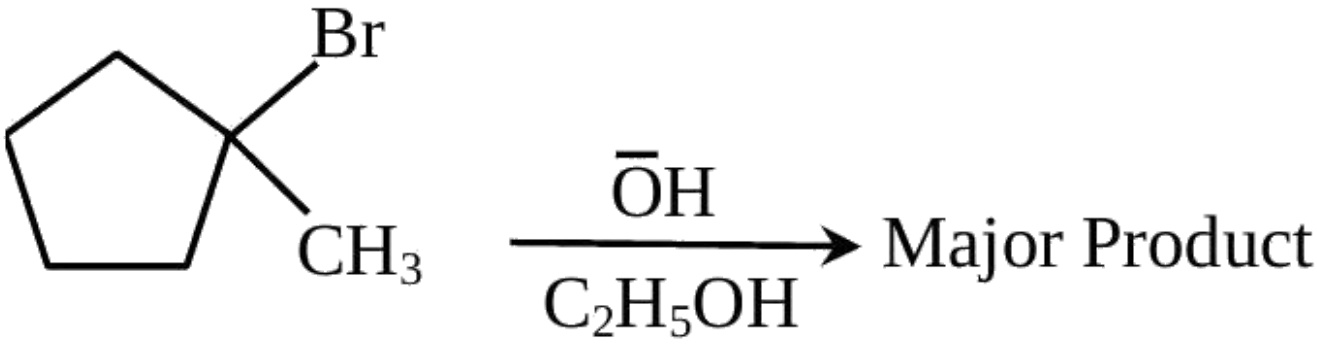
B. B = 2-Propanol C = 1-Propanol

C. B = 1-Propanol C = 2-Propanol

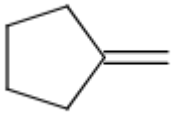
D. B = C = 1-Propanol

Question 98 View solution online

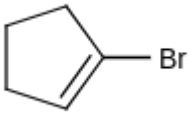
Identify the major product in the following reaction.



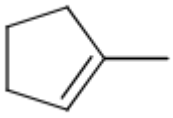
A.



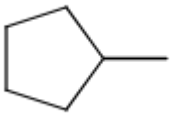
B.



C.

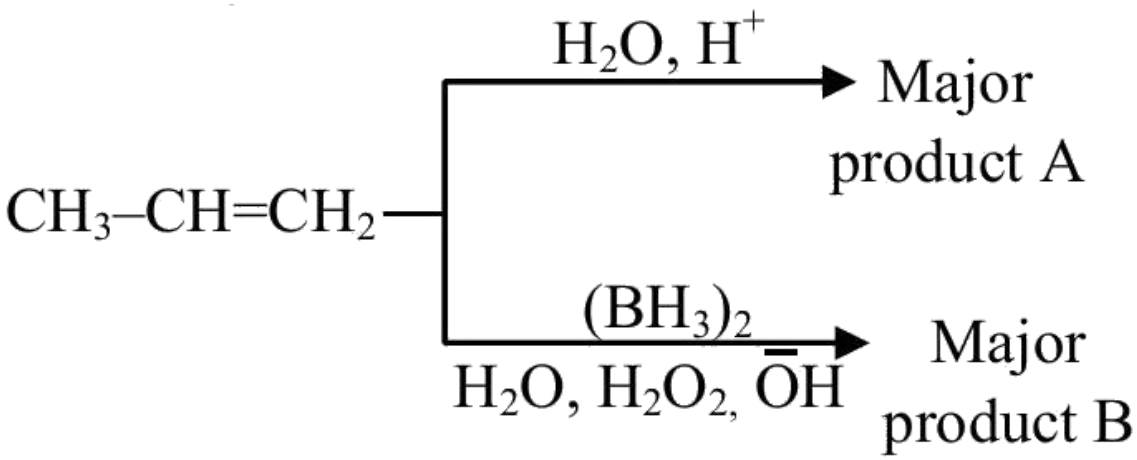


D.



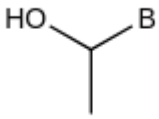
Question 99 View solution online

Identify the product A and product B in the following set of reactions.



A. $A - CH_3CH_2CH_2 - OH, B - CH_3CH_2CH_2 - OH$

B. $A - CH_3CH_2CH_2 - OH$,



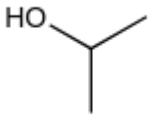
C. (2) Hydroboration Oxidation Reaction :}

(B)

$$3CH_3–CH=CH_2 + B_2H_6 \xrightarrow{THF} 2(CH_3CH_2CH_2)_3B$$

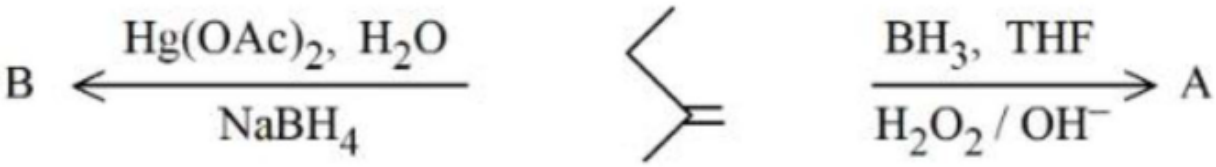
$$(CH_3CH_2CH_2)_3B + 3H_2O_2 \xrightarrow{OH^-} \underset{(B)}{3CH_3CH_2CH_2OH} + H_3BO_3$$

D. (3)



Question 100 View solution online

Find out the major products from the following reaction



A. 

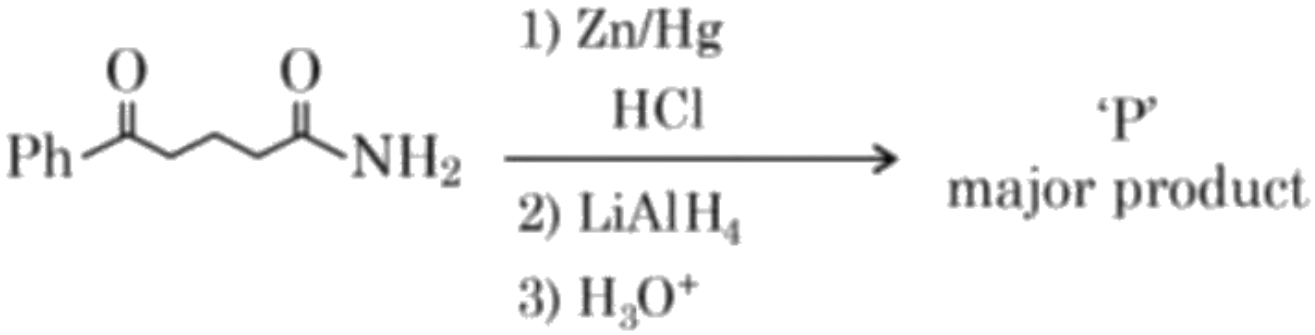
B. 

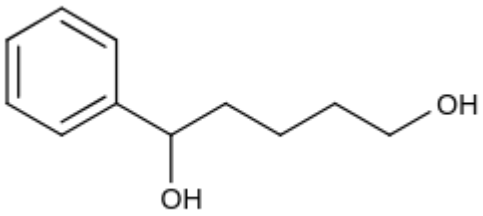
C. 

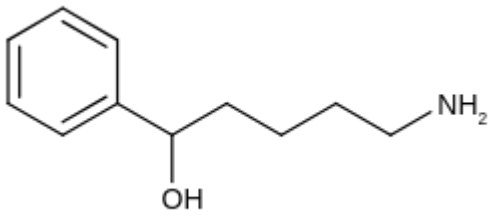
D. 

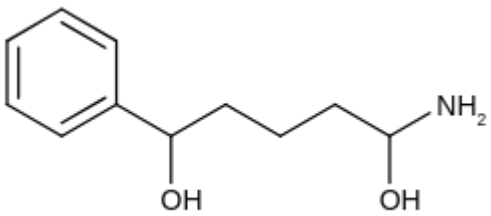
Question 101 View solution online

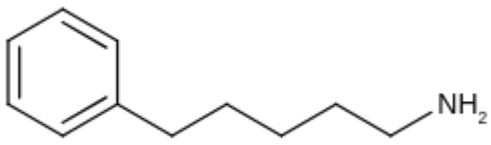
The major product ' P ' for the following sequence of reactions is:



A. 

B. 

C. 

D. 

Question 102 View solution online

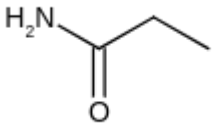
Consider the given reaction, identify the major product P .

$$CH_3-COOH \xrightarrow[(iv)\ H_2O/\bar{O}H,\Delta]{(i)\ LiAlH_4 \quad (ii)\ PCC \quad (iii)\ HCN/\bar{O}H} \text{"P"}$$

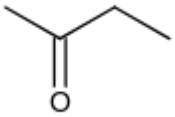
A.



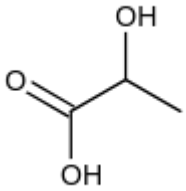
B.



C.



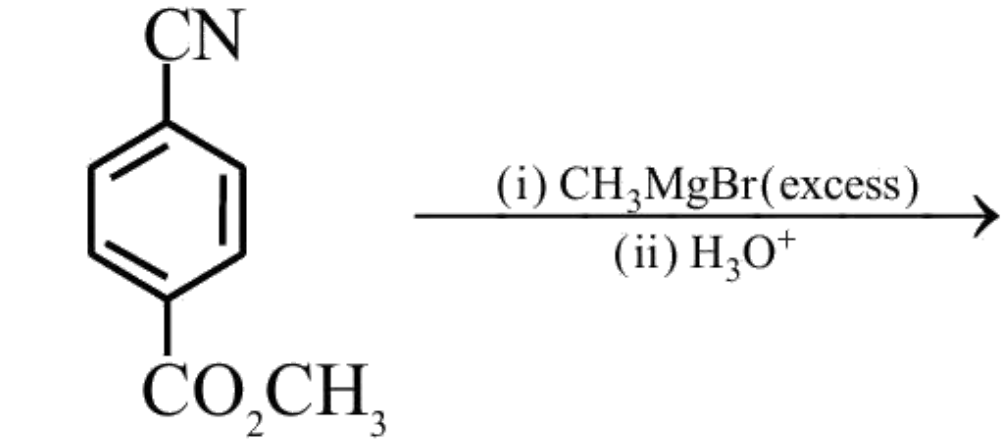
D.

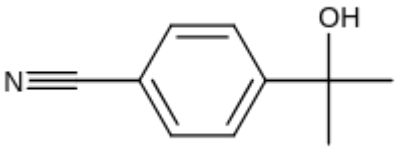


Question 103

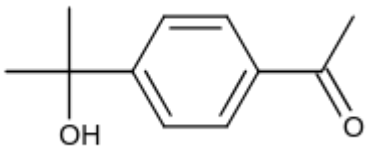
View solution online

Major product of the following reaction is

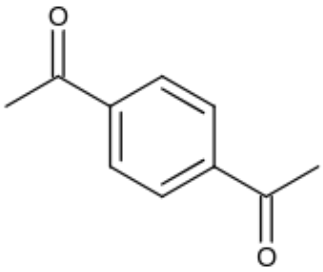




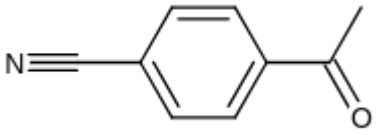
A.



B.



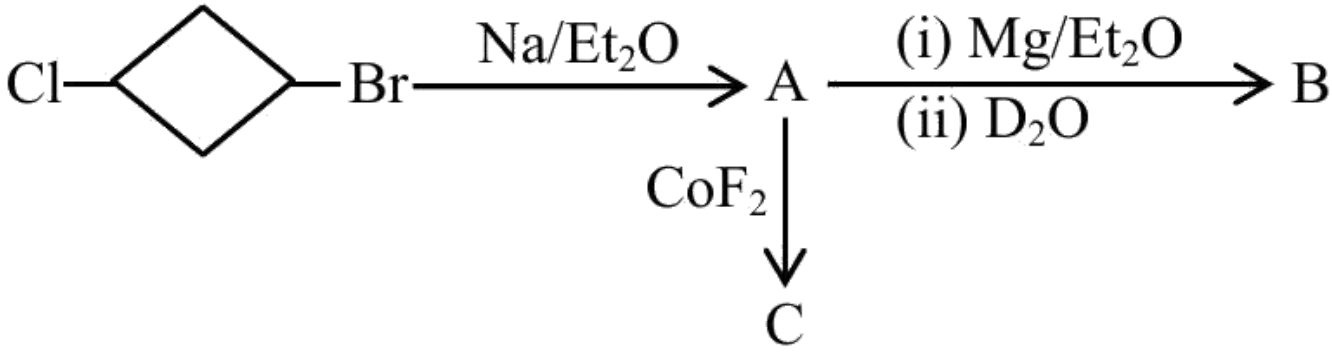
C.



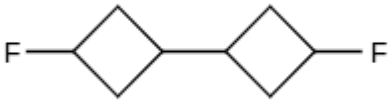
D.

Question 104 View solution online

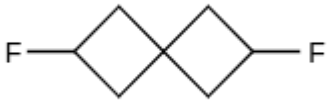
In the following sequence of reaction, the major products B and C respectively are :



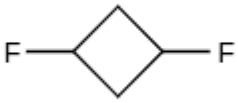
A.



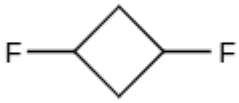
B.



C.

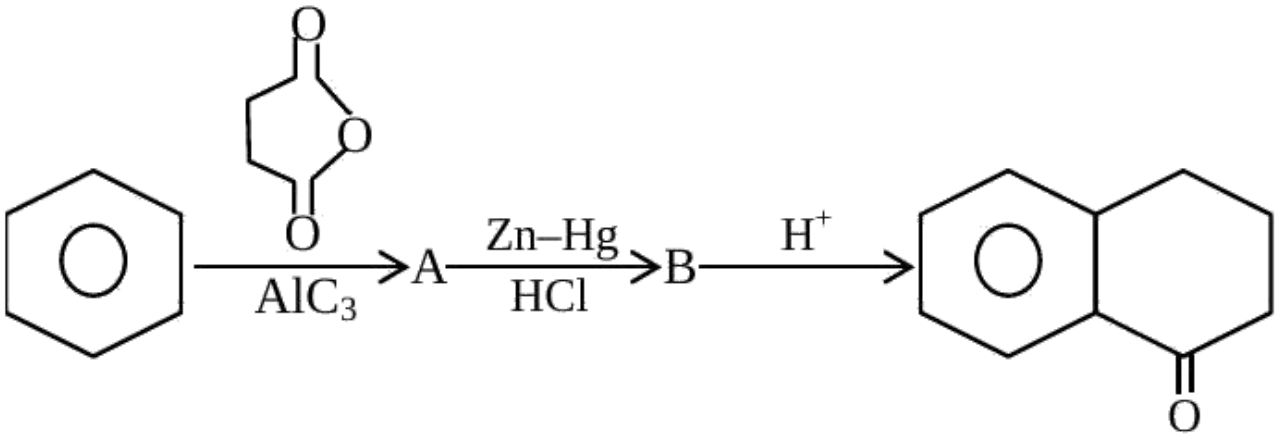


D.

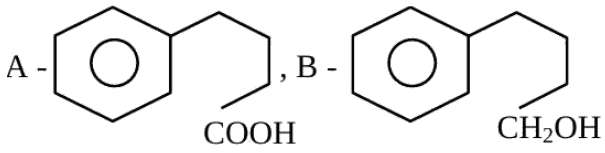


Question 105 View solution online

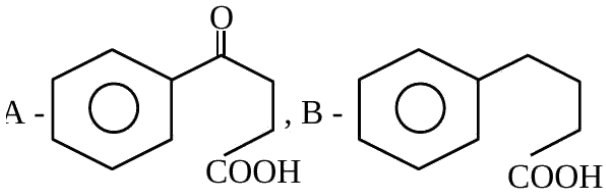
Identify A and B in the given chemical reaction sequence : -



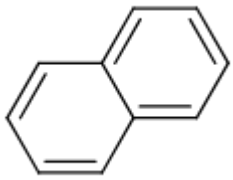
A.



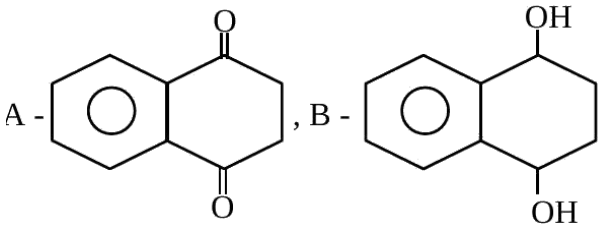
B.



C.



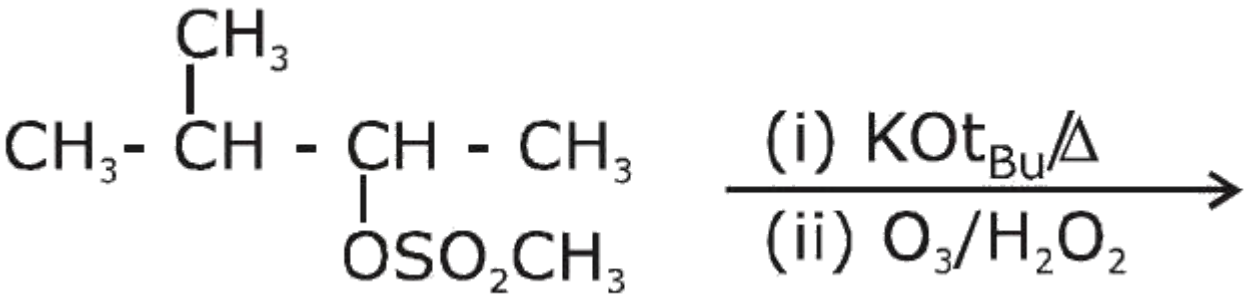
D.



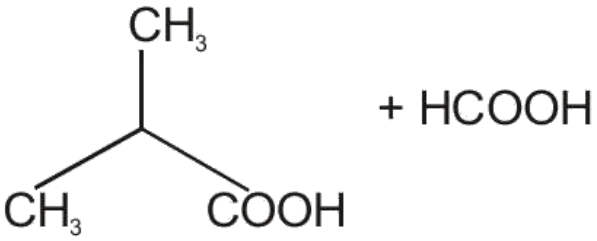
Question 106

View solution online

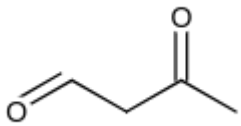
The major products of the following reactions are :



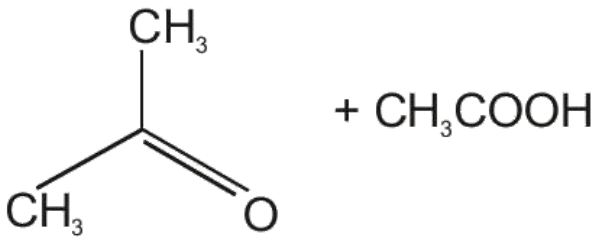
A.



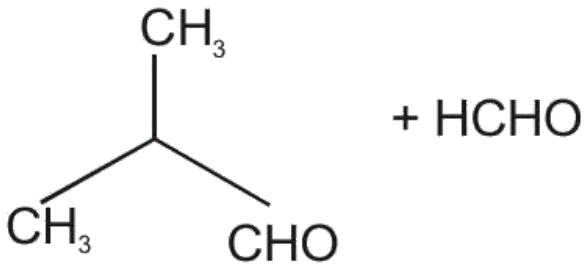
B.



C.

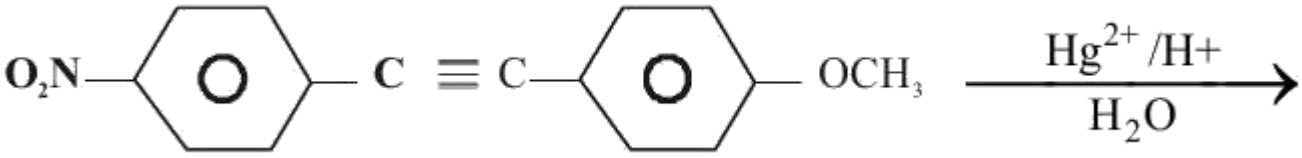


D.

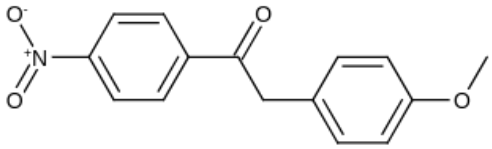


Question 107 View solution online

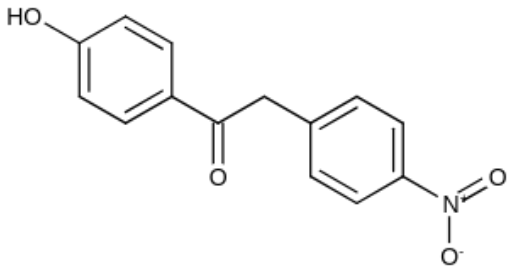
The major product obtained from the following reactions is :



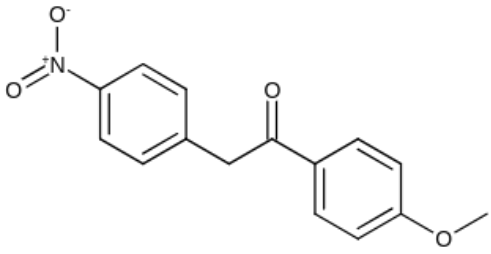
A.



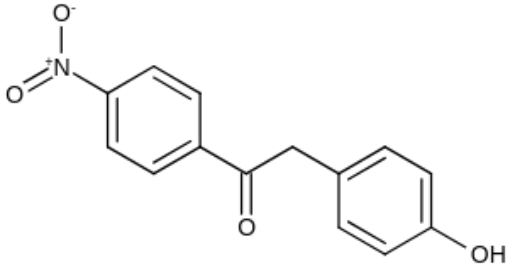
B.



C.

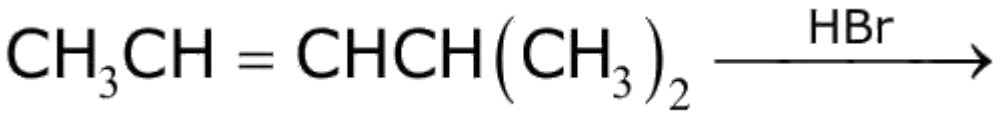


D.



Question 108 View solution online

The major product formed in the following reaction is :



A. $CH_3CH(Br)CH_2CH(CH_3)_2$

B. $CH_3CH_2CH_2C(Br)(CH_3)_2$

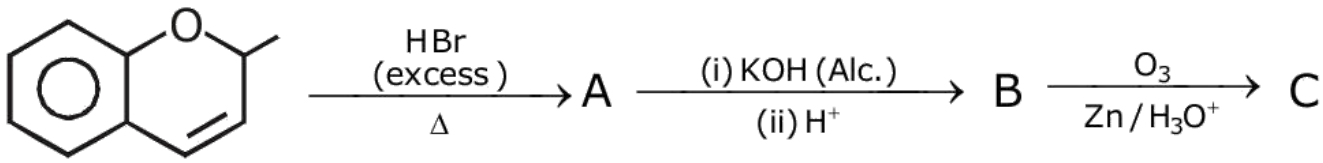
C. $CH_3CH_2CH(Br)CH(CH_3)_2$

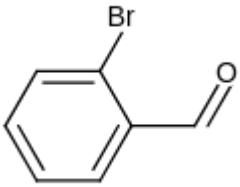
D. $Br(CH_2)_3CH(CH_3)_2$

Question 109

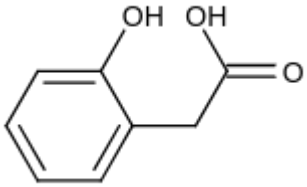
View solution online

The major aromatic product C in the following reaction sequence will be :

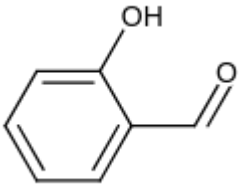




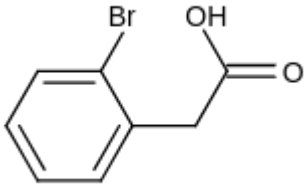
A.



B.



C.

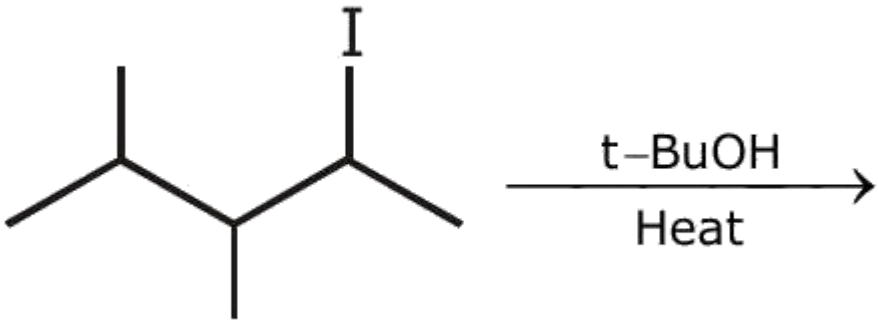


D.

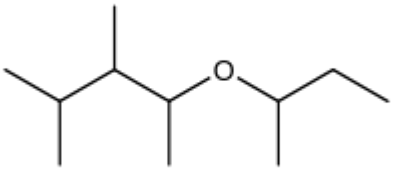
Question 110

View solution online

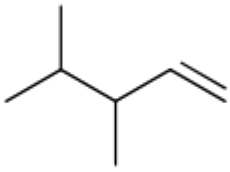
The major product in the following reaction is:



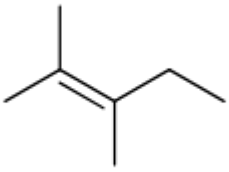
A.



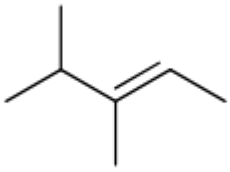
B.



C.



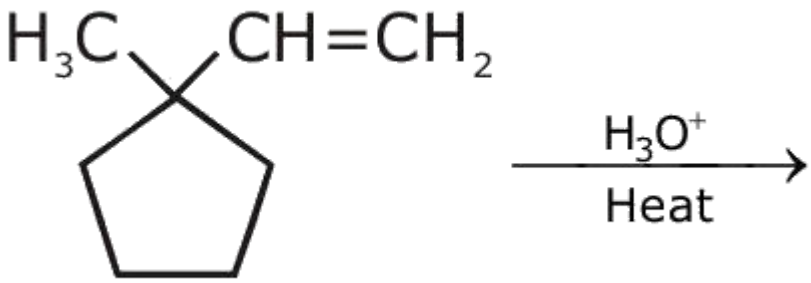
D.



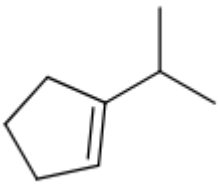
Question 111

View solution online

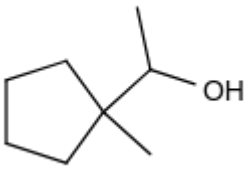
The major product in the following reaction is:



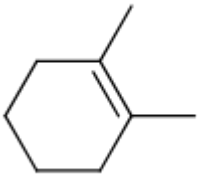
A.



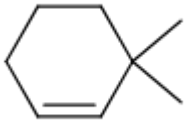
B.



C.



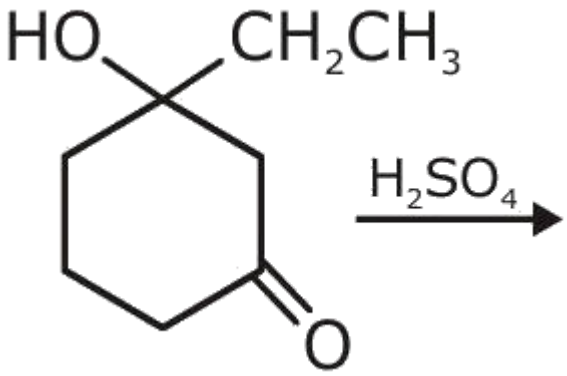
D.



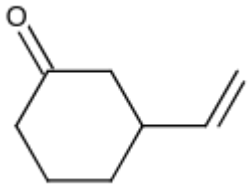
Question 112

View solution online

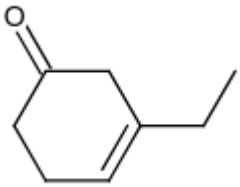
The major product of the following reaction is:



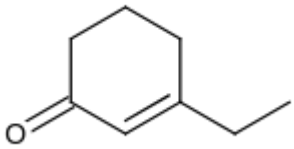
A.



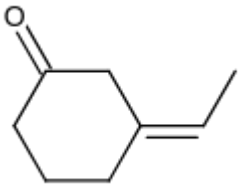
B.



C.

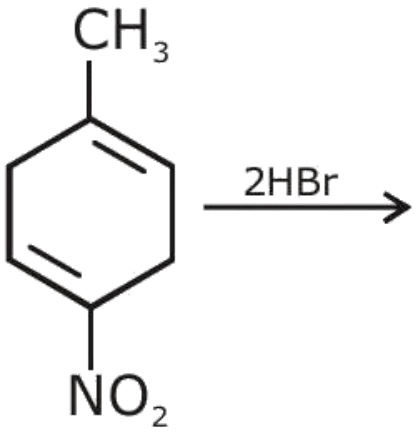


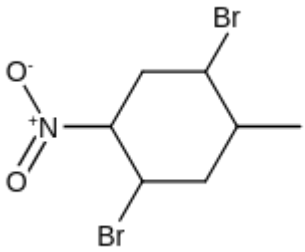
D.



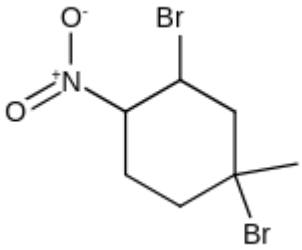
Question 113 View solution online

The major product of the following reaction is:

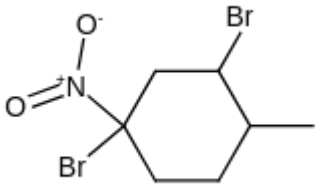




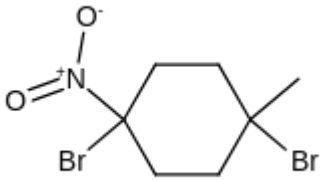
A.



B.



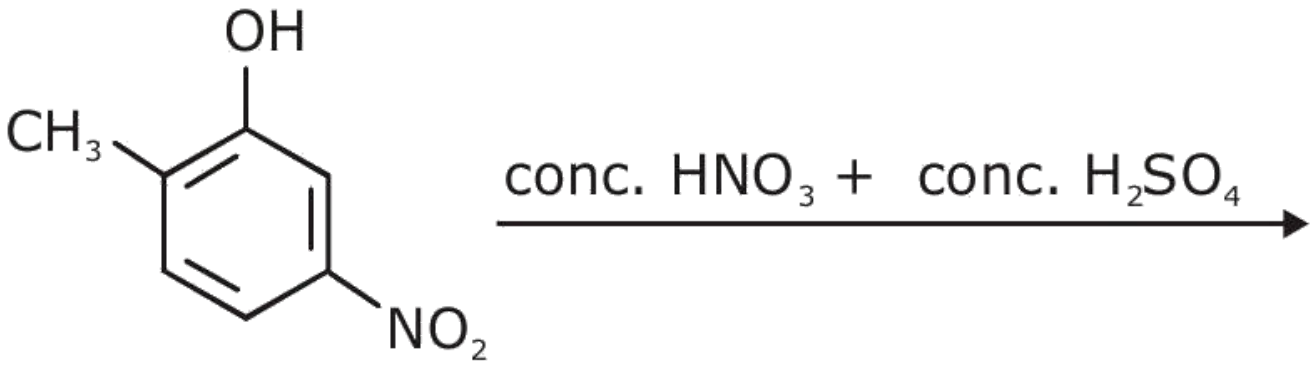
C.



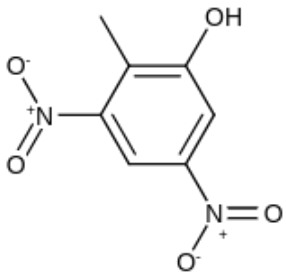
D.

Question 114 View solution online

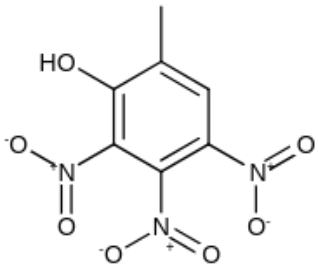
The major product of the following reaction is :



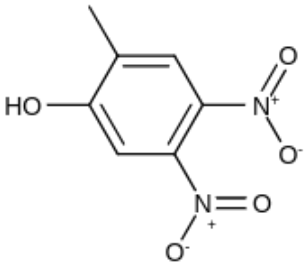
A.



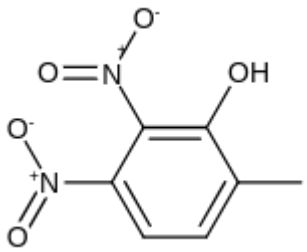
B.



C.

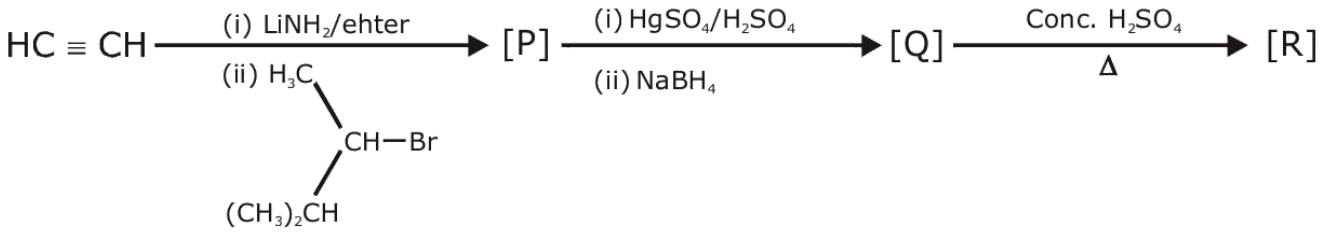


D.

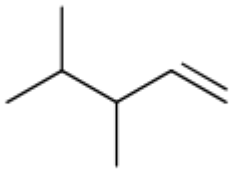


Question 115 View solution online

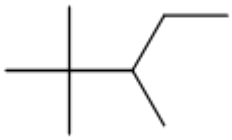
The major product $[R]$ in the following sequence of reactions is :



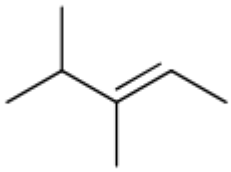
A.



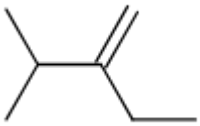
B.



C.

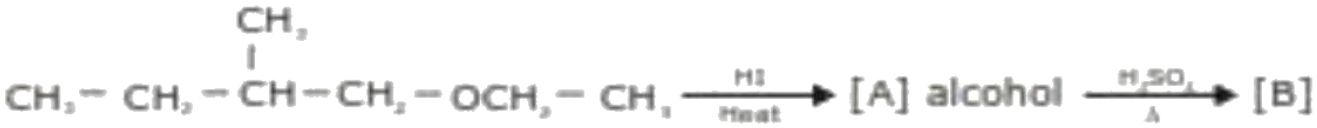


D.

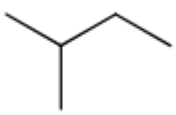


Question 116 View solution online

The major product $[B]$ in the following reactions is :

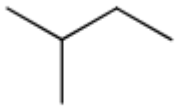


A. $CH_3 - CH_2 - CH = CH - CH_3$



B.

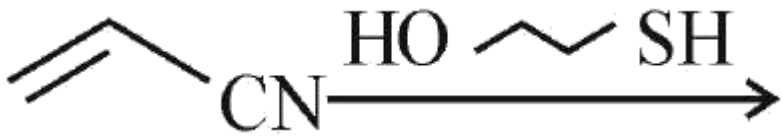
D. $CH_2 = CH_2$



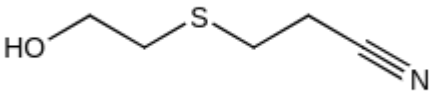
C.

Question 117 View solution online

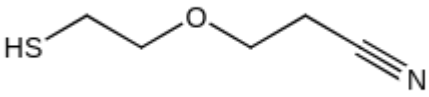
The major product for the following reaction is:



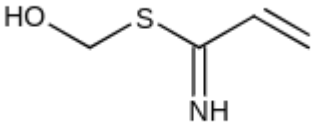
A.



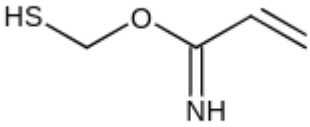
B.



C.



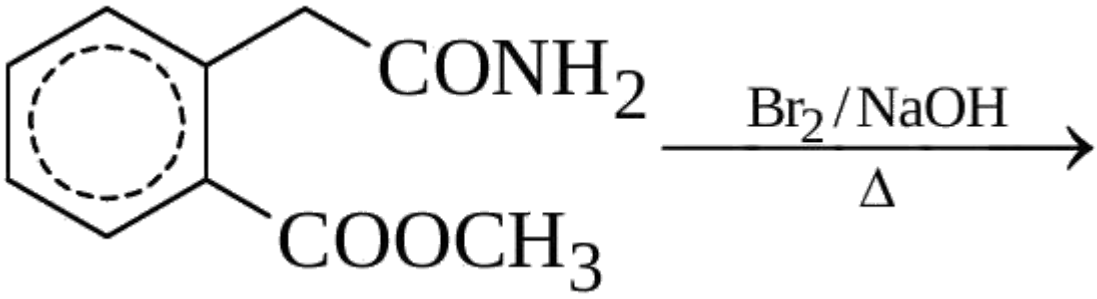
D.



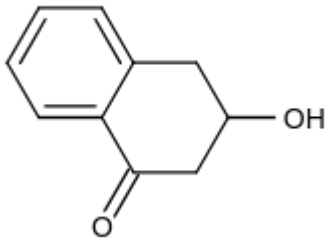
Question 118

View solution online

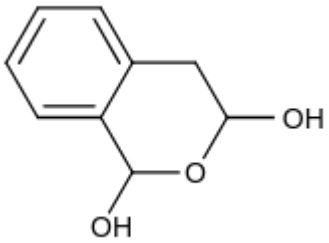
The major product formed in the following reaction is



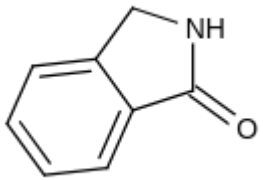
A.



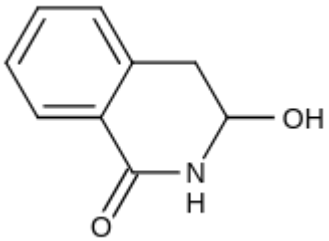
B.



C.

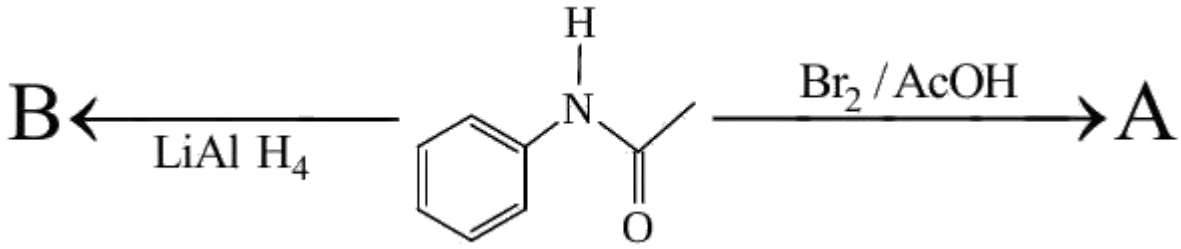


D.

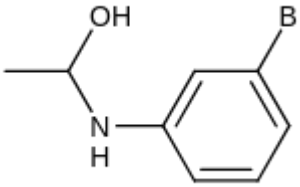


Question 119 View solution online

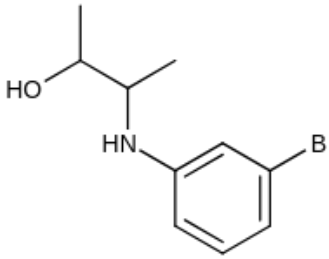
The major products A and B from the following reactions are:



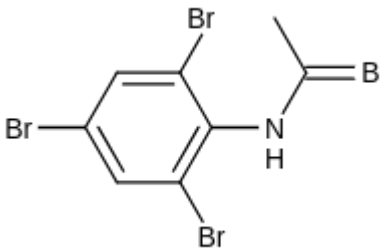
A.



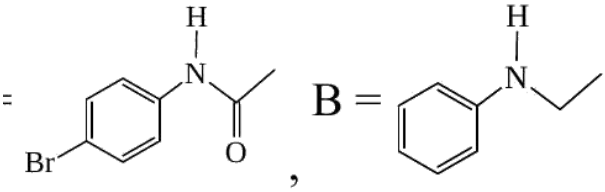
B.



C.

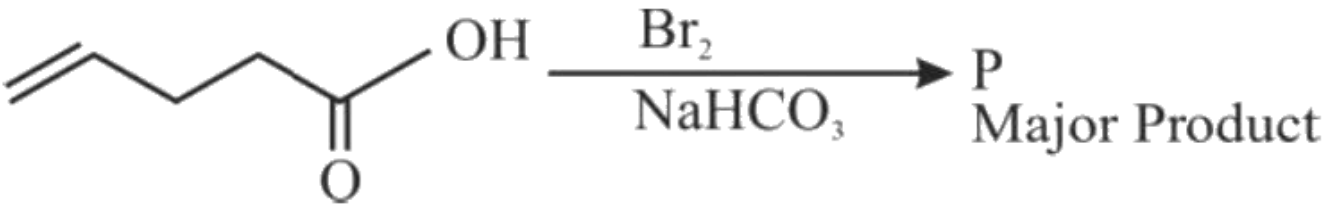


D.

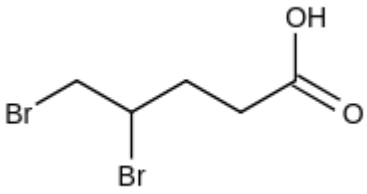


Question 120 View solution online

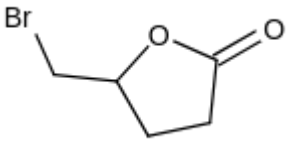
Major product ' P ' formed in the following reaction is :-



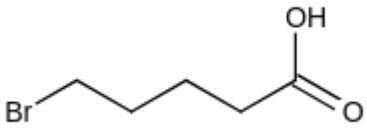
A.



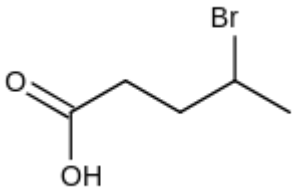
B.



C.

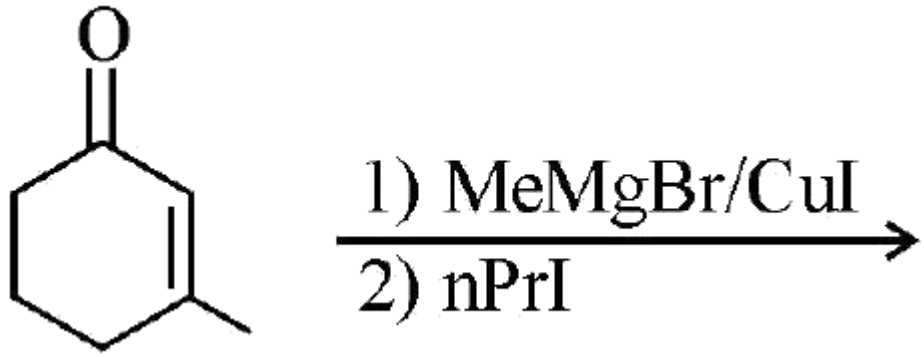


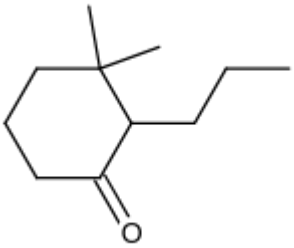
D.



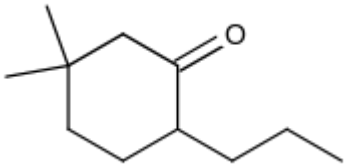
Question 121 View solution online

Find out the major product from the following reaction

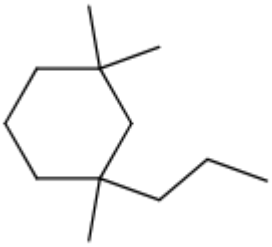




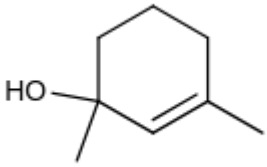
A.



B.



C.

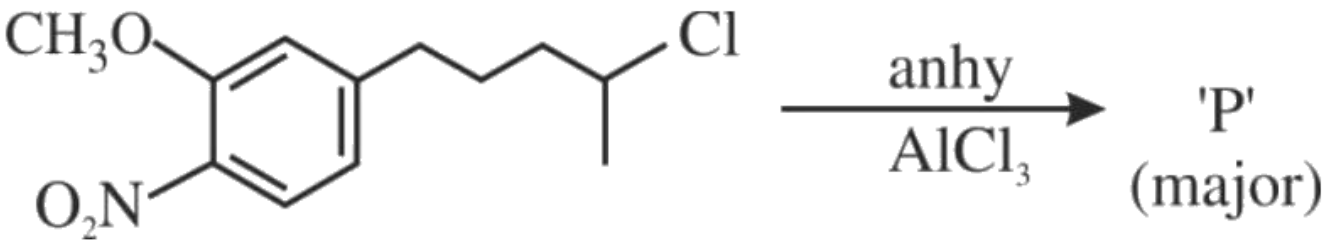


D.

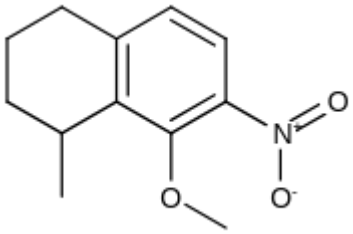
Question 122

View solution online

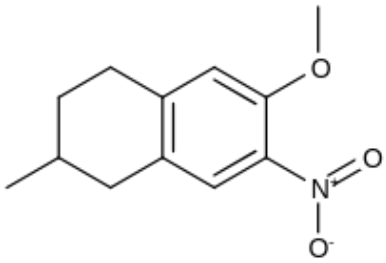
The major product ' P ' formed in the given reaction is:



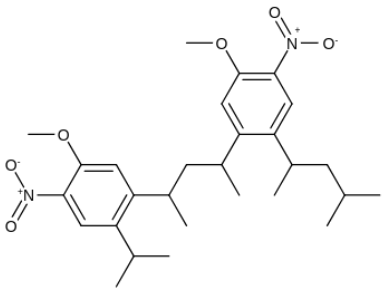
A.



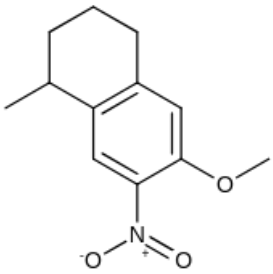
B.



C.



D.



Question 123

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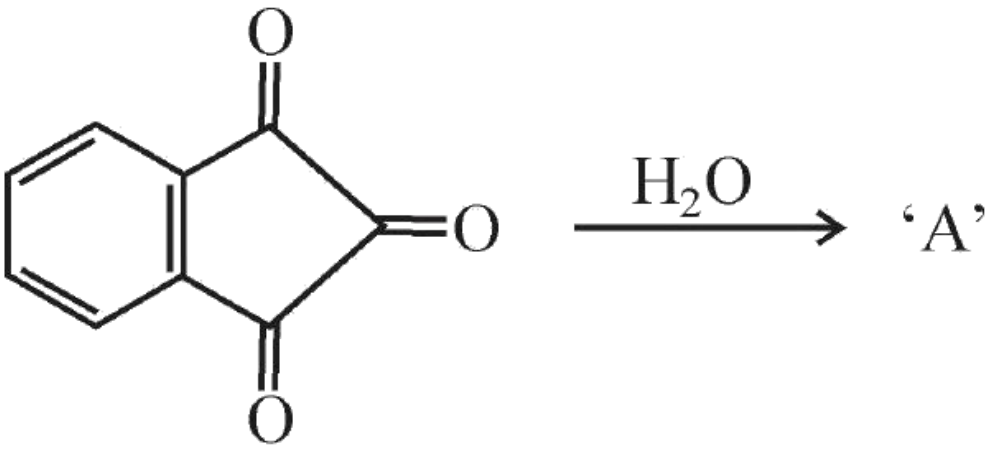
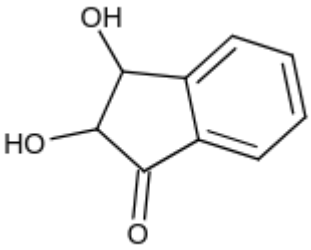
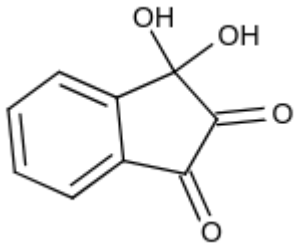
major product ' A ' formed in the above reaction is

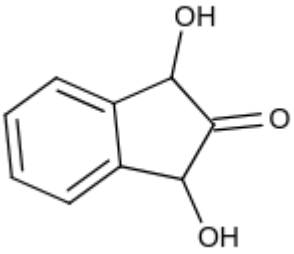




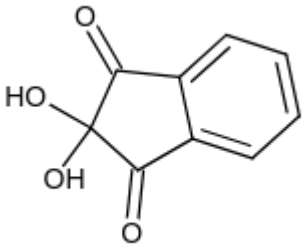
A.



B.



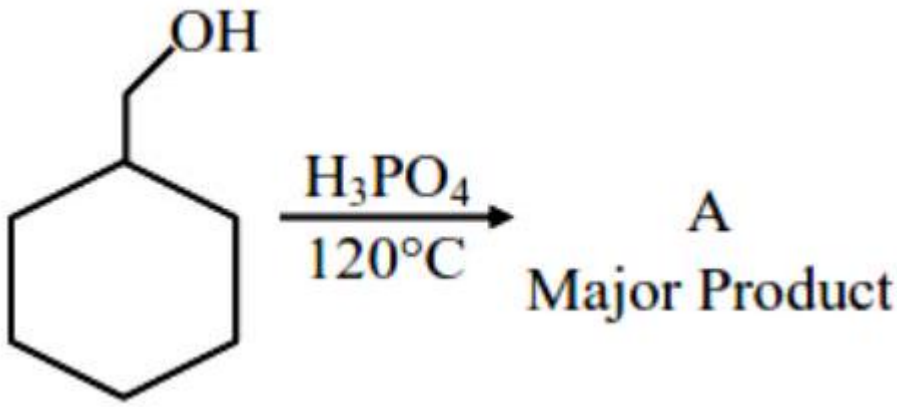
C.



D.

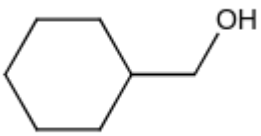
Question 124

View solution online



$$\xrightarrow[H_2O_2/O\bar{H},H_2O]{(BH_3)_2} \underset{\text{Major Product}}{P}$$

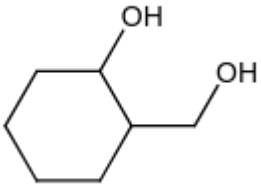
Consider the above reaction and identify the Product P :



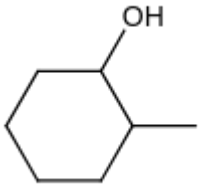
A.



B.



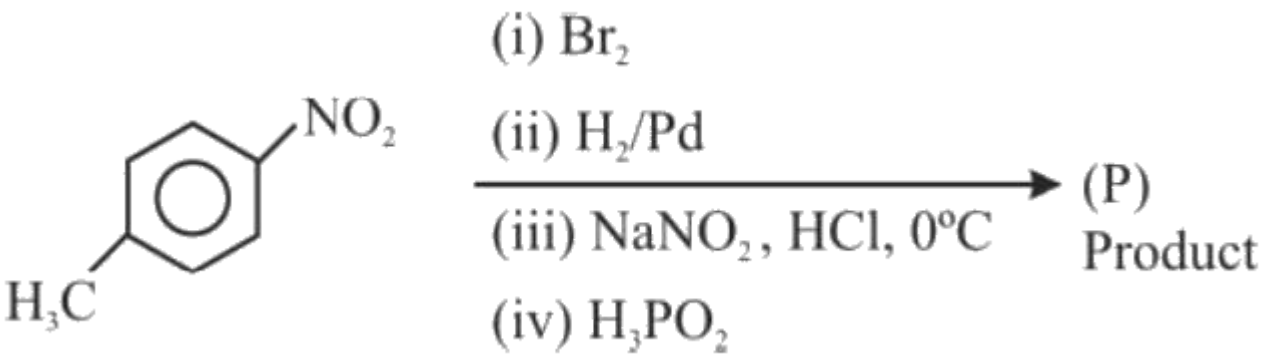
C.



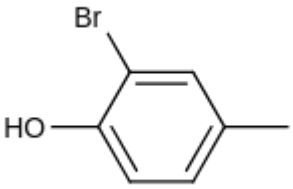
D.

Question 125 View solution online

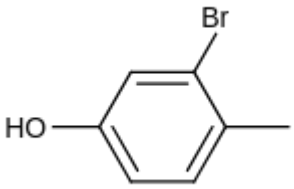
The product (P) formed from the following multistep reaction is :-



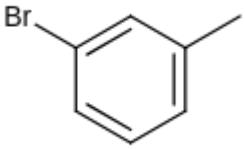
A.



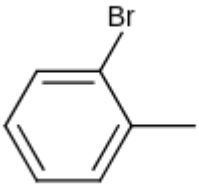
B.



C.

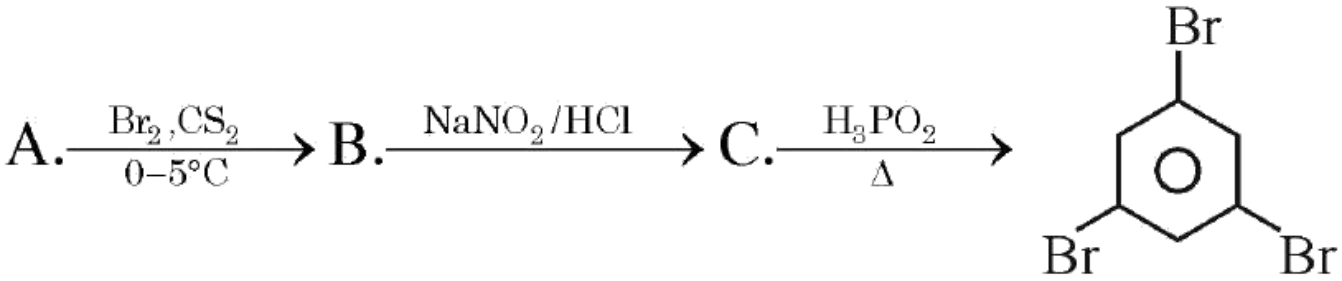


D.



Question 126 View solution online

Compound A from the following reaction sequence is:



A. Benzoic Acid

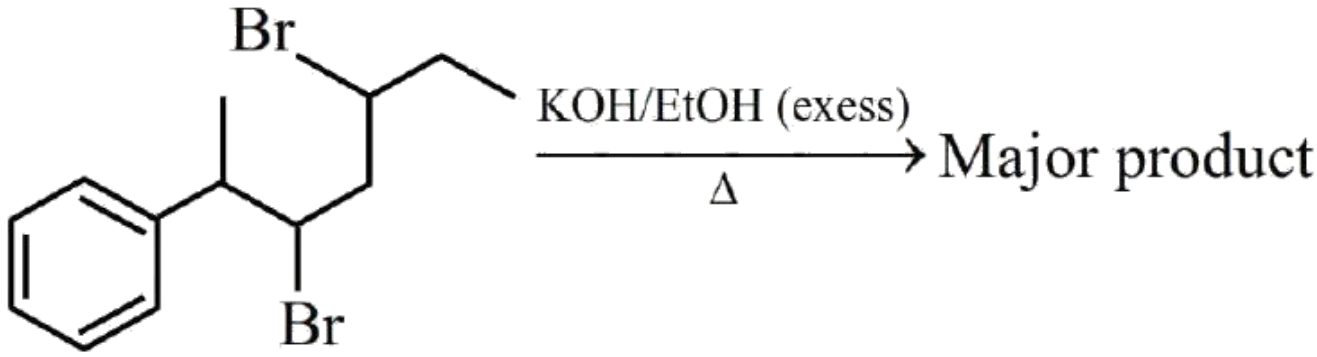
B. Phenol

C. Salicylic Acid

D. Aniline

Question 127 View solution online

The major product of the following reaction is :



A. 6-Phenylhepta-2,4-diene

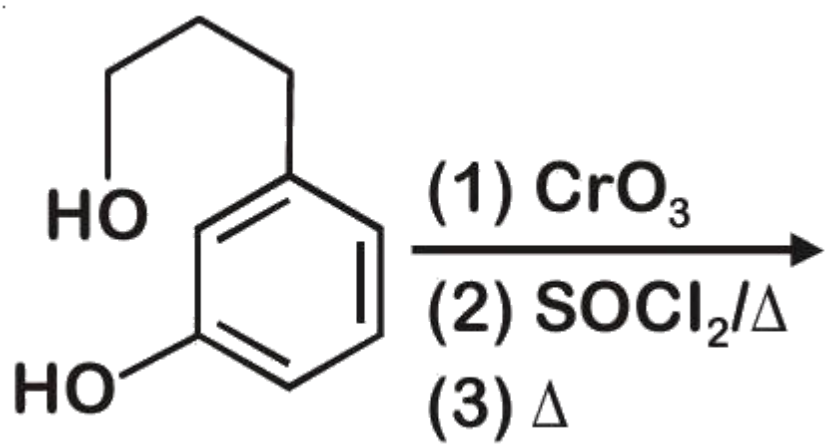
B. 2-Phenylhepta-2,5-diene

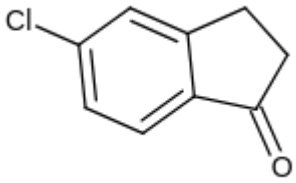
C. 6-Phenylhepta-3,5-diene

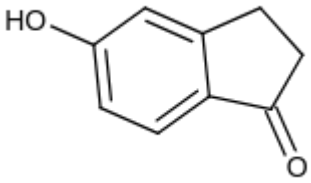
D. 2-Phenylhepta-2,4-diene

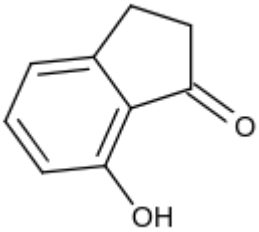
Question 128 View solution online

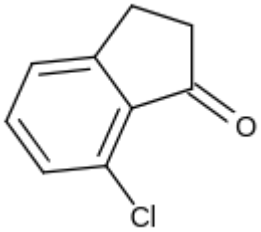
The major product of the following reaction is



A.


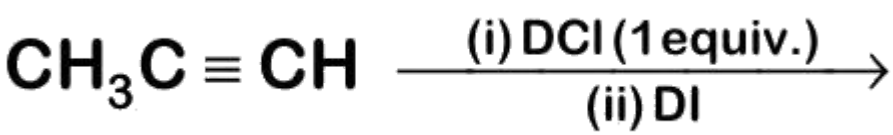
B.


C.


D.


Question 129 View solution online

The major product of the following reaction is



A. $CH_3C(I)(Cl)CHD_2$

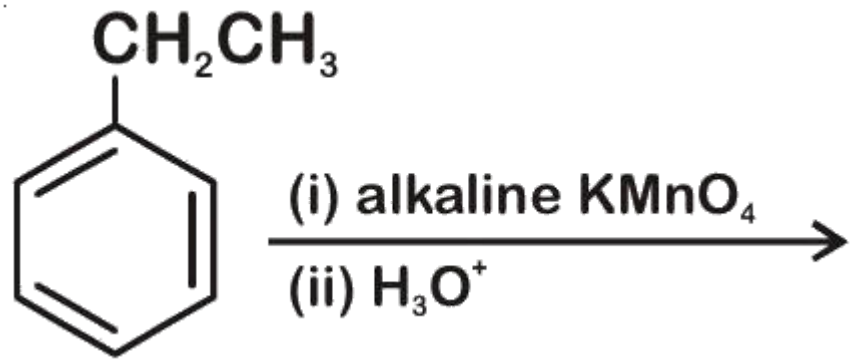
B. $CH_3CD(I)CHD(Cl)$

C. $CH_3CD(Cl)CHD(I)$

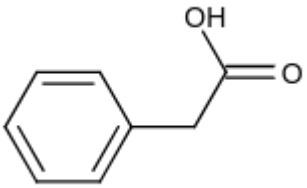
D. $CH_3CD_2CH(Cl)(I)$

Question 130 View solution online

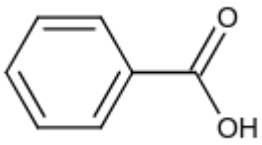
The major product of the following reaction is



A.



B.



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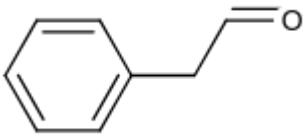
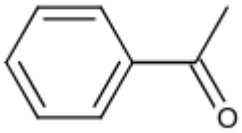


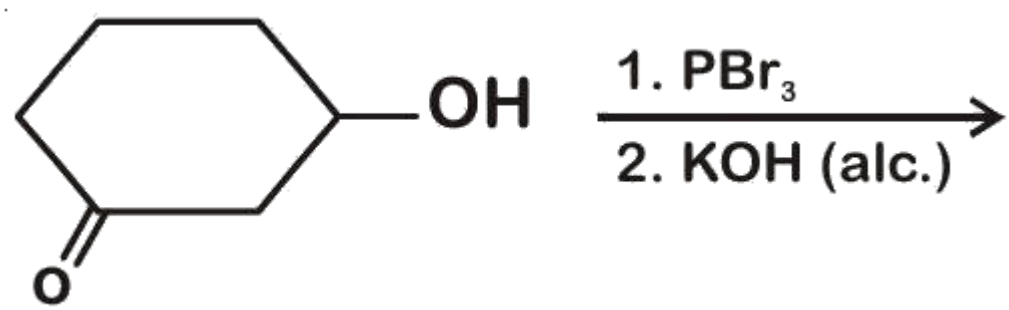
D.



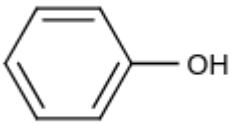
Question 131

View solution online

The major product of the following reaction is



A.



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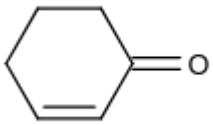
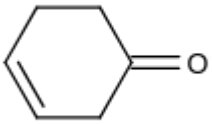
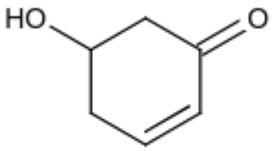


C.



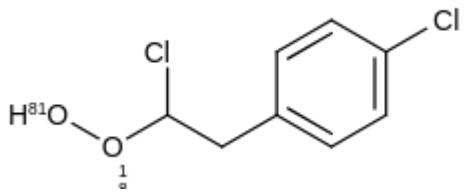
D.



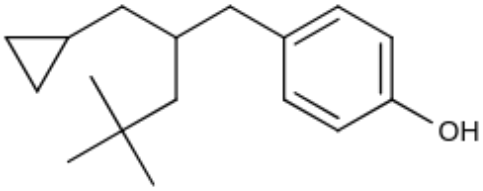
Question 132

View solution online

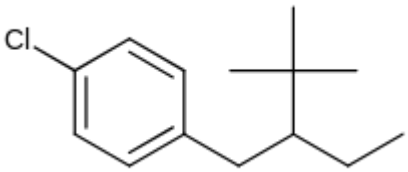
The major product of the following reaction is



A.



B.



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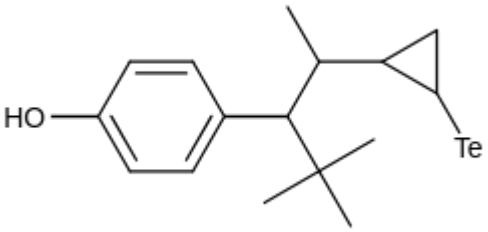
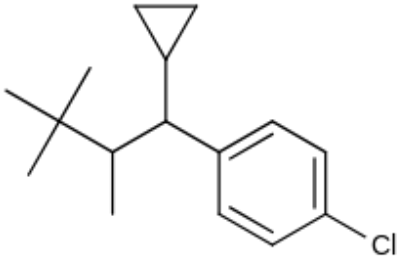
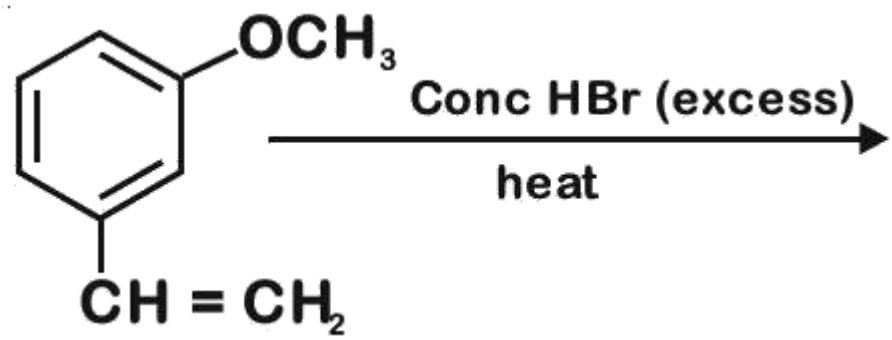


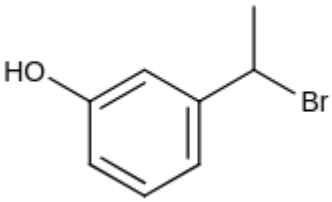
D.



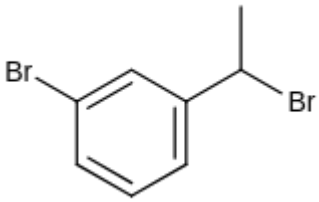
Question 133 View solution online

The major product of the following reaction is

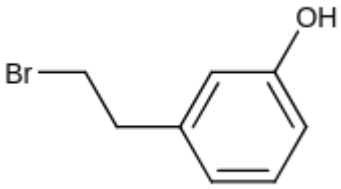




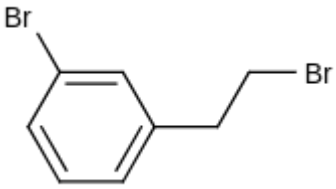
A.



B.



C.

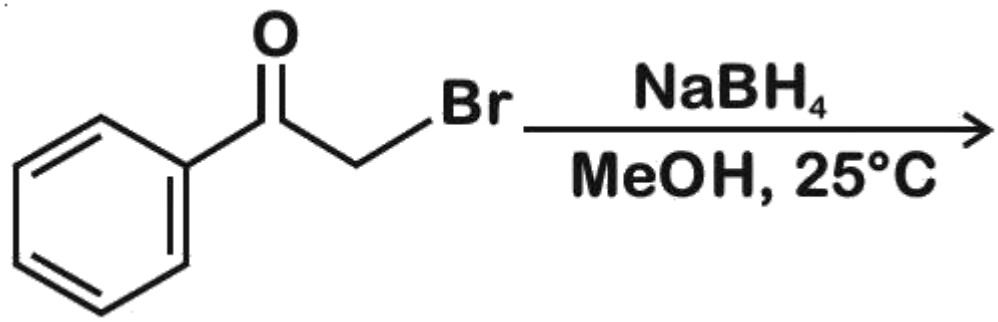


D.

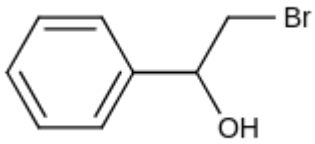
Question 134

View solution online

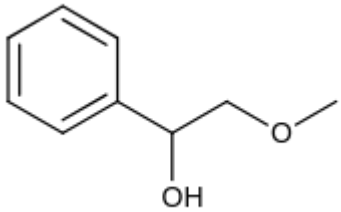
The major product of the following reaction is



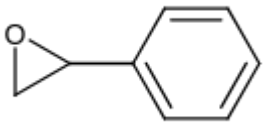
A.



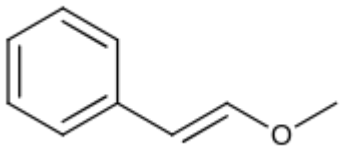
B.



C.

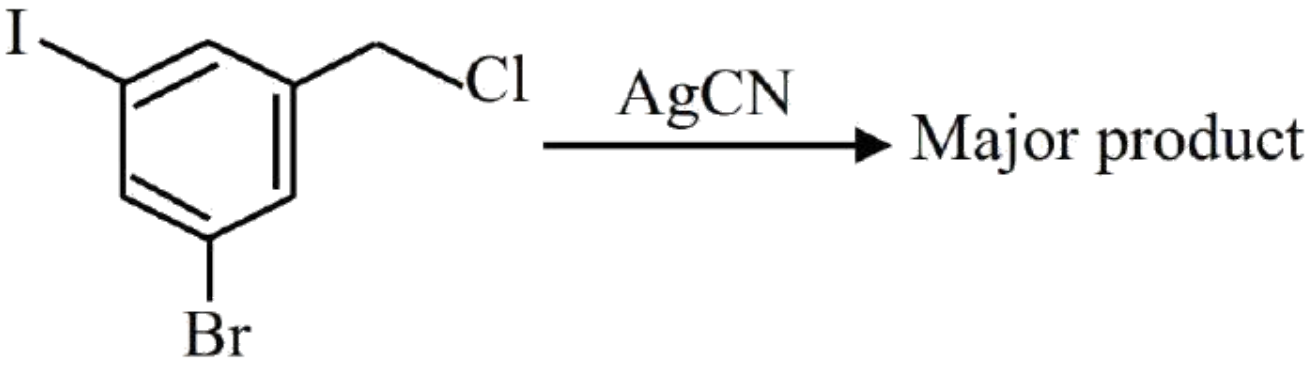


D.

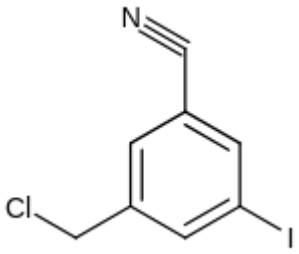


Question 135 View solution online

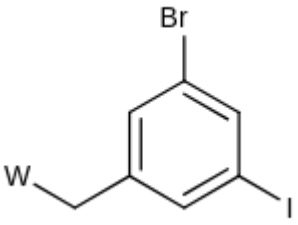
The structure of the major product formed in the following reaction is:



A.



B.



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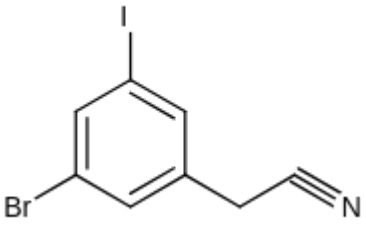
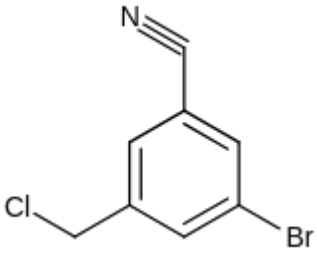
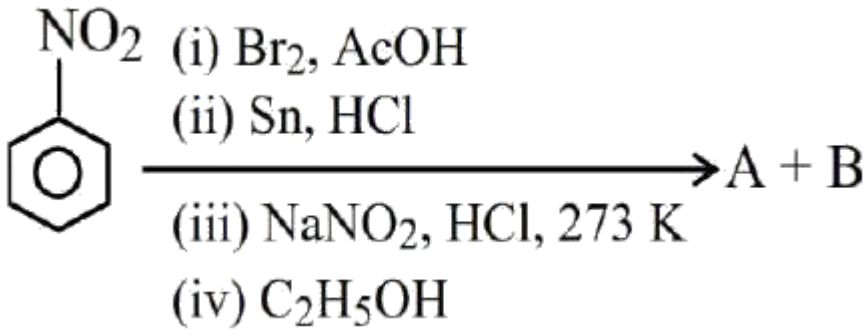


D.

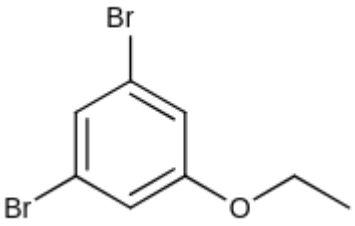


Question 136 View solution online

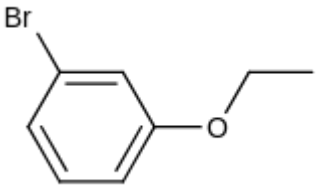
The products formed in the following reaction sequence are :



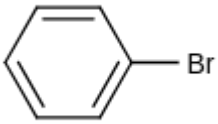
A.



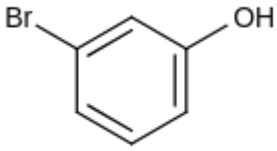
B.



C. $CH_3 - CHO$



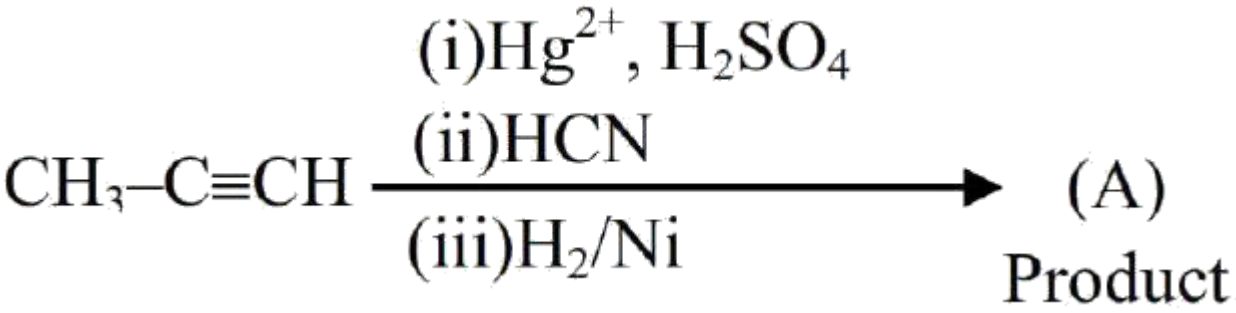
D.



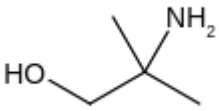
Question 137

View solution online

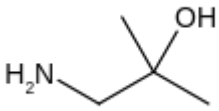
The product (A) formed in the following reaction sequence is :



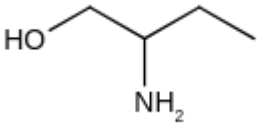
A.



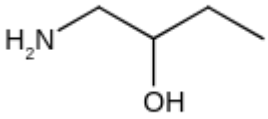
B.



C.

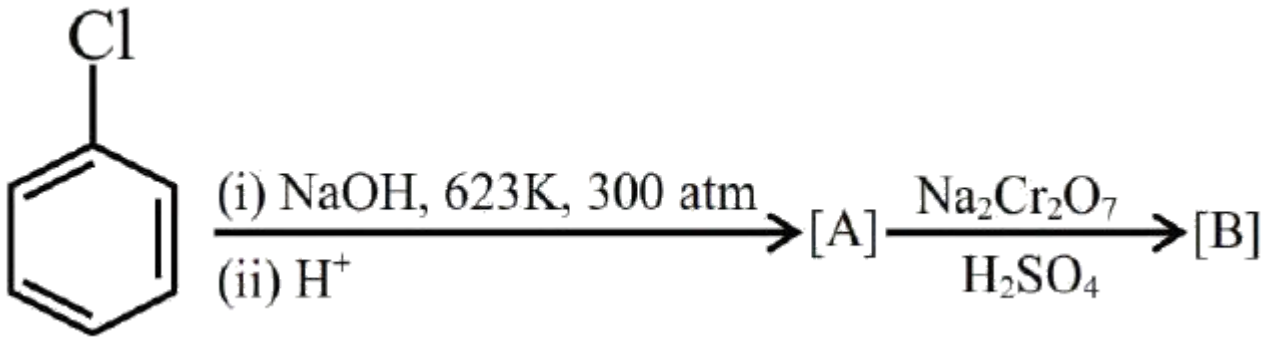


D.

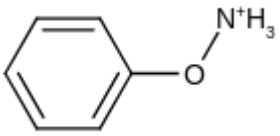


Question 138 View solution online

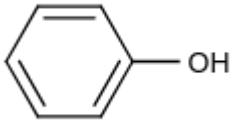
Identify the products [A] and [B], respectively in the following reaction :



A.



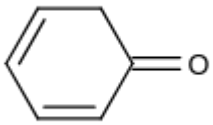
B.



C.

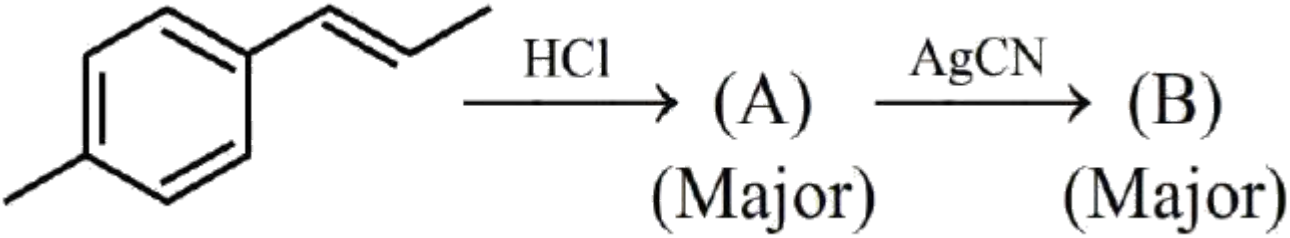


D.

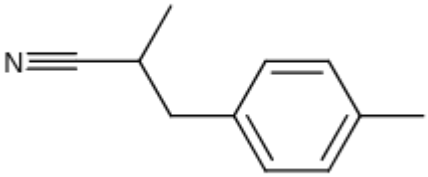


Question 139 View solution online

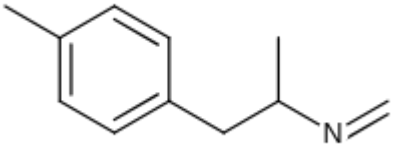
The product B formed in the following reaction sequence is :



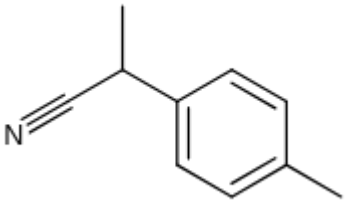
A.



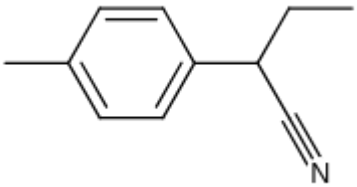
B.



C.



D.



Question 140 View solution online

Decreasing order of reactivity towards electrophilie substitution for the following compounds is :

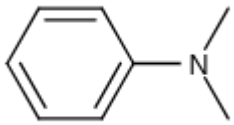
(a)

(b)

(c)

(d)

(e)



A. $c > b > a > d > e$

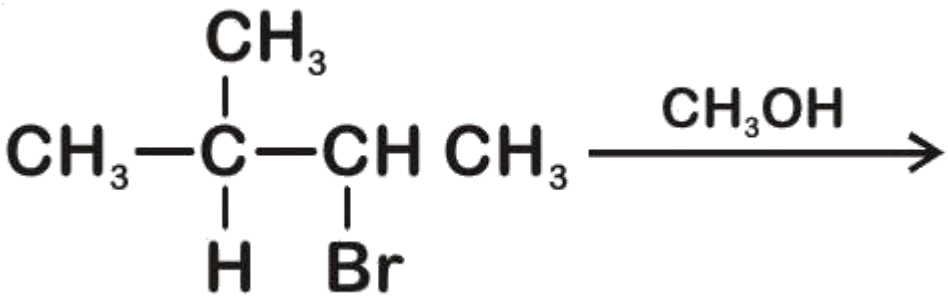
B. $e > d > a > b > c$

C. $a > d > e > b > c$

D. $d > a > e > c > b$

Question 141 View solution online

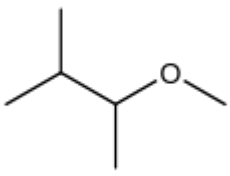
The major product of the following reaction is :



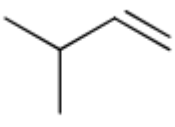
A.



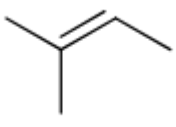
B.



C.



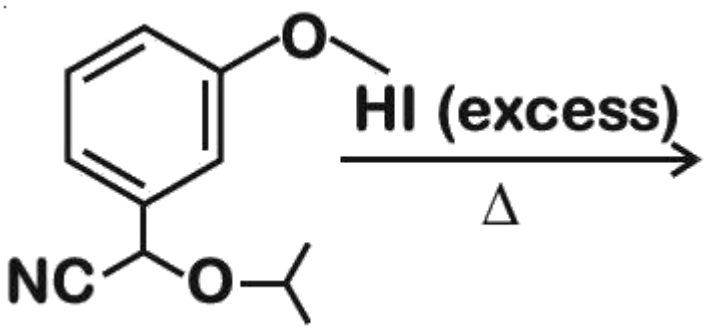
D.



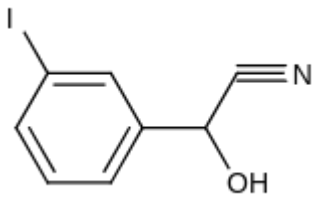
Question 142

View solution online

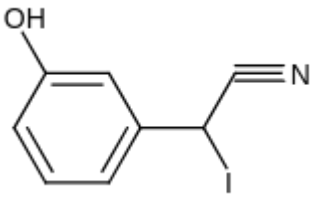
The major product of the following reaction is:



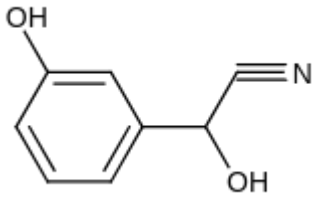
A.



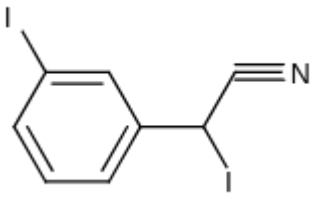
B.



C.

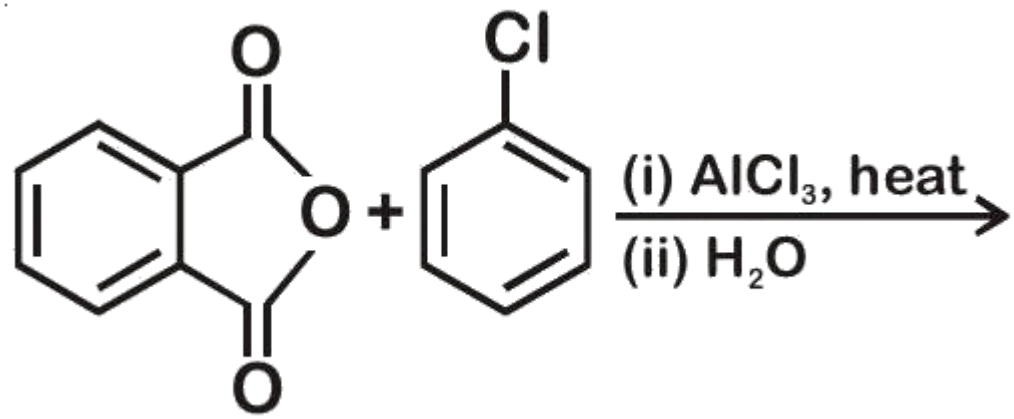


D.

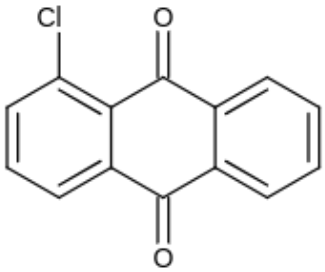


Question 143 View solution online

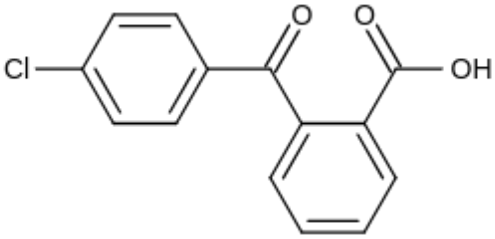
The major product of the following reaction is :



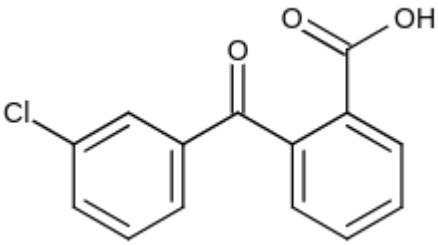
A.



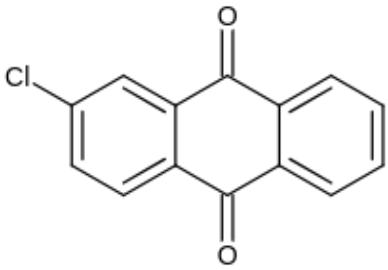
B.



C.



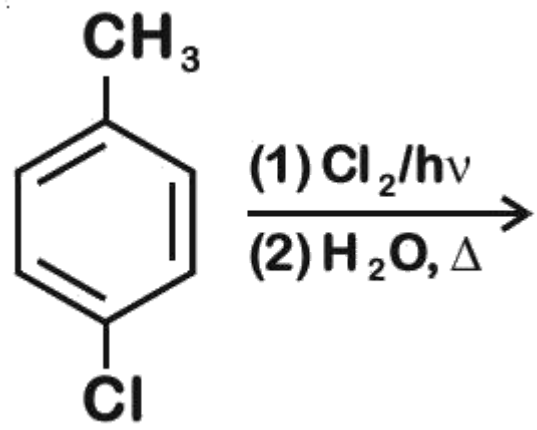
D.



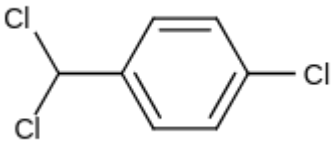
Question 144

View solution online

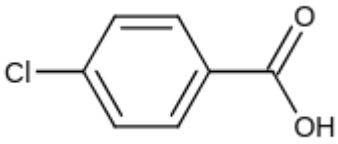
The major product of the following reaction is:



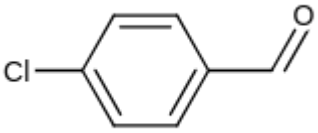
A.



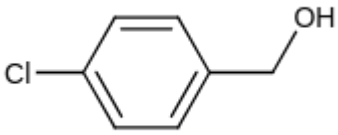
B.



C.



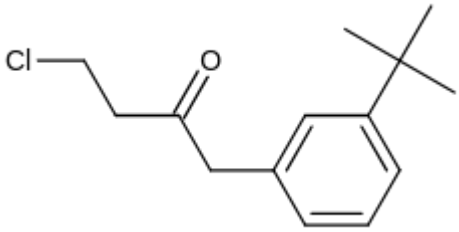
D.



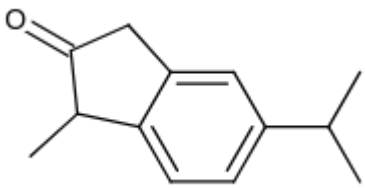
Question 145

View solution online

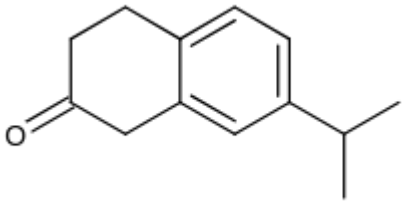
The major product of the following reaction is :



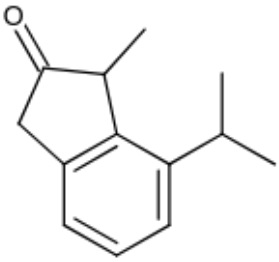
A. $\xrightarrow[(2)\ \text{Conc. } H_2SO_4/\Delta]{(1)\ \text{t BuOK}}$



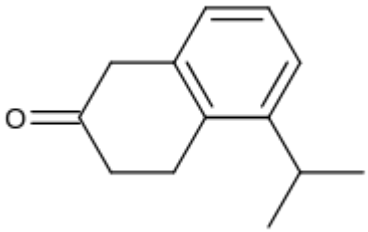
B.



C.

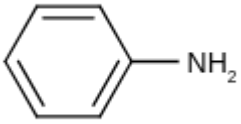


D.

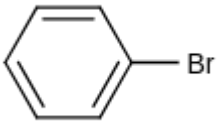


Question 146 View solution online

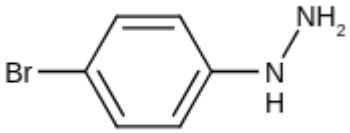
Identify the major product formed in the following sequence of reactions :



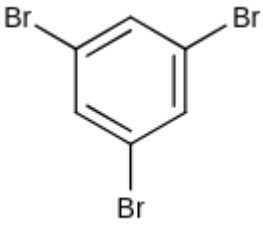
A.



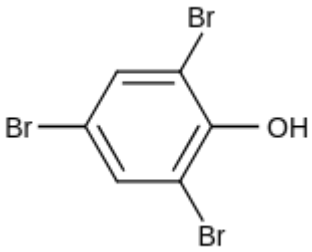
B.



C.



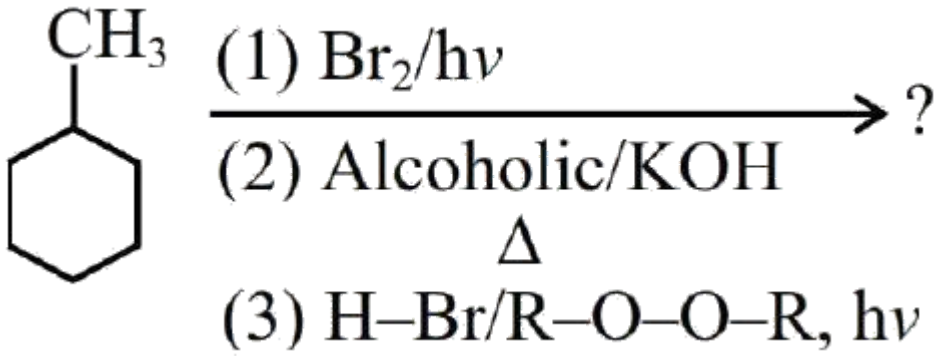
D.



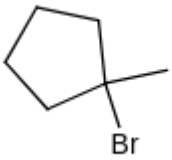
Question 147

View solution online

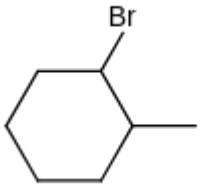
Predict the major product of the following reaction sequence :-



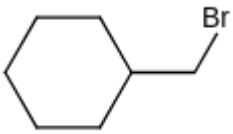
A.



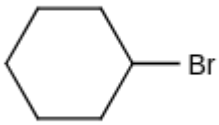
B.



C.



D.



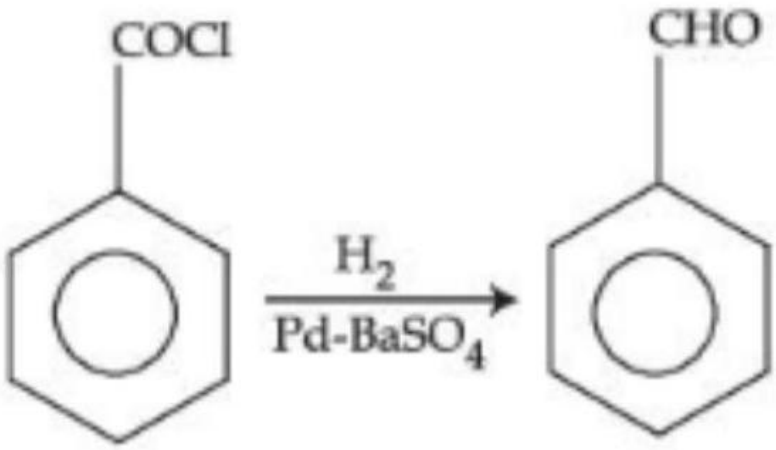
Question 148

View solution online

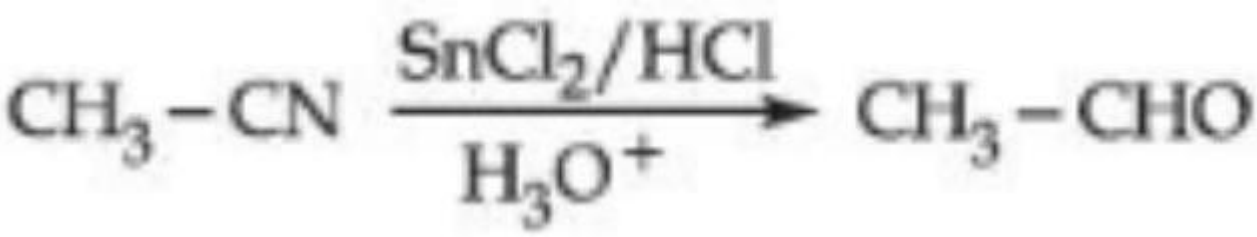
Match List-I with List-II.

List-I

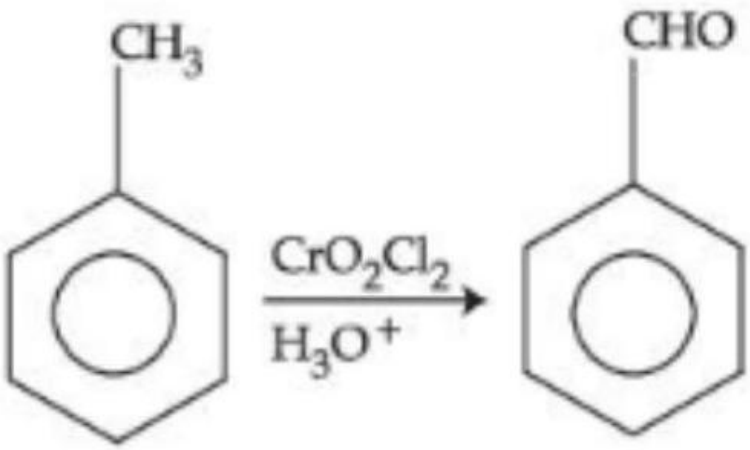
(A)



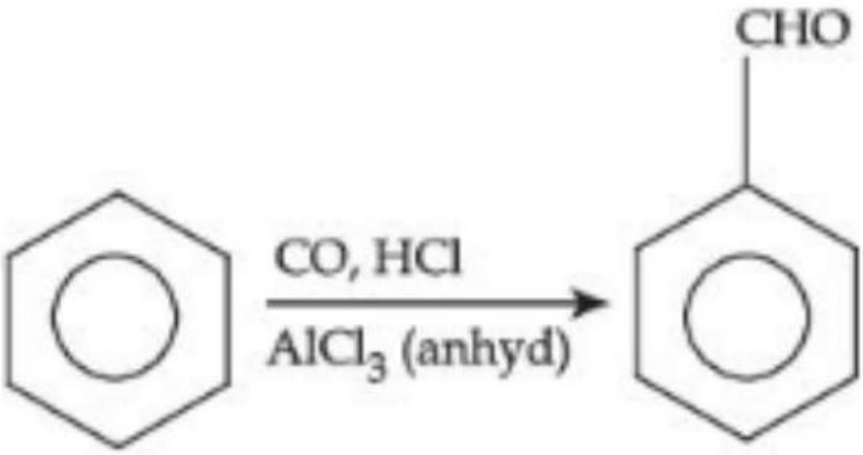
(B)



(C)



(D)



Lits-II

(I) Gatterman Koch reaction
(II) Etard reaction
(III) Stephen reaction
(IV) Rosenmund reaction

Choose the correct answer from the options given below:

A. -(IV), (B)-(III), (C)-(II), (D)-(I)

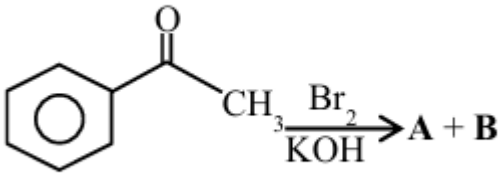
B. (A)-(I), (B)-(II), (C)-(III), (D)-(IV)

C. (A)-(II), (B)-(III), (C)-(IV), (D)-(I)

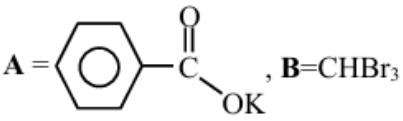
D. (A)-(III), (B)-(II), (C)-(I), (D)-(IV)

Question 149 View solution online

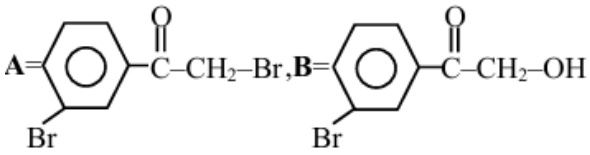
The major products formed in the following reaction sequence **A** and **B** are :



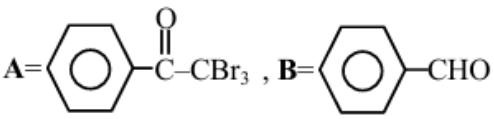
A.



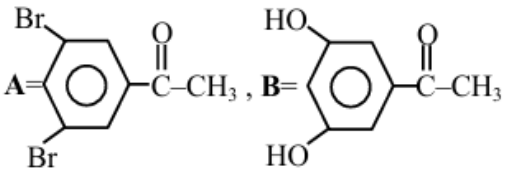
B. -2



C.

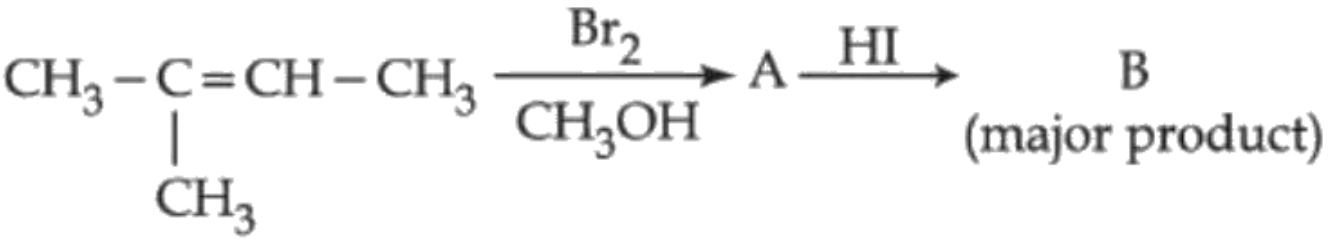


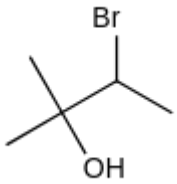
D.



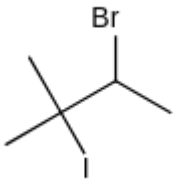
Question 150 View solution online

Major product ' B ' of the following reaction sequence is:

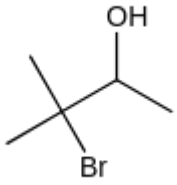




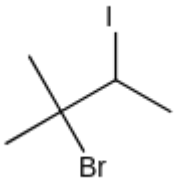
A.



B.



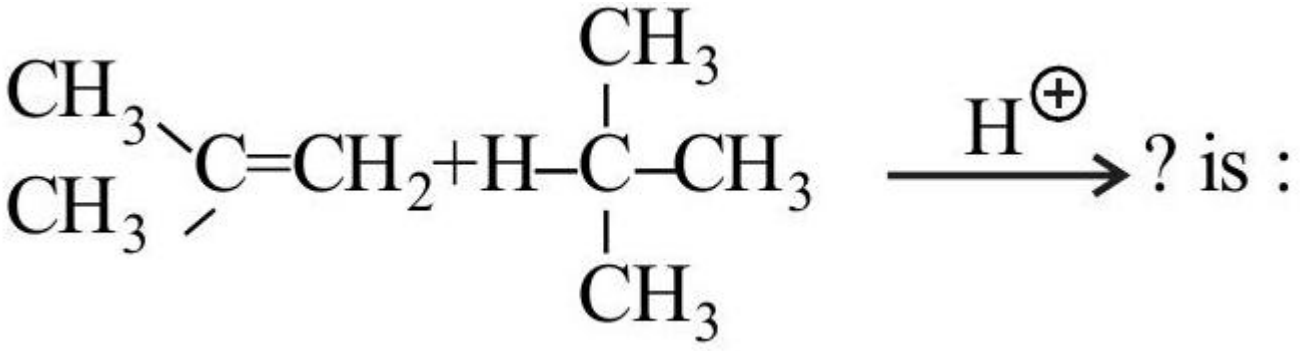
C.



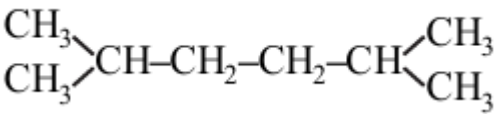
D.

Question 151 View solution online

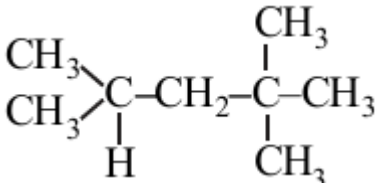
The products formed in the following reaction.



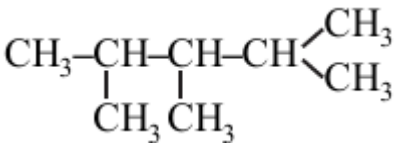
A.



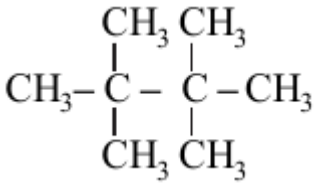
B.



C.



D.

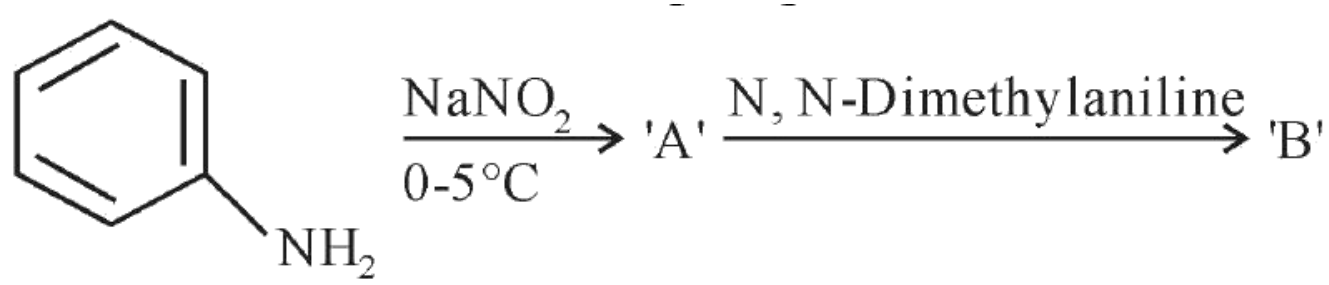


Question 152

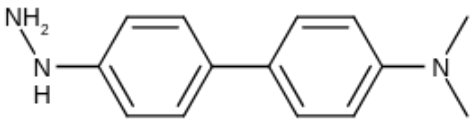
View solution online

Consider the following sequence of reactions:

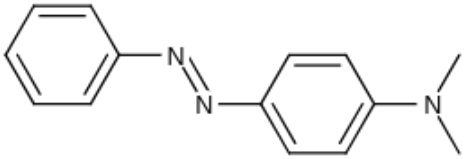
The product ' B ' is



A.



B.



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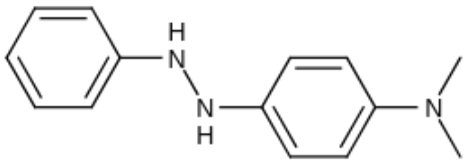
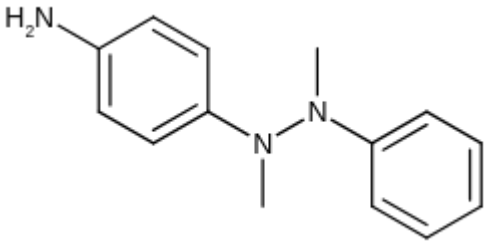


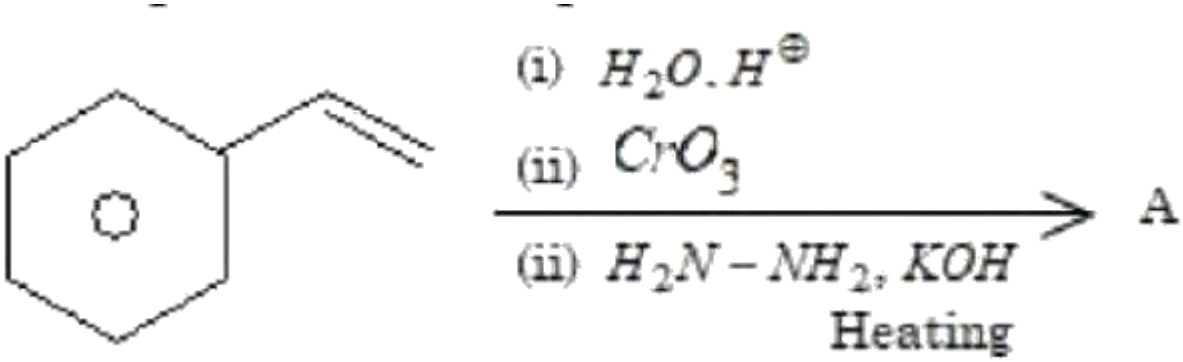
D.



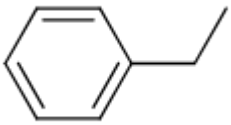
Question 153

View solution online

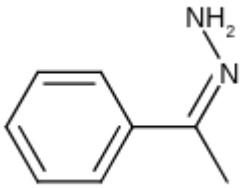
The final product A formed in the following multistep reaction sequence is



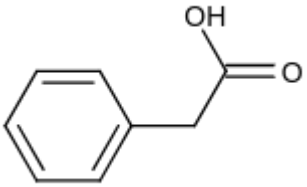
A.



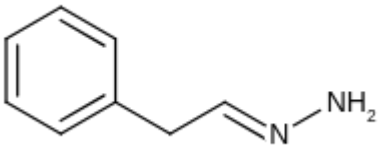
B.



C.



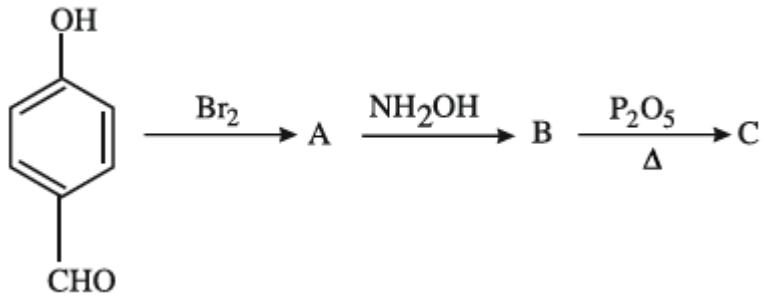
D.



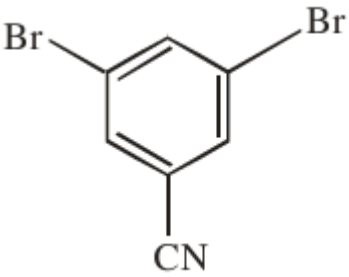
Question 154

View solution online

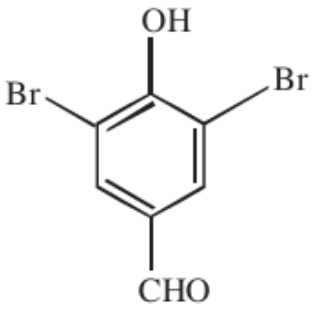
Consider the above reaction sequence, the Product ' C ' is :



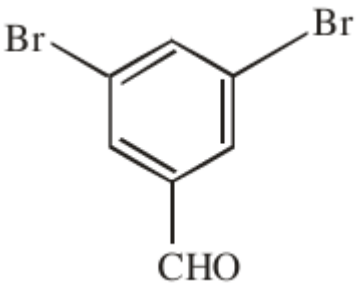
A.



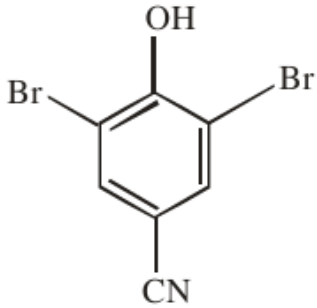
B.



C.

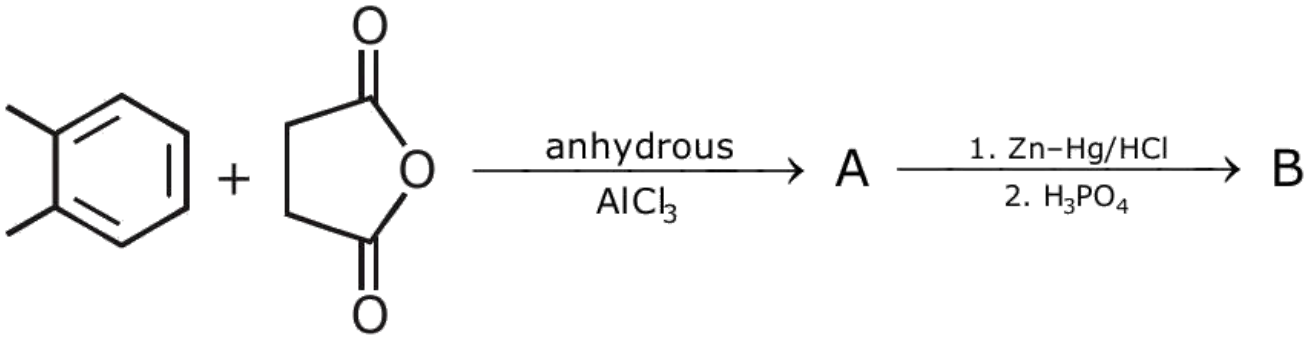


D.

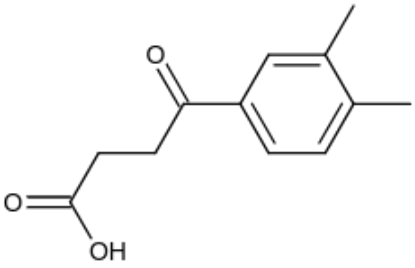


Question 155 View solution online

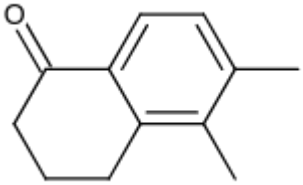
In the following reaction sequence the major products A and B are:



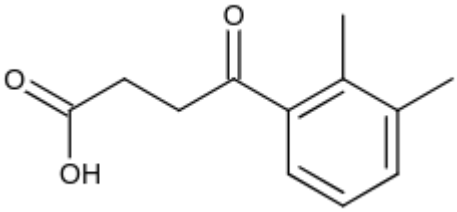
A. $A =$



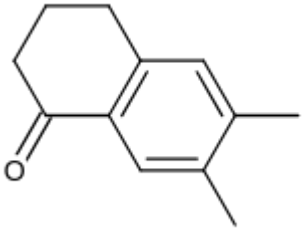
B. $A =$



C. $A =$



D. $A =$

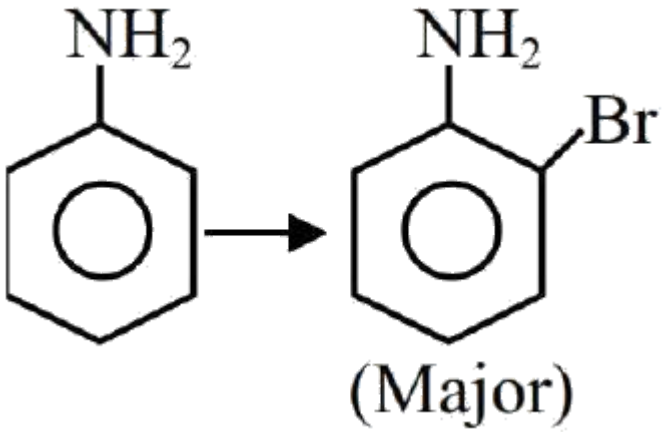


Question 156

View solution online

For reaction

The correct order of set of reagents for the above conversion is :



A. $Br_2 \mid FeBr_3, H_2O(\Delta), NaOH$

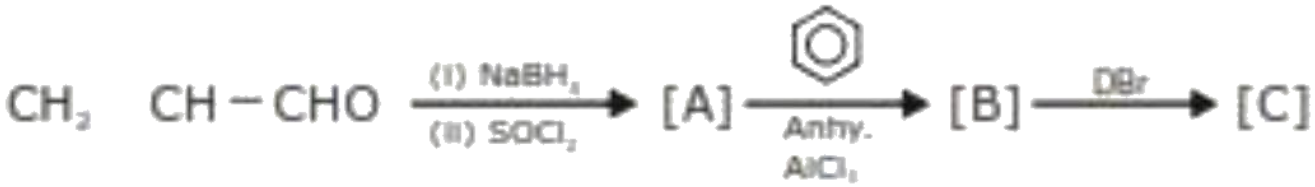
B. $H_2SO_4, Ac_2O, Br_2, H_2O(\Delta), NaOH$

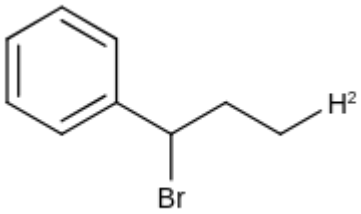
C. $Ac_2O, Br_2, H_2O(\Delta), NaOH$

D. $Ac_2O, H_2SO_4, Br_2, NaOH$

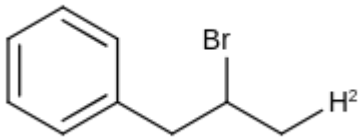
Question 157 View solution online

The major product [C] of the following reaction sequence will be :

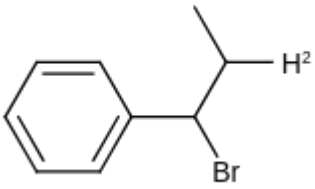




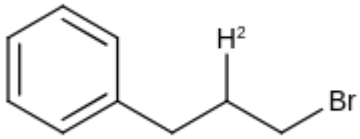
A.



B.



C.

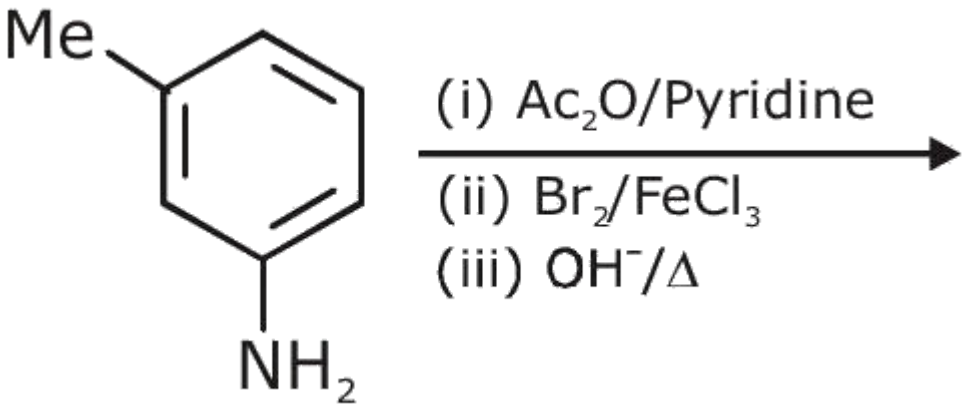


D.

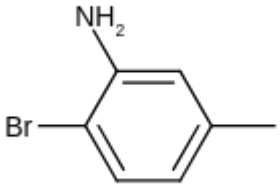
Question 158

View solution online

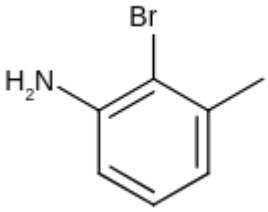
The final major product of the following reaction is :



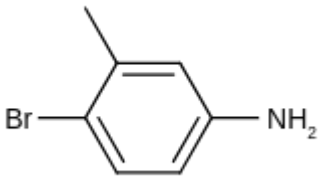
A.



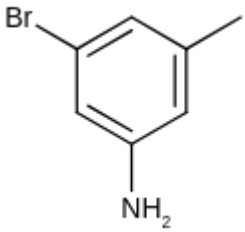
B.



C.



D.



Question 159

View solution online

Match List I with List II

LIST-I (Test)		LIST-II (Observation)	
A.	Br_2 water test	I.	Yellow orange or orange red precipitate formed
B.	Ceric ammonium nitrate test	II.	Reddish orange colour disappears
C.	Ferric chloride test	III.	Red colour appears
D.	2, 4-DNP test	IV.	Blue, Green, Violet or Red colour appear

Choose the correct answer from the options given below:

A. A-I, B-II, C-III, D-IV

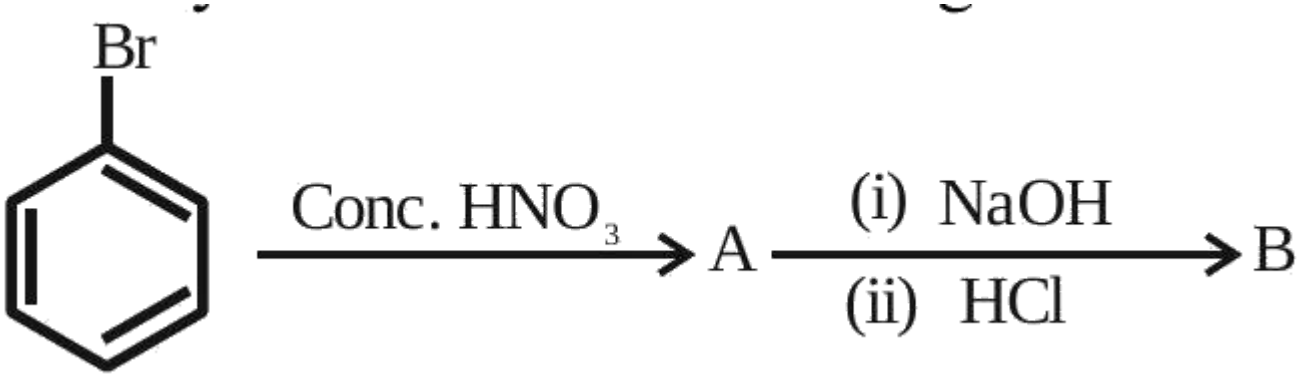
B. A-II, B-III, C-IV, D-I

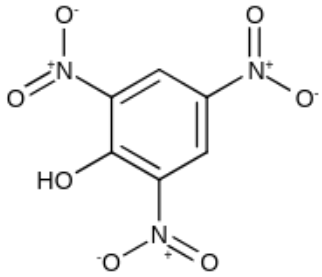
C. A-III, B-IV, C-I, D-II

D. A-IV, B-I, C-II, D-III

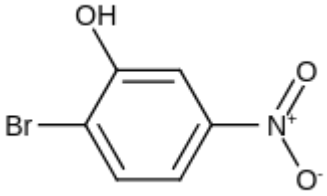
Question 160 View solution online

Identify A and B in the following reaction sequence.



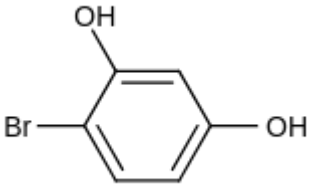


A.

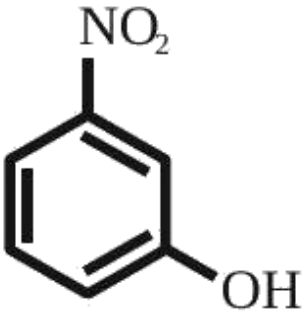


B.

C. B=



D. A =



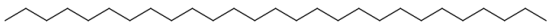
Question 161 View solution online

What will be the major product of following sequence of reactions?

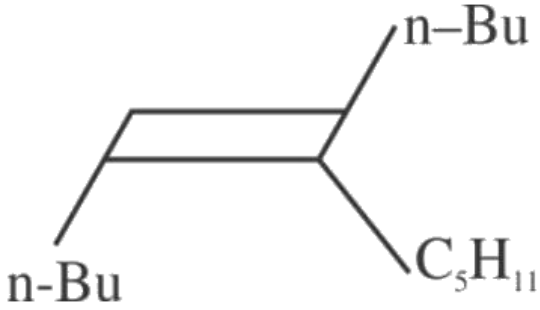
(i) $\mathbf{n-BuLi}$,

$\mathbf{n-Bu-} \equiv \xrightarrow[\text{(ii) Lindlar cat, } H_2]{\text{n}-C_5H_{11}Cl}$

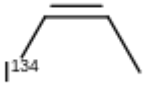
A.



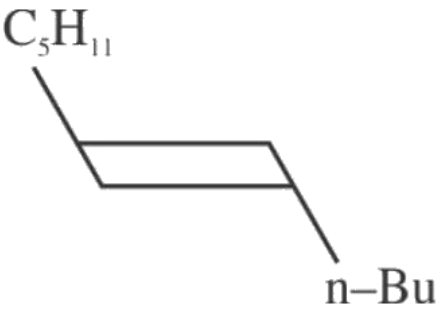
B.



C.



D.



Question 162 View solution online

The major product of the following reaction is P .

$$CH_3C \equiv C - CH_3 \xrightarrow[\substack{\text{(ii)dil. } KMnO_4 \\ 273\text{ K}}]{\text{(i) Na/ liq } \cdot NH_3} \text{'P'}$$

Number of oxygen atoms present in product ' P ' is

(nearest integer).

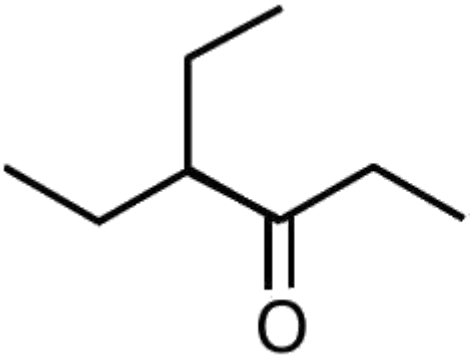
Numerical answer: _____

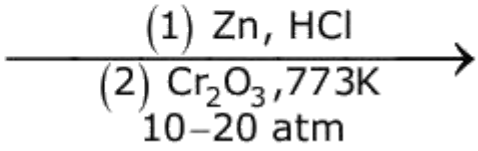
Enter the requested value or coefficient rounded to the nearest integer (0 decimal places).

Question 163

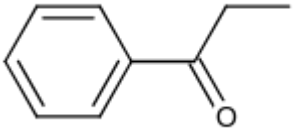
View solution online

Considering the above reaction, the major product among the following is:

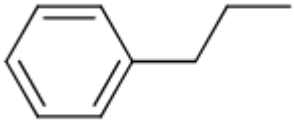




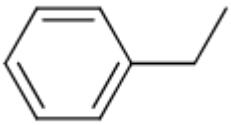
A.



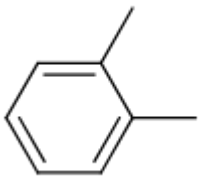
B.



C.



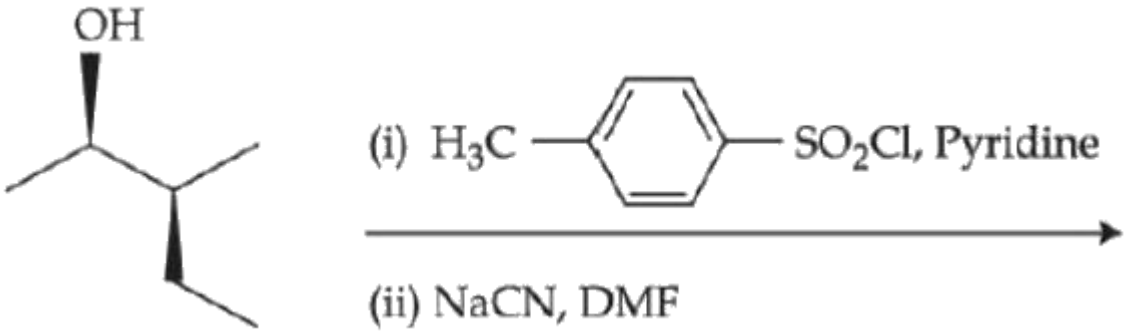
D.



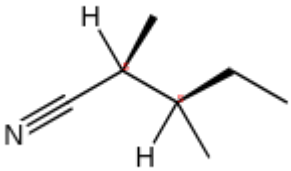
Question 164

View solution online

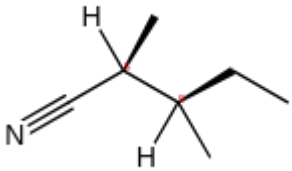
Most stable product of the following reaction is:



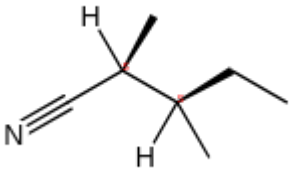
A.



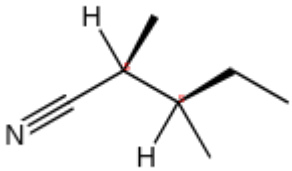
B.



C.



D.

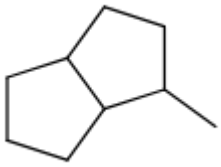


Question 165 View solution online

Match List - I with List - II.

List - I (Isomers of $C_{10}H_{14}$)	List - II (Ozonolysis product)

Choose the correct answer from the options given below:



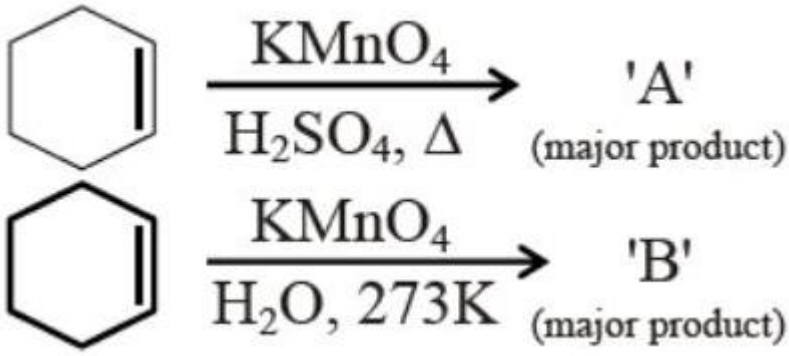
A. (A)-(II), (B)-(III), (C)-(I), (D)-(IV)

B. (A)-(III), (B)-(IV), (C)-(I), (D)-(II)

C. (A)-(III), (B)-(II), (C)-(I), (D)-(IV)

D. (A)-(I), (B)-(IV), (C)-(III), (D)-(II)

Question 166 View solution online



For above chemical reactions, identify the correct statement from the following:

A. Both compound 'A' and compound 'B' are dicarboxylic acids

B. Both compound 'A' and compound 'B' are diols

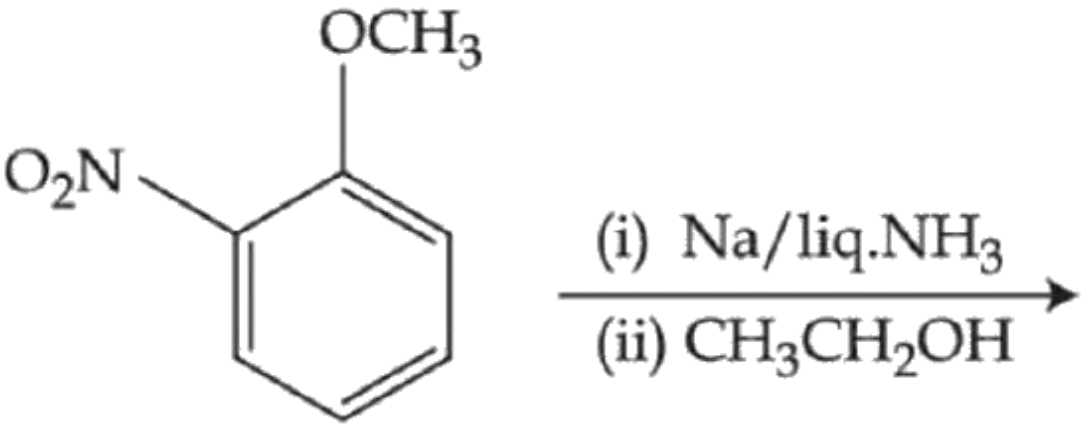
C. Compound 'A' is diol and compound 'B' is dicarboxylic acid

D. Compound 'A' is dicarboxylic acid and compound 'B' is diol

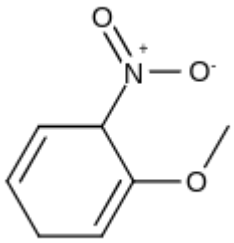
Question 167

View solution online

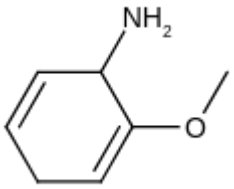
The major product of the following reaction is



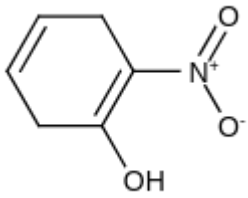
A.



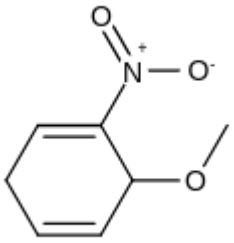
B.



C.



D.



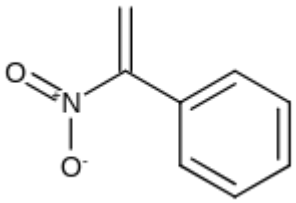
Question 168

View solution online

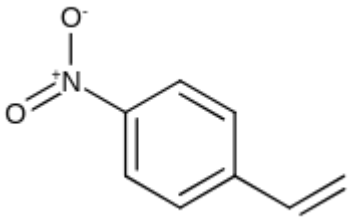
In the given reactions sequence, the major product ' C ' is :

$$C_8H_{10} \xrightarrow[H_2SO_4]{HNO_3} A \xrightarrow[\Delta]{Br_2} B \xrightarrow[KOH]{\text{alcoholic}} C$$

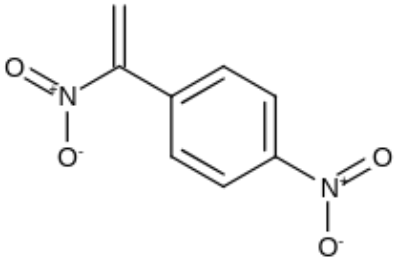
A.



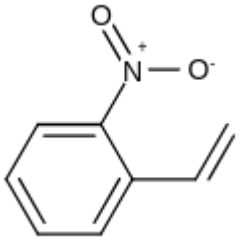
B.



C.



D.

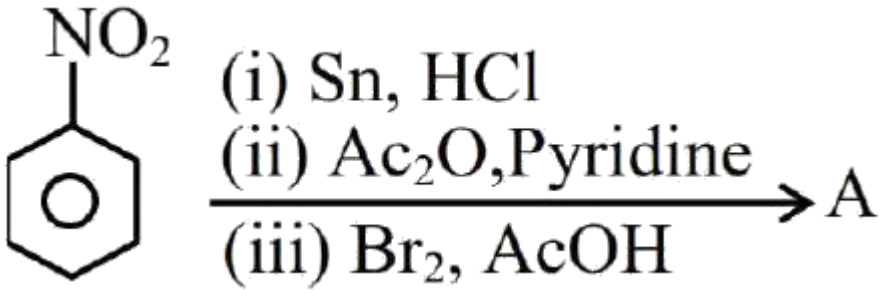


Question 169

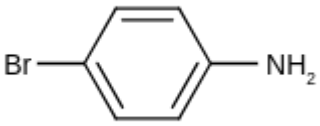
View solution online

The major product (A) formed in the following reaction sequence is

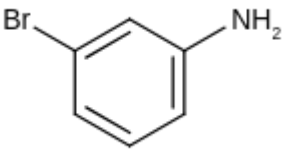
(iv) $\mathbf{NaOH(aq)}$



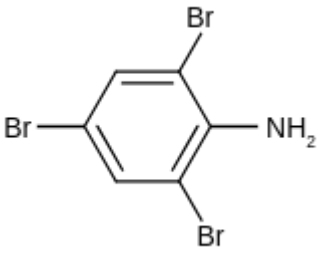
A.



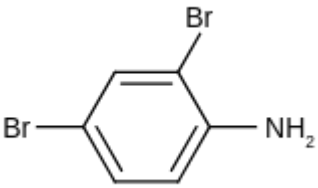
B.



C.



D.



Question 170 View solution online

Match List-I with List-II

List-I}

(A) $\mathbf{RCN} \xrightarrow[\text{(ii) } \mathbf{H_3O^+}]{\text{(i) } \mathbf{SnCl_2, HCl}} \mathbf{RCHO}$

(B)

(C)

(D)

List-II}

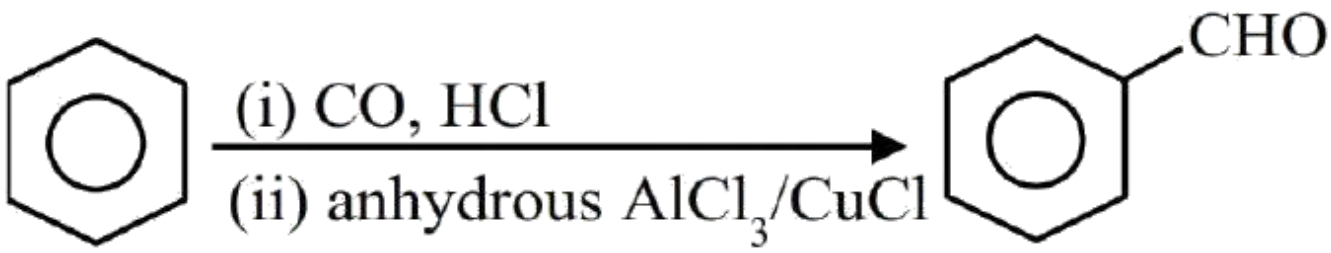
(I) Etard reaction

(II) Gatterman -Koch reaction

(III) Rosenmund reduction

(IV) Stephen reaction

Choose the correct answer from the options given below :



A. (A)-(IV), (B)-(III), (C)-(I), (D)-(II)

B. (A)-(III), (B)-(IV), (C)-(II), (D)-(I)

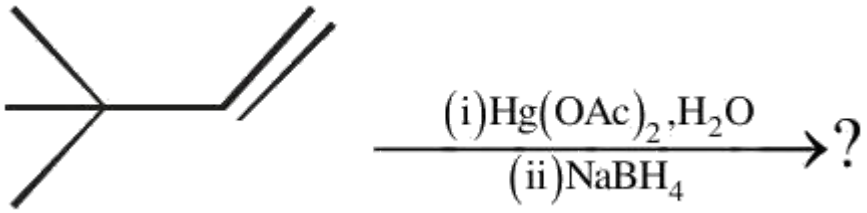
C. (A)-(I), (B)-(III), (C)-(II), (D)-(IV)

D. (A)-(III), (B)-(IV), (C)-(I), (D)-(II)

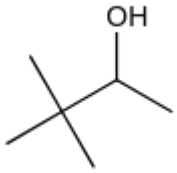
Question 171

View solution online

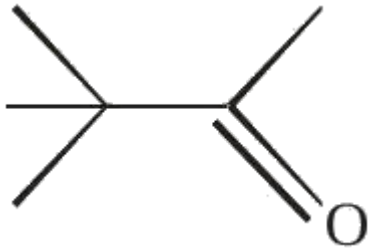
The major product in the following reaction



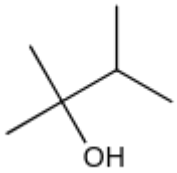
A.



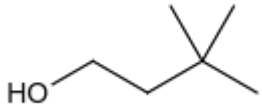
B.



C.



D.

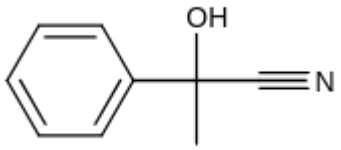


Question 172 View solution online

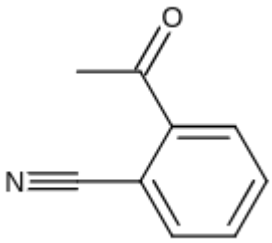
The structure of product C, formed by the following sequence of reactions is :

$$CH_3COOH + SOCl_2 \longrightarrow A \xrightarrow[AlCl_3]{Benzene} B \xrightarrow[-OH]{KCN} C$$

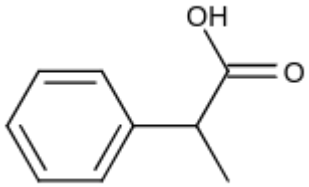
A.



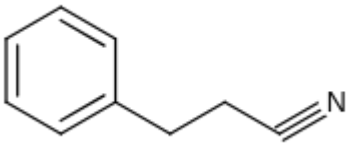
B.



C.

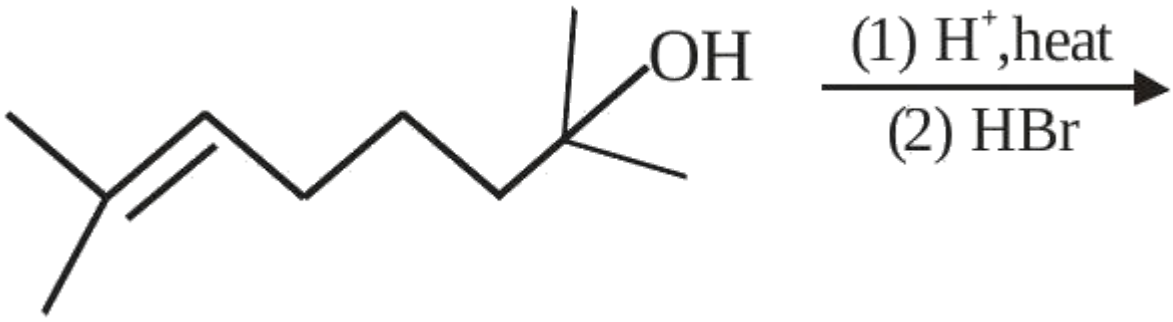


D.

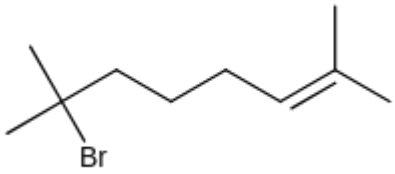


Question 173 View solution online

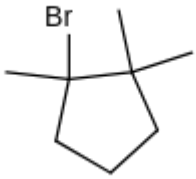
The major product in the given reaction is



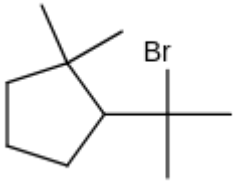
A.



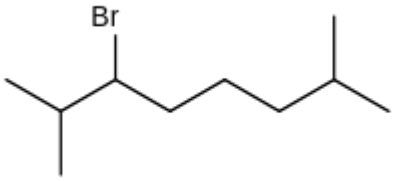
B.



C.

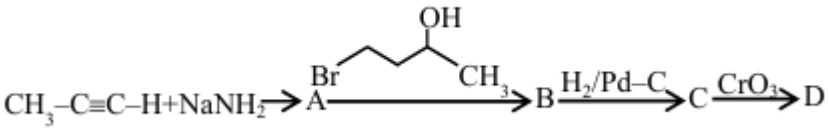


D.



Question 174 View solution online

In the following sequence of reactions, the final product D is :



A. $CH_3 - CH_2 - CH_2 - CH_2 - CH_2 - CHO$

B. $CH_3 - CH = CH - CH_2 - CH_2 - CH_2 - COOH$

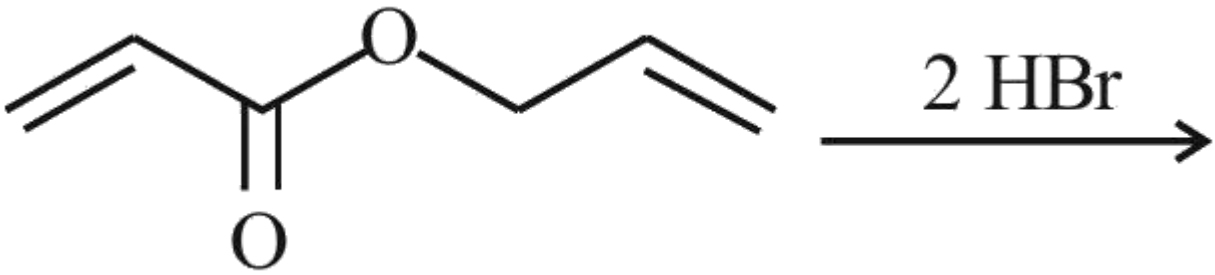
C. $CH_3 - CH = CH - CH(OH) - CH_2 - CH_2 - CH_3$

D. $CH_3 - CH_2 - CH_2 - CH_2 - CH_2 - CO - CH_3$

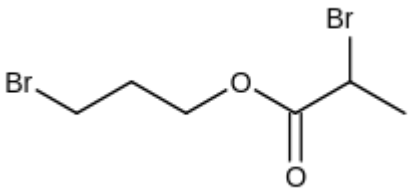
Question 175

View solution online

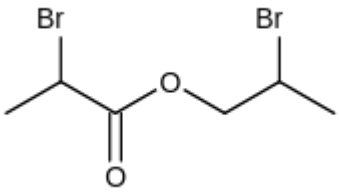
Major product of the following reaction is



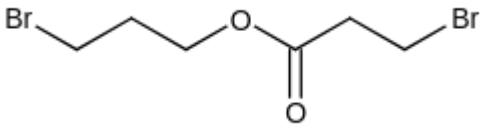
A.



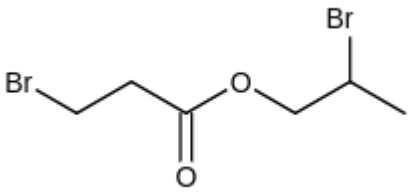
B.



C.

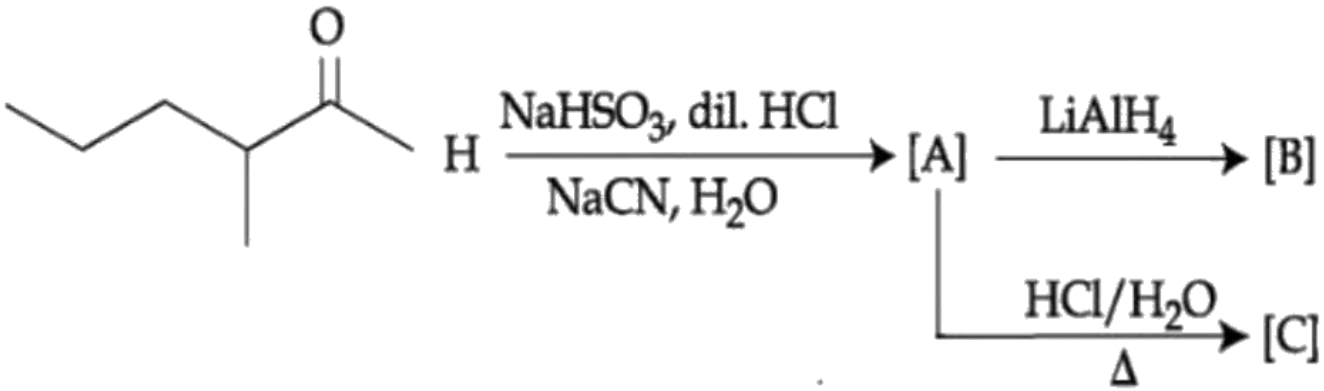


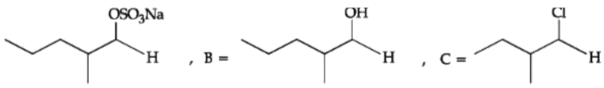
D.

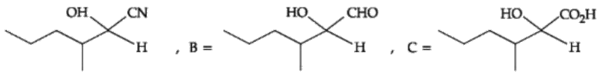


Question 176 View solution online

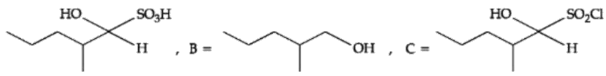
The structures of major products **A, B** and C in the following reaction are sequence.



A. 

B. 

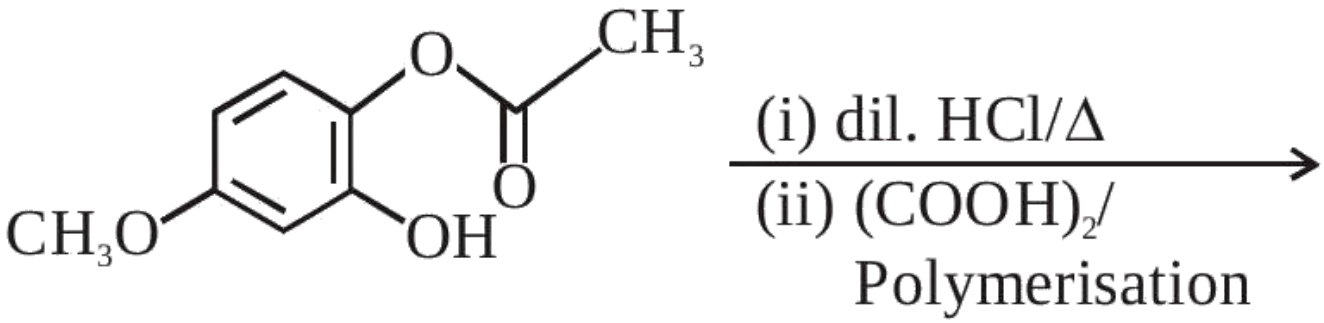
C.

D. 

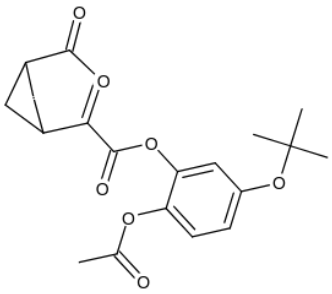
Question 177

View solution online

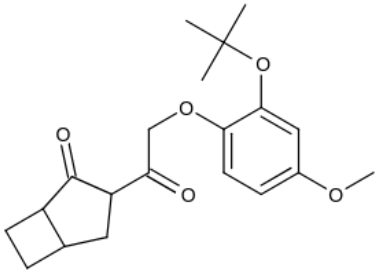
The major product of the following reaction is:



A.



B.



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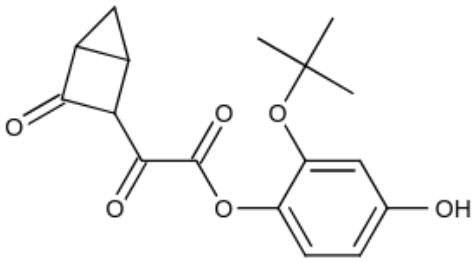

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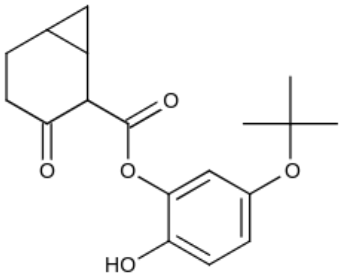

CHAPTER 09 / CHEMISTRY

Solutions

Questions 178-183 / 6 selected / 2.0% practice weight / Consolidate

Topics to prioritise in this collection

- Freezing point depression: 2 questions / 33.3% of this chapter
- Solution properties: 2 questions / 33.3% of this chapter
- Boiling point elevation: 1 question / 16.7% of this chapter
- Solutions: 1 question / 16.7% of this chapter

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Question 178 View solution online

20% of acetic acid is dissociated when its 5 g is added to 500 mL of water. The depression in freezing point of such water is $\times 10^{-3}{}^{\circ}\mathrm{C}$

Atomic mass of C, H and O are 12,1 and 16 a.m.u. respectively.
[Given : Molal depression constant and density of water are $1.86\ \mathrm{K\ kg\ mol^{-1}}$ and $1\ \mathrm{g\ cm^{-3}}$ respectively.

Numerical answer: _____

Enter the requested value or coefficient rounded to the nearest integer (0 decimal places).

Question 179 View solution online

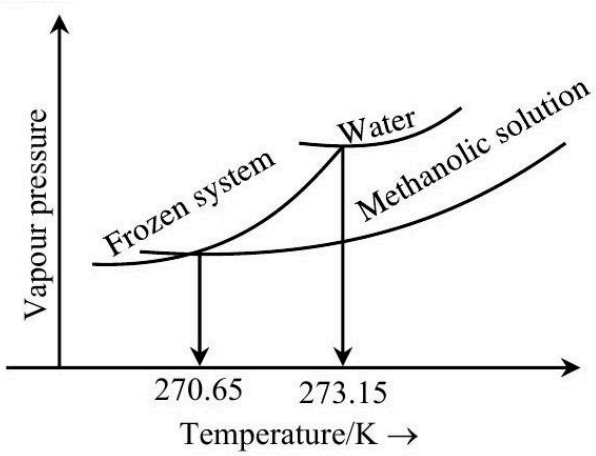
A solution containing 10 g of an electrolyte $\mathrm{AB_2}$ in 100 g of water boils at $100.52^{\circ}\mathrm{C}$. The degree of ionization of the electrolyte (α) is $\times 10^{-1}$.
(nearest integer)
[Given : Molar mass of $\mathrm{AB_2} = 200\ \mathrm{g\ mol^{-1}}$. $\mathrm{K_b}$ (molal boiling point elevation const. of water) $= 0.52\ \mathrm{K\ kg\ mol^{-1}}$, boiling point of water $= 100^{\circ}\mathrm{C}$;
$\mathrm{AB_2}$ ionises as $\mathrm{AB_2} \rightarrow \mathrm{A^{2+}} + 2\,\mathrm{B^{-}}$]

Numerical answer: _____

Enter the requested value or coefficient rounded to the nearest integer (0 decimal places).

Question 180 View solution online

When ' x ' $\times 10^{-2}$ mL methanol (molar mass = 32 g; density = 0.792 g/cm^3) is added to 100 mL water (density = 1 g/cm^3), the following diagram is obtained.



x = ...(nearest integer)

[Given: Molal freezing point depression constant of water at 273.15 K is 1.86 K kg mol^{-1}]

Numerical answer: _____

Enter the requested value or coefficient rounded to the nearest integer (0 decimal places).

Question 181 View solution online

25 mL of an aqueous solution of KCl was found to require 20 mL of 1 M AgNO 3 solution when titrated using K_2CrO_4 as an indicator. What is the depression in freezing point of KCl solutions of the given concentration? (Nearest integer).

(Given: $K_f = 2.0$ K kg mol^{-1})

Assume 1) 100% ionization and

2) density of the aqueous solution as 1 g mL^{-1}

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 182 View solution online

Match List-I with List-II

List-I (Purification technique)		List-II (Mixture of organic compounds)	
(A)	Distillation (simple)	(I)	Diesel + Petrol
(B)	Fractional distillation	(II)	Aniline + Water
(C)	Distillation under reduced pressure	(III)	Chloroform + Aniline
(D)	Steam distillation	(IV)	Glycerol + Spent-lye

Choose the correct answer from the options given below :

A. -(II), (B)-(III), (C)-(IV), (D)-(I)

B. (A)-(II), (B)-(IV), (C)-(I), (D)-(III)

C. (A)-(III), (B)-(IV), (C)-(II), (D)-(I)

D. (A)-(III), (B)-(I), (C)-(IV), (D)-(II)

Question 183 View solution online

1.24 g of $\mathbf{AX_2}$ (molar mass $\mathbf{124\ g\ mol^{-1}}$) is dissolved in 1 kg of water to form a solution with boiling point of $\mathbf{100.0156^{\circ}C}$, while 25.4 g of $\mathbf{AY_2}$ (molar mass $\mathbf{250\ g\ mol^{-1}}$) in 2 kg of water constitutes a solution with a boiling point of $\mathbf{100.0260^{\circ}C}$.
$\mathbf{K_b\ (H_2O) = 0.52\ K\ kg\ mol^{-1}}$

Which of the following is correct ?

A. $\mathbf{AX_2}$ and $\mathbf{AY_2}$ (both) are completely unionised.

B. $\mathbf{AX_2}$ and $\mathbf{AY_2}$ (both) are fully ionised.

C. $\mathbf{AX_2}$ is completely unionised while $\mathbf{AY_2}$ is fully ionised.

D. $\mathbf{AX_2}$ is fully ionised while $\mathbf{AY_2}$ is completely unionised.

CHAPTER 10 / CHEMISTRY

Electrochemistry

Questions 184-185 / 2 selected / 0.7% practice weight / Consolidate

Topics to prioritise in this collection

- Electrochemical cells: 1 question / 50.0% of this chapter
- Electrode potentials and electrolysis: 1 question / 50.0% of this chapter

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Question 184

View solution online

Match List-I with List-II :

List-I Applications		List-II Batteries/Cell	
(A)	Transistors	(I)	Anode - Zn/Hg; Cathode - HgO + C
(B)	Hearing aids	(II)	Hydrogen fuel cell
(C)	Invertors	(III)	Anode - Zn; Cathode - Carbon
(D)	Apollo space ship	(IV)	Anode - Pb ; Cathode $-\mathbf{Pb} \mid \mathbf{PbO_2}$

Choose the correct answer from the options given below:

A. -(III), (B)-(I), (C)-(IV), (D)-(II)

B. (A)-(III), (B)-(II), (C)-(IV), (D)-(I)

C. (A)-(IV), (B)-(III), (C)-(II), (D)-(I)

D. (A)-(II), (B)-(III), (C)-(IV), (D)-(I)

Question 185

View solution online

Match List I with List II

LIST-I (Cell)		LIST-II (Use/Property/Reaction)	
A.	Leclanche cell	I.	Converts energy of combustion into electrical energy
B.	Ni-Cd cell	II.	Does not involve any ion in solution and is used in hearing aids
C.	Fuel cell	III.	Rechargeable
D.	Mercury cell	IV.	Reaction at anode $\mathbf{Zn \rightarrow Zn^{2+} + 2e^-}$

Choose the correct answer from the options given below:

A. A-I, B-II, C-III, D-IV

B. A-III, B-I, C-IV, D-II

C. A-IV, B-III, C-I, D-II

D. A-II, B-III, C-IV, D-I

CHAPTER 11 / CHEMISTRY

Chemical Kinetics

Questions 186-187 / 2 selected / 0.7% practice weight / Consolidate

Topics to prioritise in this collection

- Initial-rate method: 1 question / 50.0% of this chapter
- Integrated rate laws: 1 question / 50.0% of this chapter

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Question 186

View solution online

The following data was obtained for chemical reaction given below at 975 K .

$$2NO_{(g)} + 2H_{2(g)} \rightarrow N_{2(g)} + 2H_2O_{(g)}$$

$[NO]$	$[H_2]$	Rate
$molL^{-1}$	$mol\ L^{-1}$	$mol\ L^{-1}\ s^{-1}$

(A) 8×10^{-5} 8×10^{-5} 7×10^{-9}
(B) 24×10^{-5} 8×10^{-5} 2.1×10^{-8}
(C) 24×10^{-5} 32×10^{-5} 8.4×10^{-8}

The order of the reaction with respect to NO is
. [Integer answer]

Numerical answer: _____

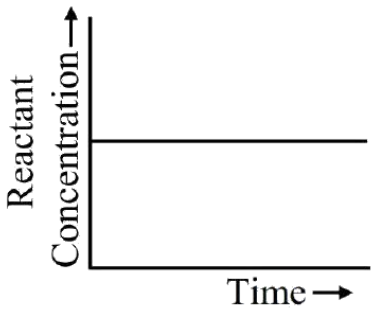
Enter the requested integer (0 decimal places).

Question 187

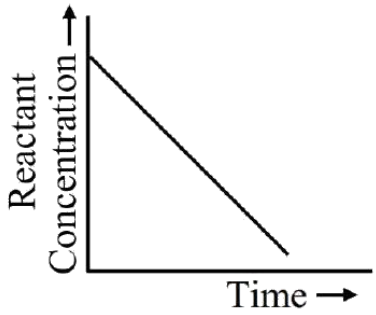
View solution online

Which of the following graphs most appropriately represents a zero order reaction?

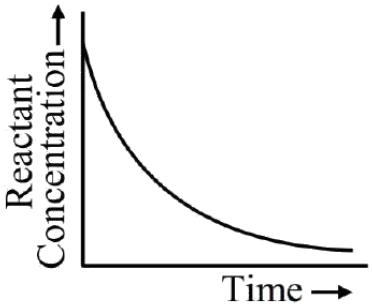
A.



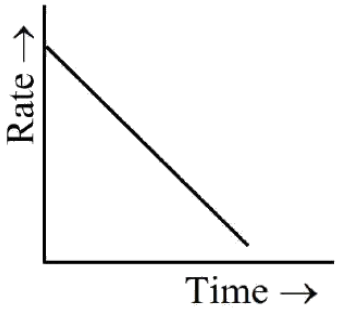
B.



C.



D.



CHAPTER 12 / CHEMISTRY

The p-Block Elements

Questions 188-192 / 5 selected / 1.7% practice weight / Consolidate

Topics to prioritise in this collection

- Main group element chemistry: 3 questions / 60.0% of this chapter
- Gas-evolution reactions: 1 question / 20.0% of this chapter
- Group 16 properties: 1 question / 20.0% of this chapter

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Question 188 View solution online

Choose the correct statements from the following A. All group 16 elements form oxides of general formula $\mathbf{EO_2}$ and $\mathbf{EO_3}$ where $\mathbf{E = S, Se, Te}$ and Po. Both the types of oxides are acidic in nature.
B. $\mathbf{TeO_2}$ is an oxidising agent while $\mathbf{SO_2}$ is reducing in nature.
C. The reducing property decreases from $\mathbf{H_2\ S}$ to $\mathbf{H_2Te}$ down the group.
D. The ozone molecule contains five lone pairs of electrons.
Choose the correct answer from the options given below:

A. A and D only

B. B and C only

C. C and D only

D. A and B only

Question 189

View solution online

Match List-I with List-II, match the gas evolved during each reaction.

	List-I		List-II
(A)	$(NH_4)_2Cr_2O_7 \xrightarrow{\Delta}$	(I)	H_2
(B)	$KMnO_4 + HCl \rightarrow$	(II)	N_2
(C)	$Al + NaOH + H_2O \rightarrow$	(III)	O_2
(D)	$NaNO_3 \xrightarrow{\Delta}$	(IV)	Cl_2

Choose the correct answer from the options given below:

A. - (II), (B) - (III), (C) - (I), (D) - (IV)

B. (A) - (III), (B) - (I), (C) - (IV), (D) - (II)

C. (A) - (II), (B) - (IV), (C) - (I), (D) - (III)

D. (A) - (III), (B) - (IV), (C) - (I), (D) - (II)

Question 190

View solution online

Match List I with List II

	List I	List II
(A)	Slaked lime	(I) NaOH
(B)	Dead burnt plaster	(II) $Ca(OH)_2$
(C)	Caustic soda	(III) $Na_2CO_3 \cdot 10H_2O$
(D)	Washing soda	(IV) $CaSO_4$

Choose the correct answer from the options given below:

A. - III, (B) - IV, (C) - II, (D) - I

B. (A) - III, (B) - II, (C) - IV, (D) - I

C. (A) - I, (B) - IV, (C) - II, (D) - III

D. (A) -II, (B) - IV, (C) - I, (D) - III

Question 191

View solution online

Match List I with List-II

List-I (Name of the test)		List-II (Reaction sequence involved) [M is metal]	
A	Borax bead test	I.	$MCO_3 \rightarrow MO \xrightarrow[+\Delta]{Co(NO_3)_2}$ CoO. MO
B.	Charcoal cavity test	II.	$MCO_3 \rightarrow MCl_2 \rightarrow M^{2+}$
C.	Cobalt nitrate test	III	$MSO_4 \xrightarrow[\Delta]{Na_2B_4O_7} M(BO_2)_2 \rightarrow MBO_2 \rightarrow M$
D.	Flame test	IV	$MSO_4 \xrightarrow[\Delta]{Na_2CO_3} MCO_3 \rightarrow MO \rightarrow M$

Choose the correct answer from the option below :

A. A-III, B-I, C-IV, D-II

B. A-III, B-II, C-IV, D-I

C. A-III, B-I, C-II, D-IV

D. A-III, B-IV, C-I, D-II

Question 192

View solution online

Match List I with List II

LIST I		LIST II	
A.	Nitrogen oxides in air	I.	Eutrophication
B.	Methane in air	II.	pH of rain water becomes 5.6.
C.	Carbon dioxide	III.	Global warming
D.	Phosphate fertilisers in water	IV.	Acid rain

Choose the correct answer from the options given below:

A. A-IV, B-III, C-II, D-I

B. A-II, B-III, C-I, D-IV

C. A-I, B-II, C-III, D-IV

D. A-IV, B-II, C-III, D-I

CHAPTER 13 / CHEMISTRY

The d- and f-Block Elements

Questions 193-200 / 8 selected / 2.7% practice weight / Next

Topics to prioritise in this collection

- Properties of transition elements: 5 questions / 62.5% of this chapter
- The d- and f- Block Elements: 2 questions / 25.0% of this chapter
- Magnetic properties of transition ions: 1 question / 12.5% of this chapter

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Question 193

View solution online

Match List-I with List-II

\multirow{2}{*}{ List-I Complex }		List-II Primary valency and Secondary valency		
		(I)	3	6
(B)	$[Pt(NH_3)_2Cl(NO_2)]$	(II)	3	4
(C)	$Hg[Co(SCN)_4]$	(III)	2	6
(D)	$[Mg(EDTA)]^{2-}$	(IV)	2	4

Choose the correct answer from the options given below :

A. -(III), (B)-(I), (C)-(II), (D)-(IV)

B. (A)-(I), (B)-(IV), (C)-(II), (D)-(III)

C. (A)-(I), (B)-(III), (C)-(II), (D)-(IV)

D. (A)-(II), (B)-(III), (C)-(IV), (D)-(I)

Question 194 View solution online

Number of complexes from the following with even number of unpaired " d " electrons is ..... .
$[V(H_2O)_6]^{3+}$, $[Cr(H_2O)_6]^{2+}$, $[Fe(H_2O)_6]^{3+}$, $[Ni(H_2O)_6]^{3+}$, $[Cu(H_2O)_6]^{2+}$
[Given atomic numbers : $V = 23, Cr = 24, Fe = 26, Ni = 28, Cu = 29$]

A. 2

B. 4

C. 5

D. 1

Question 195 View solution online

Number of complexes with even number of electrons in t_{2g} orbitals is -
$[Fe(H_2O)_6]^{2+}$, $[Co(H_2O)_6]^{2+}$, $[Co(H_2O)_6]^{3+}$,
$[Cu(H_2O)_6]^{2+}$, $[Cr(H_2O)_6]^{2+}$

A. 1

B. 3

C. 2

D. 5

Question 196

View solution online

Match List I with List II.

List I Complex		List II Colour	
A.	$Mg(NH_4)PO_4$	I.	Brown
B.	$K_3[Co(NO_2)_6]$	II.	White
C.	$MnO(OH)_2$	III.	Yellow
D.	$Fe_4[Fe(CN)_6]_3$	IV.	blue

Choose the correct answer from the options given below:

A. A-II, B-III, C-I, D-IV

B. A-III, B-IV, C-II, D-I

C. A-II, B-IV, C-I, D-III

D. A-II, B-III, C-IV, D-I

Question 197

View solution online

Match items of List-I with those of List-II :

List-I}
(Property)
(a) Diamagnetism
(b) Ferrimagnetism
(c) Paramagnetism
(d) Antiferromagnetism
(i) MnO
(ii) O_2
(iii) NaCl
(iv) Fe_3O_4

List-II}
(Example)

Choose the most appropriate answer from the options given below :

A. (a)-(ii), (b)-(i), (c)-(iii), (d)-(iv)

B. (a)-(i), (b)-(iii), (c)-(iv), (d)-(ii)

C. (a)-(iii), (b)-(iv), (c)-(ii), (d)-(i)

D. (a)-(iv), (b)-(ii), (c)-(i), (d)-(iii)

Question 198

View solution online

Match List-I with List-II.

List-I
(Complex ion)
(A) $[Cr(NH_3)_6]^{3+}$
(B) $[NiCl_4]^{2-}$
(C) $[CoF_6]^{3-}$
(D) $[Ni(CN)_4]^{2-}$

List-II
(Spin only magnetic
moment in B.M.)
(I) 4.90
(II) 3.87
(III) 0.0
(IV) 2.83

Choose the correct answer from the options given below:

A. (A)-(I), (B)-(IV), (C)-(II), (D)-(III)

B. (A)-(IV), (B)-(III), (C)-(I), (D)-(II)

C. (A)-(II), (B)-(IV), (C)-(I), (D)-(III)

D. (A)-(II), (B)-(III), (C)-(I), (D)-(IV)

Question 199 View solution online

Match List-I with List-II.

List-I
(Transition metal ion) (Spin only magnetic moment (B.M.))
(A) Ti^{3+}
(I) 3.87
(B) V^{2+}
(II) 0.00
(C) Ni^{2+}
(III) 1.73
(D) Sc^{3+}
(IV) 2.84

Choose the correct answer from the options given below:

A. (A)-(III), (B)-(I), (C)-(II), (D)-(IV)

B. (A)-(III), (B)-(I), (C)-(IV), (D)-(II)

C. (A)-(IV), (B)-(II), (C)-(III), (D)-(I)

D. (A)-(II), (B)-(IV), (C)-(I), (D)-(III)

Question 200

View solution online

Match List-I with List-II

List-I}
Species
(A) $\mathbf{Cr^{+2}}$
(B) $\mathbf{Mn^{+}}$
(C) $\mathbf{Ni^{+2}}$
(D) $\mathbf{V^{+}}$

List-II}
Electronic distribution}
(I) $\mathbf{3\,d^{8}}$
(II) $\mathbf{3\,d^{3}4\,s^{1}}$
(III) $\mathbf{3\,d^{4}}$
(IV) $\mathbf{3}d^{5}\mathbf{4}s^{1}$

Choose the correct answer from the options given below:

A. (A)-I, (B)-II, (C)-III, (D)-IV

B. (A)-III, (B) - IV, (C) - I, (D)-II

C. (A)-IV, (B)-III, (C)-I, (D)-II

D. (A)-II, (B)-I, (C)-IV, (D)-III

CHAPTER 14 / CHEMISTRY

Coordination Compounds

Questions 201-210 / 10 selected / 3.3% practice weight / Next

Topics to prioritise in this collection

- Coordination chemistry: 7 questions / 70.0% of this chapter
- Coordination Compounds: 1 question / 10.0% of this chapter
- Coordination number and geometry: 1 question / 10.0% of this chapter
- Crystal field splitting: 1 question / 10.0% of this chapter

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Question 201

View solution online

Match list I with List II

\multirow{2}{*}{LIST I Coordination entity}		\multirow{2}{*}{
		LIST II
		Wavelength of light absorbed in nm
		}	

A.	$[CoCl(NH_3)_5]^{2+}$	I.	310
B.	$[Co(NH_3)_6]^{3+}$	II.	475
C.	$[Co(CN)_6]^{3-}$	III.	535
D.	$[Cu(H_2O)_4]^{2+}$	IV.	600

Choose the correct answer from the options given below:

A. A-III, B-I, C-II, D-IV

B. A-IV, B-I, C-III, D-II

C. A-III, B-II, C-I, D-IV

D. A-II, B-III, C-IV, D-I

Question 202 View solution online

Identify the homoleptic complexes with odd number of d electrons in the central metal.
(A) $[FeO_4]^{2-}$
(B) $[Fe(CN)_6]^{3-}$
(C) $[Fe(CN)_5NO]^{2-}$
(D) $[CoCl_4]^{2-}$
(E) $[Co(H_2O)_3\ F_3]$

Choose the correct answer from the options given below :

A. (B) and (D) only

B. (C) and (E) only

C. (A), (B) and (D) only

D. (A), (C) and (E) only

Question 203 View solution online

Complex A has a composition of $H_{12}O_6Cl_3Cr$. If the complex on treatment with conc. H_2SO_4 loses 13.5% of its original mass, the correct molecular formula of A is:
[Given: atomic mass of $Cr = 52$ amu and $Cl = 35$ amu]

A. $[Cr(H_2O)_5Cl]Cl_2 \cdot H_2O$

B. $[Cr(H_2O)_4Cl_2]Cl \cdot 2H_2O$

C. $[Cr(H_2O)_3Cl_3] \cdot 3H_2O$

D. $[Cr(H_2O)_6]Cl_3$

Question 204 View solution online

	List-I (Complex)		List-II (Primary, Secondary Valency)
A	$[Co(NH_3)_6]Cl_3$	I	3, 6
B	$[Pt(NH_3)_2Cl(NO_2)]$	II	3, 4
C	$Hg[Co(SCN)_4]$	III	2, 6
D	$[Mg(EDTA)]^{2-}$	IV	2, 4

A. (A)-(III), (B)-(I), (C)-(II), (D)-(IV)

B. (A)-(I), (B)-(IV), (C)-(II), (D)-(III)

C. (A)-(I), (B)-(III), (C)-(II), (D)-(IV)

D. (A)-(II), (B)-(III), (C)-(IV), (D)-(I)

Question 205 View solution online

Match the LIST-I with LIST-II

LIST-I (Complex/Species)		LIST-II (Shape & magnetic moment)	
A.	$[Ni(CO)_4]$	I.	Tetrahedral, 2.8 BM
B.	$[Ni(CN)_4]^{2-}$	II.	Square planar, 0 BM
C.	$[NiCl_4]^{2-}$	III.	Tetrahedral, 0 BM
D.	$[MnBr_4]^{2-}$	IV	Tetrahedral, 5.9 BM

Choose the correct answer from the options given below :

A. A-III, B-IV, C-II, D-I

B. A-I, B-II, C-III, D-IV

C. A-III, B-II, C-I, D-IV

D. A-IV, B-I, C-III, D-II

Question 206 View solution online

The correct order of spin only magnetic moments for the following complex ions is

A. $[Fe(CN)_6]^{3-} < [CoF_6]^{3-} < [MnBr_4]^{2-} < [Mn(CN)_6]^{3-}$

B. $[Fe(CN)_6]^{3-} < [Mn(CN)_6]^{3-} < [CoF_6]^{3-} < [MnBr_4]^{2-}$

C. $[MnBr_4]^{2-} < [CoF_6]^{3-} < [Fe(CN)_6]^{3-} < [Mn(CN)_6]^{3-}$

D. $[CoF_6]^{3-} < [MnBr_4]^{2-} < [Fe(CN)_6]^{3-} < [Mn(CN)_6]^{3-}$

Question 207

View solution online

Match List I with List II

LIST-I

(Substances)
A.Ziegler catalyst
B.Blood Pigment
C.Wilkinson catalyst
D.Vitamin $\mathbf{B_{12}}$

LIST-II

(Element Present)
I.Rhodium
II. Cobalt
III.Iron
IV.Titanium

Choose the correct answer from the options given below:

A. A-II, B-IV, C-I, D-III

B. A-II, B-III, C-IV, D-I

C. A-III, B-II, C-IV, D-I

D. A-IV, B-III, C-I, D-II

Question 208 View solution online

Consider the following complex ions
$\mathbf{P} = [\mathbf{FeF_6}]^{3-}$
$\mathbf{Q} = [\mathbf{V(H_2O)_6}]^{2+}$
$\mathbf{R} = [\mathbf{Fe(H_2O)_6}]^{2+}$
The correct order of the complex ions, according to their spin only magnetic moment values (in B.M.) is :

A. $\mathrm{R} < \mathrm{Q} < \mathrm{P}$

B. $\mathbf{R} < \mathbf{P} < \mathbf{Q}$

C. $\mathbf{Q} < \mathbf{R} < \mathbf{P}$

D. $\mathbf{Q} < \mathbf{P} < \mathbf{R}$

Question 209 View solution online

Given below are two statements :

Statement I : $[\mathbf{Mn(CN)_6}]^{3-}$, $[\mathbf{Fe(CN)_6}]^{3-}$ and $[\mathbf{Co(C_2O_4)_3}]^{3-}$ are $\mathbf{d^2sp^3}$ hybridised.
Statement II : $[\mathbf{MnCl_6}]^{3-}$ and $[\mathbf{FeF_6}]^{3-}$ are paramagnetic and have 4 and 5 unpaired electrons, respectively.
In the light of the above statements, choose the correct answer from the options given below :

A. Statement I is correct but statement II is false

B. Both statement I and statement II are false

C. Statement I is incorrect but statement II is true

D. Both statement I and statement II are are true

Question 210

View solution online

LIST-I	Complex	LIST-II	Hybridisation
A	$K_2[Ni(CN)_4]$	I	sp^3
B	$[Ni(CO)_4]$	II	sp^3d^2
C	$[Co(NH_3)_6]Cl_3$	III	dsp^2
D	$Na_3[CoF_6]$	IV	d^2sp^3

Choose the correct answer from the options given below:

A. A-III, B-I, C-II, D-IV

B. A-III, B-II, C-IV, D-I

C. A-I, B-III, C-II, D-IV

D. A-III, B-I, C-IV, D-II

CHAPTER 15 / CHEMISTRY

Haloalkanes and Haloarenes

Questions 211-226 / 16 selected / 5.3% practice weight / Focus first

Topics to prioritise in this collection

- Nucleophilic substitution: 11 questions / 68.8% of this chapter
- Haloalkanes and Haloarenes: 2 questions / 12.5% of this chapter
- Reactivity of aryl halides: 2 questions / 12.5% of this chapter
- SN2 mechanism: 1 question / 6.3% of this chapter

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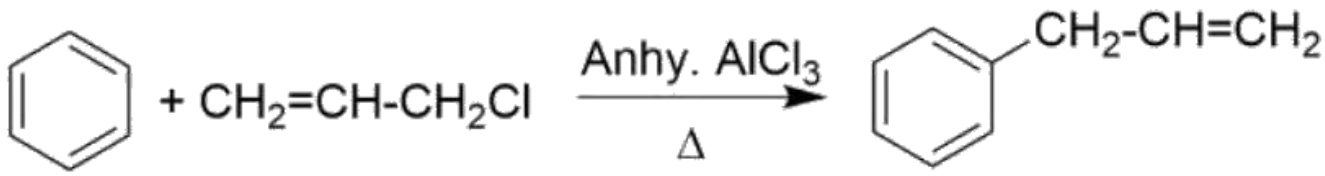
Question 211

View solution online

Which of the following reactions are possible?



A. A, B, C

B. **B, D**

C. A, C, D

D. **A, C**

Question 212 View solution online

With respect to the following reaction, consider the given statements:

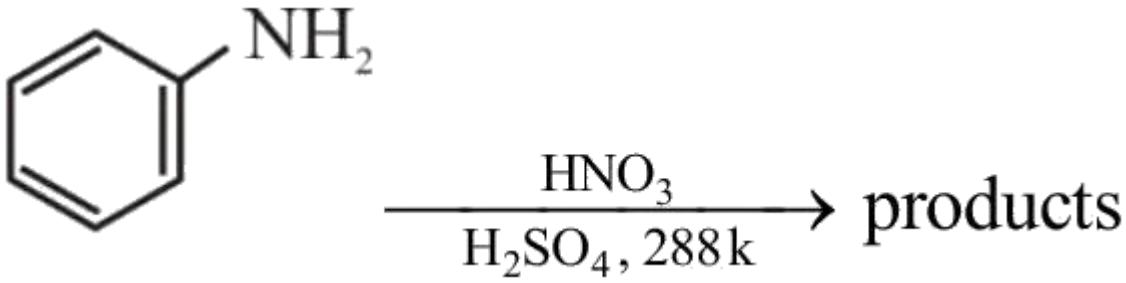
$$C_6H_5NH_2 \xrightarrow[288\ K]{HNO_3/H_2SO_4} \text{products}$$

(A) o-Nitroaniline and p-nitroaniline are the predominant products.

(B) p-Nitroaniline and m-nitroaniline are the predominant products.

(C) HNO_3 acts as an acid.

(D) H_2SO_4 acts as an acid.



A. (A) and (C) are correct statements.

B. (A) and (D) are correct statements.

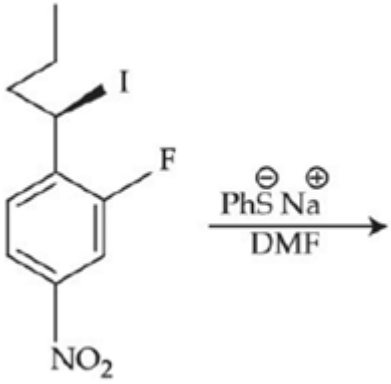
C. (B) and (D) are correct statements.

D. (B) and (D) are correct statements.

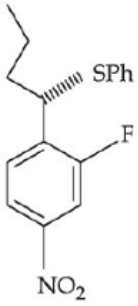
Question 213

View solution online

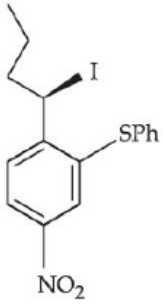
The major product of the following reaction is:



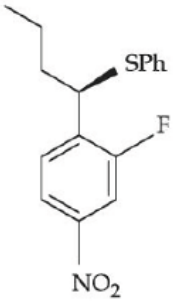
A.



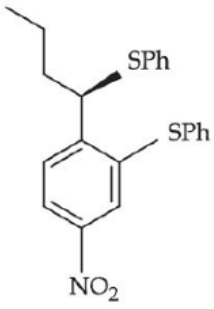
B.



C.



D.

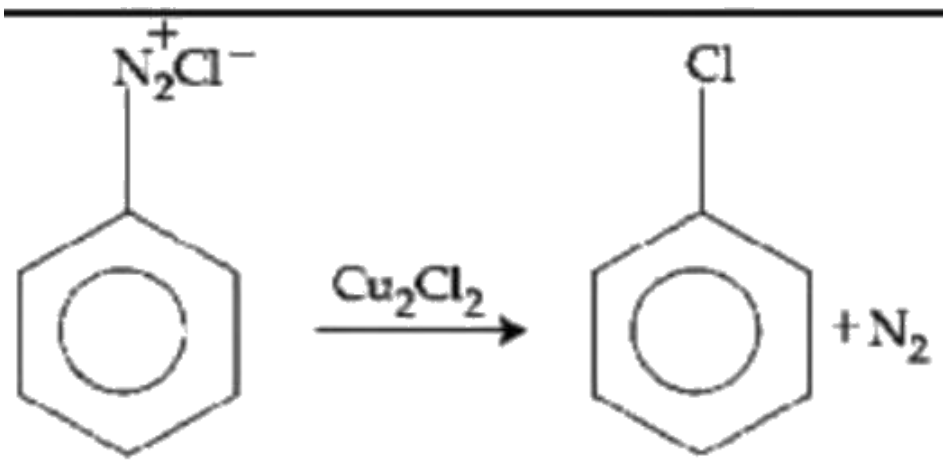


Question 214 View solution online

Match List I with List II

LIST I			LIST II	
		I.	Fittig reaction	
	II.	Wurtz Fittig reaction		
	III.	Finkelstein reaction		
D.	$C_2H_5Cl + NaI \rightarrow C_2H_5I + NaCl$		IV.	Sandmeyer reaction

Choose the correct answer from the options given below:



A. A - II, B - I, C - IV, D - III

B. A - IV, B - II, C - III, D - I

C. A - III, B - II, C - IV, D - I

D. A - II, B - I, C - III, D - IV

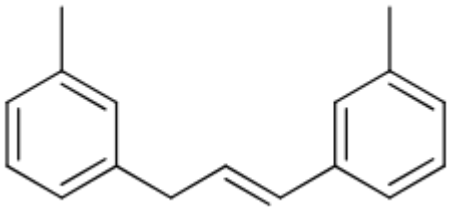
Question 215

View solution online

Match List-I with List-II

List-I Conversion		List-II Reagents, Conditions used
	(III)	(a) $\mathbf{NaOH, 443\ K}$; (b) $\mathbf{H_3O^+}$
(a) $\mathbf{NaOH, 623\ K}$, 300 atm ; (b) $\mathbf{H_3O}$		

Choose the correct answer from the options given below :



A. (A)-(II), (B)-(III), (C)-(I), (D)-(IV)

B. (A)-(III), (B)-(IV), (C)-(II), (D)-(I)

C. (A)-(IV), (B)-(III), (C)-(II), (D)-(I)

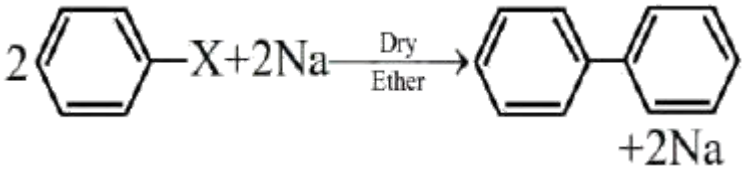
D. (A)-(IV), (B)-(III), (C)-(I), (D)-(II)

Question 216 View solution online

Match List-I with List-II

List-I (Reaction)		List-II (Name of reaction)	
	(I)	Lucas reaction	
(B)	$ArN_2^+X^- \xrightarrow[HCl]{Cu} ArCl + N_2 \uparrow + CuX$	(II)	Finkelstein reaction
(C)	$C_2H_5Br + NaI \xrightarrow[Acctonc]{Dry} C_2H_5I + NaBr$	(III)	Fittig reaction
(D)	$CH_3C(OH)(CH_3)CH_3 \xrightarrow[ZnCl_2]{HCl} CH_3C(Cl)(CH_3)CH_3$	(IV)	Gatterman reaction

Choose the correct answer from the options given below:



A. (A)-(III), (B)-(II), (C)-(IV), (D)-(I)

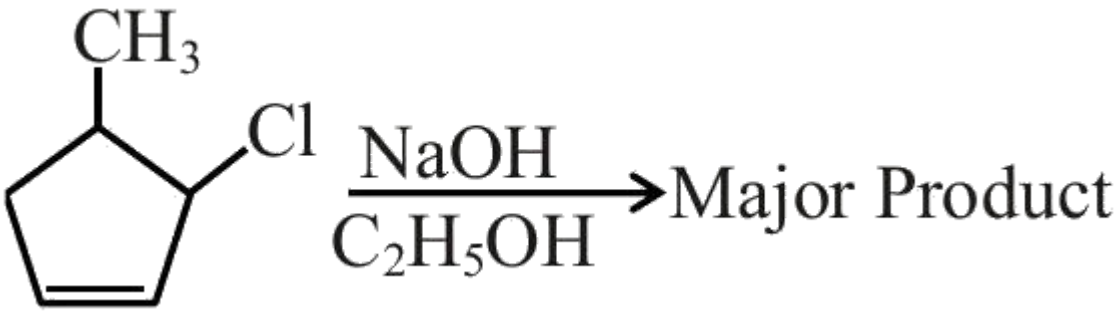
B. (A)-(III), (B)-(IV), (C)-(II), (D)-(I)

C. (A)-(IV), (B)-(III), (C)-(I), (D)-(II)

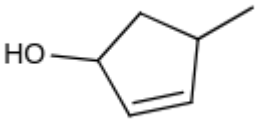
D. (A)-(IV), (B)-(I), (C)-(II), (D)-(III)

Question 217 View solution online

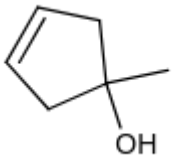
The major product of the following reaction is :



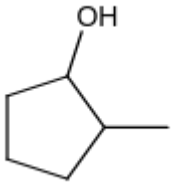
A.



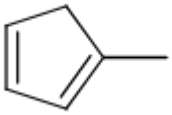
B.



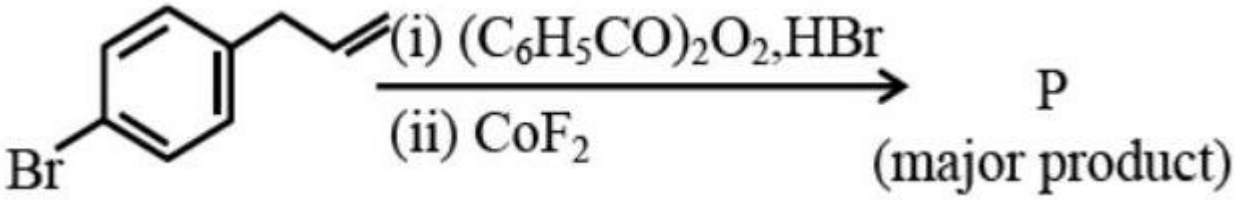
C.



D.

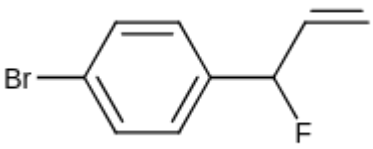


Question 218 View solution online

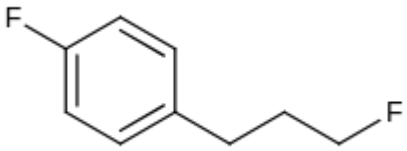


Major product P of above reaction is:

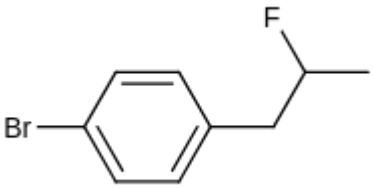
A.



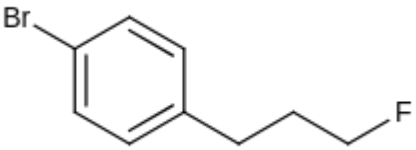
B.



C.



D.



Question 219 View solution online

The products A and B in the following reactions, respectively are

$$A \xrightarrow{Ag-NO_2} CH_3-CH_2-CH_2-Br \xrightarrow{AgCN} B$$

A. $CH_3-CH_2-CH_2-ONO, CH_3-CH_2-CH_2-NC$

B. $CH_3-CH_2-CH_2-ONO, CH_3-CH_2-CH_2-CN$

C. $CH_3-CH_2-CH_2-NO_2, CH_3-CH_2-CH_2-CN$

D. $CH_3-CH_2-CH_2-NO_2, CH_3-CH_2-CH_2-NC$

Question 220 View solution online

Identify the correct order of reactivity for the following pairs towards the respective mechanism

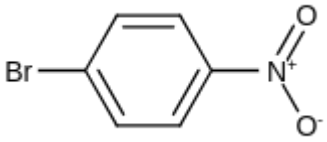
(A)

(B)

(C) Electrophilic substitution

(D) Nucleophilic substitution

Choose the correct answer from the options given below:



A. (A), (B) and (D) only

B. (A), (B), (C) and (D)

C. (A), (C) and (D) only

D. (B), (C) and (D) only

Question 221 View solution online

The correct order of reactivity of following haloarenes towards nucleophilic substitution with aqueous NaoH is :

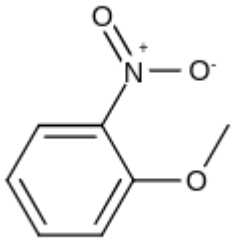
A.

B.

C.

D.

Choose the correct answer from the options given below:



A. A > B > D > C

B. C > A > D > B

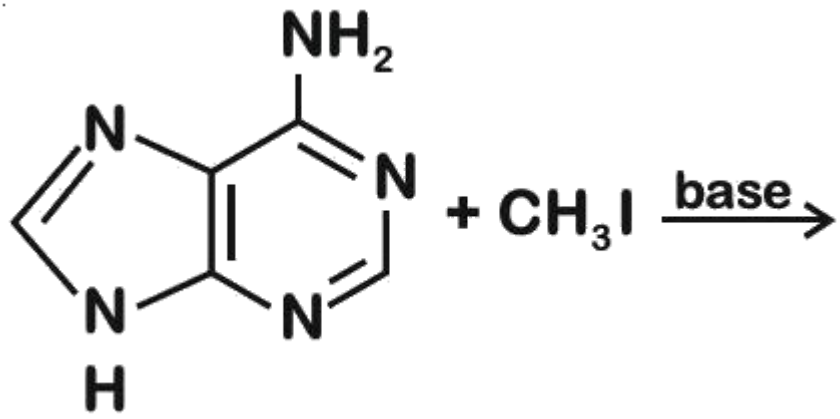
C. **D > C > B > A**

D. **D > B > A > C**

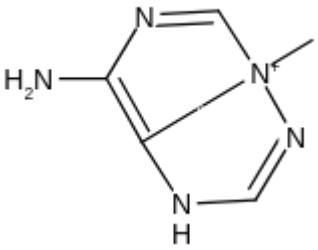
Question 222

View solution online

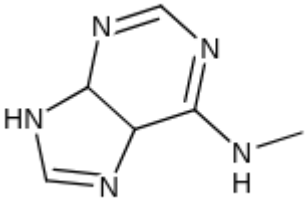
The major product in the following reaction is:



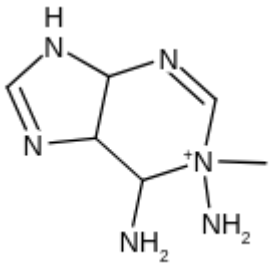
A.



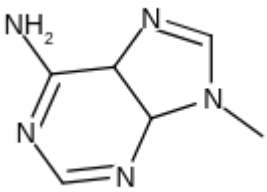
B.



C.



D.



Question 223

View solution online

Match the LIST-I with LIST-II

LIST-I Name reaction		LIST-II Product obtainable	
A.	Swarts reaction	I.	Ethyl benzene
B.	Sandmeyer's reaction	II.	Ethyl iodide
C.	Wurtz Fittig reaction	III.	Cyanobenzene
D.	Finkelstein reaction	IV.	Ethyl fluoride

Choose the correct answer from the options given below:

A. A-II, B-III, C-I, D-IV

B. A-IV, B-I, C-III, D-II

C. A-IV, B-III, C-I, D-II

D. A-II, B-I, C-III, D-IV

Question 224

View solution online

Match List I with List II

List I Name of reaction		List II Reagent used	
A	Hell-VolhardZelinsky reaction	I.	$NaOH + I_2$
B	Iodoform reaction	II.	(i) CrO_2Cl_2, CS_2 (ii) H_2O
C	Etard reaction	III.	(i) $Br_2/$ red phosphorus (ii) H_2O
D	Gatterman-Koch reaction	IV.	CO, HCl, anhyd. $AlCl_3$

Choose the correct answer from the options given below:

A. A-III, B-II, C-I, D-IV

B. A-III, B-I, C-IV, D-II

C. A-I, B-II, C-III, D-IV

D. A-III, B-I, C-II, D-IV

Question 225

View solution online

Match List I with List II

List I	List II
A.	I. Br_2 in CS_2
B.	II. $Na_2Cr_2O_7/H_2SO_4$
C.	III. Zn
D.	IV. $CHCl_3/NaOH$

Choose the correct answer from the options given below:

A. A-IV, B-III, C-II, D-I

B. A-IV, B-III, C-I, D-II

C. A-II, B-III, C-I, D-IV

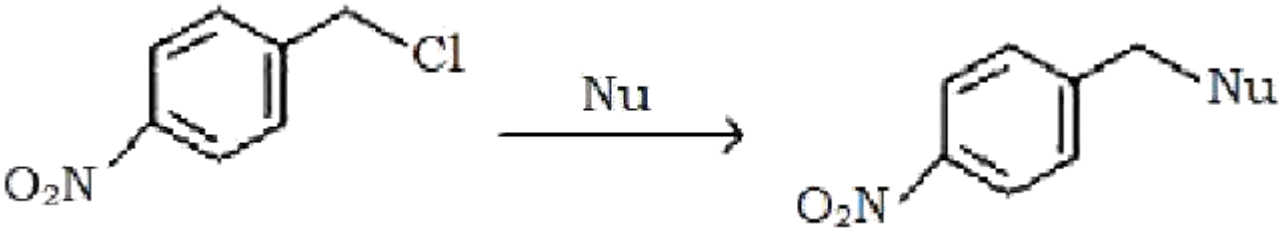
D. A-IV, B-II, C-III, D-I

Question 226 View solution online

-(II)

Where $\mathbf{Nu} =$ Nucleophile

Find out the correct statement from the options given below for the above 2 reactions.



A. Reaction (I) is of $\mathbf{2^{nd}}$ order and reaction (II) is of $\mathbf{1^{st}}$ order

B. Reaction (I) and (II) both are of $\mathbf{2^{nd}}$ order

C. Reaction (I) is of $\mathbf{1^{st}}$ order and reaction (II) is of $\mathbf{2^{nd}}$ order

D. Reactions (I) and (II) both are of $\mathbf{1^{st}}$ order

CHAPTER 16 / CHEMISTRY

Alcohols, Phenols and Ethers

Questions 227-258 / 32 selected / 10.7% practice weight / Focus first

Topics to prioritise in this collection

- Reactions of alcohols, phenols and ethers: 19 questions / 59.4% of this chapter
- Reactions of alcohols and phenols: 4 questions / 12.5% of this chapter
- Acid-catalysed dehydration: 2 questions / 6.3% of this chapter
- Acid-catalysed cyclisation: 1 question / 3.1% of this chapter
- Alcohols, phenols and ethers: 1 question / 3.1% of this chapter
- Cumene process and phenol reactions: 1 question / 3.1% of this chapter
- Electrophilic substitution in phenols: 1 question / 3.1% of this chapter
- Hydrogen halide reactions: 1 question / 3.1% of this chapter
- Phenol acidity: 1 question / 3.1% of this chapter
- Phenol reactions: 1 question / 3.1% of this chapter

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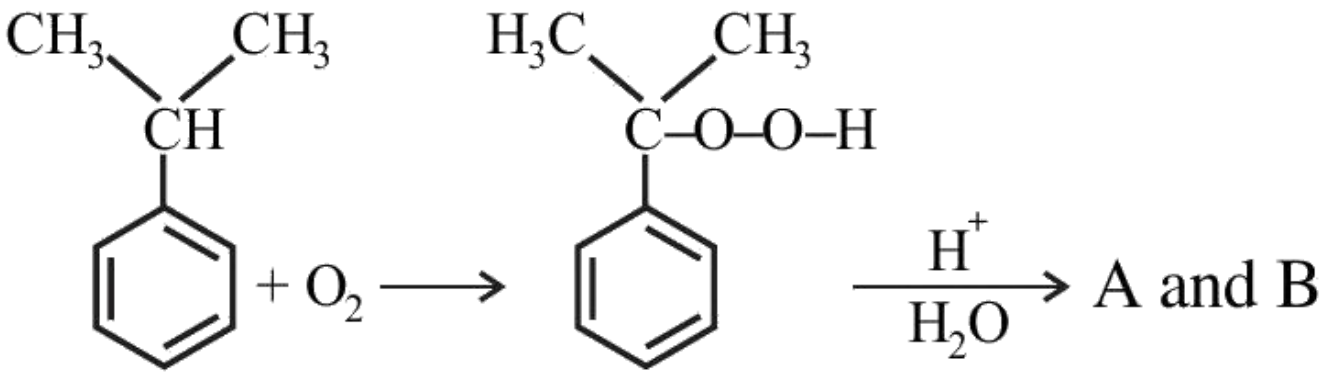
Question 227

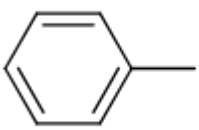
View solution online

In the following reaction:

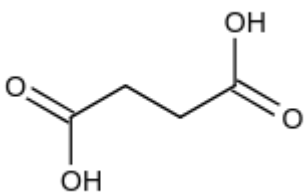
The compounds A and B respectively are :-



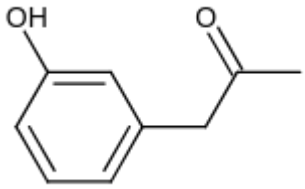
A.



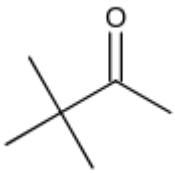
B.



C.



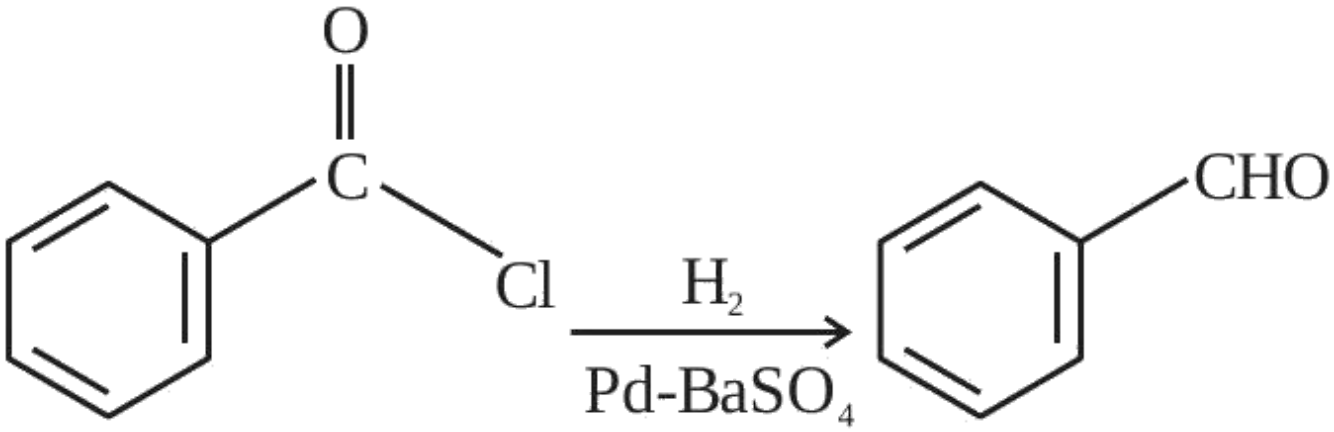
D.



Question 228

View solution online

This reduction reaction is known as:



A. Rosenmund reduction

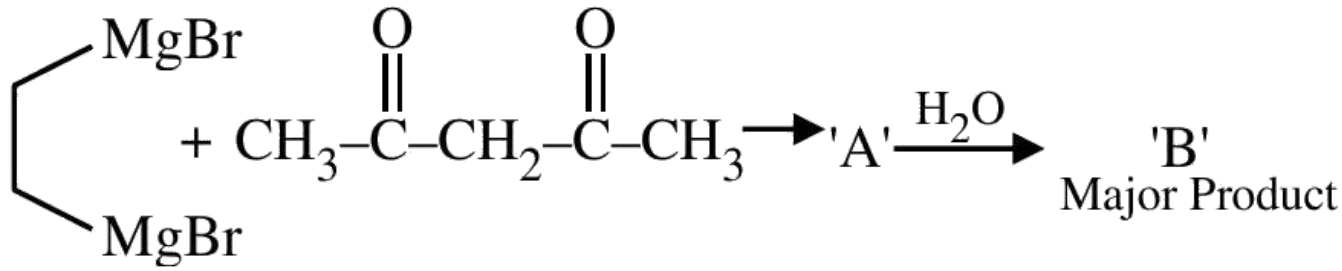
B. Wolff-Kishner reduction

C. Stephen reduction

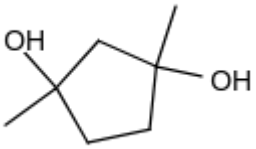
D. Etard reduction

Question 229 View solution online

Consider the above reaction sequence and identify the product B.



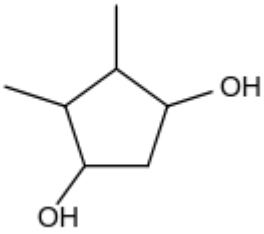
A.



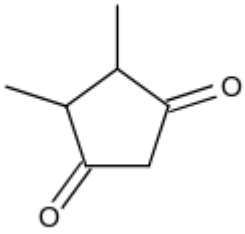
B.



C.

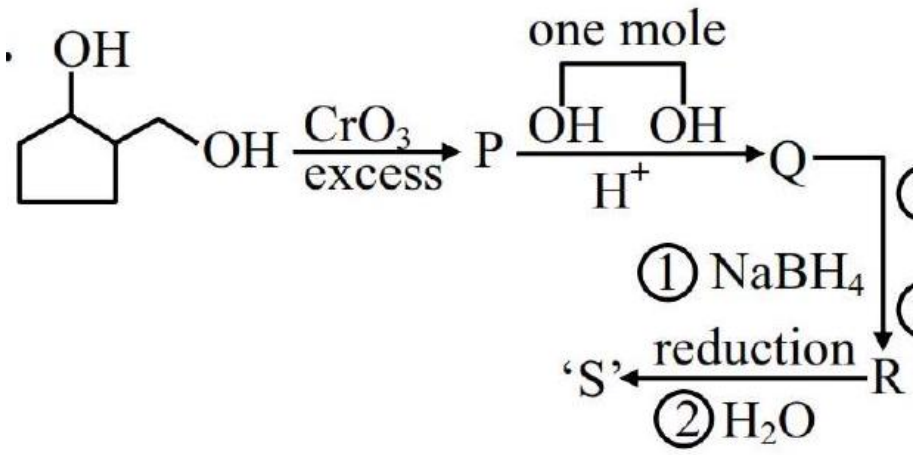


D.



Question 230

View solution online



(1) CH_3Mg I in ether

(2) $H_3O^{(+)}$

0.1 mole of compound ' S ' will weigh g.

(Given molar mass in $gmol^{-1}$ $C : 12, H : 1, O : 16$)

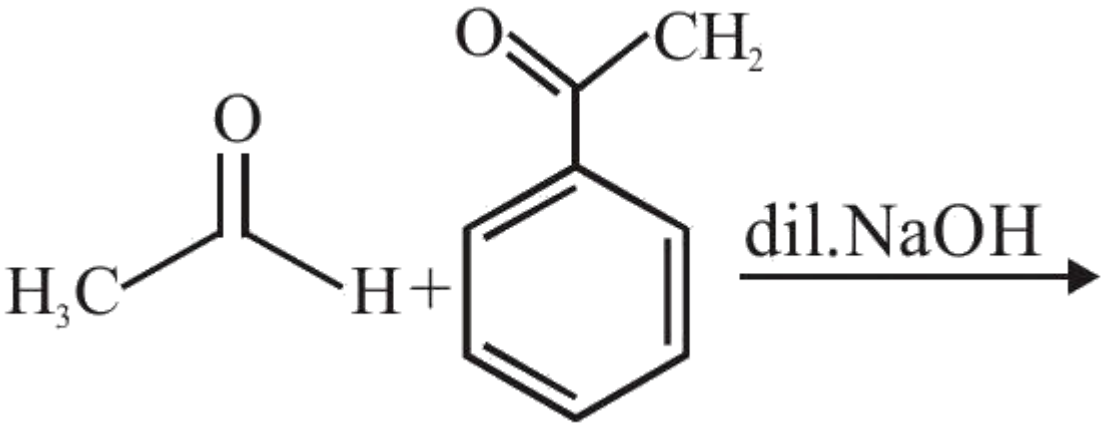
Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

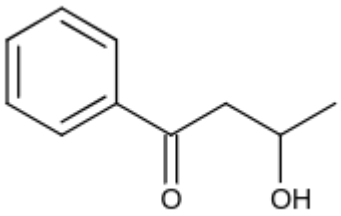
Question 231

View solution online

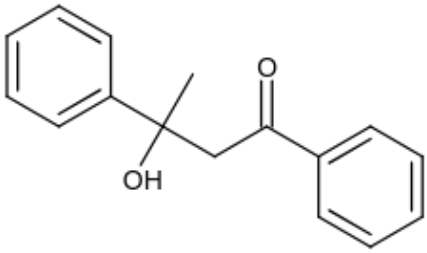
The major product formed in the following reaction is:



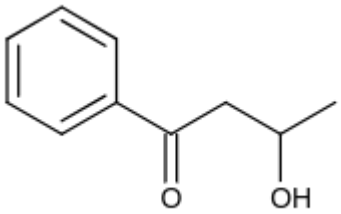
A.



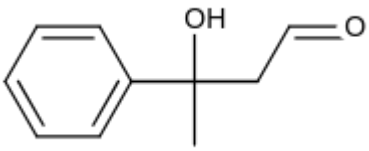
B.



C.



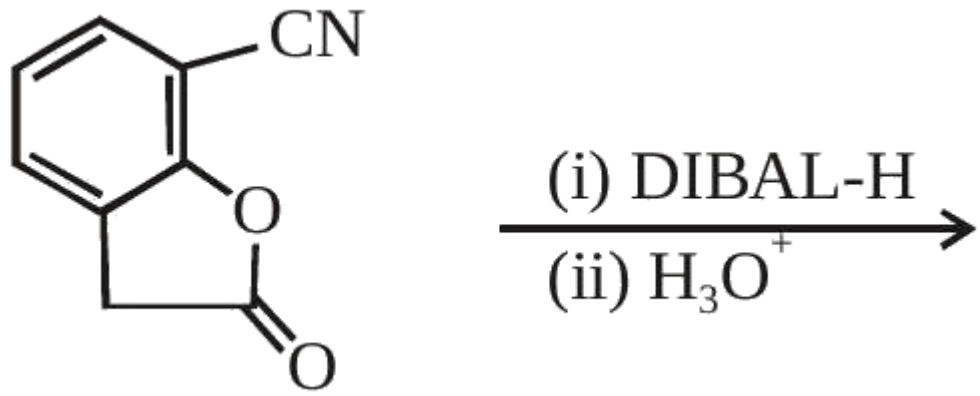
D.



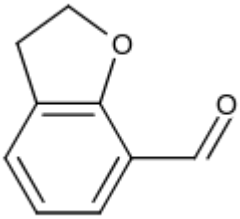
Question 232

View solution online

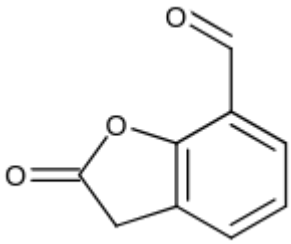
The major product of the following reaction is:



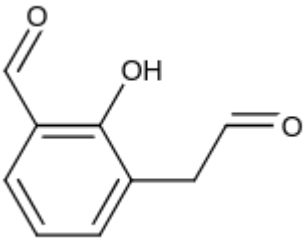
A.



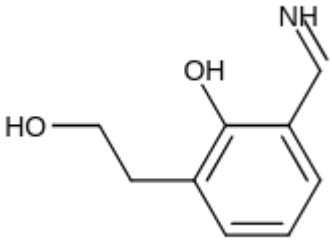
B.



C.



D.



Question 233 View solution online

Match the LIST-I with LIST-II

LIST-I (Reagent)		LIST-II (Functional Group detected)	
A.	Sodium bicarbonate solution	I.	double bond/unsaturation
B.	Neutral ferric chloride	II.	carboxylic acid
C.	ceric ammonium nitrate	III.	phenolic - OH
D.	alkaline $KMnO_4$	IV	alcoholic - OH

Choose the correct answer from the options given below:

A. A-II, B-III, C-IV, D-I

B. A-II, B-III, C-I, D-IV

C. A-III, B-II, C-IV, D-I

D. A-II, B-IV, C-III, D-I

Question 234 View solution online

Which one of the following reactions will not yield propionic acid?

A. $CH_3CH_2COCH_3 + OI^-/H_3O^+$

B. $CH_3CH_2CH_3 + KMnO_4$ (Heat), OH^-/H_3O^+

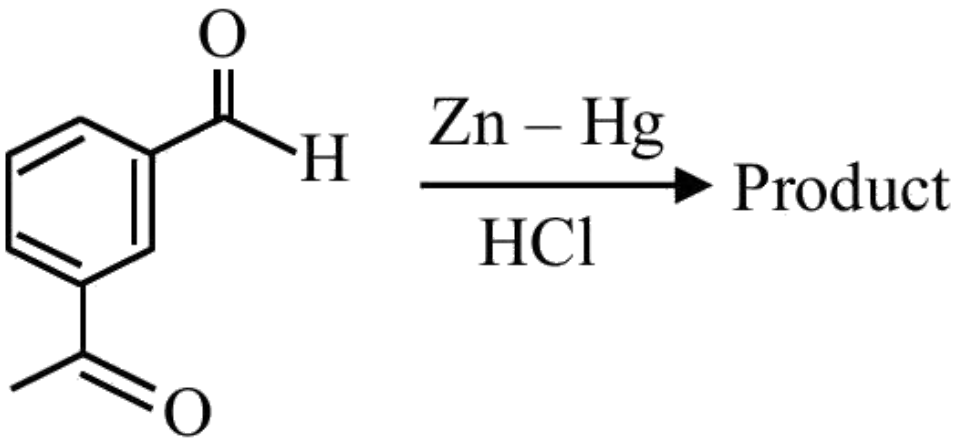
C. $CH_3CH_2CCl_3 + OH^-/H_3O^+$

D. $CH_3CH_2CH_2Br + Mg, CO_2$ dry ether $/H_3O^+$

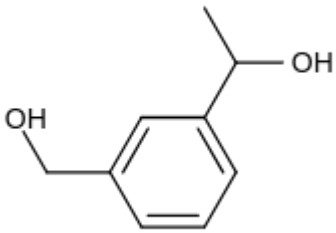
Question 235

View solution online

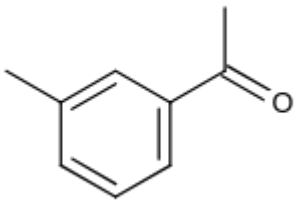
Identify the product in the following reaction :



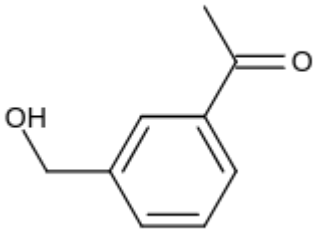
A.



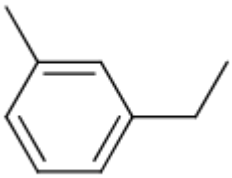
B.



C.



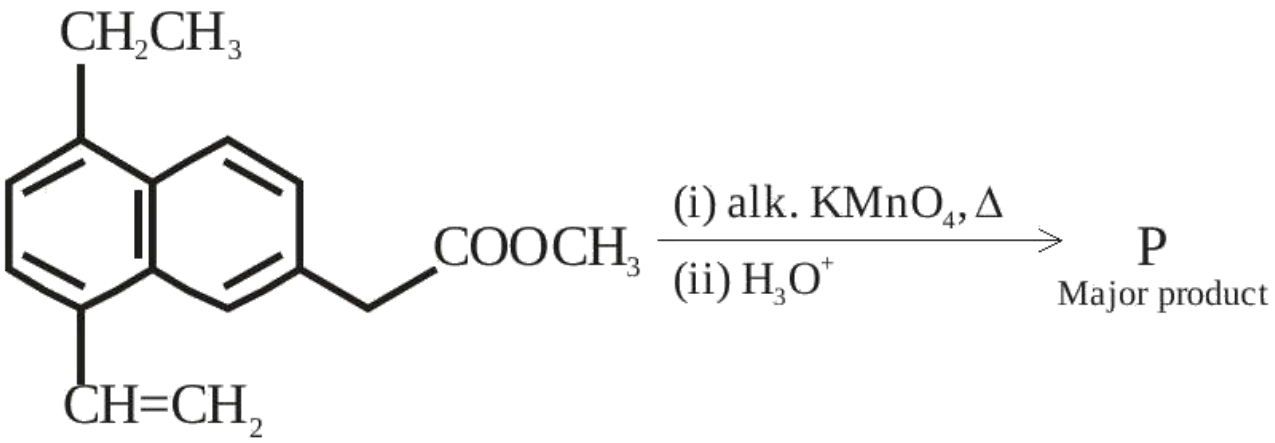
D.



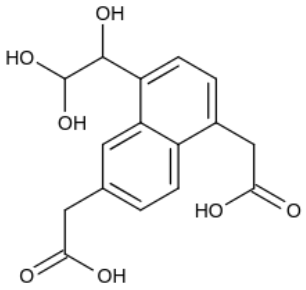
Question 236

View solution online

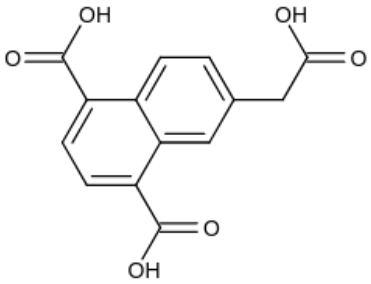
The major product ' P ' formed in the given reaction is



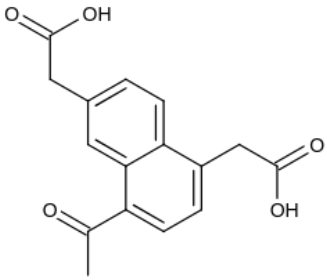
A.



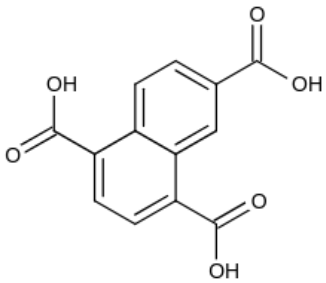
B.



C.



D.



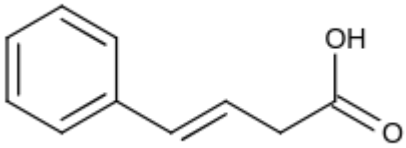
Question 237 View solution online

The major product ' P ' formed in the following sequence of reactions is

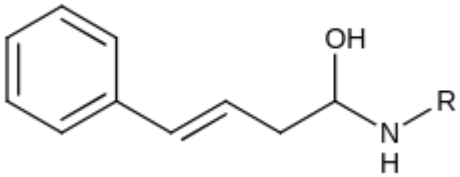
$\xrightarrow[\text{(ii) } R-NH_2]{\text{(i) } SOCl_2}$ 'P' (Major Product)

(iii) $LiAlH_4$

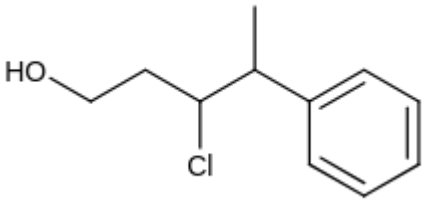
(iv) H_3O^+



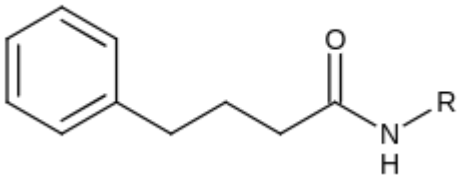
A. $H-N-R$



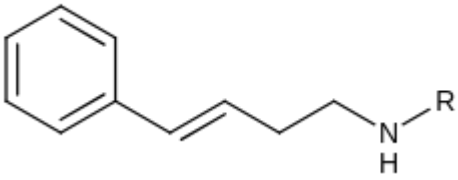
B.



C. H

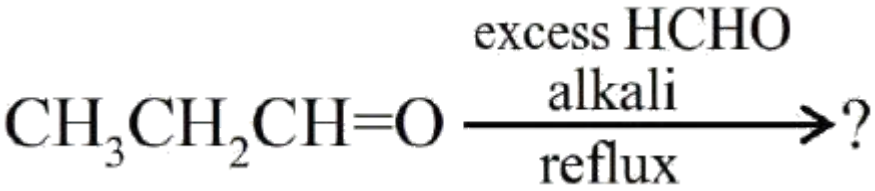


D.



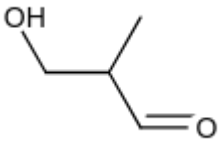
Question 238 View solution online

The major product of the following reaction is :

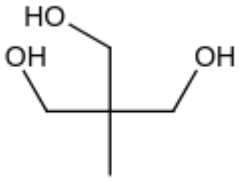


A. $CH_3 - CH_2 - CH_2 - OH$

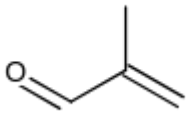
B.



C.

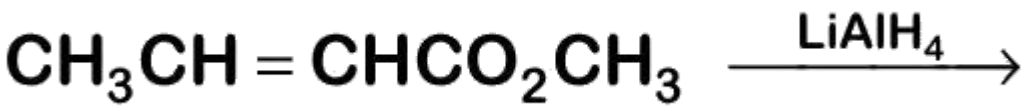


D.



Question 239 View solution online

The major product of the following reaction is



A. $CH_3CH_2CH_2CH_2OH$

B. $CH_3CH_2CH_2CHO$

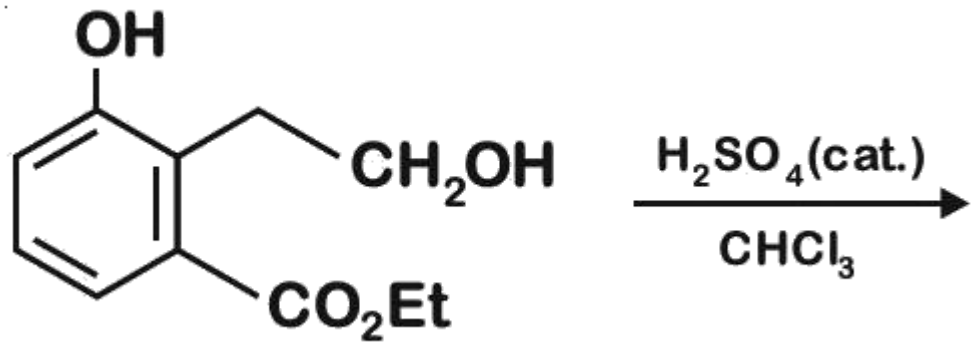
C. $CH_3CH_2CH_2CO_2CH_3$

D. $CH_3CH = CHCH_2OH$

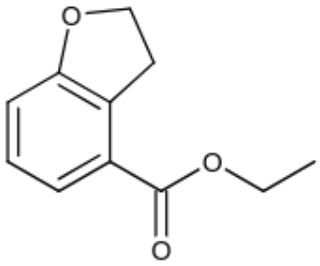
Question 240

View solution online

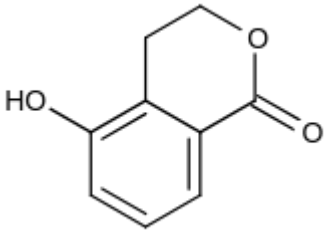
The major product of the following reaction is :



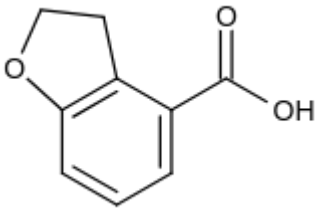
A.



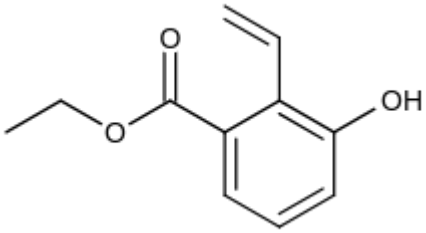
B.



C.



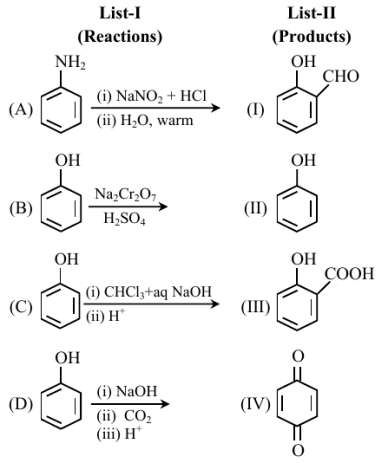
D.



Question 241

View solution online

Match List-I (Reactions) with List-II (Products):



Choose the correct answer from the options given below.

A. -(III), (B)-(II), (C)-(I), (D)-(IV)

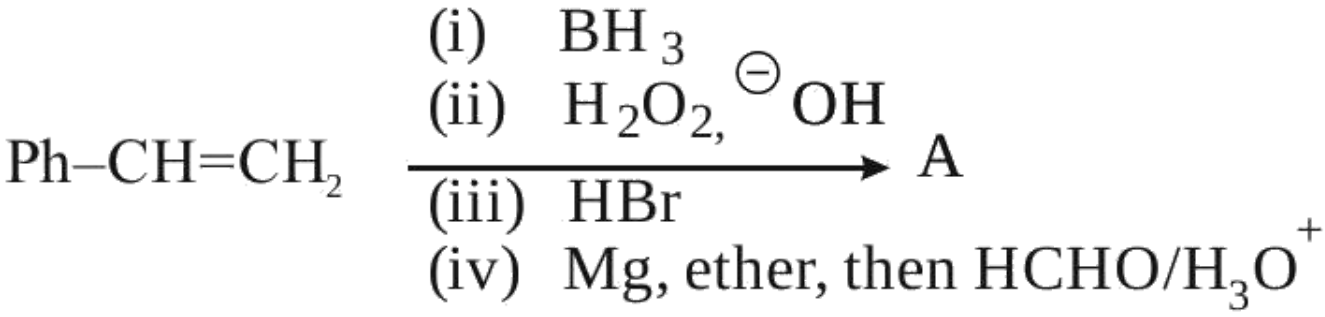
B. (A)-(IV), (B)-(II), (C)-(III), (D)-(I)

C. (A)-(I), (B)-(IV), (C)-(II), (D)-(III)

D. (A)-(II), (B)-(IV), (C)-(I), (D)-(III)

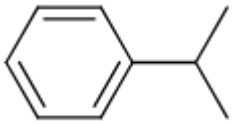
Question 242 View solution online

The final product A, formed in the following reaction sequence is:

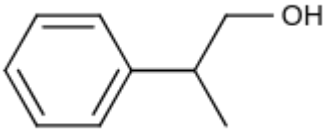


A. $Ph - CH_2 - CH_2 - CH_3$

B.



C.

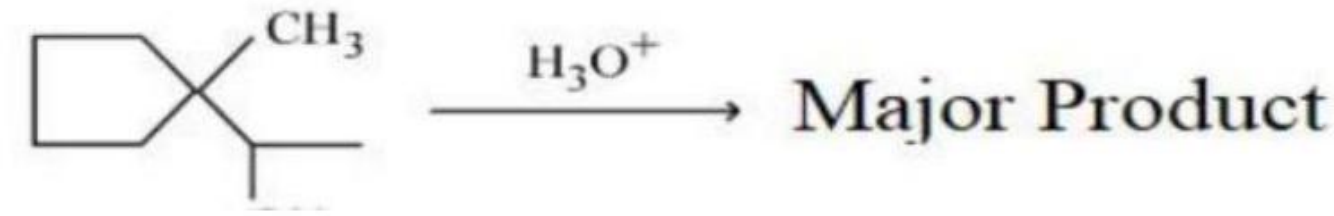


D. $Ph - CH_2 - CH_2 - CH_2 - OH$

Question 243

View solution online

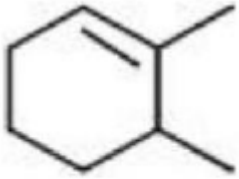
Find out the major product for the following reaction.



A.

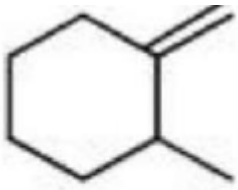


B.

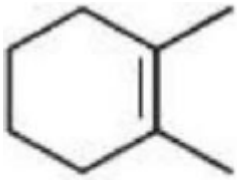


C.

3.



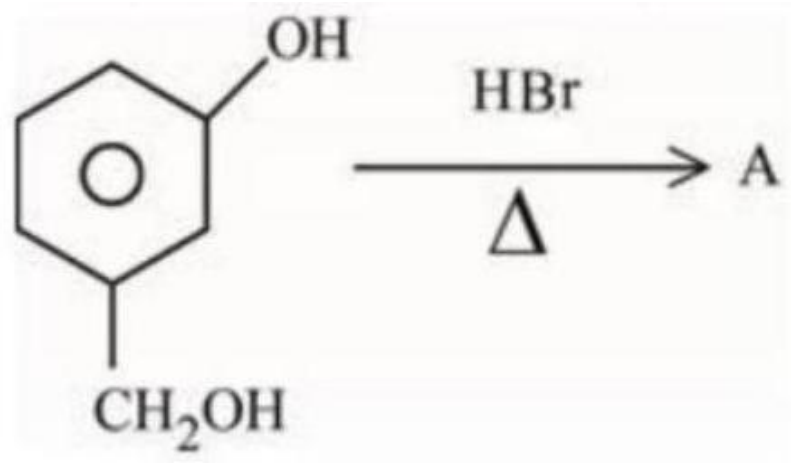
D.

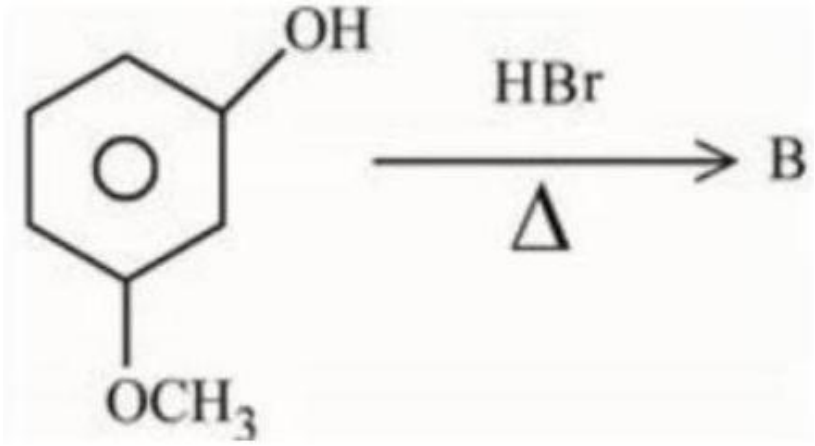


Question 244

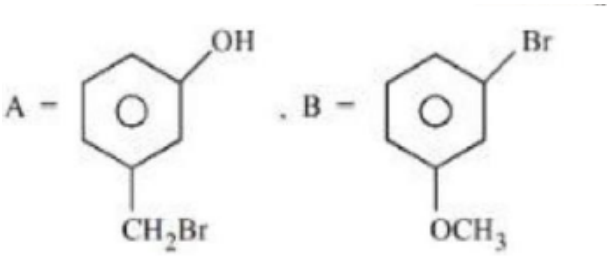
View solution online

' A ' and ' B ' formed in the following set of reactions are:

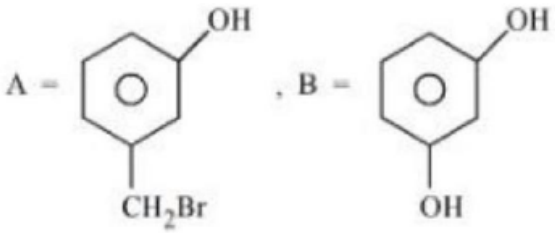




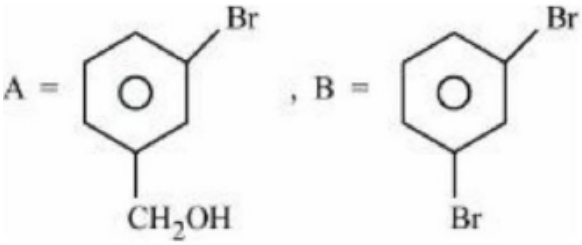
A.



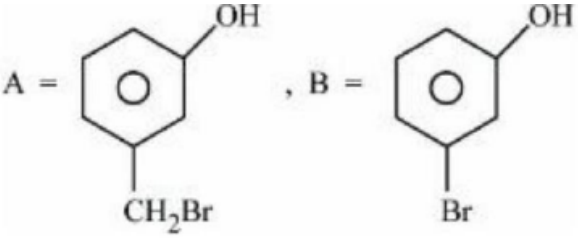
B.



C.



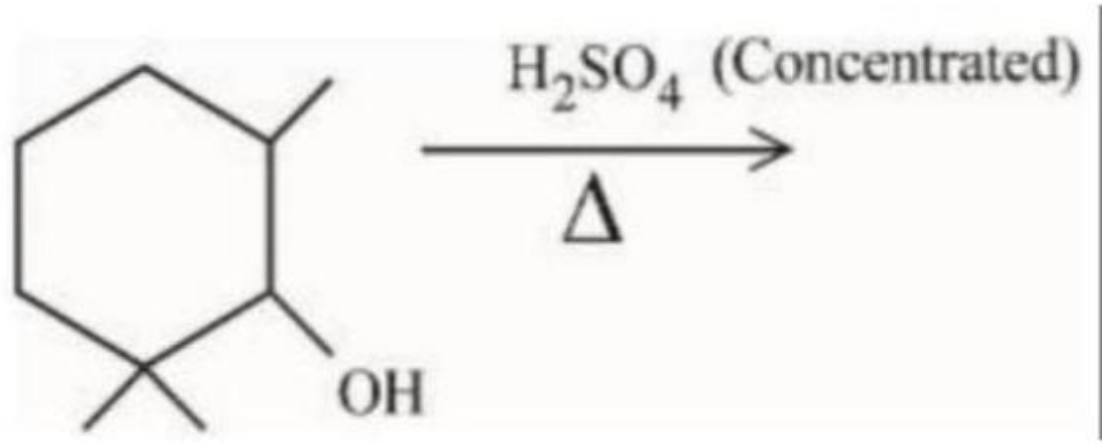
D.



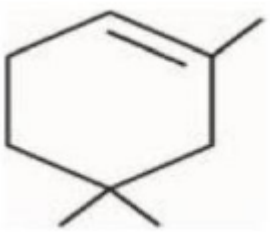
Question 245

View solution online

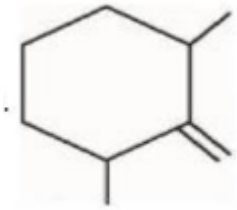
Find out the major product from the following reaction.



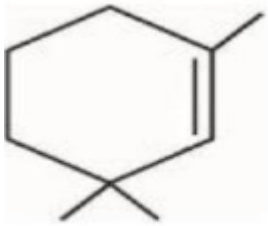
A.



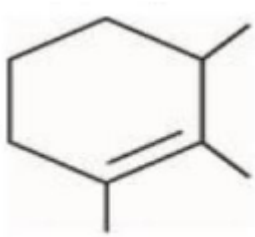
B.



C.

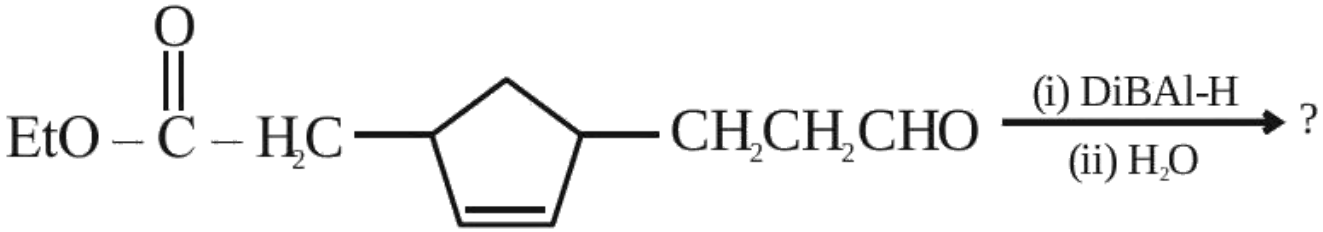


D.

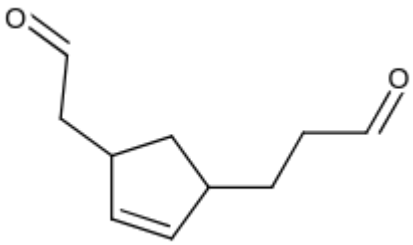


Question 246 View solution online

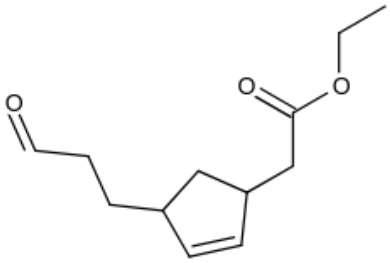
Consider the above reaction and predict the major product.



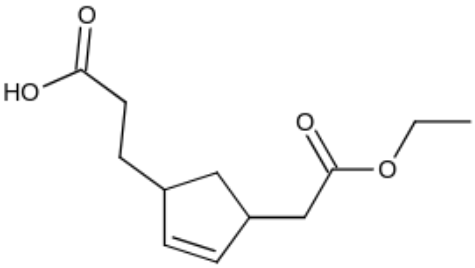
A.



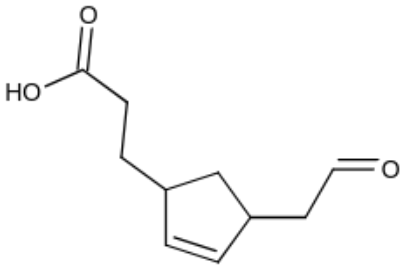
B.



C.

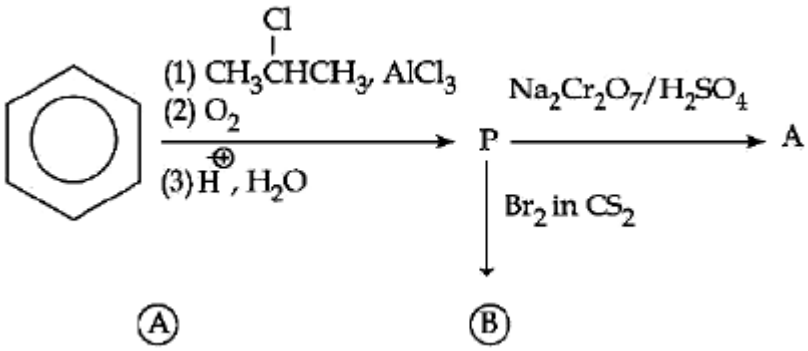


D.

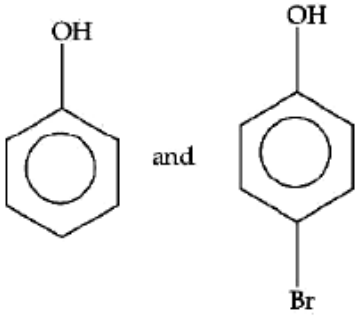


Question 247 View solution online

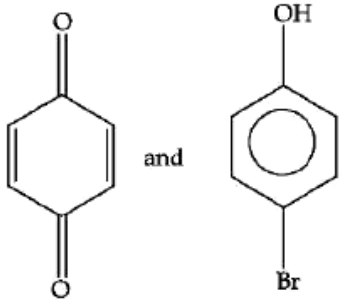
Identify the major products A and B in the following sequence:



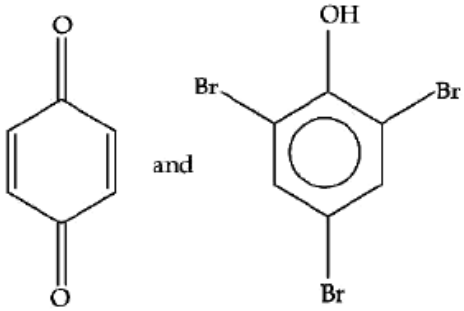
A.



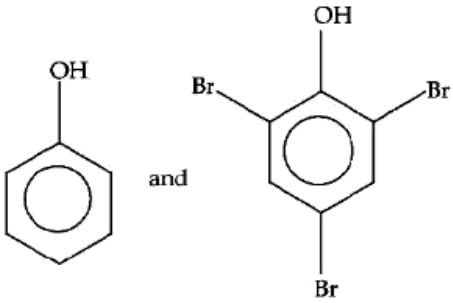
B.



C.



D.

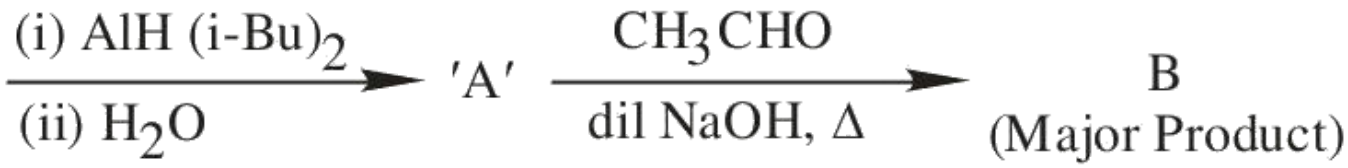


Question 248

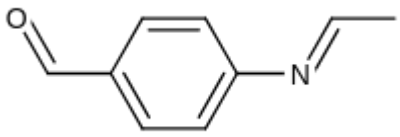
View solution online

Consider the following reaction sequence :

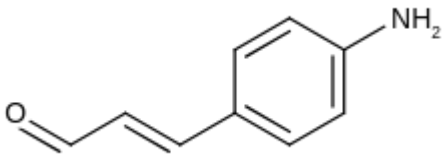
The product ' B ' is :



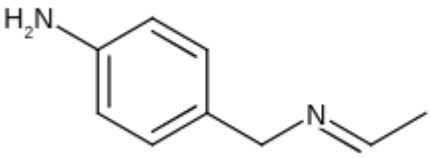
A.



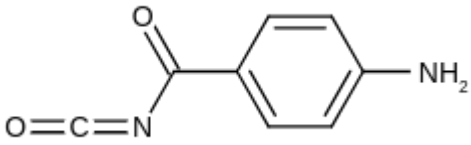
B.



C.



D.

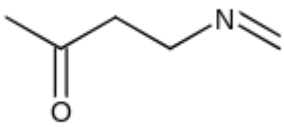


Question 249 View solution online

Match List-I with List-II :

List-I
(Chemical Reaction)}
List-II}
(Reagent used)
(a) $\mathbf{CH_3COOCH_2CH_3 \rightarrow CH_3CH_2OH}$
(i) $\mathbf{CH_3MgBr/H_3O^+}$
(b) $\mathbf{CH_3COOCH_3 \rightarrow CH_3CHO}$ (1.equivalent)
(ii) $\mathbf{H_2SO_4/H_2O}$
(c) $\mathbf{CH_3C \equiv N \rightarrow CH_3CHO}$
(iii) $\mathbf{DIBAL - H/H_2O}$
(d)
(iv) $\mathbf{SnCl_2, HCl/H_2O}$

Choose the most appropriate match :



A. a-ii, b-iv, c-iii, d-i

B. a-iv, b-ii, c-iii, d-i

C. a-ii, b-iii, c-iv, d-i

D. a-iii, b-ii, c-i, d-iv

Question 250

View solution online

Match List I with List II

List I (Compound)		List II (pK_a value)	
A.	Ethanol	I.	10.0
B.	Phenol	II.	15.9
C.	m-Nitrophenol	III.	7.1
D.	p-Nitrophenol	IV.	8.3

Choose the correct answer from the options given below :-

A. A-I, B-II, C-III, D-IV

B. A-IV, B-I, C-II, D-III

C. A-III, B-IV, C-I, D-II

D. A-II, B-I, C-IV, D-III

Question 251

View solution online

Match List-I with List-II.

List-I
(Test)}
(A) Bayer's test
(B) Ceric ammonium nitrate test
(C) Phthalein dye test
(D) Schiff's test

List-II
(Identification)}
(I) Phenol
(II) Aldehyde
(III) Alcoholic-OH group
(IV) Unsaturation

Choose the correct answer from the options given below:

A. (A)-(III), (B)-(I), (C)-(IV), (D)-(II)

B. (A)-(II), (B)-(III), (C)-(IV), (D)-(I)

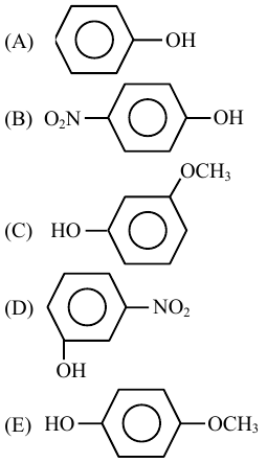
C. (A)-(IV), (B)-(I), (C)-(II), (D)-(III)

D. (A)-(IV), (B)-(III), (C)-(I), (D)-(II)

Question 252

View solution online

For the compounds below, choose the correct order of increasing pKa:



A. (E) < (D) < (C) < (B) < (A)

B. (D) < (E) < (C) < (B) < (A)

C. (E) < (D) < (B) < (A) < (C)

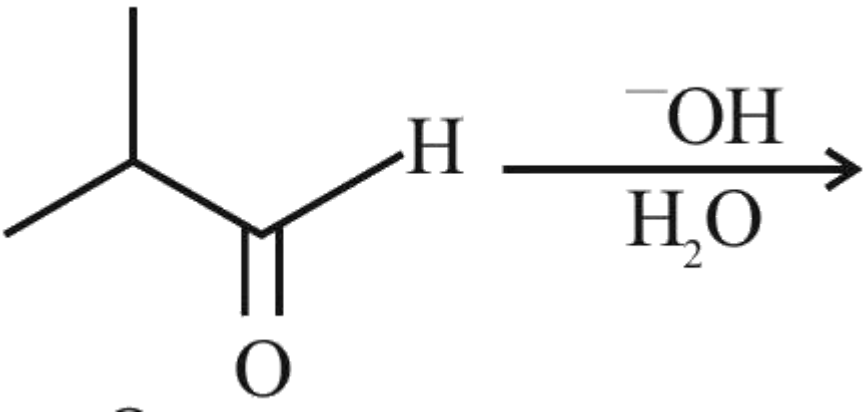
D. $(B) < (D) < (C) < (A) < (E)$

This question was incorrect in the original exam paper. ALLEN marked it BONUS because all options were incorrect. For practice, option 4 is corrected to B < D < C < A < E, following the ALLEN worked solution.

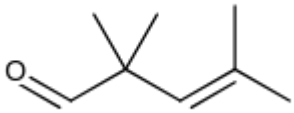
Question 253

View solution online

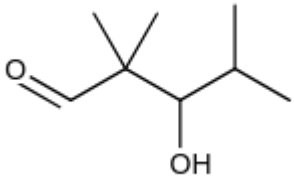
What is the major product of the following reaction?



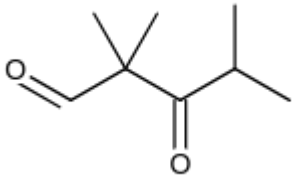
A.



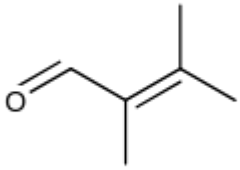
B.



C.



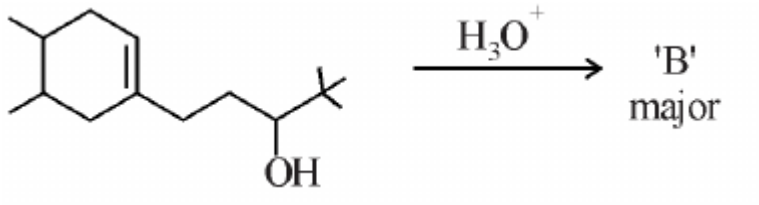
D.



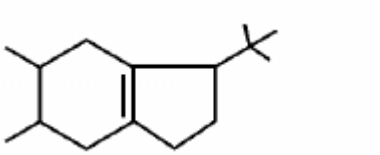
Question 254

View solution online

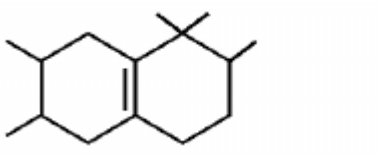
Identify the major product B in the following acid-catalysed reaction:



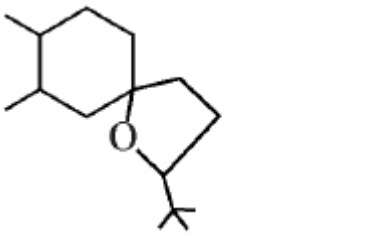
A.



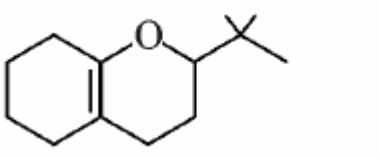
B.



C.

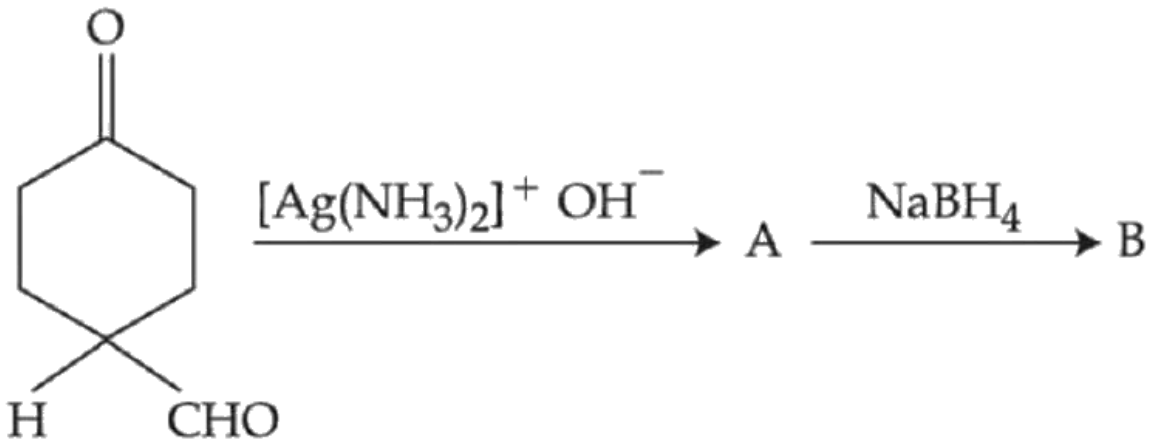


D.

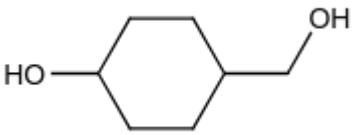


Question 255 View solution online

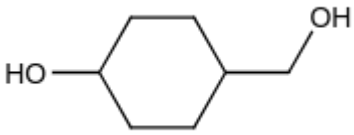
The products formed in the following reaction, A and B are



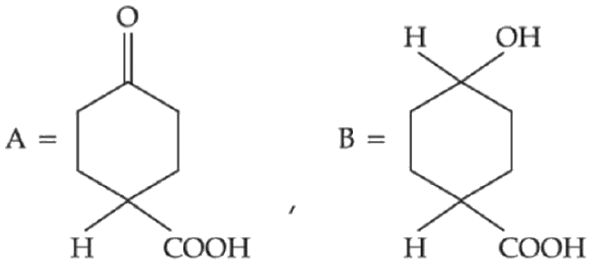
A. B =



B.

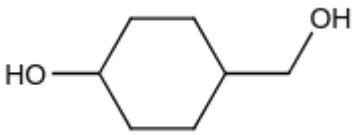


C.



D. $A =$

$B =$

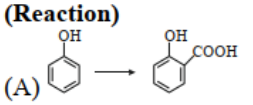
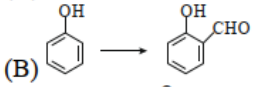
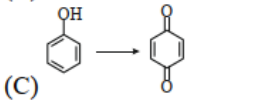
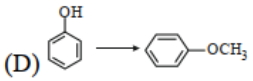


Question 256

View solution online

Match List-I with List-II.

Choose the correct answer from the options given

List – I (Reaction)	**List – II (Reagent(s))**
(A) 	(I) $Na_2Cr_2O_7$, H_2SO_4
(B) 	(II) (i) NaOH (ii) CH_3Cl
(C) 	(III) (i) NaOH, $CHCl_3$ (ii) NaOH (iii) HCl
(D) 	(IV) (i) NaOH (ii) CO_2 (iii) HCl

A. (A)-(IV), (B)-(I), (C)-(III), (D)-(II)

B. (A)-(II), (B)-(III), (C)-(I), (D)-(IV)

C. (A)-(II), (B)-(I), (C)-(III), (D)-(IV)

D. (A)-(IV), (B)-(III), (C)-(I), (D)-(II)

Question 257

View solution online

Match List I with List II

\multirow{2}{*}{}	LIST I	LIST II	
	Isomeric pairs		Type of isomers
A.	Propanamine and N-Methylethanamine	I.	Metamers
B.	Hexan-2-one and Hexan-3-one	II.	Positional isomers
C.	Ethanamide and Hydroxyethanimine	III.	Functional isomers
D.	o-nitrophenol and p-nitrophenol	IV.	Tautomers

Choose the correct answer from the options given below:

A. A-II, B-III, C-I, D-IV

B. A-III, B-I, C-IV, D-II

C. A-III, B-IV, C-I, D-II

D. A-IV, B-III, C-I, D-II

Question 258 View solution online

Match List-I and List-II.

List - I

List-II

(a) $\overset{O}{\overset{||}{}} -C - Cl \rightarrow R - CHO$

(i) $Br_2/NaOH$

(b)

(ii) $H_2/Pd - BaSO_4$

(c) $\underset{||}{O} - \underset{-}{C} - NH_2 \rightarrow R - NH_2$

(iii) $Zn(Hg)/$ Conc. HCl

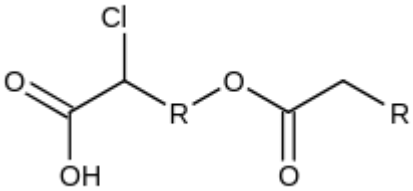
O

II

O

(d) $R - C - CH_3 \rightarrow R - CH_2 - CH_3$ (iv) $Cl_2/$ Red P, H_2O

Choose the correct answer from the options given below :



A. (a)-(ii), (b)-(i), (c)-(iv), (d)-(iii)

B. (a)-(iii), (b)-(iv), (c)-(i), (d)-(ii)

C. (a)-(iii), (b)-(i), (c)-(iv), (d)-(ii)

D. (a)-(ii), (b)-(iv), (c)-(i), (d)-(iii)

CHAPTER 17 / CHEMISTRY

Aldehydes, Ketones and Carboxylic Acids

Questions 259-267 / 9 selected / 3.0% practice weight / Next

Topics to prioritise in this collection

- Aldehydes, Ketones and Carboxylic Acids: 4 questions / 44.4% of this chapter
- Cannizzaro reaction: 1 question / 11.1% of this chapter
- Carbonyl compounds and carboxylic acids: 1 question / 11.1% of this chapter
- Carbonyl reaction sequence: 1 question / 11.1% of this chapter
- Cyanohydrin reaction sequence: 1 question / 11.1% of this chapter
- Reactivity of the carbonyl group: 1 question / 11.1% of this chapter

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Question 259 View solution online

Given below are two statements : one is labelled as Assertion (A) and the other is labelled as Reason (R).

Assertion (A) : α-halocarboxylic acid on reaction with dil NH_3 gives good yield of α-amino carboxylic acid whereas the yield of amines is very low when prepared from alkyl halides.
Reason (R) : Amino acids exist in zwitter ion form in aqueous medium.
In the light of the above statements, choose the correct answer from the options given below :

A. Both (A) and (R) are correct and (R) is the correct explanation of (A)

B. (A) is not correct but (R) is correct

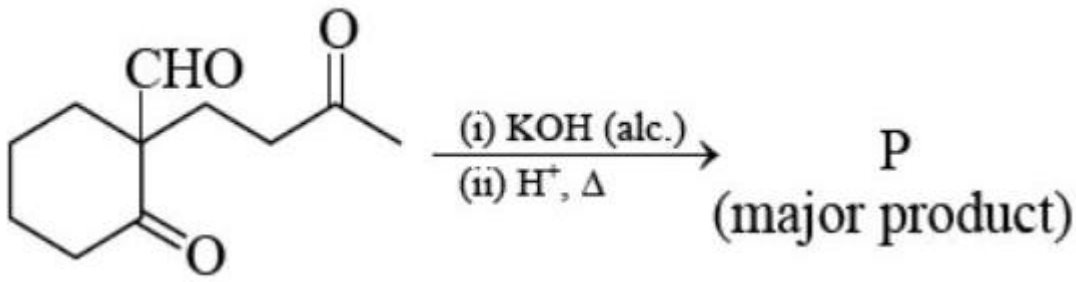
C. Both (A) and (R) are correct but (R) is not the correct explanation of (A)

D. (A) is correct but (R) is not correct

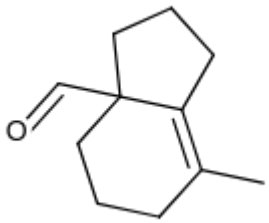
Question 260

View solution online

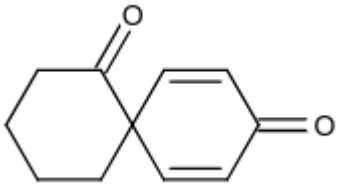
The major product (P) in the following reaction is



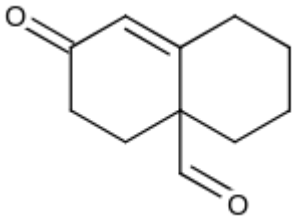
A.



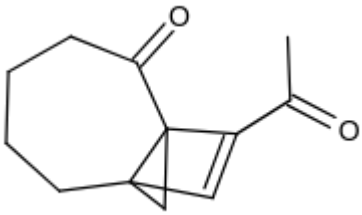
B.



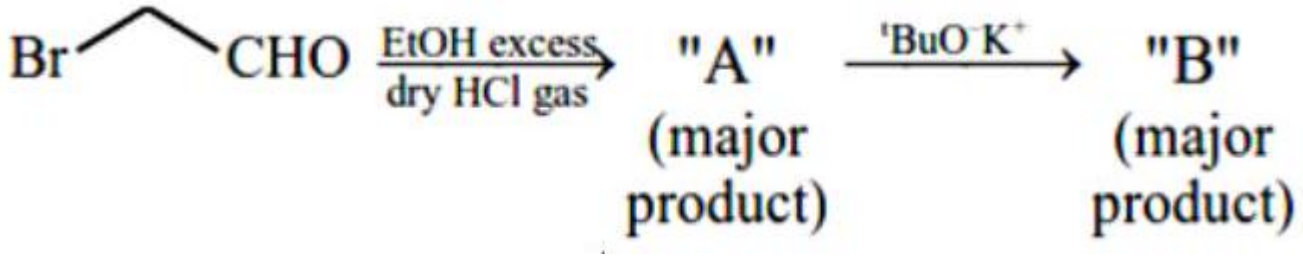
C.



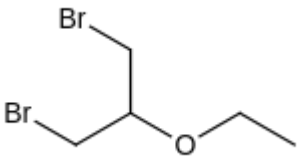
D.



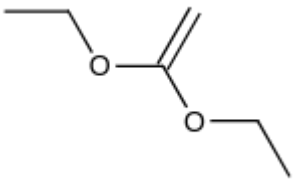
Question 261 View solution online

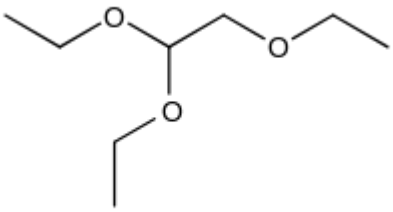


[where $\mathbf{Et} \Rightarrow -C_2H_5$ $^t\mathbf{Bu} \Rightarrow (CH_3)_3C-$] Consider the above reaction sequence, Product "A"and Product "B" formed respectively are :

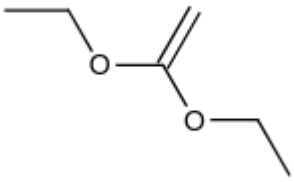


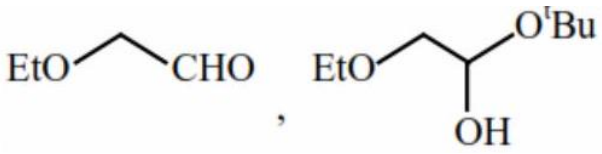
A. ,



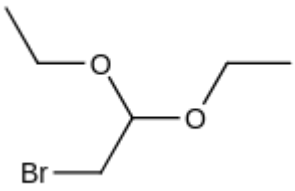


C. ,

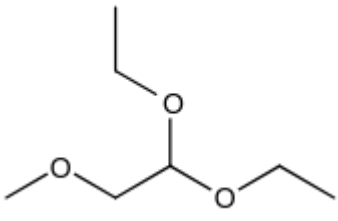




B.

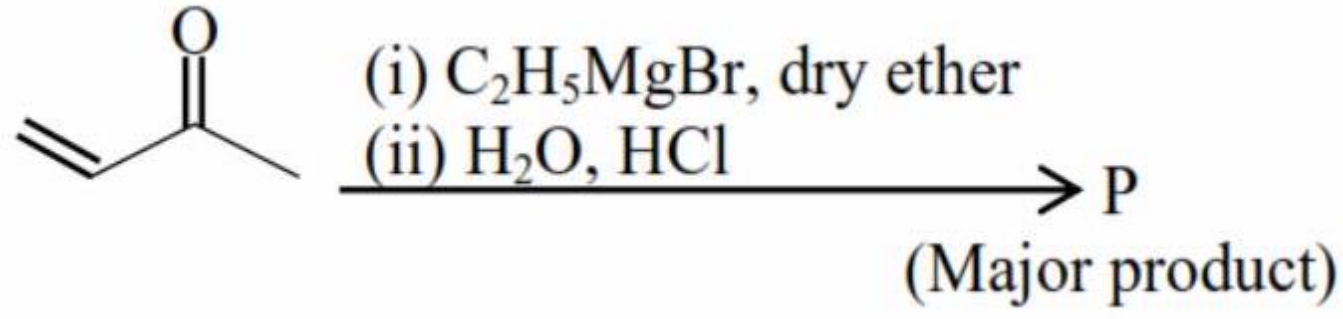


D. ,



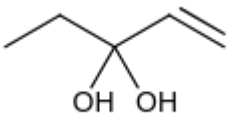
Question 262

View solution online

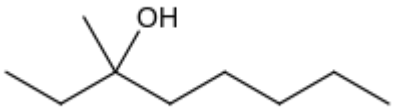


Consider the above reaction, the major product 'P' is:

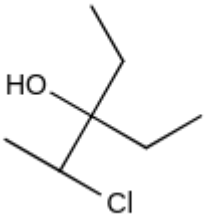
A.



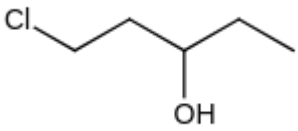
B.



C.



D.



Question 263 View solution online

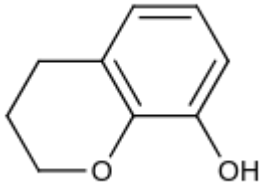
Arrange the following compounds in increasing order of rate of aromatic electrophilic substitution reaction

(a)

(b)

(c)

(d)



A. d, b, c, a

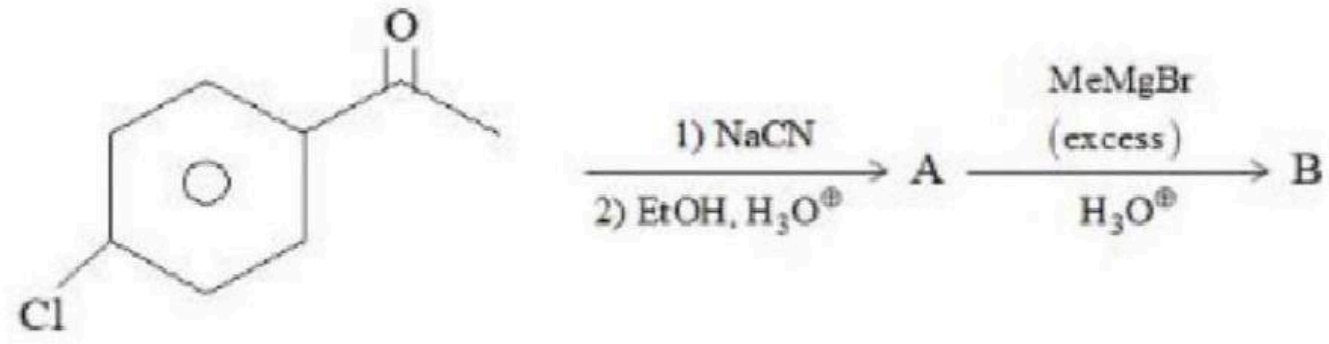
B. b, c, a, d

C. c, a, b, d

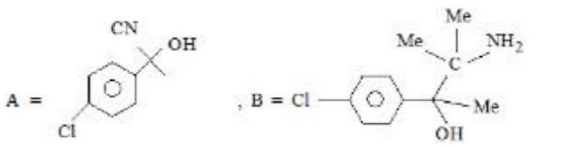
D. d, b, a, c

Question 264 View solution online

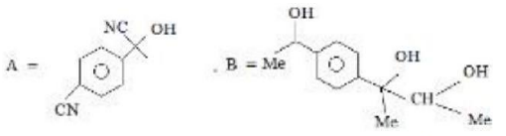
Find out the major products from the following reaction sequence.



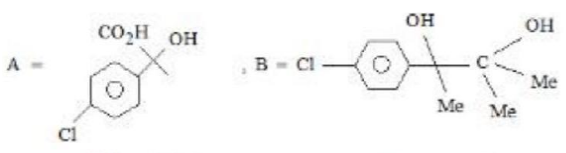
A.



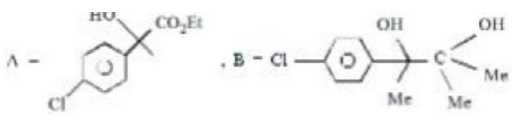
B.



C.

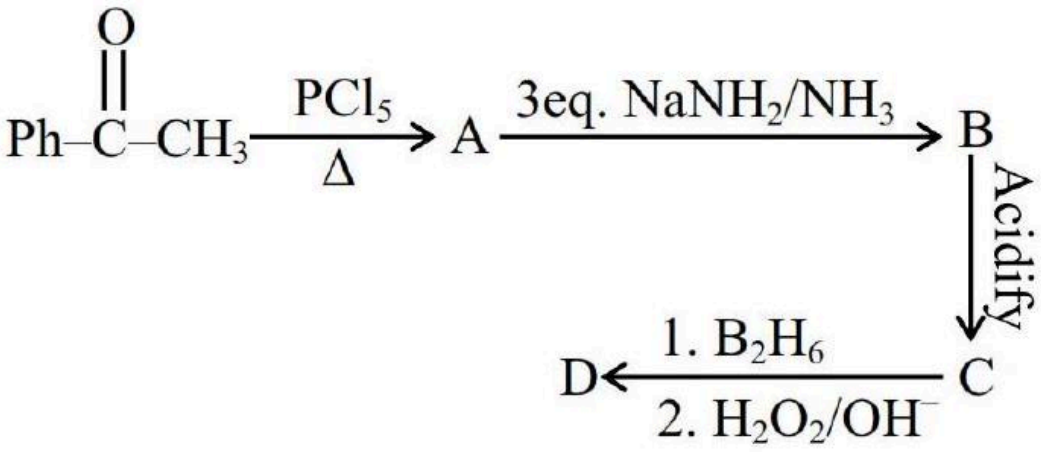


D.



Question 265 View solution online

Identify the structure of the final product (D) in the following sequence of the reactions :



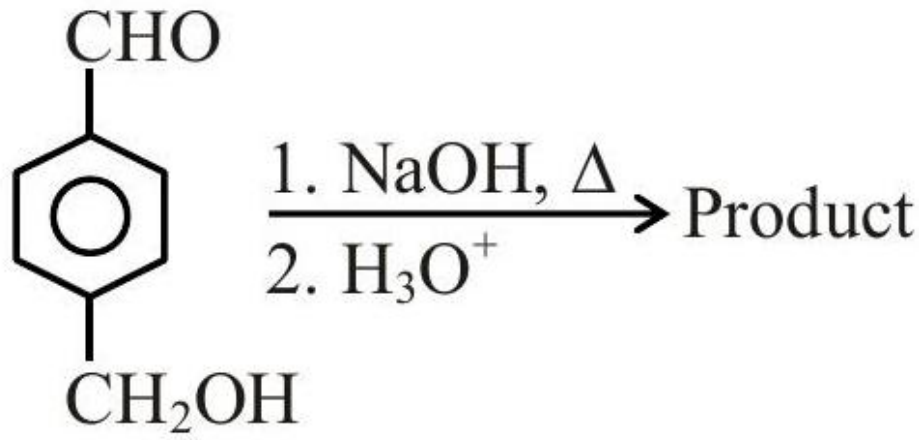
Total number of $\mathbf{sp^2}$ hybridised carbon atoms in product D is.

Numerical answer: _____

Enter an integer (0 digits after the decimal point). Round to the nearest integer where requested; enter the coefficient of any power of ten shown in the question.

Question 266 View solution online

For the reaction given below:



. The compound which is not formed as a product is a:

A. Compound with both alcohol and acid functional groups

B. Monocarboxylic acid

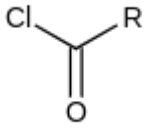
C. Dicarboxylic acid

D. Diol

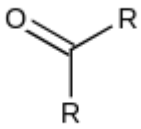
Question 267

View solution online

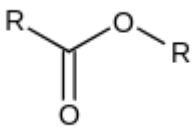
(A)



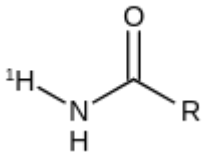
(B)



(C)



(D)



The correct order of their reactivity towards hydrolysis at room temperature is :

A. > (B) > (C) > (D)

B. (D) > (A) > (B) > (C)

C. (D) > (B) > (A) > (C)

D. (A) > (C) > (B) > (D)

CHAPTER 18 / CHEMISTRY

Amines

Questions 268-278 / 11 selected / 3.7% practice weight / Focus first

Topics to prioritise in this collection

- Amines: 5 questions / 45.5% of this chapter
- Reactions of amines: 3 questions / 27.3% of this chapter
- Diazotisation and azo coupling: 1 question / 9.1% of this chapter
- Hofmann bromamide degradation: 1 question / 9.1% of this chapter
- Hofmann elimination: 1 question / 9.1% of this chapter

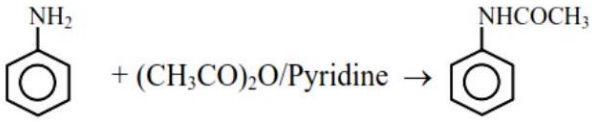
Open this chapter's solutions on mobile / Back to chapter guide

Question 268

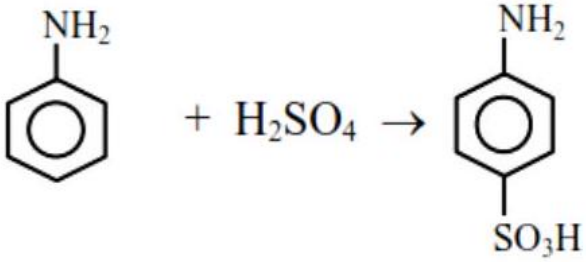
View solution online

Which one of the following reactions does not occur?

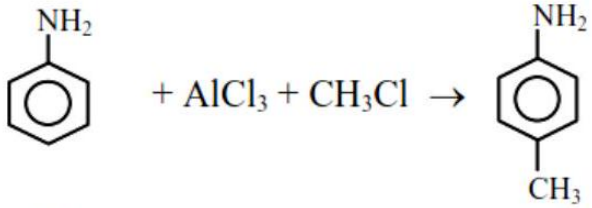
A.



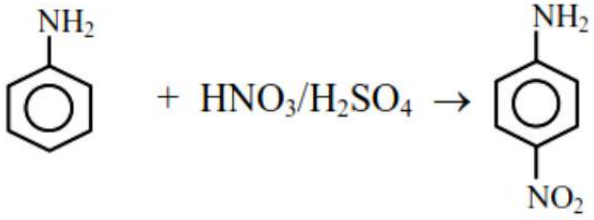
B.



C.



D.



Question 269

View solution online

Match List I with List II

List I	List II
A. Benzenesulphonyl chloride	I. Test for primary amines
B. Hoffmann bromamide reaction	II. Anti Saytzeff
C. Carbylamine reaction	III. Hinsberg reagent
D. Hoffmann orientation	IV. Known reaction of Isocyanates.

Choose the correct answer from the options given below:

A. A-IV, B -III, C-II, D-I

B. A-IV, B -II, C-I, D-III

C. (2) Hoffmann bromamide reaction $\rightarrow$ known reaction of isocynates

$$\mathbf{R-CO-NH_2 + X_2 + 4NaOH \rightarrow R-NH_2 + 2NaX + Na_2CO_3 + 2H_2O}$$

Intermediate : $\mathbf{R-N=C=O}$ (isocyanate)

D. (3) A-III, B -IV, C-I, D-II

Question 270 View solution online

Match List I with List II

LIST I (Amines)		LIST II pK_b)	
A.	Aniline	I.	3.25
B.	Ethanamine	II.	3.00
C.	N-Ethylethanamine	III	9.38
D.	N. N-Diethylethanamine	IV.	3.29

Choose the correct answer from the options given below:

A. A-III, B-IV, C-II, D-I

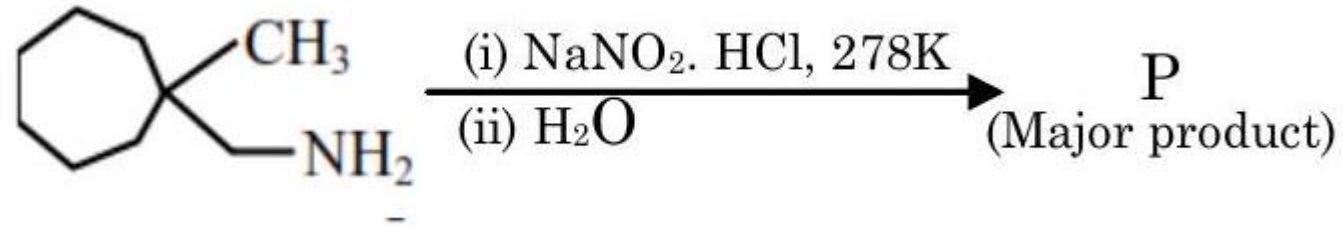
B. A-III, B-II, C-I, D-IV

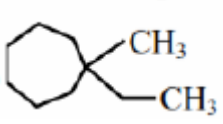
C. A-I, B-IV, C-II, D-III

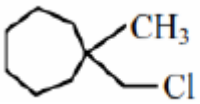
D. A-III, B-II, C-IV, D-I

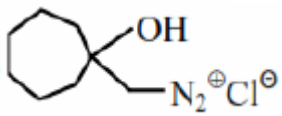
Question 271 View solution online

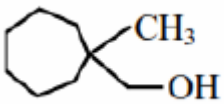
What is the major product "P" of the following reaction ?



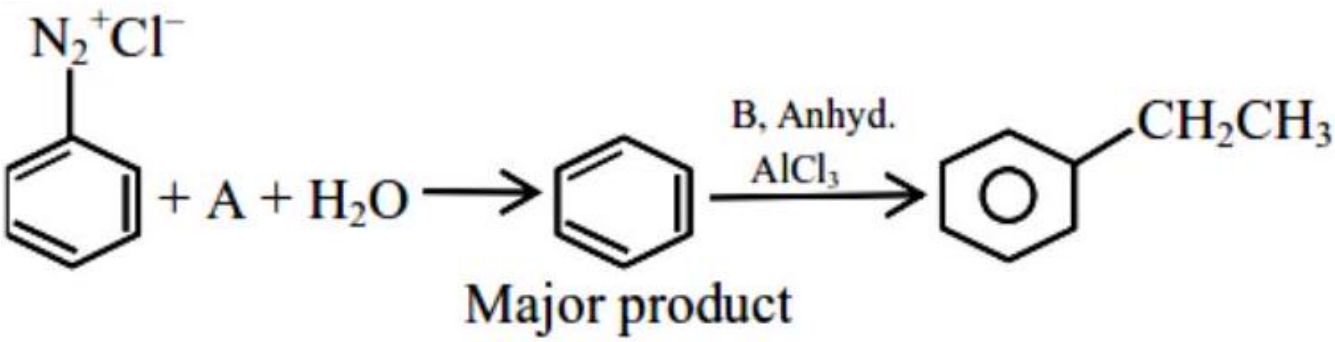
A.


B.


C.


D.


Question 272 View solution online



In the chemical reactions given above A and B respectively are :

A. H_3PO_2 and CH_3CH_2Cl

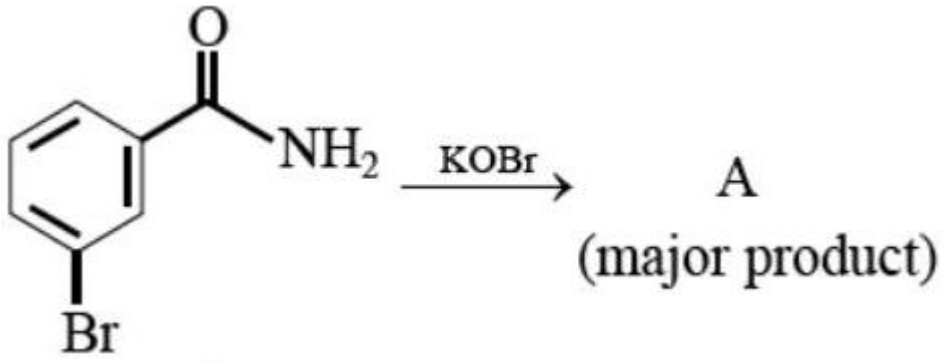
B. CH_3CH_2OH and H_3PO_2

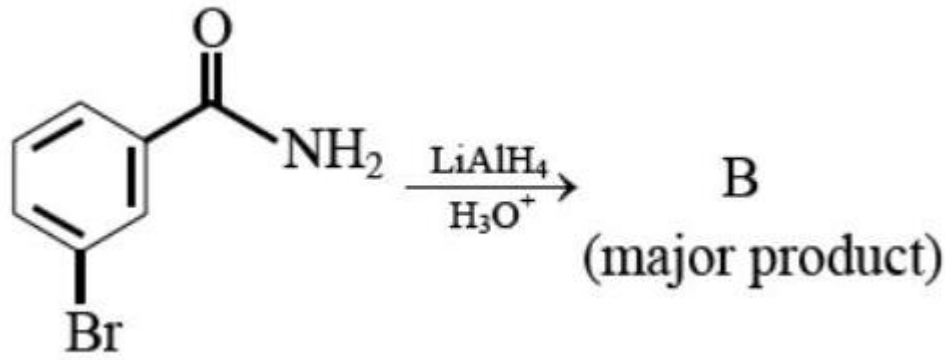
C. H_3PO_2 and $CH_3CH_2PO_2$

D. CH_3CH_2Cl and H_3PO_2

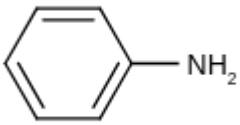
Question 273

View solution online

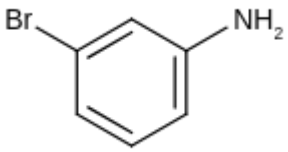




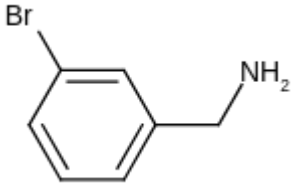
In the above reactions, product A and product B respectively are :

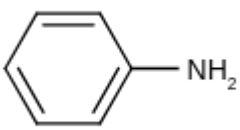


A. ,

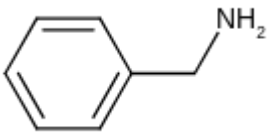


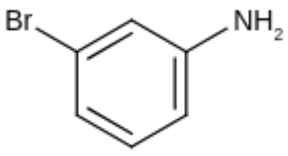
B. ,



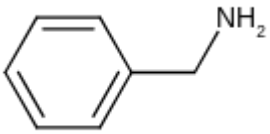


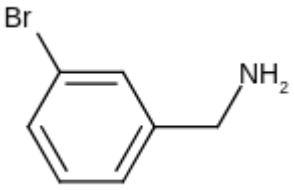
C. ,





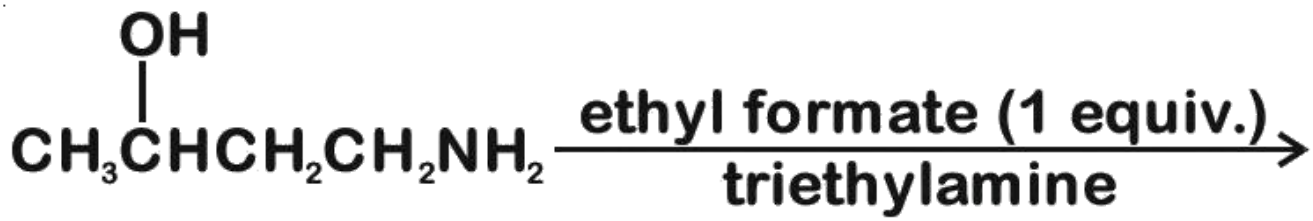
D. ,





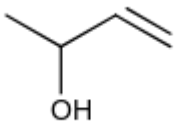
Question 274 View solution online

The major product of the following reaction is:

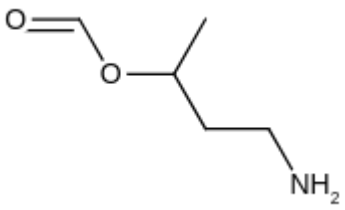


A. $CH_3CH = CH - CH_2NH_2$

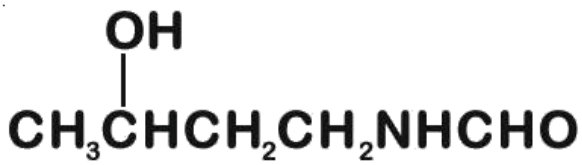
B.



C.

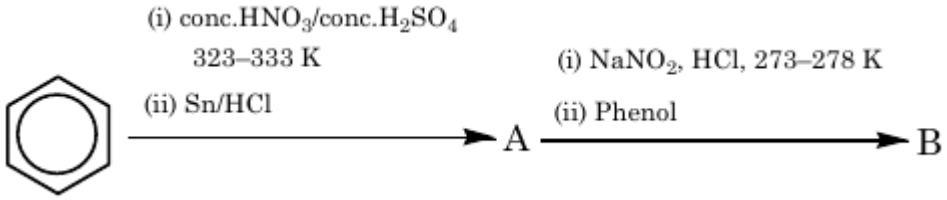


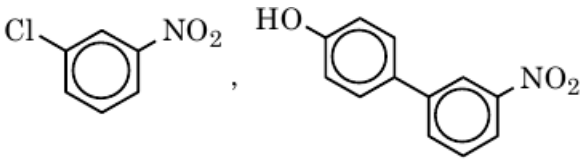
D.

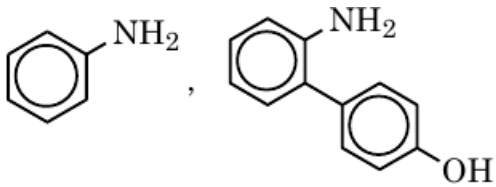


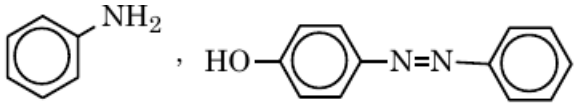
Question 275 View solution online

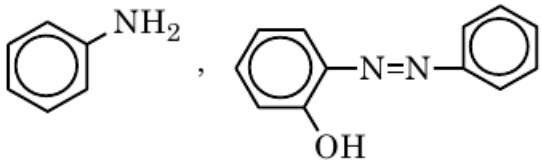
The products A and B formed in the following reaction scheme are respectively:



A. 

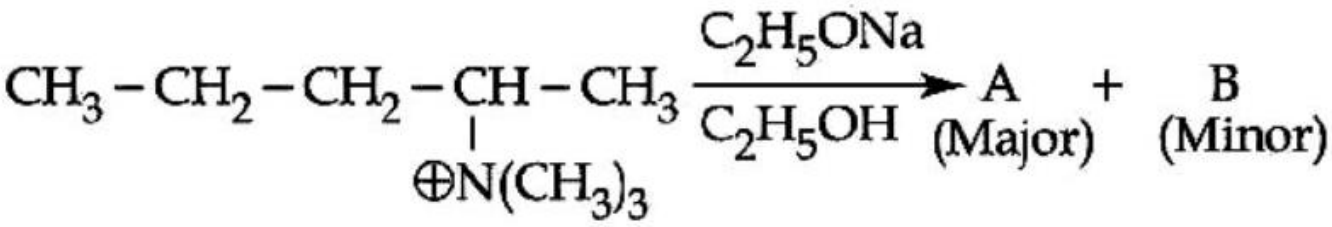
B. 

C. 

D. 

Question 276 View solution online

Identify the correct statement for the below given transformation.



A. $A - CH_3CH_2CH = CH - CH_3$,
$B - CH_3CH_2CH_2CH = CH_2$,
Saytzeff products

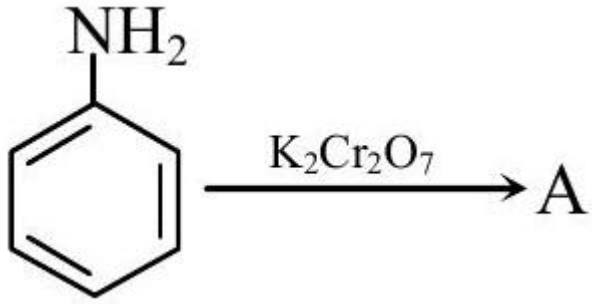
B. $A - CH_3CH_2CH = CH - CH_3$,
$B - CH_3CH_2CH_2CH = CH_2$,
Hafmann products

C. $A - CH_3CH_2CH_2CH = CH_2$,
$B - CH_3CH_2CH = CHCH_3$,
Hofmann products

D. $A - CH_3CH_2CH_2CH = CH_2$,
$B - CH_3CH_2CH = CHCH_3$,
Saytzeff products

Question 277 View solution online

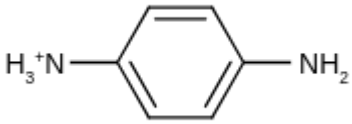
Identify A in the following reaction.



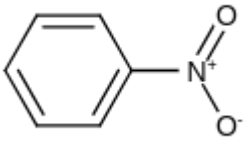
A.



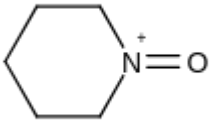
B.



C.



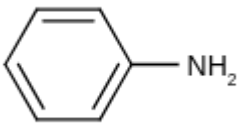
D.



Question 278 View solution online

Which among the following react with Hinsberg's reagent?

(A)

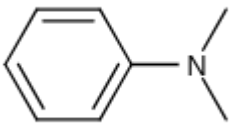


A. B and D only

B. C and D only

C. (2)

(C) $\mathbf{CH_3 - NH_2}$



D. (3) A, B and E only

CHAPTER 19 / CHEMISTRY

Biomolecules

Questions 279-292 / 14 selected / 4.7% practice weight / Focus first

Topics to prioritise in this collection

- Carbohydrates: 8 questions / 57.1% of this chapter
- Structure and function of biomolecules: 3 questions / 21.4% of this chapter
- Biomolecules: 2 questions / 14.3% of this chapter
- Enzymes: 1 question / 7.1% of this chapter

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Question 279

View solution online

Match List-I with List-II.

	List-I Reaction		List-II Catalyst
(A)	$4NH_3(g) + 5O_2(g) \rightarrow 4NO(g) + 6H_2O(g)$	(I)	NO(g)
(B)	$N_2(g) + 3H_2(g) \rightarrow 2NH_3(g)$	(II)	$H_2SO_4(l)$
(C)	$C_{12}H_{22}O_{11}(aq) + H_2O(l) \rightarrow C_6H_{12}O_6(\text{Glucose}) + C_6H_{12}O_6(\text{Fructose})$	(III)	Pt(s)
(D)	$2SO_2(g) + O_2(g) \rightarrow 2SO_3(g)$	(IV)	Fe(s)

Choose the correct answer from the options given below:

A. - (II), (B) - (III), (C) - (I), (D) - (IV)

B. (A) - (III), (B) - (II), (C) - (I), (D) - (IV)

C. (A) - (III), (B) - (IV), (C) - (II), (D) - (I)

D. (A) - (III), (B) - (II), (C) - (IV), (D) - (I)

Question 280

View solution online

Match List I with List II}

List I Enzymatic reaction		List II Enzyme	
A	Sucrose $\rightarrow$ Glucose and Fructose	I.	Zymase
B	Glucose $\rightarrow$ ethyl alcohol and CO_2	II.	Pepsin
C	Starch $\rightarrow$ Maltose	III.	Invertase
D	Proteins $\rightarrow$ Amino acids	IV.	Diastase

Choose the correct answer from the options given below:

A. A-III, B-I, C-II, D-IV

B. A-I, B-IV, C-III, D-II

C. A-III, B-I, C-IV, D-II

D. A-I, B-II, C-IV, D-III

Question 281

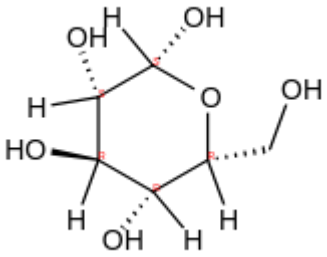
View solution online

Match items of Row I with those of Row II.

Row I
(A)
(i) $\alpha - \mathbf{D} - (-)$-Fructofuranose,

Row II
(B)
(C)
(D)
(iii) $\alpha - D - (-)$ Glucopyranose,
(iv) $\beta - D - (-)$-Glucopyranose
(ii) $\beta - \mathbf{D} - (-)-$ Fructofuranose
(ii) $\alpha - D$ ( ) Glucopyanose,

Correct match is



A. $\mathbf{A \rightarrow i, B \rightarrow ii, C \rightarrow ii, D \rightarrow iv}$

B. A $\rightarrow$ iv, B $\rightarrow$ iii, C $\rightarrow$ i, D $\rightarrow$ ii

C. A $\rightarrow$ iii, B $\rightarrow$ iv, C $\rightarrow$ ii, D $\rightarrow$ I

D. A $\rightarrow$ iii, B $\rightarrow$ iV, C $\rightarrow$ i, D $\rightarrow$ ii

Question 282

View solution online

Match List-I with List-II

List-I}
(Saccharides)
(A) Sucrose
(B) Maltose
(C) Lactose
(D) Amylopectin

List_II
(Glycosidic-linkages found)
(I) α 1-4
(II) $\alpha 1-4$ and $\alpha 1-6$
(III) $\alpha 1-\beta 2$
(IV) $\beta 1-4$

Choose the correct answer from the options given below :

A. (A)-(III), (B)-(I), (C)-(IV), (D)-(II)

B. (A)-(IV), (B)-(II), (C)-(I), (D)-(III)

C. (A)-(II), (B)-(IV), (C)-(III), (D)-(I)

D. (A)-(I), (B)-(II), (C)-(III), (D)-(IV)

Question 283

View solution online

Match List I with List II.

List I Enzyme	*c* Conversion of
A. Invertase	I. Starch into maltose
B. Zymase	II. Maltose into glucose
C. Diastase	III. Glucose into ethanol
D. Maltase	IV. Cane sugar into glucose

Choose the most appropriate answer from the options given below :

A. A-III, B-IV. C-II. D-I

B. A-III. B-II. C-I. D-IV

C. A-IV, B-IIL C-I. D-II

D. A-IV, B-II. C-III. D-I

Question 284

View solution online

Match List I with List II

LIST-I		LIST-II	
A.	Glucose/$NaHCO_3/\Delta$	I.	Gluconic acid
B.	Glucose/ HNO_3	II.	No reaction
C.	Glucose/HI/ Δ	III.	n-hexane
D.	Glucose/Bromine water]	IV.	Saccharic acid

Choose the correct answer from the options given below:

A. A-IV, B-I, C-III, D-II

B. A-II, B-IV, C-III, D-I

C. A-III, B-II, C-I, D-IV

D. A-I, B-IV, C-III, D-II

Question 285

View solution online

Match List I with List II

	LIST I		LIST II
A.	α - Glucose and α-Galactose	I.	Functional isomers
B.	α - Glucose and β-Glucose	II.	Homologous
C.	α - Glucose and α-Fructose	III.	Anomers
D.	α - Glucose and α-Ribose	IV.	Epimers

Choose the correct answer from the options given below:

A. A-III, B-IV, C-II, D-I

B. A-III, B-IV, C-I, D-II

C. A-IV, B-III, C-I, D-II

D. A-IV, B-III, C-II, D-I

Question 286

View solution online

Match List I with List II

List I Bio Polymer)		List II (Monomer)	
A.	Starch	I.	nucleotide
B.	Cellulose	II.	α-glucose
C.	Nucleic acid	III.	β-glucose
D.	Protein	IV.	α-amino acid

Choose the correct answer from the options given below :-

A. A-II, B-I, C-III, D-IV

B. A-IV, B-II, C-I, D-III

C. A-I, B-III, C-IV, D-II

D. A-II, B-III, C-I, D-IV

Question 287

View solution online

Match List-I with List-II

	List-I (Disaccharide)		List-II (Constituent monosaccharides)
(a)	Sucrose	(i)	β-D-Galactose and β-D-Glucose
(b)	Lactose	(ii)	α-D-Glucose and β-D-Fructose
(c)	Maltose	(iii)	α-D-Glucose and α-D-Glucose

Choose the correct answer from the options given below.

A. (a)-(iii), (b)-(ii), (c)-(i)

B. (a)-(iii), (b)-(i), (c)-(ii)

C. (a)-(i), (b)-(iii), (c)-(ii)

D. (a)-(ii), (b)-(i), (c)-(iii)

Question 288

View solution online

Match List I with List II.

List I
A. Zymase
B. Diastase
C. Urease
D. Pepsin

List II
I. Stomach
II. Yeast
III. Malt
IV. Soyabean

Choose the correct answer from the options given below:

A. A-II, B-III, C-I, D-IV

B. A-II, B-III, C-IV, D-I

C. A-III, B-II, C-IV, D-I

D. A-III, B-II, C-I, D-IV

Question 289

View solution online

Match List-I with List-II.

List-I

List-II

(A) Adenine

(I)

(B) Cytosine

(II)

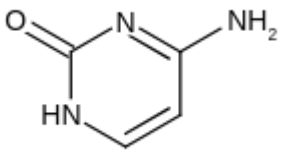
(C) Thymine

(III)

(D) Uracil

(IV)

Choose the correct answer from the options given below:



A. (A)-(III), (B)-(IV), (C)-(II), (D)-(I)

B. (A)-(III), (B)-(I), (C)-(IV), (D)-(II)

C. (A)-(IV), (B)-(III), (C)-(II), (D)-(I)

D. (A)-(III), (B)-(IV), (C)-(I), (D)-(II)

Question 290

View solution online

Match List - I with List - II.

List - I
(Carbohydrate)}
List - II
(Linkage}
Source)}
(A) Amylose
(B) Cellulose
(C) Glycogen
(D) Amylopectin
(I) $\beta - C_1 - C_4$, plant
(II) $\alpha - C_1 - C_4$, animal
(III) $\alpha - C_1 - C_4$,
$\alpha - C_1 - C_6$, plant
(IV) $\alpha - C_1 - C_4$, plant

Choose the correct answer form the options given below:

A. (A)-(III), (B)-(II), (C)-(I), (D)-(IV)

B. (A)-(IV), (B)-(I), (C)-(II), (D)-(III)

C. (A)-(II), (B)-(III), (C)-(I), (D)-(IV)

D. (A)-(IV), (B)-(I), (C)-(III), (D)-(II)

Question 291

View solution online

The correct match between Item -I and ItemII is :

Item - I (drug)		Item - II (test)	
(A)	Chloroxylenol	(P)	Carbylamine Test
(B)	Norethindrone	(Q)	Sodium Hydrogen carbonateTest
(C)	Sulphapyridine	(R)	Ferric chloride test
(D)	Penicillin	(S)	Bayer's test

A. $\mathrm{A} \rightarrow \mathrm{Q}; \mathrm{B} \rightarrow \mathrm{P}; \mathrm{C} \rightarrow \mathrm{S}; \mathrm{D} \rightarrow \mathrm{R}$

B. $\mathrm{A} \rightarrow \mathrm{R}; \mathrm{B} \rightarrow \mathrm{P}; \mathrm{C} \rightarrow \mathrm{S}; \mathrm{D} \rightarrow \mathrm{Q}$

C. $\mathrm{A} \rightarrow \mathrm{R}; \mathrm{B} \rightarrow \mathrm{S}; \mathrm{C} \rightarrow \mathrm{P}; \mathrm{D} \rightarrow \mathrm{Q}$

D. $\mathrm{A} \rightarrow \mathrm{Q}; \mathrm{B} \rightarrow \mathrm{S}; \mathrm{C} \rightarrow \mathrm{P}; \mathrm{D} \rightarrow \mathrm{R}$

Question 292

View solution online

The correct match between item I and item II is

Item I		Item II	
(A)	Allosteric effect	(P)	Molecule binding to the active site of enzyme
(B)	Competitive inhibitor	(Q)	Molecule crucial for communication in the body
(C)	Receptor	(R)	Molecule binding to a site other than the active site of enzyme
(D)	Poison	(S)	Molecule binding to the enzyme covalently

A. $(A) \rightarrow (P); (B) \rightarrow (R); (C) \rightarrow (S); (D) \rightarrow (Q)$

B. $(A) \rightarrow (R); (B) \rightarrow (P); (C) \rightarrow (S); (D) \rightarrow (Q)$

C. $(A) \rightarrow (P); (B) \rightarrow (R); (C) \rightarrow (Q); (D) \rightarrow (S)$

D. $(A) \rightarrow (R); (B) \rightarrow (P); (C) \rightarrow (Q); (D) \rightarrow (S)$

CHAPTER 20 / CHEMISTRY

Practical Chemistry (NCERT Laboratory Manual)

Questions 293-295 / 3 selected / 1.0% practice weight / Consolidate

Topics to prioritise in this collection

- Practical and qualitative chemistry: 1 question / 33.3% of this chapter
- Qualitative chemical analysis: 1 question / 33.3% of this chapter
- Qualitative inorganic analysis: 1 question / 33.3% of this chapter

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Question 293

View solution online

Match List I with List II

List I (Anion)	List II (Gas evolved on reaction with dil. H_2SO_4)
A. CO_3^{2-}	I. Colourless gas which turns lead acetate paper black
B. S^{2-}	II. Colourless gas which turns acidified potassium dichromate solution green.
C. SO_3^{2-}	III. Brown fumes which turns acidified KI solution containing starch blue.
D. NO_2^-	IV. Colourless gas evolved with brisk effervescence, which turns lime water milky.

Choose the correct answer from the options given below:

A. A-III, B-I, C-II, D-IV

B. A-II, B-I, C-IV, D-III

C. A-IV, B-I, C-III, D-II

D. A-IV, B-I, C-II, D-III

Question 294 View solution online

For reaction: $SO_2(g) + \frac{1}{2}O_2(g) \rightleftharpoons SO_3(g)$
$K_p = 2 \times 10^{12}$ at $27°C$ and 1 atm pressure. The K_c for the same reaction is $\times 10^{13}$. (Nearest integer) (Given $R = 0.082\ L\ atm\ K^{-1}\ mol^{-1}$)

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 295 View solution online

Match the List-I with List-II

List-I	List-II
Cations	Group reagents
$A \rightarrow Pb^{2+}, Cu^{2+}$	i) H_2S gas in presence of dilute HCl
$B \rightarrow Al^{3+}, Fe^{3+}$	ii) $(NH_4)_2CO_3$ in presence of NH_4OH
$C \rightarrow Co^{2+}, Ni^{2+}$	iii) NH_4OH in presence of NH_4Cl
$D \rightarrow Ba^{2+}, Ca^{2+}$	iv) H_2S in presence of NH_4OH

Correct match is -

A. A → iii, B → i, C → iv, D → ii

B. $A \rightarrow$ i, $B \rightarrow$ iii, $C \rightarrow$ ii, $D \rightarrow$ iv

C. $A \rightarrow$ iv, $B \rightarrow$ ii, $C \rightarrow$ iii, $D \rightarrow$ i

D. A → i, B → iii, C → iv, D → ii

CHAPTER 21 / CHEMISTRY / HISTORICAL APPENDIX

Hydrogen

Questions 296-297 / 2 selected / 0.7% practice weight / Historical appendix

Topics to prioritise in this collection

- Hydrogen and its compounds: 1 question / 50.0% of this chapter
- Hydrogen and water chemistry: 1 question / 50.0% of this chapter

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Question 296

View solution online

In basic medium, $\mathbf{H_2O_2}$ exhibits which of the following reactions ?
(A) $\mathbf{Mn^{2+} \rightarrow Mn^{4+}}$
(B) $\mathbf{I_2 \rightarrow I^-}$
(C) $\mathbf{PbS \rightarrow PbSO_4}$

Choose the most appropriate answer from the options given below :

A. , (C) only

B. (A) only

C. (B) only

D. (A), (B) only

Question 297

View solution online

Match List I with List II

LIST I		LIST II	
A.	Cobalt catalyst	I.	$(H_2 + Cl_2)$ production
B.	Syngas	II.	Water gas production
C.	Nickel catalyst	III.	Coal gasification
D.	Brine solution	IV.	Methanol production

Choose the correct answer from the options given below:

A. A-IV, B-I, C-II, D-III

B. A-IV, B-III, C-II, D-I

C. A-II, B-III, C-IV, D-I

D. A-IV, B-III, C-I, D-II

CHAPTER 22 / CHEMISTRY / HISTORICAL APPENDIX

The s-Block Elements

Questions 298-298 / 1 selected / 0.3% practice weight / Historical appendix

Topics to prioritise in this collection

- Uses of alkali metals: 1 question / 100.0% of this chapter

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Question 298

View solution online

Match List-I with List-II :

List-I	List-II
A. K	I. Thermonuclear reactions
B. KCl	II. Fertilizer
C. KOH	III. Sodium potassium pump
D. Li	IV. Absorbent of CO_2

Choose the correct answer from the options given below :

A. A-III, B-II, C-IV, D-I

B. A-IV, B-I, C-III, D-II

C. A-IV, B-III, C-I, D-II

D. A-III, B-IV, C-II, D-I

CHAPTER 23 / CHEMISTRY / HISTORICAL APPENDIX

Surface Chemistry

Questions 299-300 / 2 selected / 0.7% practice weight / Historical appendix

Topics to prioritise in this collection

- Adsorption: 1 question / 50.0% of this chapter
- Adsorption isotherms: 1 question / 50.0% of this chapter

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Question 299

View solution online

Which of the following represent the Freundlich adsorption isotherms?

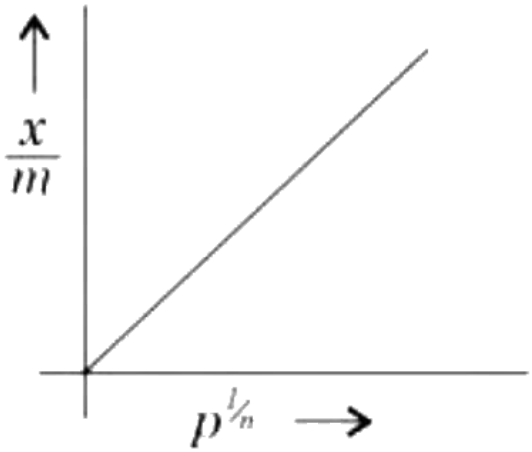
(A)

(B)

(C)

(D)

Choose the correct answer from the options given below:



A. B, C, D only

B. A, B, D only

C. A, B only

D. A, C, D only

Question 300

View solution online

Match List I with List II

LIST I		LIST II	
A.	Physisorption	I.	Single Layer Adsorption
B.	Chemisorption	II.	$20 - 40\ \mathrm{kJ\ mol^{-1}}$
C.	$\mathrm{N_2(g) + 3H_2(g) \xrightarrow{Fe(s)} 2NH_3(g)}$	III.	Chromatography
D.	Analytical Application or Adsorption	IV.	Heterogeneous catalysis

Choose the correct answer from the options given below:

A. A - II, B - I, C - IV, D - III

B. A - IV, B - II, C - III, D - I

C. A - II, B - III, C - I, D - IV

D. A - III, B - IV, C - I, D - II

QUICK CHECK

Answer key

For numerical questions the stored answer value is shown. Follow the question's precision and units.

1. 100	**2.** 20	**3.** 1655	**4.** D	**5.** 2
6. 6	**7.** D	**8.** D	**9.** D	**10.** B
11. B	**12.** B	**13.** A	**14.** C	**15.** C
16. 6	**17.** A	**18.** A	**19.** A	**20.** B
21. A	**22.** 4	**23.** C	**24.** 5	**25.** 2000
26. A	**27.** D	**28.** 6	**29.** C	**30.** 3
31. 182	**32.** B	**33.** D	**34.** 171	**35.** 154
36. B	**37.** B	**38.** A	**39.** B	**40.** A
41. A	**42.** B	**43.** A	**44.** D	**45.** A
46. C	**47.** C	**48.** D	**49.** A	**50.** A
51. D	**52.** C	**53.** B	**54.** A	**55.** D
56. D	**57.** A	**58.** A	**59.** C	**60.** B
61. A	**62.** C	**63.** B	**64.** A	**65.** D
66. C	**67.** A	**68.** A	**69.** B	**70.** D
71. B	**72.** D	**73.** A	**74.** B	**75.** B
76. C	**77.** D	**78.** A	**79.** A	**80.** C
81. A	**82.** B	**83.** C	**84.** C	**85.** A
86. B	**87.** C	**88.** C	**89.** C	**90.** D
91. B	**92.** D	**93.** B	**94.** A	**95.** B
96. A	**97.** B	**98.** C	**99.** C	**100.** B
101. D	**102.** D	**103.** B	**104.** A	**105.** B
106. A	**107.** C	**108.** A	**109.** C	**110.** C
111. C	**112.** C	**113.** B	**114.** C	**115.** B
116. C	**117.** A	**118.** C	**119.** D	**120.** B
121. A	**122.** D	**123.** D	**124.** D	**125.** D
126. D	**127.** D	**128.** B	**129.** A	**130.** B
131. B	**132.** D	**133.** A	**134.** C	**135.** B
136. C	**137.** B	**138.** C	**139.** D	**140.** B
141. A	**142.** B	**143.** B	**144.** C	**145.** B
146. C	**147.** B	**148.** A	**149.** A	**150.** B

151. B **152.** B **153.** A **154.** D **155.** D

156. B **157.** A **158.** C **159.** B **160.** A

161. C **162.** 2 **163.** C **164.** B **165.** B

166. D **167.** A **168.** B **169.** A **170.** A

171. A **172.** A **173.** C **174.** D **175.** D

176. D **177.** C **178.** 372 **179.** 5 **180.** 543

181. 3 **182.** D **183.** D **184.** A **185.** C

186. 1 **187.** B **188.** D **189.** C **190.** D

191. D **192.** A **193.** B **194.** A **195.** B

196. A **197.** C **198.** C **199.** B **200.** B

201. C **202.** A **203.** B **204.** B **205.** C

206. B **207.** D **208.** C **209.** D **210.** D

211. B **212.** C **213.** A **214.** A **215.** C

216. B **217.** C **218.** D **219.** D **220.** B

221. D **222.** D **223.** C **224.** D **225.** A

226. C **227.** C **228.** A **229.** A **230.** 13

231. A **232.** C **233.** A **234.** D **235.** D

236. D **237.** D **238.** C **239.** D **240.** B

241. D **242.** D **243.** D **244.** B **245.** D

246. A **247.** B **248.** B **249.** C **250.** D

251. D **252.** D **253.** B **254.** B **255.** C

256. D **257.** B **258.** D **259.** A **260.** B

261. A **262.** C **263.** C **264.** D **265.** 7

266. C **267.** A **268.** C **269.** C **270.** A

271. D **272.** A **273.** D **274.** D **275.** C

276. C **277.** A **278.** D **279.** C **280.** C

281. D **282.** A **283.** C **284.** B **285.** C

286. D **287.** D **288.** B **289.** A **290.** B

291. C **292.** D **293.** D **294.** 1 **295.** D

296. D **297.** B **298.** A **299.** B **300.** A

LEARNE2I / PRIORITY PRACTICE

JEE Main 2026 Session 1

Mathematics
Chapter-wise practice collection

300 questions / NCERT chapter navigation
Chapter and topic priority guide, followed by questions and an answer key.

Start with the priority guide, then practise chapter by chapter. Enter a numerical value where no options are given; follow the units and precision specified in the question.

Solutions on your phone

Scan to choose a chapter or question. You can also download all three solutions PDFs together.

learne2i.com/jee-main/revision-archive/2026-session-1/

Open the PDF bookmarks panel on the left to jump between chapters. The chapter links in the guide are clickable too.

YOUR PRACTICE ROADMAP

Chapter & topic priorities

For this Session 1 collection, begin with **Three Dimensional Geometry; Sequences and Series; Conic Sections**. These chapters have the largest share of the selected questions.

Practice weight = questions selected from a chapter / 300. Topic percentages use that chapter's question count. These are practice priorities from the prediction output, not guaranteed exam marks or probabilities.

NCERT chapter / leading topics	Priority	Questions	Weight
Relations and Functions Equivalence relations: 3 (33.3%) / Domain and range: 2 (22.2%) / Functions and relations: 2 (22.2%) / More topics in chapter guide	Next	1-9 (9)	3.0%
Trigonometric Functions Trigonometric identities: 3 (50.0%) / Trigonometric equations: 2 (33.3%) / Trigonometric Functions: 1 (16.7%)	Next	10-15 (6)	2.0%
Complex Numbers and Quadratic Equations Complex Numbers and Quadratic Equations: 2 (33.3%) / Algebra of complex numbers: 1 (16.7%) / Nature of roots: 1 (16.7%) / More topics in chapter guide	Next	16-21 (6)	2.0%
Linear Inequalities Solution of linear inequalities: 1 (100.0%)	Consolidate	22-22 (1)	0.3%
Permutations and Combinations Fundamental counting principle: 2 (33.3%) / Permutations and Combinations: 2 (33.3%) / Counting arrangements: 1 (16.7%) / More topics in chapter guide	Consolidate	23-28 (6)	2.0%
Binomial Theorem Binomial expansion: 1 (50.0%) / Middle term of a binomial expansion: 1 (50.0%)	Consolidate	29-30 (2)	0.7%
Sequences and Series Sequences and finite sums: 18 (52.9%) / Arithmetic progression: 6 (17.6%) / Geometric progression: 4 (11.8%) / More topics in chapter guide	Focus first	31-64 (34)	11.3%
Straight Lines Equation of a straight line: 3 (50.0%) / Coordinate geometry of lines: 2 (33.3%) / Distance from a point to a line: 1 (16.7%)	Consolidate	65-70 (6)	2.0%
Conic Sections Circle geometry: 13 (41.9%) / Conic geometry: 8 (25.8%) / Parabola geometry: 5 (16.1%) / More topics in chapter guide	Focus first	71-101 (31)	10.3%
Introduction to Three Dimensional Geometry Coordinates in three dimensions: 2 (100.0%)	Consolidate	102-103 (2)	0.7%
Limits and Derivatives Standard limits: 2 (100.0%)	Consolidate	104-105 (2)	0.7%

NCERT chapter / leading topics	Priority	Questions	Weight
Statistics Variance and standard deviation: 5 (71.4%) / Mean, median and mode: 1 (14.3%) / Measures of central tendency and dispersion: 1 (14.3%)	Next	106-112 (7)	2.3%
Probability Addition and multiplication rules of probability: 1 (33.3%) / Binomial distribution: 1 (33.3%) / Probability: 1 (33.3%)	Consolidate	113-115 (3)	1.0%
Inverse Trigonometric Functions Inverse trigonometric identities: 4 (57.1%) / Inverse trigonometric functions: 2 (28.6%) / Inverse Trigonometric Functions: 1 (14.3%)	Next	116-122 (7)	2.3%
Determinants System of linear equations: 1 (100.0%)	Consolidate	123-123 (1)	0.3%
Application of Derivatives Derivative-based curve analysis: 3 (60.0%) / Maxima and minima: 1 (20.0%) / Tangents and normals: 1 (20.0%)	Consolidate	124-128 (5)	1.7%
Integrals Properties of definite integrals: 1 (100.0%)	Consolidate	129-129 (1)	0.3%
Application of Integrals Area under a curve: 8 (57.1%) / Area bounded by curves: 3 (21.4%) / Application of Integrals: 2 (14.3%) / More topics in chapter guide	Next	130-143 (14)	4.7%
Vector Algebra Algebra of vectors: 7 (25.0%) / Vector operations: 6 (21.4%) / Vector projection: 6 (21.4%) / More topics in chapter guide	Focus first	144-171 (28)	9.3%
Three Dimensional Geometry Coordinates in three dimensions: 42 (34.4%) / Lines and planes in space: 24 (19.7%) / Equation of a plane: 19 (15.6%) / More topics in chapter guide	Focus first	172-293 (122)	40.7%
Mathematical Reasoning Historical appendix / omitted source chapter Mathematical reasoning: 5 (71.4%) / Propositional equivalence: 1 (14.3%) / Translation of compound statements: 1 (14.3%)	Historical appendix	294-300 (7)	2.3%

How to use the priorities

1. Rank chapters by their selected question counts. Ties follow NCERT book order.
2. Focus first: chapters starting within the first 70% of selected, non-historical questions. Next: the following 20%. Consolidate: the remainder. A chapter crossing a threshold stays together.
3. Topic counts use the question's existing core concept, falling back to topic and then chapter. Each question is counted once. Full topic lists begin each chapter.
4. Historical/omitted chapters stay in a separate appendix. Their presence is not a recommendation that they are in the target examination syllabus.

Names follow NCERT Classes XI and XII. Practical chemistry is identified as a laboratory-manual section. Percentages are rounded and may not add to exactly 100.0%. Chapters with no selected questions are not listed; this does not mean they have

no exam importance.

Chapter naming references: NCERT textbooks.

CHAPTER 01 / MATHEMATICS

Relations and Functions

Questions 1-9 / 9 selected / 3.0% practice weight / Next

Topics to prioritise in this collection

- Equivalence relations: 3 questions / 33.3% of this chapter
- Domain and range: 2 questions / 22.2% of this chapter
- Functions and relations: 2 questions / 22.2% of this chapter
- Properties of functions: 2 questions / 22.2% of this chapter

Open this chapter's solutions on mobile / Back to chapter guide

Question 1 View solution online

Let $f : R \to R$ be a function defined by $f(x) = (2 + 3a)x^2 + \left(\frac{a+2}{a-1}\right)x + b, a \neq 1$. If $f(x + y) = f(x) + f(y) + 1 - \frac{2}{7}xy$, then the value of $28 \sum_{i=1}^{5} |f(i)|$ is:

A. 715

B. 735

C. 545

D. 675

Question 2 View solution online

Let $S = \{x : x \in \mathbb{R} \text{ and } (\sqrt{3} + \sqrt{2})^{x^2-4} + (\sqrt{3} - \sqrt{2})^{x^2-4} = 10\}$

Then $n(S)$ is equal to

A. 4

B. 0

C. 6

D. 2

Question 3 View solution online

Let the domains of the functions
$f(x) = \log_4 \log_3 \log_7 \left(8 - \log_2 \left(x^2 + 4x + 5\right)\right)$ and
$g(x) = \sin^{-1}\left(\frac{7x+10}{x-2}\right)$ be (α, β) and $[\gamma, \delta]$, respectively. Then $\alpha^2 + \beta^2 + \gamma^2 + \delta^2$ is equal to :-

A. 15

B. 13

C. 16

D. 14

Question 4 View solution online

If the domain of the function
$f(x) = \log_7 \left(1 - \log_4 \left(x^2 - 9x + 18\right)\right)$ is $(\alpha, \beta) \cup (\gamma, \delta)$, then $\alpha + \beta + \gamma + \delta$ is equal to

A. $\cap(2) \quad (2,3) \cup (6,7) = (\alpha, \beta) \cup (\gamma, \delta)$
$\Rightarrow \alpha + \beta + \gamma + \delta = 18$

B. (1) 18

C. (2) 16

D. (3) 15

Question 5 View solution online

Let $A = \{0, 3, 4, 6, 7, 8, 9, 10\}$ and R be the relation defined on A such that $R = \{(x, y) \in A \times A : x - y$ is odd positive integer or $x - y = 2\}$. The minimum number of elements that must be added to the relation R , so that it is a symmetric relation, is equal to

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 6 View solution online

Let $A = \{1, 2, 3, 4, \ldots . 10\}$ and $B = \{0, 1, 2, 3, 4\}$.

The number of elements in the relation $R = \{(a, b) \in A \times A : 2(a-b)^2 + 3(a-b) \in B\}$ is

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 7 View solution online

Let $\mathbf{A}=\{0,1,2,3,4,5\}$. Let R be a relation on A defined by $(x, y) \in R$ if and only if max $\{\mathbf{x}, \mathbf{y}\} \in\{3,4\}$. Then among the statements

(S_1) : The number of elements in R is 18 , and

$(\mathbf{S_2})$: The relation R is symmetric but neither reflexive nor transitive

A. both are true

B. both are false

C. only ($\mathbf{S_2}$) is true

D. only ($\mathbf{S_1}$) is true

Question 8 View solution online

Let $\mathbf{A}=\{-3,-2,-1,0,1,2,3\}$ and R be a relation on A defined by xRy if and only if $2x-y \in\{0,1\}$. Let l be the number of elements in R. Let m and n be the minimum number of elements required to be added in R to make it reflexive and symmetric relations, respectively. Then $l+\mathbf{mn}$ is equal to:-

A. 18

B. 17

C. 15

D. 16

Question 9 View solution online

Let $\mathbf{A}=\{-3,-2,-1,0,1,2,3\}$. Let R be a relation on A defined by xRy if and only if $0 \leq x^2+2y \leq 4$. Let l be the number of elements in R and m be the minimum number of elements required to be added in R to make it a reflexive relation. then $l+m$ is equal to

A. 19

B. 20

C. 17

D. 18

CHAPTER 02 / MATHEMATICS

Trigonometric Functions

Questions 10-15 / 6 selected / 2.0% practice weight / Next

Topics to prioritise in this collection

- Trigonometric identities: 3 questions / 50.0% of this chapter
- Trigonometric equations: 2 questions / 33.3% of this chapter
- Trigonometric Functions: 1 question / 16.7% of this chapter

Open this chapter's solutions on mobile / Back to chapter guide

Question 10 View solution online

Let $S = \{\sin^2 2\theta : (\sin^4\theta + \cos^4\theta)x^2 + (\sin 2\theta)x + (\sin^6\theta + \cos^6\theta) = 0$ has real roots $\}$. If α and β be the smallest and largest elements of the set S , respectively, then $3\left((\alpha-2)^2 + (\beta-1)^2\right)$ equals.....

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 11 View solution online

If for some $\alpha, \beta; \alpha \leq \beta, \alpha + \beta = 8$ and $\sec^2\left(\tan^{-1}\alpha\right) + \operatorname{cosec}^2\left(\cot^{-1}\beta\right) = 36$, then $\alpha^2 + \beta$ is .

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 12 View solution online

Question ID: 101787

Let $c, k \in R$. If $f(x) = (c+1)x^2 + (1-c^2)x + 2k$ and $f(x+y) = f(x) + f(y) - xy$, for all $x, y \in R$, then the value of $|2(f(1) + f(2) + f(3) + \ldots\ldots + f(20))|$ is equal to .

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 13 View solution online

A value of $\theta \in (0, \pi/3)$, for which
$\begin{vmatrix} 1+\cos^2\theta & \sin^2\theta & 4\cos 6\theta\cos^2\theta \\ 1+\sin^2\theta & 4\cos 6\theta\cos^2\theta & \sin^2\theta \\ 1+4\cos 6\theta & \end{vmatrix} = 0$, is :

A. $\frac{\pi}{18}$

B. $\frac{7\pi}{36}$

C. $\frac{7\pi}{24}$

D. $\frac{\pi}{9}$

Question 14 View solution online

If $\cot\alpha = 1$ and $\sec\beta = -\frac{5}{3}$, where $\pi < \alpha < \frac{3\pi}{2}$ and $\frac{\pi}{2} < \beta < \pi$, then the value of $\tan(\alpha+\beta)$ and the quadrant in which $\alpha+\beta$ lies, respectively are

A. $-\frac{1}{7}$ and IV th quadrant

B. 7 and I^{st} quadrant

C. -7 and IVth quadrant

D. $\frac{1}{7}$ and I^{st} quadrant

Question 15 View solution online

The number of values of x in the interval $\left(\frac{\pi}{4}, \frac{7\pi}{4}\right)$ for which $14\,\text{cosec}^2 x - 2\sin^2 x = 21 - 4\cos^2 x$ holds, is

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

CHAPTER 03 / MATHEMATICS

Complex Numbers and Quadratic Equations

Questions 16-21 / 6 selected / 2.0% practice weight / Next

Topics to prioritise in this collection

- Complex Numbers and Quadratic Equations: 2 questions / 33.3% of this chapter
- Algebra of complex numbers: 1 question / 16.7% of this chapter
- Nature of roots: 1 question / 16.7% of this chapter
- Quadratic equations: 1 question / 16.7% of this chapter
- Quadratic equations and complex roots: 1 question / 16.7% of this chapter

Open this chapter's solutions on mobile / Back to chapter guide

Question 16 View solution online

Let α_θ and β_θ be the distinct roots of $2x^2 + (\cos\theta)x - 1 = 0, \theta \in (0, 2\pi)$. If m and M are the minimum and the maximum values of $\alpha_\theta^4 + \beta_\theta^4$, then $16(M + m)$ equals :

A. 24

B. 25

C. 27

D. 17

Question 17 View solution online

If the sum of the squares of the reciprocals of the roots α and β of the equation $3x^2 + \lambda x - 1 = 0$ is 15 , then $6\left(\alpha^3 + \beta^3\right)^2$ is equal to :

A. 18

B. 24

C. 36

D. 96

Question 18 View solution online

If α satisfies the equation $x^2+x+1=0$ and $(1+\alpha)^7=A+B\alpha+C\alpha^2,\ A,\ B, C\geq 0$, then $5(3A-2B-C)$ is equal to .

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 19 View solution online

Let α be a solution of $x^2+x+1=0$, and for some a and b in $\mathbb{R}$, $[4 \quad a \quad b]\begin{bmatrix}1 & 16 & 13\\ -1 & 2 & -14\\ 2 & -1 & -8\end{bmatrix}=[0 \quad 0 \quad 0]$. If $\frac{4}{\alpha^4}+\frac{m}{\alpha^a}+\frac{n}{\alpha^b}=3$, then $m+n$ is equal to .....

A. 3

B. 11

C. 7

D. 8

Question 20 View solution online

Let $\Delta, \nabla \in \{\Lambda, V\}$ be such that $(p\rightarrow q)\Delta(p\nabla q)$ is a tautology. Then

A. $\Delta=V, \nabla=V$

B. $\Delta=V, \nabla=\Lambda$

C. $\Delta=\Lambda, \nabla=V$

D. $\Delta=\Lambda, \nabla=\Lambda$

Question 21 View solution online

Let O be the origin, the point A be $z_1=\sqrt{3}+2\sqrt{2}i$, the point $B(z_2)$ be such that $\sqrt{3}|z_2|=|z_1|$ and $\arg(z_2)=\arg(z_1)+\frac{\pi}{6}$. Then

A. area of triangle ABO is $\frac{11}{\sqrt{3}}$

B. ABO is a scalene triangle

C. area of triangle ABO is $\frac{11}{4}$

D. ABO is an obtuse angled isosceles triangle

CHAPTER 04 / MATHEMATICS

Linear Inequalities

Questions 22-22 / 1 selected / 0.3% practice weight / Consolidate

Topics to prioritise in this collection

- Solution of linear inequalities: 1 question / 100.0% of this chapter

Open this chapter's solutions on mobile / Back to chapter guide

Question 22 View solution online

Let the set of all values of $p \in \mathbb{R}$, for which both the roots of the equation $x^2 - (p+2)x + (2p+9) = 0$ are negative real numbers, be the interval $(\alpha, \beta]$. Then $\beta - 2\alpha$ is equal to

A. 0

B. 9

C. 5

D. 20

CHAPTER 05 / MATHEMATICS

Permutations and Combinations

Questions 23-28 / 6 selected / 2.0% practice weight / Consolidate

Topics to prioritise in this collection

- Fundamental counting principle: 2 questions / 33.3% of this chapter
- Permutations and Combinations: 2 questions / 33.3% of this chapter
- Counting arrangements: 1 question / 16.7% of this chapter
- Counting arrangements and selections: 1 question / 16.7% of this chapter

Open this chapter's solutions on mobile / Back to chapter guide

Question 23 View solution online

Let ${}^nC_{r-1} = 28, {}^nC_r = 56$ and ${}^nC_{r+1} = 70$. Let $\mathrm{A}(4\cos t, 4\sin t), \mathrm{B}(2\sin t, -2\cos t)$ and $\mathrm{C}\left(3\mathrm{r} - \mathrm{n}, \mathrm{r}^2 - \mathrm{n} - 1\right)$ be the vertices of a triangle ABC , where t is a parameter. If $(3\mathrm{x} - 1)^2 + (3\mathrm{y})^2 = \alpha$, is the locus of the centroid of triangle ABC , then α equals :

A. 20

B. 8

C. 6

D. 18

Question 24 View solution online

The sum of all 3-digit numbers less than or equal to 500 , that are formed without using the digit " 1 " and they all are multiple of 11, is .

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 25 View solution online

Total numbers of 3-digit numbers that are divisible by 6 and can be formed by using the digits $\mathbf{1, 2, 3}$, 4, 5 with repetition, is .

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 26 View solution online

If the sum and product of four positive consecutive terms of a G.P., are 126 and 1296 , respectively, then the sum of common ratios of all such GPs is

A. 7

B. 3

C. $\frac{9}{2}$

D. 14

Question 27 View solution online

If all the six digit numbers $x_1x_2x_3x_4x_5x_6$ with $0 < x_1 < x_2 < x_3 < x_4 < x_5 < x_6$ are arranged in the increasing order, then the sum of the digits in the 72th number is

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 28 View solution online

The total number of six digit numbers, formed using the digits $\mathbf{4, 5, 9}$ only and divisible by 6 , is

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

CHAPTER 06 / MATHEMATICS

Binomial Theorem

Questions 29-30 / 2 selected / 0.7% practice weight / Consolidate

Topics to prioritise in this collection

- Binomial expansion: 1 question / 50.0% of this chapter
- Middle term of a binomial expansion: 1 question / 50.0% of this chapter

Open this chapter's solutions on mobile / Back to chapter guide

Question 29 View solution online

Let the coefficients of three consecutive terms $\mathbf{T_r}$, $\mathbf{T_{r+1}}$ and $\mathbf{T_{r+2}}$ in the binomial expansion of $\mathbf{(a+b)^{12}}$ be in a G.P. and let $\boldsymbol{p}$ be the number of all possible values of $\boldsymbol{r}$. Let $\boldsymbol{q}$ be the sum of all rational terms in the binomial expansion of $(\sqrt[4]{3}+\sqrt[3]{4})^{12}$. Then $\mathbf{p+q}$ is equal to :

A. 283

B. 295

C. 287

D. 299

Question 30 View solution online

Let $\boldsymbol{K}$ be the sum of the coefficients of the odd powers of $\boldsymbol{x}$ in the expansion of $(1+x)^{99}$. Let $\boldsymbol{a}$ be the middle term in the expansion of $\left(2+\frac{1}{\sqrt{2}}\right)^{200}$. If $\frac{{}^{200}C_{99}K}{a}=\frac{2^l m}{n}$, where $\boldsymbol{m}$ and $\boldsymbol{n}$ are odd numbers, then the ordered pair ($\boldsymbol{l}, \boldsymbol{n}$) is equal to

A. $(50,51)$

B. $(50,101)$

C. $(51,99)$

D. $(51,101)$

CHAPTER 07 / MATHEMATICS

Sequences and Series

Questions 31-64 / 34 selected / 11.3% practice weight / Focus first

Topics to prioritise in this collection

- Sequences and finite sums: 18 questions / 52.9% of this chapter
- Arithmetic progression: 6 questions / 17.6% of this chapter
- Geometric progression: 4 questions / 11.8% of this chapter
- Summation of series: 3 questions / 8.8% of this chapter
- Progressions: 2 questions / 5.9% of this chapter
- Sequences and Series: 1 question / 2.9% of this chapter

Open this chapter's solutions on mobile / Back to chapter guide

Question 31 View solution online

If the domain of the function $\log_5\left(18x - x^2 - 77\right)$ is (α, β) and the domain of the function $\log_{(x-1)}\left(\frac{2x^2+3x-2}{x^2-3x-4}\right)$ is (γ, δ), then $\alpha^2 + \beta^2 + \gamma^2$ is equal to :

A. 195

B. 174

C. 186

D. 179

Question 32 View solution online

If the set of all $a \in \mathbf{R} - \{1\}$, for which the roots of the equation $(1-a)x^2 + 2(a-3)x + 9 = 0$ are positive is $(-\infty, -\alpha] \cup [\beta, \gamma)$, then $2\alpha + \beta + \gamma$ is equal to .

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 33 View solution online

A ray of light passing through the point $\mathbf{P(2,3)}$ reflects on the x -axis at point A and the reflected ray passes through the point $\mathbf{Q(5,4)}$. Let R be the point that divides the line segment AQ internally into the ratio $\mathbf{2:1}$. Let the co-ordinates of the foot of the perpendicular M from R on the bisector of the angle PAQ be (α, β). Then, the value of $\mathbf{7\alpha+3\beta}$ is equal to .

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 34 View solution online

Let the image of the point $\mathbf{P(1,2,3)}$ in the line $\mathbf{L: \frac{x-6}{3} = \frac{y-1}{2} = \frac{z-2}{3}}$ be Q . let $\mathbf{R(\alpha,\beta,\gamma)}$ be a point that divides internally the line segment PQ in the ratio $\mathbf{1:3}$. Then the value of $\mathbf{22(\alpha+\beta+\gamma)}$ is equal to

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 35 View solution online

Let a conic C pass through the point $(4,-2)$ and $\mathbf{P(x,y), x \geq 3}$, be any point on C . Let the slope of the line touching the conic C only at a single point $\boldsymbol{P}$ be half the slope of the line joining the points P and (3, -5). If the focal distance of the point (7, 1) on C is d , then 12 d equals .

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 36 View solution online

A line passes through $\mathbf{A(4,-6,-2)}$ and $\mathbf{B(16,-2,4)}$. The point $\mathbf{P(a,b,c)}$ where $\mathbf{a,b,c}$ are non-negative integers, on the line AB lies at a distance of 21 units, from the point A . The distance between the points $\mathbf{P(a,b,c)}$ and $\mathbf{Q(4,-12,3)}$ is equal to .

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 37 View solution online

The point of intersection C of the plane $8x + y + 2z = 0$ and the line joining the point $A(-3, -61)$ and $B(2, -4, -3)$ divides the line segment AB internally in the ratio k :. If $a, b, c(|a|, |b|, |c|)$ are coprime are the direction ratios of the perpendicular form the point C on the line $\frac{1-x}{1} = \frac{y+4}{2} = \frac{z+2}{3}$, then $|a + b + c|$ is equal to

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 38 View solution online

Let $\vec{a} = \hat{i} + 2\hat{j} + \lambda\hat{k}, \vec{b} = 3\hat{i} - 5\hat{j} - \lambda\hat{k}, \vec{a} \cdot \vec{c} = 7, 2\vec{b} \cdot \vec{c} + 43 = 0, \vec{a} \times \vec{c} = \vec{b} \times \vec{c}$. Then $|\vec{a} \cdot \vec{b}|$ is equal to

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 39 View solution online

Let T_r be the rth term of an A.P. If for some m, $T_m = \frac{1}{25}$, $T_{25} = \frac{1}{20}$ and $20\sum_{r=1}^{25} T_r = 13$, then $5\,m\sum_{r=m}^{2m} T_r$ is equal to :

A. 112

B. 126

C. 98

D. 142

Question 40 View solution online

Let $a_1, a_2, a_3 \ldots$. be a G.P. of increasing positive terms. If $a_1a_5 = 28$ and $a_2 + a_4 = 29$, the a_6 is equal to

A. 628

B. 526

C. 784

D. 812

Question 41 View solution online

If the first term of an A.P. is 3 and the sum of its first four terms is equal to one-fifth of the sum of the next four terms, then the sum of the first 20 terms is equal to

A. -1200

B. -1080

C. -1020

D. -120

Question 42 View solution online

Consider an A.P. of positive integers, whose sum of the first three terms is 54 and the sum of the first twenty terms lies between 1600 and 1800. Then its 11th term is :

A. 84

B. 122

C. 90

D. 108

Question 43 View solution online

In an increasing geometric progression ol positive terms, the sum of the second and sixth terms is $\frac{70}{3}$ and the product of the third and fifth terms is 49. Then the sum of the $4^{th}, 6^{th}$ and 8th terms is :-

A. 96

B. 78

C. 91

D. 84

Question 44 View solution online

If the sum of the second, fourth and sixth terms of a G.P. of positive terms is 21 and the sum of its eighth, tenth and twelfth terms is 15309, then the sum of its first nine terms is :

A. 760

B. 755

C. 750

D. 757

Question 45 View solution online

Let $a_1, a_2, \ldots\ldots, a_{21}$ be an AP such that $\sum_{n=1}^{20} \frac{1}{a_n a_{n+1}} = \frac{4}{9}$. If the sum of this AP is 189, then $a_6 a_{16}$ is equal to :

A. 57

B. 72

C. 48

D. 36

Question 46 View solution online

Let $a_1, a_2, a_3, \ldots$ be a G. P. of increasing positive numbers. If $a_3 a_5 = 729$ and $a_2 + a_4 = \frac{111}{4}$, then $24\left(a_1 + a_2 + a_3\right)$ is equal to

A. 131

B. 130

C. 129

D. 128

Question 47 View solution online

Let $a_1, a_2, \ldots, a_{10}$ be an AP with common difference -3 and $b_1, b_2, \ldots, b_{10}$ be a GP with common ratio 2 . Let $c_k = a_k + b_k, k = 1, 2, \ldots, 10$. If $c_2 = 12$ and $c_3 = 13$, then $\sum_{k=1}^{10} c_k$ is equal to .

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 48 View solution online

The number of terms of an A.P. is even; the sum of all the odd terms is 24 , the sum of all the even terms is 30 and the last term exceeds the first by $\frac{21}{2}$. Then the number of terms which are integers in the A.P. is :

A. 2

B. (1) 4

C. (2) 10

D. (3) 6

Question 49 View solution online

The sum $1+3+11+25+45+71+$.. upto 20 terms, is equal to

A. 7240

B. 7130

C. 6982

D. 8124

Question 50 View solution online

Let x_1, x_2, x_3, x_4 be in a geometric progression. If $2, 7, 9, 5$ are subtracted respectively from x_1, x_2, x_3, x_4 then the resulting numbers are in an arithmetic progression. Then the value of $\frac{1}{24}(x_1 x_2 x_3 x_4)$ is :

A. 72

B. 18

C. 36

D. 216

Question 51 View solution online

Let p and q be two statements. Then $\sim (p \wedge (p \Rightarrow \sim q))$ is equivalent to

A. $p \vee (p \wedge q)$

B. $p \vee (p \wedge (\sim q))$

C. $(\sim p) \vee q$

D. $p \vee ((\sim p) \wedge q)$

Question 52 View solution online

If p, q and r three propositions, then which of the following combination of truth values of p, q and r makes the logical expression $\{(p \vee q) \wedge ((\sim p) \vee r)\} \rightarrow ((\sim q) \vee r)$ false?

A. $p = T, q = T, r = F$

B. $p = T, q = F, r = T$

C. $p = F, q = T, r = F$

D. $p = T, q = F, r = F$

Question 53 View solution online

Among the statements :
$(S1)((p \vee q) \Rightarrow r) \Leftrightarrow (p \Rightarrow r)$
(S2) $((p \vee q) \Rightarrow r) \Leftrightarrow ((p \Rightarrow r) \vee (q \Rightarrow r))$

A. only (S2) is a tautology

B. only (S1) is a tautology

C. neither (S1) nor (S2) is a tautology

D. both (S1) and (S2) are tautologies

Question 54 View solution online

The sum of the common terms of the following three arithmetic progressions.

3, 7, 11, 15, ...,399
$2, 5, 8, 11, \ldots\ldots, 359$ and
2, 7, 12, 17, ..., 197
is equal to

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 55 View solution online

The 4th term of GP is 500 and its common ratio is $\frac{1}{m}, m \in \mathbb{N}$. Let S_n denote the sum of the first n terms of this GP. If $S_6 > S_5 + 1$ and $S_7 < S_6 + \frac{1}{2}$, then the number of possible values of m is

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 56 View solution online

Let the sixth term in the binomial expansion of $\left(\sqrt{\log_2\left(10-3^3\right)}+\sqrt[5]{2^{x \log_2 3}}\right)^m$, in the increasing powers of $2^{(x-2)\log_2 3}$, be 21 . If the binomial coefficients of the second, third and fourth terms in the expansion are respectively the first, third and fifth terms of A.P., then the sum of the squares of all possible values of x is

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 57 View solution online

Let $a_1, a_2, a_3, \ldots$ be a GP of increasing positive numbers. If the product of fourth and sixth terms is 9 and the sum of fifth and seventh terms is 24 , then $a_1 a_9+a_2 a_4 a_9+a_5+a_7$ is equal to

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 58 View solution online

Let $a_1=8, a_2, a_3, \ldots, a_n$ be an A.P. If the sum of its first four terms is 50 and the sum of its last four terms is 170 , then the product of its middle two terms is

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 59 View solution online

If $\mathrm{a_n}=\frac{-2}{4n^2-16n+15}$, then $\mathrm{a_1}+\mathrm{a_2}+\ldots\ldots+\mathrm{a_{25}}$ is equal to:

A. $52/147$

B. $49/138$

C. $50/141$

D. $51/144$

Question 60 View solution online

Let $a, b, c > 1, a^3, b^3$ and c^3 be in A.P., and $\log_a b, \log_c a$ and $\log_b c$ be in G.P. If the sum of first 20 terms of an A.P., whose first term is $\frac{a+4b+c}{3}$ and the common difference is $\frac{a-8b+c}{10}$ is -444 , then abc is equal to:

A. $\frac{125}{8}$

B. 216

C. 343

D. $\frac{343}{8}$

Question 61 View solution online

Let $a_1, a_2, \ldots, a_n$ be in A.P. If $a_5 = 2a_7$ and $a_{11} = 18$, then $12\left(\frac{1}{\sqrt{a_{10}}+\sqrt{a_{11}}} + \frac{1}{\sqrt{a_{11}}+\sqrt{a_{12}}} + \cdots + \frac{1}{\sqrt{a_{17}}+\sqrt{a_{18}}}\right)$ is equal to

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 62 View solution online

Let S be the focus of the hyperbola $\frac{x^2}{3} - \frac{y^2}{5} = 1$, on the positive x -axis. Let C be the circle with its centre at $A(\sqrt{6}, \sqrt{5})$ and passing through the point S . if O is the origin and SAB is a diameter of C then the square of the area of the triangle OSB is equal to -

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 63 View solution online

Consider the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ having one of its focus at $P(-3, 0)$. If the latus ractum through its other focus subtends a right angle at P and $a^2b^2 = \alpha\sqrt{2} - \beta, \alpha, \beta \in \mathbb{N}$.

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 64 View solution online

Let $\mathbf{P}(a_1, b_1)$ and $\mathbf{Q}(a_2, b_2)$ be two distinct points on a circle with center $\mathbf{C}(\sqrt{2}, \sqrt{3})$. Let O be the origin and OC be perpendicular to both CP and CQ .

If the area of the triangle OCP is $\frac{\sqrt{35}}{2}$, then $a_1^2 + a_2^2 + b_1^2 + b_2^2$ is equal to .

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

CHAPTER 08 / MATHEMATICS

Straight Lines

Questions 65-70 / 6 selected / 2.0% practice weight / Consolidate

Topics to prioritise in this collection

- Equation of a straight line: 3 questions / 50.0% of this chapter
- Coordinate geometry of lines: 2 questions / 33.3% of this chapter
- Distance from a point to a line: 1 question / 16.7% of this chapter

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Question 65 View solution online

Let $\mathbf{A(-1,1)}$ and $\mathbf{B(2,3)}$ be two points and P be a variable point above the line AB such that the area of $\triangle\mathbf{PAB}$ is 10 . If the locus of P is $\mathbf{ax+}$ by $\mathbf{= 15}$, then $\mathbf{5a + 2\ b}$ is :

A. $-\frac{12}{5}$

B. $-\frac{6}{5}$

C. 4

D. 6

Question 66 View solution online

Let two straight lines drawn from the origin O intersect the line $\mathbf{3x + 4y = 12}$ at the points P and Q such that $\triangle\mathbf{OPQ}$ is an isosceles triangle and $\angle\mathbf{POQ} = \mathbf{90}^\circ$. If $l = \mathbf{OP^2 + PQ^2 + QO^2}$, then the greatest integer less than or equal to l is :

A. 44

B. 48

C. 46

D. 42

Question 67 View solution online

Let circle C be the image of $\mathbf{x^2 + y^2 - 2x + 4y - 4 = 0}$ in the line $2x - 3y + 5 = 0$ and A be the point on C such that OA is parallel to x -axis and A lies on the right hand side of the centre O of C . If $\mathbf{B(\alpha, \beta)}$, with $\beta < 4$, lies on C such that the length of the arc AB is $(1/6)^{\text{th}}$ of the perimeter of C , then $\beta - \sqrt{3}\alpha$ is equal to

A. 3

B. $3 + \sqrt{3}$

C. $4 - \sqrt{3}$

D. 4

Question 68 View solution online

Consider the lines $x(3\lambda + 1) + y(7\lambda + 2) = 17\lambda + 5$, λ being a parameter, all passing through a point P . One of these lines (say L) is farthest from the origin. If the distance of L from the point $(3, 6)$ is d , then the value of $\mathbf{d^2}$ is

A. 20

B. 30

C. 10

D. 15

Question 69 View solution online

Let the area of the triangle formed by the lines $x + 2 = y - 1 = z$, $\frac{x-3}{5} = \frac{y}{-1} = \frac{z-1}{1}$ and $\frac{x}{-3} = \frac{y-3}{3} = \frac{z-2}{1}$ be A . Then $\mathbf{A^2}$ is equal to

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 70 View solution online

Let the points of intersections of the lines $\mathbf{x - y + 1 = 0, x - 2y + 3 = 0}$ and $\mathbf{2x - 5y + 11 = 0}$ are the mid points of the sides of a triangle ABC. Then the area of the triangle ABC is ___.

Numerical answer: _____

Enter the requested integer (0 decimal places).

CHAPTER 09 / MATHEMATICS

Conic Sections

Questions 71-101 / 31 selected / 10.3% practice weight / Focus first

Topics to prioritise in this collection

- Circle geometry: 13 questions / 41.9% of this chapter
- Conic geometry: 8 questions / 25.8% of this chapter
- Parabola geometry: 5 questions / 16.1% of this chapter
- Ellipse geometry: 2 questions / 6.5% of this chapter
- Properties of conic sections: 2 questions / 6.5% of this chapter
- Hyperbola tangency: 1 question / 3.2% of this chapter

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Question 71 View solution online

If the locus of the point, whose distances from the point $(2, 1)$ and $(1, 3)$ are in the ratio $5 : 4$, is $ax^2 + by^2 + cxy + dx + ey + 170 = 0$, then the value of $a^2 + 2b + 3c + 4d + e$ is equal to:

A. 5

B. -27

C. 37

D. 437

Question 72 View solution online

The plane $2x - y + z = 4$ intersects the line segment joining the points $A(a, -2, 4)$ and $B(2, b, -3)$ at the point C in the ratio $2 : 1$ and the distance of the point C from the origin is $\sqrt{5}$. If $\mathbf{ab} < 0$ and P is the point $(a - b, b, 2b - a)$ then $\mathbf{CP}^2$ is equal to

A. $\frac{97}{3}$

B. $\frac{17}{3}$

C. $\frac{16}{3}$

D. $\frac{73}{3}$

Question 73 View solution online

Let the abscissae of the two points P and Q on a circle be the roots of $x^2 - 4x - 6 = 0$ and the ordinates of P and Q be the roots of $y^2 + 2y - 7 = 0$. If PQ is a diameter of the circle $x^2 + y^2 + 2ax + 2by + c = 0$, then the value of ($a + b - c$) is

A. 12

B. 13

C. 14

D. 16

Question 74 View solution online

Let the focal chord PQ of the parabola $y^2 = 4x$ make an angle of $60°$ with the positive x -axis, where P lies in the first quadrant. If the circle, whose one diameter is PS, S being the focus of the parabola, touches the y -axis at the point $(0, \alpha)$, then $5\alpha^2$ is equal to :

A. 15

B. 25

C. 30

D. 20

Question 75 View solution online

Let the ellipse $3x^2 + py^2 = 4$ pass through the centre C of the circle $x^2 + y^2 - 2x - 4y - 11 = 0$ of radius r. Let f_1, f_2 be the focal distances of the point C on the ellipse. Then $6f_1f_2 - r$ is equal to

A. 74

B. 68

C. 70

D. 78

Question 76 View solution online

If the x - intercept of a focal chord of the parabola $y^2 = 8x + 4y + 4$ is 3 , then the length of this chord is equal to

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 77 View solution online

Let the sum of the focal distances of the point $P(4,3)$ on the hyperbola $\mathbf{H}: \frac{x^2}{a^2}-\frac{y^2}{b^2}=1$ be $8\sqrt{\frac{5}{3}}$. If for H , the length of the latus rectum is l and the product of the focal distances of the point P is m , then $9l^2+6\,\mathbf{m}$ is equal to :-

A. 184

B. 186

C. 185

D. 187

Question 78 View solution online

Let R be the focus of the parabola $\mathbf{y^2=20x}$ and the line $\mathbf{y=mx+c}$ intersect the parabola at two points P and Q . Let the point $\mathbf{G(10,10)}$ be the centroid of the triangle PQR . If $\mathbf{c-m=6}$, then $\mathbf{(PQ)^2}$ is

A. 325

B. 317

C. 296

D. 346

Question 79 View solution online

Let P be a parabola with vertex $(2,3)$ and directrix $2x+y=6$. Let an ellipse $E: \frac{x^2}{a^2}+\frac{y^2}{b^2}=1, a>b$ of eccentricity $\frac{1}{\sqrt{2}}$ pass through the focus of the parabola P. Then the square of the length of the latus rectum of E , is

A. $\frac{385}{8}$

B. $\frac{347}{8}$

C. $\frac{512}{25}$

D. $\frac{656}{25}$

Question 80 View solution online

The length of the latus rectum and the directrices of a hyperbola with eccentricity e are 9 and $x = \pm 4/\sqrt{13}$, respectively. Let the line $y - \sqrt{3}x + \sqrt{3} = 0$ touch this hyperbola at (x_0, y_0). If m is the product of the focal distances of (x_0, y_0), then $4e^2 + m$ is equal to ___.

Numerical answer: _____

This question was incorrect in the original exam paper and ALLEN marked it BONUS. This corrected practice version uses the directrices x = +/-4/sqrt(13), explicitly corrected by ALLEN, instead of the printed +/-4/sqrt(3). Enter an integer (0 decimal places).

Question 81 View solution online

Let $\mathbf{y^2 = 12x}$ the parabola and S be its focus. Let PQ be a focal chord of the parabola such that (SP) $\mathbf{(SQ) = \frac{147}{4}}$. Let C be the circle described taking PQ as a diameter. If the equation of a circle C is $64x^2 + 64y^2 - \alpha x - 64\sqrt{3}y = \beta$, then $\beta - \alpha$ is equal to .

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 82 View solution online

Let the line $\mathbf{L : \sqrt{2}x + y = \alpha}$ pass through the point of the intersection P (in the first quadrant) of the circle $x^2 + y^2 = 3$ and the parabola $x^2 = 2y$. Let the line L touch two circles $\mathbf{C_1}$ and $\mathbf{C_2}$ of equal radius $2\sqrt{3}$. If the centres $\mathbf{Q_1}$ and $\mathbf{Q_2}$ of the circles $\mathbf{C_1}$ and $\mathbf{C_2}$ lie on the y -axis, then the square of the area of the triangle $\mathbf{PQ_1Q_2}$ is equal to .

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 83 View solution online

Let the point P of the focal chord PQ of the parabola $\mathbf{y^2 = 16x}$ be $(\mathbf{1, -4})$. If the focus of the parabola divides the chord PQ in the ratio $m : n$, $\mathbf{gcd(m, n) = 1}$, then $\mathbf{m^2 + n^2}$ is equal to :

A. 17

B. 10

C. 37

D. 26

Question 84 View solution online

The area (in sq. units) of the smaller of the two circles that touch the parabola, $y^2 = 4x$ at the point $(1, 2)$ and the x-axis is :

A. $4\pi(3 + \sqrt{2})$

B. $8\pi(2 - \sqrt{2})$

C. $8\pi(3 - 2\sqrt{2})$

D. $4\pi(2 - \sqrt{2})$

Question 85 View solution online

If one end of a focal chord of the parabola, $y^2 = 16x$ is at (1,4), then the length of this focal chord is :

A. 24

B. 20

C. 22

D. 25

Question 86 View solution online

Let $\mathbf{A}(\alpha, 0)$ and $\mathbf{B}(0, \beta)$ be the points on the line $5x + 7y = 50$. Let the point P divide the line segment AB internally in the ratio $7 : 3$. Let $3x - 25 = 0$ be a directrix of the ellipse $E : \frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ and the corresponding focus be S . If from S , the perpendicular on the x -axis passes through P , then the length of the latus rectum of E is equal to

A. $\frac{25}{3}$

B. $\frac{32}{9}$

C. $\frac{25}{9}$

D. $\frac{32}{5}$

Question 87 View solution online

If the foci of a hyperbola are same as that of the ellipse $\frac{x^2}{9}+\frac{y^2}{25}=1$ and the eccentricity of the hyperbola is $\frac{15}{8}$ times the eccentricity of the ellipse, then the smaller focal distance of the point $\left(\sqrt{2}, \frac{14}{3}\sqrt{\frac{2}{5}}\right)$ on the hyperbola, is equal to

A. $7\sqrt{\frac{2}{5}}-\frac{8}{3}$

B. $14\sqrt{\frac{2}{5}}-\frac{4}{3}$

C. $14\sqrt{\frac{2}{5}}-\frac{16}{3}$

D. $7\sqrt{\frac{2}{5}}+\frac{8}{3}$

Question 88 View solution online

A circle of radius 2 unit passes through the vertex and the focus of the parabola $y^2=2x$ and touches the parabola $y=\left(x-\frac{1}{4}\right)^2+\alpha$, where $\alpha>0$. Then $(4\alpha-8)^2$ is equal to .

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 89 View solution online

Let the latus rectum of the parabola $y^2=4x$ be the common chord to the circles C_1 and C_2 each of them having radius $2\sqrt{5}$. Then, the distance between the centres of the circles C_1 and C_2 is:

A. 8

B. $8\sqrt{5}$

C. $4\sqrt{5}$

D. 12

Question 90 View solution online

The length of the latus-rectum of the ellipse, whose foci are $(2,5)$ and $(2,-3)$ and eccentricity is $\frac{4}{5}$, is

A. $\frac{6}{5}$

B. $\frac{50}{3}$

C. $\frac{10}{3}$

D. $\frac{18}{5}$

Question 91 View solution online

Let the circle C touch the line $\mathbf{x - y + 1 = 0}$, have the centre on the positive x-axis, and cut off a chord of length $\frac{4}{\sqrt{13}}$ along the line $-3x + 2y = 1$. Let H be the hyperbola $\frac{x^2}{\alpha^2} - \frac{y^2}{\beta^2} = 1$, whose one of the foci is the centre of C and the length of the transverse axis is the diameter of C . Then $2\alpha^2 + 3\beta^2$ is equal to

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 92 View solution online

Let $A(0,1), B(1,1)$ and $C(1,0)$ be the mid - points of the sides of a triangle with incentre at the point D. If the focus of the parabola $y^2 = 4ax$ passing through D is $(\alpha + \beta\sqrt{2}, 0)$, where α and β are rational numbers, then $\frac{\alpha}{\beta^2}$ is equal to

A. 6

B. 8

C. 12

D. $\frac{9}{2}$

Question 93 View solution online

Let the product of the focal distances of the point $\mathbf{P(4, 2\sqrt{3})}$ on the hyperbola $\mathbf{H : \frac{x^2}{a^2} - \frac{y^2}{b^2} = 1}$ be 32 . Let the length of the conjugate axis of H be p and the length of its latus rectum be q . Then $\mathbf{p^2 + q^2}$ is equal to .....

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 94 View solution online

Let PQ be a focal chord of the parabola $\mathbf{y^2 = 4x}$ such that it subtends an angle of $\frac{\pi}{2}$ at the point (3 , 0). Let the line segment PQ be also a focal chord of the ellipse $E : \frac{x^2}{a^2} + \frac{y^2}{b^2} = 1, a^2 > b^2$. If e is the eccentricity of the ellipse E , then the value of $\frac{1}{e^2}$ is equal to :

A. $1 + \sqrt{2}$

B. $3 + 2\sqrt{2}$

C. $1 + 2\sqrt{3}$

D. $4 + 5\sqrt{3}$

Question 95 View solution online

The focus of the parabola $y^2 = 4x + 16$ is the centre of the circle C of radius 5 . If the values of λ, for which C passes through the point of intersection of the lines $3x - y = 0$ and $x + \lambda y = 4$, are λ_1 and $\lambda_2, \lambda_1 < \lambda_2$, then $12\lambda_1 + 29\lambda_2$ is equal to .

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 96 View solution online

Let the shortest distance from $(a, 0), a > 0$, to the parabola $y^2 = 4x$ be 4 . Then the equation of the circle passing through the point $(a, 0)$ and the focus of the parabola, and having its centre on the axis of the parabola is:

A. $x^2 + y^2 - 6x + 5 = 0$

B. $x^2 + y^2 - 4x + 3 = 0$

C. $x^2 + y^2 - 10x + 9 = 0$

D. $x^2 + y^2 - 8x + 7 = 0$

Question 97 View solution online

Let the lengths of the transverse and conjugate axes of a hyperbola in standard form be 2 a and 2 b , respectively, and one focus and the corresponding directrix of this hyperbola be $(-5, 0)$ and $5x + 9 = 0$, respectively. If the product of the focal distances of a point $(\alpha, 2\sqrt{5})$ on the hyperbola is p, then $4p$ is equal to .

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 98 View solution online

If A and B are the points of intersection of the circle $x^2 + y^2 - 8x = 0$ and the hyperbola $\frac{x^2}{9} - \frac{y^2}{4} = 1$ and a point P moves on the line $2x - 3y + 4 = 0$, then the centroid of $\triangle PAB$ lies on the line :

A. $4x - 9y = 12$

B. $x + 9y = 36$

C. $9x - 9y = 32$

D. $6x - 9y = 20$

Question 99 View solution online

The length of the chord of the parabola $x^2 = 4y$ having equation $x - \sqrt{2}y + 4\sqrt{2} = 0$ is :

A. $2\sqrt{11}$

B. $3\sqrt{2}$

C. $6\sqrt{3}$

D. $8\sqrt{2}$

Question 100 View solution online

If the midpoint of a chord of the ellipse $\frac{x^2}{9} + \frac{y^2}{4} = 1$ is $(\sqrt{2}, 4/3)$, and the length of the chord is $\frac{2\sqrt{\alpha}}{3}$, then α is :

A. 18

B. 22

C. 26

D. 20

Question 101 View solution online

The length of the chord of the ellipse $\frac{x^2}{25} + \frac{y^2}{16} = 1$, whose mid point is $\left(1, \frac{2}{5}\right)$, is equal to :

A. $\frac{\sqrt{1691}}{5}$

B. $\frac{\sqrt{2009}}{5}$

C. $\frac{\sqrt{1741}}{5}$

D. $\frac{\sqrt{1541}}{5}$

CHAPTER 10 / MATHEMATICS

Introduction to Three Dimensional Geometry

Questions 102-103 / 2 selected / 0.7% practice weight / Consolidate

Topics to prioritise in this collection

- Coordinates in three dimensions: 2 questions / 100.0% of this chapter

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Question 102 View solution online

If the four points, whose position vectors are $3\hat{i}-4\hat{j}+2\hat{k}, \hat{i}+2\hat{j}-\hat{k}, -2\hat{i}-\hat{j}+3\hat{k}$ and $5\hat{i}-2\alpha\hat{j}+4\hat{k}$ are coplanar, then α is equal to

A. $\frac{73}{17}$

B. $\frac{107}{17}$

C. $\frac{-73}{17}$

D. $\frac{-107}{17}$

Question 103 View solution online

Let for a triangle ABC ,

$\overrightarrow{AB}=-2\hat{i}+\hat{j}+3\hat{k}$

$\overrightarrow{CB}=\alpha\hat{i}+\beta\hat{j}+\gamma\hat{k}$

$\overrightarrow{CA}=4\hat{i}+3\hat{j}+\delta\hat{k}$

If $\delta>0$ and the area of the triangle ABC is $5\sqrt{6}$, then $\overrightarrow{CB}\cdot\overrightarrow{CA}$ is equal to

A. 60

B. 120

C. 108

D. 54

Official Answer. By NTA (1)

CHAPTER 11 / MATHEMATICS

Limits and Derivatives

Questions 104-105 / 2 selected / 0.7% practice weight / Consolidate

Topics to prioritise in this collection

- Standard limits: 2 questions / 100.0% of this chapter

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Question 104 View solution online

If the domain of the function
$f(x) = \log_e\left(4x^2 + 11x + 6\right) + \sin^{-1}$
$(4x + 3) + \cos^{-1}\left(\frac{10x+6}{3}\right)$ is $(\alpha, \beta]$,
Then $36|\alpha + \beta|$ is equal to :

A. 63

B. 45

C. 72

D. 54

Question 105 View solution online

If the domain of the function $f(x) = \log_e\left(\frac{2x-3}{5+4x}\right) + \sin^{-1}\left(\frac{4+3x}{2-x}\right)$ is $[\alpha, \beta)$, then $\alpha^2 + 4\beta$ is equal to

A. 5

B. 4

C. 3

D. 7

CHAPTER 12 / MATHEMATICS

Statistics

Questions 106-112 / 7 selected / 2.3% practice weight / Next

Topics to prioritise in this collection

- Variance and standard deviation: 5 questions / 71.4% of this chapter
- Mean, median and mode: 1 question / 14.3% of this chapter
- Measures of central tendency and dispersion: 1 question / 14.3% of this chapter

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Question 106 View solution online

The mean and variance of a set of 15 numbers are 12 and 14 respectively. The mean and variance of another set of 15 numbers are 14 and σ^2 respectively. If the variance of all the 30 numbers in the two sets is 13 , then σ^2 is equal to

A. 9

B. 12

C. 11

D. 10

Question 107 View solution online

Let the mean and variance of 12 observations be $\frac{9}{2}$ and 4 respectively. Later on, it was observed that two observations were considered as 9 and 10 instead of 7 and 14 respectively. If the correct variance is $\frac{m}{n}$, where m and n are co-prime, then $m+n$ is equal to

A. 316

B. 314

C. 317

D. 315

Question 108 View solution online

Let sets A and B have 5 elements each. Let the mean of the elements in sets A and B be 5 and 8 respectively and the variance of the elements in sets A and B be 12 and 20 respectively A new set C of 10 elements is formed by subtracting 3 from each element of A and adding 2 to each element of B. Then the sum of the mean and variance of the elements of C is ..... .

A. 32

B. 38

C. 40

D. 36

Question 109 View solution online

Let the six numbers $a_1, a_2, a_3, a_4, a_5, a_6$, be in A.P. and $a_1 + a_3 = 10$. If the mean of these six numbers is $\frac{19}{2}$ and their variance is σ^2, then $8\sigma^2$ is equal to :

A. 210

B. 220

C. 200

D. 105

Question 110 View solution online

Let $9 = x_1 < x_2 < \ldots\ldots < x_7 \ldots\ldots, x_7$ be in an A.P. with common difference d . If the standard deviation of $x_1 \cdot x_2 \ldots., x_7$ is 4 and mean is $\overline{x}$, then $\overline{x} + x_6$ is equal to :

A. $2\left(9 + \frac{8}{\sqrt{7}}\right)$

B. $18\left(1 + \frac{1}{\sqrt{3}}\right)$

C. 25

D. 34

Question 111 View solution online

Let S be the set of all values of $\mathbf{a_1}$ for which the mean deviation about the mean of 100 consecutive positive integers $a_1, a_2, a_3, \ldots . a_{100}$ is 25 . Then S is

A. N

B. ϕ

C. $\{99\}$

D. $\{9\}$

Question 112 View solution online

The mean and variance of 7 observations are 8 and 16 respectively. If one observation 14 is omitted and a and b are respectively mean and variance of remaining 6 observation, then $a + 3b - 5$ is equal to

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

CHAPTER 13 / MATHEMATICS

Probability

Questions 113-115 / 3 selected / 1.0% practice weight / Consolidate

Topics to prioritise in this collection

- Addition and multiplication rules of probability: 1 question / 33.3% of this chapter
- Binomial distribution: 1 question / 33.3% of this chapter
- Probability: 1 question / 33.3% of this chapter

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Question 113 View solution online

Let X have a binomial distribution $B(n, p)$ such that the sum and the product of the mean and variance of X are 24 and 128 respectively. If $\mathrm{P}(\mathrm{X} > \mathrm{n} - 3) = \frac{\mathrm{k}}{2^{\mathrm{n}}}$, then k is equal to

A. 528

B. 529

C. 629

D. 630

Question 114 View solution online

The sum and product of the mean and variance of a binomial distribution are 82.5 and 1350 respectively. They the number of trials in the binomial distribution is:

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 115

View solution online

Let Ω be the sample space and $A \subseteq \Omega$ be an event.

Given below are two statements :
(S1) : If $\mathbf{P(A) = 0}$, then $\mathbf{A = \varnothing}$
(S2): If $P(A) = 1$, then $A = \Omega$
Then

A. both (S1) and (S2) are true

B. only (S1) is true

C. only (S2) is true

D. both (S1) and (S2) are false

CHAPTER 14 / MATHEMATICS

Inverse Trigonometric Functions

Questions 116-122 / 7 selected / 2.3% practice weight / Next

Topics to prioritise in this collection

- Inverse trigonometric identities: 4 questions / 57.1% of this chapter
- Inverse trigonometric functions: 2 questions / 28.6% of this chapter
- Inverse Trigonometric Functions: 1 question / 14.3% of this chapter

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Question 116 View solution online

Let $S = \left\{x \in \left(-\frac{\pi}{2}, \frac{\pi}{2}\right) : 9^{1-\tan^2 x} + 9^{\tan^2 x} = 10\right\}$ and $\beta = \sum_{x \in S} \tan^2\left(\frac{x}{3}\right)$, then $\frac{1}{6}(\beta - 14)^2$ is equal to

A. 32

B. 8

C. 64

D. 16

Question 117 View solution online

Let the domain of the function
$f(x) = \cos^{-1}\left(\frac{4x+5}{3x-7}\right)$ be $[\alpha, \beta]$ and the domain of
$g(x) = \log_2(2 - 6\log_{27}(2x+5))$ be (γ, δ).
Then $|7(\alpha+\beta) + 4(\gamma+\delta)|$ is equal to

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 118 View solution online

Let $f(x) = 2\cos^{-1}x + 4\cot^{-1}x - 3x^2 - 2x + 10, x \in [-1, 1]$. If $[a, b]$ is the range of the function then $4a-$ b is equal to:

A. 11

B. $11 - \pi$

C. $11 + \pi$

D. $15 - \pi$

Question 119 View solution online

Question ID: 101786

$50\tan\left(3\tan^{-1}\left(\frac{1}{2}\right) + 2\cos^{-1}\left(\frac{1}{\sqrt{5}}\right)\right) + 4\sqrt{2}\tan\left(\frac{1}{2}\tan^{-1}(2\sqrt{2})\right)$ is equal to .

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 120 View solution online

$\sin^{-1}\left(\sin\frac{2\pi}{3}\right) + \cos^{-1}\left(\cos\frac{7\pi}{6}\right) + \tan^{-1}\left(\tan\frac{3\pi}{4}\right)$ is equal to:

A. $\frac{11\pi}{12}$

B. $\frac{17\pi}{12}$

C. $\frac{31\pi}{12}$

D. $-\frac{3\pi}{4}$

Question 121 View solution online

All x satisfying the inequality $\left(\cot^{-1}x\right)^2 - 7\left(\cot^{-1}x\right) + 10 > 0$, lie in the interval:-

A. $(-\infty, \cot 5) \cup (\cot 4, \cot 2)$

B. $(\cot 5, \cot 4)$

C. $(\cot 2, \infty)$

D. $(-\infty, \cot 5) \cup (\cot 2, \infty)$

Question 122 View solution online

The number of values of $r \in \{p, q, \sim p, \sim q\}$ for which $((p \wedge q) \Rightarrow (r \vee q)) \wedge ((p \wedge r) \Rightarrow q)$ is a tautology, is:

A. 3

B. 4

C. 1

D. 2

CHAPTER 15 / MATHEMATICS

Determinants

Questions 123-123 / 1 selected / 0.3% practice weight / Consolidate

Topics to prioritise in this collection

- System of linear equations: 1 question / 100.0% of this chapter

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Question 123 View solution online

Let the system of equations :
$2x + 3y + 5z = 9$,
$7x + 3y - 2z = 8$,
$12x + 3y - (4 + \lambda)z = 16 - \mu$,
have infinitely many solutions. Then the radius of the circle centred at (λ, μ) and touching the line $4x = 3y$ is

A. $\frac{17}{5}$

B. $\frac{7}{5}$

C. 7

D. $\frac{21}{5}$

CHAPTER 16 / MATHEMATICS

Application of Derivatives

Questions 124-128 / 5 selected / 1.7% practice weight / Consolidate

Topics to prioritise in this collection

- Derivative-based curve analysis: 3 questions / 60.0% of this chapter
- Maxima and minima: 1 question / 20.0% of this chapter
- Tangents and normals: 1 question / 20.0% of this chapter

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Question 124 View solution online

Let $y = f(x)$ be a thrice differentiable function in $(-5, 5)$. Let the tangents to the curve $\mathbf{y = f(x)}$ at $\mathbf{(1, f(1))}$ and $\mathbf{(3, f(3))}$ make angles $\frac{\pi}{6}$ and $\frac{\pi}{4}$, respectively with positive x -axis. If $27\int_1^3 \left((f'(t))^2 + 1\right) f''(t)dt = \alpha + \beta\sqrt{3}$ where α, β are integers, then the value of $\alpha + \beta$ equals

A. -14

B. 26

C. -16

D. 36

Question 125 View solution online

Let $a > 0$. If the function $f(x) = 6x^3 - 45ax^2 + 108a^2x + 1$ attains its local maximum and minimum values at the points $\mathbf{x_1}$ and $\mathbf{x_2}$ respectively such that $\mathbf{x_1x_2 = 54}$, then $\mathbf{a + x_1 + x_2}$ is equal to :-

A. 15

B. 18

C. 24

D. 13

Question 126 View solution online

Let the triangle PQR be the image of the triangle with vertices $(1,3),(3,1)$ and $(2,4)$ in the line $x+2y=2$. If the centroid of $\triangle PQR$ is the point (α,β), then $15(\alpha-\beta)$ is equal to :

A. 24

B. 19

C. 21

D. 22

Question 127 View solution online

Let the plane $P: 8x+\alpha_1 y+\alpha_2 z+12=0$ be parallel to the line $\mathrm{L}: \frac{x+2}{2}=\frac{y-3}{3}=\frac{z+4}{5}$. If the intercept of P on the y-axis is 1 , then the distance between P and L is :

A. $\sqrt{\frac{7}{2}}$

B. $\sqrt{\frac{2}{7}}$

C. $\frac{6}{\sqrt{14}}$

D. $\sqrt{14}$

Question 128 View solution online

Let the area of a $\triangle \mathrm{PQR}$ with vertices $\mathrm{P}(5,4), \mathrm{Q}(-2,4)$ and $\mathrm{R}(\mathrm{a}, \mathrm{b})$ be 35 square units. If its orthocenter and centroid are $\mathrm{O}\left(2, \frac{14}{5}\right)$ and $\mathrm{C}(\mathrm{c}, \mathrm{d})$ respectively, then $\mathrm{c}+2\,\mathrm{d}$ is equal to

A. $\frac{7}{3}$

B. 3

C. 2

D. $\frac{8}{3}$

CHAPTER 17 / MATHEMATICS

Integrals

Questions 129-129 / 1 selected / 0.3% practice weight / Consolidate

Topics to prioritise in this collection

- Properties of definite integrals: 1 question / 100.0% of this chapter

Open this chapter's solutions on mobile / Back to chapter guide

Question 129 View solution online

Let $f(x)+2f\left(\frac{1}{x}\right)=x^2+5$ and $2g(x)-3g\left(\frac{1}{2}\right)=x, x>0$. If $\alpha=\int_1^2 f(x)dx$, and $\beta=\int_1^2 g(x)dx$, then the value of $9\alpha+\beta$ is :

A. 1

B. 0

C. 10

D. 11

CHAPTER 18 / MATHEMATICS

Application of Integrals

Questions 130-143 / 14 selected / 4.7% practice weight / Next

Topics to prioritise in this collection

- Area under a curve: 8 questions / 57.1% of this chapter
- Area bounded by curves: 3 questions / 21.4% of this chapter
- Application of Integrals: 2 questions / 14.3% of this chapter
- Area between curves: 1 question / 7.1% of this chapter

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Question 130 View solution online

Let B be the centre of the circle $x^2 + y^2 - 2x + 4y + 1 = 0$.

Let the tangents at two points P and Q on the circle intersect at the point $\mathbf{A(3,1)}$. Then $\mathbf{8.\left(\frac{\text{area } \triangle APQ}{\text{area } \triangle BPQ}\right)}$ is equal to .

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 131 View solution online

Let the focal chord of the parabola $\mathbf{P : y^2 = 4x}$ along the line $\mathbf{L : y = mx + c, m > 0}$ meet the parabola at the points M and N . Let the line L be a tangent to the hyperbola $\mathbf{H : x^2 - y^2 = 4}$. If O is the vertex of P and F is the focus of H on the positive x-axis, then the area of the quadrilateral OMFN is :

A. $2\sqrt{6}$

B. $2\sqrt{14}$

C. $4\sqrt{6}$

D. $4\sqrt{14}$

Question 132 View solution online

Let $\mathbf{P}(4, 4\sqrt{3})$ be a point on the parabola $\mathbf{y^2 = 4ax}$ and PQ be a focal chord of the parabola. If M and N are the foot of perpendiculars drawn from P and Q respectively on the directrix of the parabola, then the area of the quadrilateral PQMN is equal to:

A. $\frac{263\sqrt{3}}{8}$

B. $17\sqrt{3}$

C. $\frac{343\sqrt{3}}{8}$

D. $\frac{34\sqrt{3}}{3}$

Question 133 View solution online

It the area enclosed by the parabolas $P_1 : 2y = 5x^2$ and $P_2 : x^2 - y + 6 = 0$ is equal to the area enclosed by P_1 and $y = \alpha x, \alpha > 0$, then α^3 is equal to

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 134 View solution online

Let the locus of the centre $(\alpha, \beta), \beta > 0$, of the circle which touches the circle $x^2 + (y-1)^2 = 1$ externally and also touches the x -axis be L . Then the area bounded by L and the line $\mathbf{y = 4}$ is :

A. $\frac{32\sqrt{2}}{3}$

B. $\frac{40\sqrt{2}}{3}$

C. $\frac{64}{3}$

D. $\frac{32}{3}$

Question 135 View solution online

If the tangent at a point P on the parabola $y^2 = 3x$ is parallel to the line $x + 2y = 1$ and the tangents at the points Q and R on the ellipse $\frac{x^2}{4} + \frac{y^2}{1} = 1$ are perpendicular to the line $x - y = 2$, then the area of the triangle PQR is :

A. $\frac{3}{2}\sqrt{5}$

B. (1) $\sqrt{5}$

C. (2) $3\sqrt{5}$

D. (3) $\frac{9}{\sqrt{5}}$

Question 136 View solution online

Let the parabola $y = x^2 + px - 3$, meet the coordinate axes at the points $\mathbf{P}, \mathbf{Q}$ and R . If the circle C with centre at $(-1, -1)$ passes through the points $\mathbf{P}, \mathbf{Q}$ and R , then the area of $\triangle \mathbf{PQR}$ is :

A. 4

B. 6

C. 7

D. 5

Question 137 View solution online

Consider a hyperbola $\mathbf{H : x^2 - 2y^2 = 4}$. Let the tangent at a point $\mathbf{P}(4, \sqrt{6})$ meet the x -axis at Q and latus rectum at $\mathbf{R}\left(\mathbf{x_1}, \mathbf{y_1}\right), \mathbf{x_1} > \mathbf{0}$. If F is a focus of H which is nearer to the point P , then the area of $\triangle \mathbf{QFR}$ is equal to

A. $4\sqrt{6}$

B. $\sqrt{6} - 1$

C. $\frac{7}{\sqrt{6}} - 2$

D. $4\sqrt{6} - 1$

Question 138 View solution online

The area (in sq. units) of the region enclosed between the parabola $y^2 = 2x$ and the line $x + y = 4$ is .

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 139 View solution online

Let C be the centre of the circle $x^2 + y^2 - x + 2y = \frac{11}{4}$ and P be a point on the circle. A line passes through the point C , makes an angle of $\frac{\pi}{4}$ with the line CP and intersects the circle at the points Q and R . Then the area of the triangle PQR (in unit ^{2}) is :

A. 2

B. $2\sqrt{2}$

C. $8\sin\left(\frac{\pi}{8}\right)$

D. $8\cos\left(\frac{\pi}{8}\right)$

Question 140 View solution online

Let T be the tangent to the ellipse $\mathbf{E}: \mathbf{x}^2 + 4\mathbf{y}^2 = 5$ at the point $\mathbf{P}(1, 1)$. If the area of the region bounded by the tangent T, ellipse E, lines $\mathbf{x} = 1$ and $\mathbf{x} = \sqrt{5}$ is $\alpha = \sqrt{5} + \beta + \gamma\cos^{-1}\left(\frac{1}{\sqrt{5}}\right)$, then $|\alpha + \beta + \gamma|$ is equal to ___.

Numerical answer: _____

Enter the requested integer (0 decimal places).

Question 141 View solution online

On the ellipse $\frac{x^2}{8} + \frac{y^2}{4} = 1$ let P be a point in the second quadrant such that the tangent at P to the ellipse is perpendicular to the line $x + 2y = 0$. Let S and S' be the foci of the ellipse and e be its eccentricity. If A is the area of the triangle SPS' then, the value of $\left(5 - \mathbf{e}^2\right).\mathbf{A}$ is :

A. 6

B. 12

C. 14

D. 24

Question 142 View solution online

The area of the region enclosed by the parabola $(y-2)^2 = x - 1$, the line $x - 2y + 4 = 0$ and the positive coordinate axes is .

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 143 View solution online

The parabola $y^2 = 4x$ divides the area of the circle $x^2 + y^2 = 5$ in two parts. The area of the smaller part is equal to :

A. $\frac{2}{3} + 5\sin^{-1}\left(\frac{2}{\sqrt{5}}\right)$

B. $\frac{1}{3} + 5\sin^{-1}\left(\frac{2}{\sqrt{5}}\right)$

C. $\frac{1}{3} + \sqrt{5}\sin^{-1}\left(\frac{2}{\sqrt{5}}\right)$

D. $\frac{2}{3} + \sqrt{5}\sin^{-1}\left(\frac{2}{\sqrt{5}}\right)$

CHAPTER 19 / MATHEMATICS

Vector Algebra

Questions 144-171 / 28 selected / 9.3% practice weight / Focus first

Topics to prioritise in this collection

- Algebra of vectors: 7 questions / 25.0% of this chapter
- Vector operations: 6 questions / 21.4% of this chapter
- Vector projection: 6 questions / 21.4% of this chapter
- Scalar product: 4 questions / 14.3% of this chapter
- Vector Algebra: 3 questions / 10.7% of this chapter
- Vector product: 1 question / 3.6% of this chapter
- Vector projections: 1 question / 3.6% of this chapter

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Question 144 View solution online

If the equation of the plane containing the line $x+2y+3z-4=0=2x+y-z+5$ and perpendicular to the plane $\vec{r}=(\hat{i}-\hat{j})+\lambda(\hat{i}+\hat{j}+\hat{k})+\mu(\hat{i}-2\hat{j}+3k)$ is $ax+by+cz=4$, then $(a-b+c)$ is equal to

A. 20

B. 24

C. 22

D. 18

Question 145 View solution online

Let a line l pass through the origin and be perpendicular to the lines
$l_1 : \vec{r}=(\hat{i}-11\hat{j}-7\hat{k})+\lambda(\hat{i}+2\hat{j}+3\hat{k}), \lambda \in \mathbb{R}$
and $l_2 : \vec{r}=(-\hat{i}+\hat{k})+\mu(2\hat{i}+2\hat{j}+\hat{k}), \mu \in \mathbb{R}$.

If P is the point of intersection of l and l_1, and $Q(\alpha, \beta, \gamma)$ is the foot of perpendicular from P on l_2, then $9(\alpha+\beta+\gamma)$ is equal to .

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 146 View solution online

If the equation of a plane P, passing through the intersection of the planes, $x+4y-z+7=0$ and $3x+y+5z=8$ is $ax+by+6z=15$ for some $a,b \in R$, then the distance of the point $(3,2,-1)$ from the plane P is.....

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 147 View solution online

Let $\vec{a},\vec{b}$ and $\vec{c}$ be three non-zero non-coplanar vectors. Let the position vectors of four points A,B,C and D be $\vec{a}-\vec{b}+\vec{c}, \lambda\vec{a}-3\vec{b}+4\vec{c}, -\vec{a}+2\vec{b}-3\vec{c}$ and $2\vec{a}-4\vec{b}+6\vec{c}$ respectively. If $\overrightarrow{AB}, \overrightarrow{AC}$ and $\overrightarrow{AD}$ are coplanar, then λ is equal to

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 148 View solution online

If the vectors $\vec{a}=\lambda\hat{i}+\mu\hat{j}+4\hat{k}, \vec{b}=2\hat{i}+4\hat{j}-2\hat{k}$ and $\vec{c}=2\hat{i}+3\hat{j}+\hat{k}$ are coplanar and the projection of $\vec{a}$ on the vector $\vec{b}$ is $\sqrt{54}$ units, then the sum of all possible values of $\lambda+\mu$ is equal to

A. 0

B. 24

C. 6

D. 18

Question 149 View solution online

Let $\vec{a}=4\hat{i}+3\hat{j}$ and $\vec{b}=3\hat{i}-4\hat{j}+5\hat{k}$. If $\vec{c}$ is a vector such that $\vec{c}\cdot(\vec{a}\times\vec{b})+25=0, \vec{c}\cdot(\hat{i}+\hat{j}+\hat{k})=4$, and projection of $\vec{c}$ on $\vec{a}$ is 1 , then the projection of $\vec{c}$ on $\vec{b}$ equals

A. $\frac{1}{5}$

B. $\frac{5}{\sqrt{2}}$

C. $\frac{3}{\sqrt{2}}$

D. $\frac{1}{\sqrt{2}}$

Question 150 View solution online

Let $\vec{a}=2\hat{i}-7\hat{j}+5k, \vec{b}=\hat{i}+k$ and $\vec{c}=\hat{i}+2\hat{j}-3k$ be three given vectors. If $\vec{r}$ is a vector such that $\vec{r}\times\vec{a}=\vec{c}\times\vec{a}$ and $\vec{r}\cdot\vec{b}=0$, then $|\vec{r}|$ is equal to:

A. $\frac{11}{5}\sqrt{2}$

B. $\frac{\sqrt{914}}{7}$

C. $\frac{11}{7}\sqrt{2}$

D. $\frac{11}{7}$

Question 151 View solution online

If $\vec{a},\vec{b},\vec{c}$ are three non-zero vectors and $\hat{n}$ is a unit vector perpendicular to $\vec{c}$ such that $\vec{a}=\alpha\vec{b}-\hat{n}, (\alpha\neq 0)$ and $\vec{b}\cdot\vec{c}=12$, then $|\vec{c}\times(\vec{a}\times\vec{b})|$ is equal to :

A. 9

B. 15

C. 6

D. 12

Question 152 View solution online

Let the three sides of a triangle ABC be given by the vectors $2\hat{i}-\hat{j}+\hat{k}$, $\hat{i}-3\hat{j}-5\hat{k}$ and $3\hat{i}-4\hat{j}-4\hat{k}$. Let G be the centroid of the triangle ABC . Then $6\left(|\overrightarrow{AG}|^2+|\overrightarrow{BG}|^2+|\overrightarrow{CG}|^2\right)$ is equal to

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 153 View solution online

Let the position vectors of three vertices of a triangle be $4\vec{p}+\vec{q}-3\vec{r}, -5\vec{p}+\vec{q}+2\vec{r}$ and $2\vec{p}-\vec{q}+2\vec{r}$. If the position vectors of the orthocenter and the circumcenter of the triangle are $\frac{\vec{p}+\vec{q}+\vec{r}}{4}$ and $\alpha\overrightarrow{p}+\beta\overrightarrow{q}+\gamma\overrightarrow{r}$ respectively, then $\alpha+2\beta+5\gamma$ is equal to:

A. 3

B. 1

C. 6

D. 4

Question 154 View solution online

Let P be a plane passing through the points (1, 0, 1), (1, -2, 1) and (0, 1, -2). let a vector $\vec{a} = \alpha\hat{i} + \beta\hat{j} + \gamma\hat{k}$ be such that $\vec{a}$ is parallel to the plane P , perpendicular to $(\hat{i} + 2\hat{j} + 3\hat{k})$ and $\vec{a}(\hat{i} + \hat{j} + 2\hat{k}) = 2$, then $(\alpha - \beta + \gamma)^2$ equals ___.

Numerical answer: _____

Enter the requested integer (0 decimal places).

Question 155 View solution online

If the components of $\vec{a} = \alpha\hat{i} + \beta\hat{j} + \gamma\hat{k}$ along and perpendicular to $\vec{b} = 3\hat{i} + \hat{j} - \hat{k}$ respectively, are $\frac{16}{11}(3\hat{i} + \hat{j} - \hat{k})$ and $\frac{1}{11}(-4\hat{i} - 5\hat{j} - 17\hat{k})$, then $\alpha^2 + \beta^2 + \gamma^2$ is equal to :

A. 23

B. 18

C. 16

D. 26

Question 156 View solution online

Let $\vec{a} = 4\hat{i} + 3\hat{j} + 5\hat{k}$ and $\vec{\beta} = \hat{i} + 2\hat{j} - 4\hat{k}$. Let $\vec{\beta}_1$ be parallel to $\vec{a}$ and $\vec{\beta}_2$ be perpendicular to $\vec{a}$. If $\vec{\beta} = \vec{\beta}_1 + \vec{\beta}_2$, then the value of $5\vec{\beta}_2 \cdot (\hat{i} + \hat{j} + \hat{k})$ is

A. 7

B. 9

C. 6

D. 11

Question 157 View solution online

Let A be a point on the line
$\vec{r} = (1-3\mu)\hat{i} + (\mu-1)\hat{j} + (2+5\mu)\hat{k}$ and $B(3,2,6)$ be a point in the space. Then the value of μ for which the vector $\overrightarrow{AB}$ is parallel to the plane $x - 4y + 3z = 1$ is :

A. $\frac{1}{2}$

B. $-\frac{1}{4}$

C. $\frac{1}{4}$

D. $\frac{1}{8}$

Question 158 View solution online

Let three vectors $\vec{a} = \alpha\hat{i} + 4\hat{j} + 2\hat{k}, \vec{b} = 5\hat{i} + 3\hat{j} + 4\hat{k}, \vec{c} = x\hat{i} + y\hat{j} + z\hat{k}$ from a triangle such that $\vec{c} = \vec{a} - \vec{b}$ and the area of the triangle is $5\sqrt{6}$. if α is a positive real number, then $|\vec{c}|^2$ is :

A. 16

B. 14

C. 12

D. 10

Question 159 View solution online

Let $\vec{x}$ be a vector in the plane containing vectors $\vec{a} = 2\hat{i} - \hat{j} + \hat{k}$ and $\vec{b} = \hat{i} + 2\hat{j} - \hat{k}$. If the vector $\vec{x}$ is perpendicular to $(3\hat{i} + 2\hat{j} - \hat{k})$ and its projection on $\vec{a}$ is $\frac{17\sqrt{6}}{2}$, then the value of $|\vec{x}|^2$ is equal to .

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 160 View solution online

A line ' ℓ ' passing through origin is perpendicular to the lines

$$\ell_1 : \vec{r} = (3+t)\hat{i} + (-1+2t)\hat{j} + (4+2t)\hat{k}$$
$$\ell_2 : \vec{r} = (3+2s)\hat{i} + (3+2s)\hat{j} + (2+s)\hat{k}$$

If the co-ordinates of the point in the first octant on ' ℓ_2 ' at the distance of $\sqrt{17}$ from the point of intersection of ' ℓ ' and ' ℓ ' are ($\mathbf{a, b, c}$), then $\mathbf{18(a+b+c)}$ is equal to .

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 161 View solution online

Let $\vec{p} = 2\hat{i} + 3\hat{j} + \hat{k}$ and $\vec{p} = \hat{i} + 2\hat{j} + \hat{k}$ be two vectors. If a vector $\overrightarrow{\mathbf{r}} = (\alpha\hat{\mathbf{i}} + \beta\hat{\mathbf{j}} + \gamma\hat{\mathbf{k}})$ is perpendicular to each of the vectors $(\overrightarrow{\mathbf{p}} + \overrightarrow{\mathbf{q}})$ and $(\overrightarrow{\mathbf{p}} - \overrightarrow{\mathbf{q}})$, and $|\overrightarrow{\mathbf{r}}| = \sqrt{3}$, then $|\alpha| + |\beta| + |\gamma|$ is equal to ___

Numerical answer: _____

Enter the requested integer (0 decimal places).

Question 162 View solution online

Let $\vec{a} = \hat{i} + \alpha\hat{j} + \beta\hat{k}, \alpha, \beta \in R$. Let a vector $\vec{b}$ be such that the angle between $\vec{a}$ and $\vec{b}$ is $\frac{\pi}{4}$ and $|\vec{b}|^2 = 6$, If $\vec{a} \cdot \vec{b} = 3\sqrt{2}$, then the value of $\left(\alpha^2 + \beta^2\right)|\vec{a} \times \vec{b}|^2$ is equal to

A. 90

B. 75

C. 95

D. 85

Question 163 View solution online

Let the plane $P : \vec{r} \cdot \vec{a} = d$ contain the line of intersection of two planes $\vec{r} \cdot (\hat{i} + 3\hat{j} - \hat{k}) = 6$ and $\vec{r} \cdot (-6\hat{i} + 5\hat{j} - \hat{k}) = 7$. If the plane P passes through the point $(2, 3, \frac{1}{2})$, then the value of $\frac{|13\vec{a}|^2}{d^2}$ is equal to

A. 90

B. 93

C. 95

D. 97

Question 164 View solution online

Let $\vec{a} = 3\hat{i} - \hat{j} + 2\hat{k}, \vec{b} = \vec{a} \times (\hat{i} - 2\hat{k})$ and $\vec{c} = \vec{b} \times \hat{k}$. Then the projection of $\vec{c} - 2\hat{j}$ on $\vec{a}$ is:

A. $3\sqrt{7}$

B. $\sqrt{14}$

C. $2\sqrt{14}$

D. $2\sqrt{7}$

Question 165 View solution online

Let $\vec{a} = \alpha\hat{i} + 2\hat{j} - \hat{k}$ and $\vec{b} = -2\hat{i} + \alpha\hat{j} + \hat{k}$, where $\alpha \in \mathbf{R}$. If the area of the parallelogram whose adjacent sides are represented by the vectors $\vec{a}$ and $\vec{b}$ is $\sqrt{15(\alpha^2 + 4)}$, then the value of $2|\vec{a}|^2 + (\vec{a} \cdot \vec{b})|\vec{b}|^2$ is equal to

A. 10

B. 7

C. 9

D. 14

Question 166 View solution online

Let O be the origin and the position vector of the point P be $-\hat{i} - 2\hat{j} + 3\hat{k}$. If the position vectors of the points $\mathbf{A}, \mathbf{B}$ and C are $-2\hat{i} + \hat{j} - 3\hat{k}, 2\hat{i} + 4\hat{j} - 2\hat{k}$ and $-4\hat{i} + 2\hat{j} - \hat{k}$ respectively then the projection of the vector $\overrightarrow{OP}$ on a vector perpendicular to the vectors $\overrightarrow{AB}$ and $\overrightarrow{AC}$ is

A. 3

B. $\frac{8}{3}$

C. $\frac{10}{3}$

D. $\frac{7}{3}$

Question 167 View solution online

Let $\vec{a} = \alpha\hat{i} + \hat{j} + \beta\hat{k}$ and $\vec{b} = 3\hat{i} - 5\hat{j} + 4\hat{k}$ be two vectors, such that $\vec{a} \times \vec{b} = -\hat{i} + 9\hat{i} + 12k$. Then the projection of $\vec{b} - 2\vec{a}$ on $\vec{b} + \vec{a}$ is equal to

A. 2

B. $\frac{39}{5}$

C. 9

D. $\frac{46}{5}$

Question 168 View solution online

Let $\vec{a}$ be a vector which is perpendicular to the vector $3\hat{i} + \frac{1}{2}\hat{j} + 2\hat{k}$. If $\vec{a} \times (2\hat{i} + \hat{k}) = 2\hat{i} - 13\hat{j} - 4\hat{k}$, then the projection of the vector $\vec{a}$ on the vector $2\hat{\mathrm{i}} + 2\hat{\mathrm{j}} + \hat{\mathrm{k}}$ is

A. $\frac{1}{3}$

B. 1

C. $\frac{5}{3}$

D. $\frac{7}{3}$

Question 169 View solution online

If $\vec{P} = (a+1)\hat{i} + a\hat{j} + a\hat{k}$
$\vec{Q} = a\hat{i} + (a+1)\hat{j} + a\hat{k}$
$\vec{R} = a\hat{i} + a\hat{j} + (a+1)\hat{k}$
and $\vec{P}, \vec{Q}, \vec{R}$ are coplanar vectors and $3(\vec{P}.\vec{Q})^2 - \lambda|\vec{R} \times \vec{Q}|^2 = 0$, then value of λ is

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 170 View solution online

Let $\vec{a} = 2\hat{i} - 3\hat{j} + 4\hat{k}$ and $\vec{b} = 7\hat{i} + \hat{j} - 6\hat{k}$.

If $\vec{r} \times \vec{a} = \vec{r} \times \vec{b}, \vec{r} \cdot (\hat{i} + 2\hat{j} + \hat{k}) = -3$, then $\vec{r} \cdot (2\hat{i} - 3\hat{j} + \hat{k})$ is equal to :

A. 12

B. 8

C. 13

D. 10

Question 171 View solution online

Let $\vec{a} = \hat{i} + 5\hat{j} + \alpha\hat{k}, \vec{b} = \hat{i} + 3\hat{j} + \beta\hat{k}$ and $\overrightarrow{c} = -\hat{\mathrm{i}} + 2\hat{\mathrm{j}} - 3\hat{\mathrm{k}}$ be three vectors such that, $|\vec{b} \times \vec{c}| = 5\sqrt{3}$ and $\vec{a}$ is perpendicular to $\vec{b}$. Then the greatest amongst the values of $|\vec{a}|^2$ is .

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

CHAPTER 20 / MATHEMATICS

Three Dimensional Geometry

Questions 172-293 / 122 selected / 40.7% practice weight / Focus first

Topics to prioritise in this collection

- Coordinates in three dimensions: 42 questions / 34.4% of this chapter
- Lines and planes in space: 24 questions / 19.7% of this chapter
- Equation of a plane: 19 questions / 15.6% of this chapter
- Introduction to 3D Geometry: 17 questions / 13.9% of this chapter
- Shortest distance between lines: 8 questions / 6.6% of this chapter
- Equation of a line in space: 5 questions / 4.1% of this chapter
- Three Dimensional Geometry: 5 questions / 4.1% of this chapter
- Direction cosines and direction ratios: 1 question / 0.8% of this chapter
- Section formula in three dimensions: 1 question / 0.8% of this chapter

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Question 172 View solution online

Let the line $\ell : x = \frac{1-y}{-2} = \frac{z-3}{\lambda}, \lambda \in \mathbb{R}$ meet the plane $\mathbf{P : x + 2y + 3z = 4}$ at the point (α, β, γ). If the angle between the line ℓ and the plane P is $\cos^{-1}\left(\sqrt{\frac{5}{14}}\right)$, then $\alpha + 2\beta + 6\gamma$ is equal to

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 173 View solution online

Let the image of the point $\left(\frac{5}{3}, \frac{5}{3}, \frac{8}{3}\right)$ in the plane $x - 2y + z - 2 = 0$ be P. If the distance of the point $Q(6, -2, \alpha), \alpha > 0$, from P is 13 , then α is equal to

.

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 174 View solution online

Let the lines $l_1 : \frac{x+5}{3} = \frac{y+4}{1} = \frac{z-\alpha}{-2}$ and $l_2 : 3x+2y+z-2=0=x-3y+2z-13$ be coplanar. If the point $P(a,b,c)$ on l_1 is nearest to the point $Q(-4,-3,2)$, then $|a|+|b|+|c|$ is equal to

A. 12

B. 14

C. 10

D. 8

Question 175 View solution online

Let the equation of plane passing through the line of intersection of the planes $x+2y+az=2$ and $x-y+z=3$ be $5x-11y+bz=6a-1$. For $c \in \mathbb{Z}$, if the distance of this plane from the point $(a,-c,c)$ is $\frac{2}{\sqrt{a}}$, then $\frac{a+b}{c}$ is equal to

A. -2

B. 2

C. -4

D. 4

Question 176 View solution online

Let P be the point of intersection of the line $\frac{x+3}{3} = \frac{y+2}{1} = \frac{1-z}{2}$ and the plane $x+y+z=2$.
If the distance of the point P from the plane $3x-4y+12z=32$ is q, then q and $2q$ are the roots of the equation

A. $x^2-18x-72=0$

B. $x^2+18x+72=0$

C. $x^2-18x+72=0$

D. $x^2+18x-72=0$

Question 177 View solution online

Let the lines $l_1 : \frac{x+5}{3} = \frac{y+4}{1} = \frac{z-\alpha}{-2}$ and $l_2 : 3x + 2y + z - 2 = 0 = x - 3y + 2z - 13$ be coplanar. If the point $P(a, b, c)$ on l_1 is nearest to the point $Q(-4, -3, 2)$, then $|a| + |b| + |c|$ is equal to

A. 12

B. 14

C. 10

D. 8

Question 178 View solution online

If the equation of the plane passing through the line of intersection of the planes $2x - y + z = 3, 4x - 3y + 5z + 9 = 0$ and parallel to the line $\frac{x+1}{-2} = \frac{y+3}{4} = \frac{z-2}{5}$ is $ax + by + cz + 6 = 0$. then a $+\mathrm{b} + \mathrm{c}$ is equal to

A. 14

B. 12

C. 13

D. 15

Question 179 View solution online

Let P be the point of intersection of the line

$$\frac{x+3}{3} = \frac{y+2}{1} = \frac{1-z}{2}$$

and the plane

$$x + y + z = 2.$$

If the distance of the point P from the plane

$$3x - 4y + 12z = 32$$

is q, then q and $2q$ are the roots of the equation.

A. $x^2 - 18x - 72 = 0$

B. $x^2 + 18x + 72 = 0$

C. $x^2 - 18x + 72 = 0$

D. $x^2 + 18x - 72 = 0$

Question 180 View solution online

If the line $\frac{x-2}{3} = \frac{y+1}{2} = \frac{z-1}{-1}$ intersects the plane $2x + 3y - z + 13 = 0$ at a point P and the plane $3x + y + 4z = 16$ at a point Q, then PQ is equal to:

A. $2\sqrt{14}$

B. 14

C. $2\sqrt{7}$

D. $\sqrt{14}$

Question 181 View solution online

Let the plane P contain the line $2x + y - z - 3 = 0 = 5x - 3y + 4z + 9$ and be parallel to the line $\frac{x+2}{2} = \frac{3-y}{-4} = \frac{z-7}{5}$. Then the distance of the point $A(8, -1, -19)$ from the plane P measured parallel to the line $\frac{x}{-3} = \frac{y-5}{4} = \frac{2-z}{-12}$ is equal to

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 182 View solution online

If the line $\frac{x-2}{3} = \frac{y+1}{2} = \frac{z-1}{-1}$ intersects the plane $2x + 3y - z + 13 = 0$ at a point P and the plane $3x + y + 4z = 16$ at a point Q, then PQ is equal to:

A. $2\sqrt{14}$

B. 14

C. $2\sqrt{7}$

D. $\sqrt{14}$

Question 183 View solution online

Let P be the plane passing through the points $(5, 3, 0)$, $(13, 3, -2)$ and $(1, 6, 2)$. For $\alpha \in \mathbb{N}$, if the distances of the points $A(3, 4, \alpha)$ and $B(2, \alpha, a)$ from the plane P are 2 and 3 respectively, then the positive value of a is

A. 6

B. 4

C. 3

D. 5

Question 184 View solution online

Let the line passing through the points, $\mathbf{P(2,-1,2)}$ and $\mathbf{Q(5,3,4)}$ meet the plane $\mathbf{x-y+z=4}$ at the point R . Then the distance of the point R from the plane $\boldsymbol{x+2y+3z+2=0}$ measured parallel to the line $\frac{x-7}{2}=\frac{y+3}{2}=\frac{z-2}{1}$ is equal to

A. $\sqrt{31}$

B. $\sqrt{189}$

C. $\sqrt{61}$

D. 3

Question 185 View solution online

Let (α,β,γ) be the image of the point $\mathbf{P(2,3,5)}$ in the plane $\boldsymbol{2x+y-3z=6}$. Then $\alpha+\beta+\gamma$ is equal to

A. 10

B. 5

C. 12

D. 9

Question 186 View solution online

If equation of the plane that contains the point ($-2,3,5$) and is perpendicular to each of the planes $2x+4y+5z=8$ and $3x-2y+3z=5$ is
$\alpha x+\beta y+\gamma z+97=0$ then $\alpha+\beta+\gamma=$

A. 18

B. 17

C. 16

D. 15

Question 187 View solution online

Let the equation of plane passing through the line of intersection of the planes $x + 2y + az = 2$ and $x - y + z = 3$ be $5x - 11y + bz = 6a - 1$. For $c \in \mathbb{Z}$, if the distance of this plane from the point $(a, -c, c)$ is $\frac{2}{\sqrt{a}}$, then $\frac{a+b}{c}$ is equal to

A. -2

B. 2

C. -4

D. 4

Question 188 View solution online

Let the line passing through the points, $\mathrm{P}(2, -1, 2)$ and $\mathrm{Q}(5, 3, 4)$ meet the plane $\mathrm{x} - \mathrm{y} + \mathrm{z} = 4$ at the point R. Then the distance of the point R from the plane $x + 2y + 3z + 2 = 0$ measured parallel to the line $\frac{x-7}{2} = \frac{y+3}{2} = \frac{z-2}{1}$ is equal to

A. $\sqrt{31}$

B. $\sqrt{189}$

C. $\sqrt{61}$

D. 3

Question 189 View solution online

Let P_1 be the plane $3x - y - 7z = 11$ and P_2 be the plane passing through the points $(2, -1, 0)$, $(2, 0, -1)$, and $(5, 1, 1)$. If the foot of the perpendicular drawn from the point (7, 4, -1)on the line of intersection of the planes $\mathrm{P_1}$ and $\mathrm{P_2}$ is (α, β, γ), then $\alpha + \beta + \gamma$ is equal to .

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 190 View solution online

Let the point, on the line passing through the points $P(1,-2,3)$ and $Q(5,-4,7)$, farther from the origin and at a distance of 9 units from the point P, be (α,β,γ). Then $\alpha^2+\beta^2+\gamma^2$ is equal to :

A. 155

B. 150

C. 160

D. 165

Question 191 View solution online

Let the point, on the line passing through the points $\mathbf{P}(1,-2,3)$ and $\mathbf{Q}(5,-4,7)$, farther from the origin and at a distance of 9 units from the point P , be (α,β,γ). Then $\alpha^2+\beta^2+\gamma^2$ is equal to :

A. 155

B. 150

C. 160

D. 165

Question 192 View solution online

Let $\mathbf{P}(\alpha,\beta,\gamma)$ be the image of the point $\mathbf{Q}(3,-3,1)$ in the line $\frac{x-0}{1}=\frac{y-3}{1}=\frac{z-1}{-1}$ and R be the point ($2,5,-1$). If the area of the triangle PQR is λ and $\lambda^2=14\,\mathbf{K}$, then K is equal to:

A. 36

B. 72

C. 18

D. 81

Question 193 View solution online

Let $\mathbf{P}(\alpha,\beta,\gamma)$ be the image of the point $\mathbf{Q}(3,-3,1)$ in the line $\frac{x-0}{1}=\frac{y-3}{1}=\frac{z-1}{-1}$ and R be the point $(2,5,-1)$. If the area of the triangle PQR is λ and $\lambda^2=14\,\mathbf{K}$, then K is equal to:

A. 36

B. 72

C. 18

D. 81

Question 194 View solution online

Let $\mathbf{P}(\alpha, \beta, \gamma)$ be the image of the point $\mathbf{Q}(1, 6, 4)$ in the line $\frac{x}{1} = \frac{y-1}{2} = \frac{z-2}{3}$. Then $2\alpha + \beta + \gamma$ is equal to .

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 195 View solution online

Let the mirror image of the point ($\mathbf{a}, \mathbf{b}, \mathbf{c}$) with respect to the plane $3x - 4y + 12z + 19 = 0$ be ($\mathbf{a} - 6, \beta, \gamma$). If $\mathbf{a} + \mathbf{b} + \mathbf{c} = 5$, then $7\beta - 9\gamma$ is equal to .

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 196 View solution online

If the line $\frac{2-x}{3} = \frac{3y-2}{4\lambda+1} = 4 - z$ makes a right angle with the line $\frac{x+3}{3\mu} = \frac{1-2y}{6} = \frac{5-z}{7}$, then $4\lambda + 9\mu$ is equal to :

A. 13

B. 4

C. 5

D. 6

Question 197 View solution online

Let (α, β, γ) be the point $(8, 5, 7)$ in the line

$$\frac{x-1}{2} = \frac{y+1}{3} = \frac{z-2}{5}.$$

Then $\alpha + \beta + \gamma$ is equal to

A. 16

B. 18

C. 14

D. 20

Question 198 View solution online

The distance of the point $\mathbf{P(3, 4, 4)}$ from the point of intersection of the line joining the points. $\mathbf{Q(3, -4, -5)}$ and $\mathbf{R(2, -3, 1)}$ and the plane $\mathbf{2x + y + z = 7}$, is equal to .

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 199 View solution online

Let a line passing through the point $(4, 1, 0)$ intersect the line $L_1; \frac{x-1}{2} = \frac{y-2}{3} = \frac{z-3}{4}$ at the point $\mathbf{A} \quad (\alpha, \quad \beta, \quad \gamma)$ and the line $\mathbf{L_2 : x - 6 = y = -z + 4}$ at the point $\mathbf{B(a, b, c)}$.
Then $\begin{vmatrix} 1 & 0 & 1 \\ \alpha & \beta & \gamma \\ a & b & c \end{vmatrix}$ is equal to

A. 8

B. 16

C. 12

D. 6

Question 200 View solution online

Let $L_1 : \frac{x-1}{3} = \frac{y-1}{-1} = \frac{z+1}{0}$ and
$L_2 : \frac{x-2}{2} = \frac{y}{0} = \frac{z+4}{\alpha}, \alpha \in \mathbb{R}$, be two lines, which intersect at the point B . If P is the foot of perpendicular from the point $A(1, 1, -1)$ on L_2, then the value of $26\alpha(PB)^2$ is .

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 201 View solution online

The lines $\frac{x-2}{2} = \frac{y}{-2} = \frac{z-7}{16}$ and $\frac{x+3}{4} = \frac{y+2}{3} = \frac{z+2}{1}$ intersect at the point P. If the distance of P from the line $\frac{x+1}{2} = \frac{y-1}{3} = \frac{z-1}{1}$ is l, then $14l^2$ is equal to.

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 202 View solution online

Let a line passing through the point $(4, 1, 0)$ intersect the line $L_1 : \frac{x-1}{2} = \frac{y-2}{3} = \frac{z-3}{4}$ at the point (α, β, γ) and the line $L_2 : x - 6 = y = -z + 4$ at the point (a, b, c). Then

$$\begin{vmatrix} 1 & 0 & 1 \\ \alpha & \beta & \gamma \\ a & b & c \end{vmatrix}$$

is equal to

A. 8

B. 16

C. 12

D. 6

Question 203 View solution online

Let P be the image of the point $\mathbf{Q(7,-2,5)}$ in the line $\mathbf{L:\frac{x-1}{2}=\frac{y+1}{3}=\frac{z}{4}}$ and $\mathbf{R(5,p,q)}$ be a point on L. Then the square of the area of $\mathbf{\triangle PQR}$ is

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 204 View solution online

Let L be a line obtained from the intersection of two planes $x+2y+z=6$ and $y+2z=4$. If point $P(\alpha,\beta,\gamma)$ is the foot of perpendicular from $(3,2,1)$ on L, then the value of $21(\alpha+\beta+\gamma)$ equals :

A. 142

B. 68

C. 136

D. 102

Question 205 View solution online

Consider the lines $\mathbf{L_1:x-1=y-2=z}$ and $\mathbf{L_2:x-2=y=z-1}$. Let the feet of the perpendiculars from the point $\mathbf{P(5,1,-3)}$ on the lines $\mathbf{L_1}$ and $\mathbf{L_2}$ be Q and R respectively. If the area of the triangle PQR is A, then $\mathbf{4\,A^2}$ is equal to :

A. 139

B. 147

C. 151

D. 143

Question 206 View solution online

If the mirror image of the point $P(3,4,9)$ in the line $\frac{x-1}{3}=\frac{y+1}{2}=\frac{z-2}{1}$ is (α,β,γ), then $14(\alpha+\beta+\gamma)$ is :

A. 102

B. 138

C. 108

D. 132

Question 207 View solution online

Let P and Q be the points on the line

$$\frac{x+3}{8} = \frac{y-4}{2} = \frac{z+1}{2}$$

which are at a distance of 6 units from the point $\mathbf{R(1,2,3)}$. If the centroid of the triangle PQR is (α, β, γ), then $\alpha^2 + \beta^2 + \gamma^2$ is:

A. 26

B. 36

C. 18

D. 24

Question 208 View solution online

If the mirror image of the point $\mathbf{P(3,4,9)}$ in the line $\frac{x-1}{3} = \frac{y+1}{2} = \frac{z-2}{1}$ is (α, β, γ), then $\mathbf{14(\alpha+\beta+\gamma)}$ is :

A. 102

B. 138

C. 108

D. 132

Question 209 View solution online

Let $a, b \in \mathbb{R}$. If the mirror image of the point $P(a, 6, 9)$ with respect to the line $\frac{x-3}{7} = \frac{y-2}{5} = \frac{z-1}{-9}$ is $(20, b, -a-9)$, then $|a+b|$ is equal to :

A. 86

B. 88

C. 84

D. 90

Question 210 View solution online

Let P and Q be the points on the line $\frac{x+3}{8} = \frac{y-4}{2} = \frac{z+1}{2}$ which are at a distance of 6 units from the point $\mathbf{R(1, 2, 3)}$. If the centroid of the triangle PQR is (α, β, γ), then $\alpha^2 + \beta^2 + \gamma^2$ is:

A. 26

B. 36

C. 18

D. 24

Question 211 View solution online

Consider the lines $L_1 : x - 1 = y - 2 = z$ and $L_2 : x - 2 = y = z - 1$. Let the feet of the perpendiculars from the point $P(5, 1, -3)$ on the lines L_1 and L_2 be Q and R respectively. If the area of the triangle PQR is A, then $4A^2$ is equal to:

A. 139

B. 147

C. 151

D. 143

Question 212 View solution online

Let the line L be the projection of the line

$$\frac{x-1}{2} = \frac{y-3}{1} = \frac{z-4}{2}$$

in the plane $\mathbf{x - 2y - z = 3}$. If d is the distance of the point $\mathbf{(0, 0, 6)}$ from L , then $\mathbf{d^2}$ is equal to

.

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 213 View solution online

Let $(\lambda, 2, 1)$ be a point on the plane which passes through the point $(4, -2, 2)$. If the plane is perpendicular to the line joining the point $(-2, -21, 29)$ and $(-1, -16, 23)$, then $\left(\frac{\lambda}{11}\right)^2 - \frac{4\lambda}{11} - 4$ is equal to .

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 214 View solution online

Let the line $L : \frac{x-1}{2} = \frac{y+1}{-1} = \frac{z-3}{1}$ intersect the plane $2x + y + 3z = 16$ at the point P. Let the point Q be the foot of perpendicular from the point $R(1, -1, -3)$ on the line L. If α is the area of triangle PQR, then α^2 is equal to

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 215 View solution online

Let P be a plane containing the line $\frac{x-1}{3} = \frac{y+6}{4} = \frac{z+5}{2}$ and parallel to the line $\frac{x-3}{4} = \frac{y-2}{-3} = \frac{z+5}{7}$. If the point $(1, -1, \alpha)$ lies on the plane P , then the value of $|5\alpha|$ is equal to .

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 216 View solution online

Let a line L pass through the point $P(2, 3, 1)$ and be parallel to the line $x + 3y - 2z - 2 = 0 = x - y + 2$ z . If the distance of L from the point $(5, 3, 8)$ is α, then $3\alpha^2$ is equal to .

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 217 View solution online

Let the equation of the plane P containing the line $x + 10 = \frac{8-y}{2} = z$ be $ax + by + 3z = 2(a + b)$ and the distance of the plane P from the point $(1, 27, 7)$ be c. Then $a^2 + b^2 + c^2$ is equal to

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 218 View solution online

Let the plane P pass through the intersection of the planes $2x + 3y - z = 2$ and $x + 2y + 3z = 6$ and be perpendicular to the plane $2\mathrm{x} + \mathrm{y} - \mathrm{z} = 0$. If d is the distance of P form the point ($-7, 1, 1,$) then d^2 is equal to :

A. $\frac{250}{83}$

B. $\frac{250}{82}$

C. $\frac{15}{53}$

D. $\frac{25}{83}$

Question 219 View solution online

If the shortest distance between the line joining the points $(1, 2, 3)$ and $(2, 3, 4)$, and the line $\frac{x-1}{2} = \frac{y+1}{-1} = \frac{z-2}{0}$ is a, then $28a^2$ is equal to

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 220 View solution online

If (x, y, z) be an arbitrary point lying on a plane P which passes through the point $(42, 0, 0)$, $(0, 42, 0)$ and $(0, 0, 42)$, then the value of expression

$$3 + \frac{x-11}{(y-19)^2(z-12)^2} + \frac{y-19}{(x-11)^2(z-12)^2} + \frac{z-12}{(x-11)^2(y-19)^2} - \frac{x+y+z}{14(x-11)(y-19)(z-12)}$$

A. 0

B. 3

C. 39

D. -45

Official Answer by NTA (2)

Question 221 View solution online

If (x, y, z) be an arbitrary point lying on a plane P which passes through the point $(42, 0, 0)$, $(0, 42, 0)$ and $(0, 0, 42)$, then the value of expression

$3 + \frac{x-11}{(y-19)^2(z-12)^2} + \frac{y-19}{(x-11)^2(z-12)^2}$
$+ \frac{z-12}{(x-11)^2(y-19)^2} - \frac{x+y+z}{14(x-11)(y-19)(z-12)}$

A. 0

B. 3

C. 39

D. -45

Official Answer by NTA (2)

Question 222 View solution online

Let the plane P pass through the intersection of the planes $2x + 3y - z = 2$ and $x + 2y + 3z = 6$ and be perpendicular to the plane $2x + y - z = 0$. If d is the distance of P from the point $(-7, 1, 1)$, then d^2 is equal to:

A. $\frac{250}{83}$

B. $\frac{250}{82}$

C. $\frac{15}{53}$

D. $\frac{25}{83}$

Question 223 View solution online

Let P be a plane $\mathbf{lx+my+nz=0}$ containing the line, $\frac{1-x}{1}=\frac{y+4}{2}=\frac{z+2}{3}$. If plane P divides the line segment AB joining points $\mathbf{A(-3,-6,1)}$ and $\mathbf{B(2,4,-3)}$ in ratio $\mathbf{k:1}$ then the value of k is equal to :

A. 1.5

B. 3

C. 2

D. 4

Question 224 View solution online

If the equation of plane passing through the mirror image of a point $\mathbf{(2,3,1)}$ with respect to line $\frac{x+1}{2}=\frac{y-3}{1}=\frac{z+2}{-1}$ and containing the line $\frac{x-2}{3}=\frac{1-y}{2}=\frac{z+1}{1}$ is $\alpha x+\beta y+\gamma z=24$, then $\alpha+\beta+\gamma$ is equal to :

A. 20

B. 19

C. 18

D. 21

Question 225 View solution online

Let P be a plane $lx+my+nz=0$ containing the line,

$$\frac{1-x}{1}=\frac{y+4}{2}=\frac{z+2}{3}.$$

If plane P divides the line segment AB joining points $A(-3,-6,1)$ and $B(2,4,-3)$ in ratio $k:1$ then the value of k is equal to :

A. 1.5

B. 3

C. 2

D. 4

Question 226 View solution online

If a point $\mathbf{P}(\alpha, \beta, \gamma)$ satisfying
$(\alpha\beta\gamma)\,(2 \quad 10 \quad 89 \quad 3 \quad 88 \quad 4 \quad 8) = (000)$
lies on the plane $2x + 4y + 3z = 5$, then $6\alpha + 9\beta + 7\gamma$ is equal to :

A. -1

B. $\frac{11}{5}$

C. $\frac{5}{4}$

D. 11

Question 227 View solution online

If the four points, whose position vectors are $3\hat{i} - 4\hat{j} + 2\hat{k}, \hat{i} + 2\hat{j} - \hat{k}, -2\hat{i} - \hat{j} + 3\hat{k}$ and $5\hat{i} - 2\alpha\hat{j} + 4\hat{k}$ are coplanar, then α is equal to

A. $\frac{73}{17}$

B. $\frac{107}{17}$

C. $\frac{-73}{17}$

D. $\frac{-107}{17}$

Question 228 View solution online

Let P be the plane containing the straight line

$$\frac{x-3}{9}=\frac{y+4}{-1}=\frac{z-7}{-5}$$

and perpendicular to the plane containing the straight lines

$$\frac{x}{2}=\frac{y}{3}=\frac{z}{5}$$

and

$$\frac{x}{3}=\frac{y}{7}=\frac{z}{8}.$$

If d is the distance of P from the point $(2,-5,11)$, then d^2 is equal to :

A. $\frac{147}{2}$

B. 96

C. $\frac{32}{3}$

D. 54

Question 229 View solution online

If the length of the perpendicular drawn from the point $\mathrm{P}(\mathrm{a},4,2), \mathrm{a}>0$ on the line $\frac{x+1}{2}=\frac{y-3}{3}=\frac{z-1}{-1}$ is $2\sqrt{6}$ units and $\mathrm{Q}\left(\alpha_1,\alpha_2,\alpha_3\right)$ is the image of the point P in this line, then $\mathrm{a}+\sum_{\mathrm{i}=1}^{3}\alpha_{\mathrm{i}}$ is equal to :

A. 7

B. 8

C. 12

D. 14

Question 230 View solution online

Let P be the plane containing the straight line $\frac{x-3}{9} = \frac{y+4}{-1} = \frac{z-7}{-5}$ and perpendicular to the plane containing the straight lines $\frac{x}{2} = \frac{y}{3} = \frac{z}{5}$ and $\frac{x}{3} = \frac{y}{7} = \frac{z}{8}$. If d is the distance of P from the point $(2, -5, 11)$, then d^2 is equal to :

A. $\frac{147}{2}$

B. 96

C. $\frac{32}{3}$

D. 54

Question 231 View solution online

A plane E is perpendicular to the two planes $2x - 2y + z = 0$ and $x - y + 2z = 4$, and passes through the point $P(1, -1, 1)$. If the distance of the plane E from the point $Q(a, a, 2)$ is $3\sqrt{2}$, then $(PQ)^2$ is equal to

A. 9

B. 12

C. 21

D. 33

Question 232 View solution online

If the point $(2, \alpha, \beta)$ lies on the plane which passes through the points $(3, 4, 2)$ and $(7, 0, 6)$ and is perpendicular to the plane $2x - 5y = 15$, then $2\alpha - 3\beta$ is equal to :-

A. 5

B. 17

C. 12

D. 7

Question 233 View solution online

If the point $(2, \alpha, \beta)$ lies on the plane which passes through the points $(3, 4, 2)$ and $(7, 0, 6)$ and is perpendicular to the plane $2x - 5y = 15$, then $2\alpha - 3\beta$ is equal to :-

A. 5

B. 17

C. 12

D. 7

Question 234 View solution online

On which of the following lines lies the point of intersection of the line, $\frac{x-4}{2} = \frac{y-5}{2} = \frac{z-3}{1}$ and the plane, $x + y + z = 2$?

A. $\frac{x-2}{2} = \frac{y-3}{2} = \frac{z+3}{3}$

B. $\frac{x-4}{1} = \frac{y-5}{1} = \frac{z-5}{-1}$

C. $\frac{x-1}{1} = \frac{y-3}{2} = \frac{z+4}{-5}$

D. $\frac{x+3}{3} = \frac{4-y}{3} = \frac{z+1}{-2}$

Question 235 View solution online

The equation of the line passing through $(-4, 3, 1)$, parallel to the plane $x + 2y - z - 5 = 0$ and intersecting the line $\frac{x+1}{-3} = \frac{y-3}{2} = \frac{z-2}{-1}$ is:

A. $\frac{x+4}{-1} = \frac{y-3}{1} = \frac{z-1}{1}$

B. $\frac{x+4}{3} = \frac{y-3}{-1} = \frac{z-1}{1}$

C. $\frac{x+4}{1} = \frac{y-3}{1} = \frac{z-1}{3}$

D. $\frac{x-4}{2} = \frac{y+3}{1} = \frac{z+1}{4}$

Question 236 View solution online

The equation of the line passing through $(-4, 3, 1)$, parallel to the plane $x + 2y - z - 5 = 0$ and intersecting the line

$$\frac{x+1}{-3} = \frac{y-3}{2} = \frac{z-2}{-1}$$

is:

A. $\frac{x+4}{-1} = \frac{y-3}{1} = \frac{z-1}{1}$

B. $\frac{x+4}{3} = \frac{y-3}{-1} = \frac{z-1}{1}$

C. $\frac{x+4}{1} = \frac{y-3}{1} = \frac{z-1}{3}$

D. $\frac{x-4}{2} = \frac{y+3}{1} = \frac{z+1}{4}$

Question 237 View solution online

The plane containing the line $\frac{x-3}{2} = \frac{y+2}{-1} = \frac{z-1}{3}$ and also containing its projection on the plane $2x + 3y - z = 5$, contains which one of the following points ?

A. $(2, 0, -2)$

B. (-2, 2, 2)

C. $(0, -2, 2)$

D. $(2, 2, 0)$

Question 238 View solution online

The perpendicular distance from the origin to the plane containing the two lines,

$$\frac{x+2}{3} = \frac{y-2}{5} = \frac{z+5}{7}$$

and

$$\frac{x-1}{1} = \frac{y-4}{4} = \frac{z+4}{7},$$

is:

A. $11/\sqrt{6}$

B. $6\sqrt{11}$

C. 11

D. $11\sqrt{6}$

Question 239 View solution online

The plane containing the line

$$\frac{x-3}{2}=\frac{y+2}{-1}=\frac{z-1}{3}$$

and also containing its projection on the plane

$$2x+3y-z=5,$$

contains which one of the following points?

A. $(2,0,-2)$

B. (-2, 2, 2)

C. $(0,-2,2)$

D. $(2,2,0)$

Question 240 View solution online

the perpendicular distance from the origin to the plane containing the two lines, $\frac{x+2}{3}=\frac{y-2}{5}=\frac{z+5}{7}$ and $\frac{x-1}{1}=\frac{y-4}{4}=\frac{z+4}{7}$, is:

A. $11/\sqrt{6}$

B. $6\sqrt{11}$

C. 11

D. $11\sqrt{6}$

Question 241 View solution online

The plane through the intersection of the planes $x+y+z=1$ and $2x+3y-z+4=0$ and parallel to y-axis also passes through the point :

A. $(-3,0,-1)$

B. $(3,3,-1)$

C. $(3,2,1)$

D. $(-3,1,1)$

Question 242 View solution online

The plane passing through the point $(4, -1, 2)$ and parallel to the lines

$$\frac{x+2}{3} = \frac{y-2}{-1} = \frac{z+1}{2}$$

and

$$\frac{x-2}{1} = \frac{y-3}{2} = \frac{z-4}{3}$$

also passes through the point:

A. $(-1, -1, -1)$

B. $(-1, -1, 1)$

C. $(1, 1, -1)$

D. $(1, 1, 1)$

Question 243 View solution online

The equation of the plane containing the straight line $\frac{x}{2} = \frac{y}{3} = \frac{z}{4}$ and perpendicular to the plane containing the straight lines $\frac{x}{3} = \frac{y}{4} = \frac{z}{2}$ and $\frac{x}{4} = \frac{y}{2} = \frac{z}{3}$ is:

A. $x + 2y - 2z = 0$

B. $x - 2y + z = 0$

C. $5x + 2y - 4z = 0$

D. $3x + 2y - 3z = 0$

Question 244 View solution online

The plane passing through the point $(4, -1, 2)$ and parallel to the lines $\frac{x+2}{3} = \frac{y-2}{-1} = \frac{z+1}{2}$ and $\frac{x-2}{1} = \frac{y-3}{2} = \frac{z-4}{3}$ also passes through the point :

A. $(-1, -1, -1)$

B. $(-1, -1, 1)$

C. $(1, 1, -1)$

D. $(1, 1, 1)$

Question 245 View solution online

The plane through the intersection of the planes $x+y+z=1$ and $2x+3y-z+4=0$ and parallel to the y-axis also passes through the point:

A. $(-3,0,-1)$

B. $(3,3,-1)$

C. $(3,2,1)$

D. $(-3,1,1)$

Question 246 View solution online

Let a line pass through two distinct points $\mathrm{P}(-2,-1,3)$ and Q, and be parallel to the vector $3\hat{\mathrm{i}}+2\hat{\mathrm{j}}+2\hat{\mathrm{k}}$. If the distance of the point Q from the point $\mathrm{R}(1,3,3)$ is 5, then the square of the area of $\triangle\mathrm{PQR}$ is equal to:

A. 136

B. 140

C. 144

D. 148

Question 247 View solution online

If $Q(0,-1,-3)$ is the image of the point P in the plane $3x-y+4z=2$ and R is the point $(3,-1,-2)$, then the area (in sq. units) of $\triangle PQR$ is :

A. $\frac{\sqrt{65}}{2}$

B. $\frac{\sqrt{91}}{4}$

C. $2\sqrt{13}$

D. $\frac{\sqrt{91}}{2}$

Question 248 View solution online

Let PQR be a triangle with $R(-1,4,2)$. Suppose $\mathrm{M}(2,1,2)$ is the mid point of PQ . The distance of the centroid of $\triangle\mathrm{PQR}$ from the point of intersection of the line $\frac{x-2}{0}=\frac{y}{2}=\frac{z+3}{-1}$ and $\frac{x-1}{1}=\frac{y+3}{-3}=\frac{z+1}{1}$ is

A. 69

B. 9

C. $\sqrt{69}$

D. $\sqrt{99}$

Question 249 View solution online

The square of the distance of the image of the point $(6, 1, 5)$ in the line $\frac{x-1}{3} = \frac{y}{2} = \frac{z-2}{4}$, from the origin is .

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 250 View solution online

Let the values of p, for which the shortest distance between the lines $\frac{x+1}{3} = \frac{y}{4} = \frac{z}{5}$ and $\vec{r} = (p\hat{i} + 2\hat{j} + \hat{k}) + \lambda(2\hat{i} + 3\hat{j} + 4\hat{k})$ is $\frac{1}{\sqrt{6}}$, be $a, b, (a < b)$. Then the length of the latus rectum of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ is :-

A. 9

B. $\frac{3}{2}$

C. $\frac{2}{3}$

D. 18

Question 251 View solution online

The vertices B and C of a $\triangle ABC$ lie on the line, $\frac{x+2}{3} = \frac{y-1}{0} = \frac{z}{4}$ such that $BC = 5$ units. Then the area (in sq. units) of this triangle, given that the point $A(1, -1, 2)$, is:

A. $5\sqrt{17}$

B. $\sqrt{34}$

C. 6

D. $2\sqrt{34}$

Question 252 View solution online

Let a line pass through two distinct points $P(-2, -1, 3)$ and Q , and be parallel to the vector $3\hat{i} + 2\hat{j} + 2k$. If the distance of the point Q from the point $R(1, 3, 3)$ is 5 , then the square of the area of $\triangle PQR$ is equal to:

A. 136

B. 140

C. 144

D. 148

Question 253 View solution online

Let A be the point of intersection of the lines

$$L_1 : \frac{x-7}{1} = \frac{y-5}{0} = \frac{z-3}{-1}$$

and

$$L_2 : \frac{x-1}{3} = \frac{y+3}{4} = \frac{z+7}{5}.$$

Let B and C be the points on the lines L_1 and L_2 respectively such that $AB = AC = \sqrt{15}$. Then the square of the area of the triangle ABC is :

A. (4) 60

B. (3) 57

C. (2) 63

D. (1) 54

Question 254 View solution online

Let the line passing through the points $(-1, 2, 1)$ and parallel to the line

$$\frac{x-1}{2} = \frac{y+1}{3} = \frac{z}{4}$$

intersect the line

$$\frac{x+2}{3} = \frac{y-3}{2} = \frac{z-4}{1}$$

at the point P. Then the distance of P from the point $\mathrm{Q}(4, -5, 1)$ is :

A. 5

B. 10

C. $5\sqrt{6}$

D. $5\sqrt{5}$

Question 255 View solution online

Let $A(a, b), B(3, 4)$ and $(-6, -8)$ respectively denote the centroid, circumcentre and orthocentre of a triangle. Then, the distance of the point $\mathrm{P}(2\mathrm{a}+3, 7\,\mathrm{b}+5)$ from the line $2\mathrm{x}+3\mathrm{y}-4=0$ measured parallel to the line $x-2y-1=0$ is

A. $\frac{15\sqrt{5}}{7}$

B. $\frac{17\sqrt{5}}{6}$

C. $\frac{17\sqrt{5}}{7}$

D. $\frac{\sqrt{5}}{17}$

Question 256

View solution online

Let for a triangle ABC,

$$\overrightarrow{AB} = -2\hat{i} + \hat{j} + 3\hat{k}$$

$$\overrightarrow{CB} = \alpha\hat{i} + \beta\hat{j} + \gamma\hat{k}$$

$$\overrightarrow{CA} = 4\hat{i} + 3\hat{j} + \delta\hat{k}$$

If $\delta > 0$ and the area of the triangle ABC is $5\sqrt{6}$, then $\overrightarrow{CB} \cdot \overrightarrow{CA}$ is equal to

A. 60

B. 120

C. 108

D. 54

Official Answer. By NTA (1)

Question 257 View solution online

Let the values of p, for which the shortest distance between the lines

$$\frac{x+1}{3} = \frac{y}{4} = \frac{z}{5}$$

and

$$\vec{r} = (p\hat{i} + 2\hat{j} + \hat{k}) + \lambda(2\hat{i} + 3\hat{j} + 4\hat{k})$$

is $\frac{1}{\sqrt{6}}$, be $a, b, (a < b)$. Then the length of the latus rectum of the ellipse

$$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$$

is :-

A. 18

B. $\frac{2}{3}$

C. $\frac{3}{2}$

D. 9

Question 258 View solution online

Let Q and R be two points on the line $\frac{x+1}{2} = \frac{y+2}{3} = \frac{z-1}{2}$ at a distance $\sqrt{26}$ from the point $P(4, 2, 7)$. Then the square of the area of the triangle PQR is .

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 259 View solution online

Let the position vectors of two points P and Q be $3\hat{i}-\hat{j}+2\hat{k}$ and $\hat{i}+2\hat{j}-4\hat{k}$, respectively. Let R and S be two points such that the direction ratios of lines PR and QS are $(4,-1,2)$ and $(-2,1,-2)$, respectively. Let lines PR and QS intersect at T . If the vector $\overrightarrow{\mathrm{TA}}$ is perpendicular to both $\overrightarrow{\mathrm{PR}}$ and $\overrightarrow{\mathrm{QS}}$ and the length of vector $\overrightarrow{\mathrm{TA}}$ is $\sqrt{5}$ units, then the modulus of a position vector of A is :

A. $\sqrt{482}$

B. $\sqrt{171}$

C. $\sqrt{5}$

D. $\sqrt{227}$

Question 260 View solution online

Let the vertices Q and R of the triangle PQR lie on the line

$$\frac{x+3}{5}=\frac{y-1}{2}=\frac{z+4}{3}, \quad QR=5$$

and the coordinates of the point P be $(0,2,3)$. If the area of the triangle PQR is $\frac{m}{n}$ then:

A. $\mathrm{m}-5\sqrt{21}\mathrm{n}=0$

B. $2\,\mathrm{m}-5\sqrt{21}\mathrm{n}=0$

C. $5\,\mathrm{m}-2\sqrt{21}\mathrm{n}=0$

D. $5\,\mathrm{m}-21\sqrt{2}\mathrm{n}=0$

Question 261 View solution online

The line L_1 is parallel to the vector $\vec{\mathrm{a}}=-3\hat{\mathrm{i}}+2\hat{\mathrm{j}}+4\hat{\mathrm{k}}$ and passes through the point $(7,6,2)$ and the line L_2 is parallel to the vector $\vec{b}=2\hat{i}+\hat{j}+3\hat{k}$ and passes through the point $(5,3,4)$. The shortest distance between the lines L_1 and L_2 is :

A. $\frac{23}{\sqrt{38}}$

B. $\frac{21}{\sqrt{57}}$

C. $\frac{23}{\sqrt{57}}$

D. $\frac{21}{\sqrt{38}}$

Question 262 View solution online

The line $\mathbf{L_1}$ is parallel to the vector $\overrightarrow{\mathbf{a}} = -3\hat{\mathbf{i}} + 2\hat{\mathbf{j}} + 4\hat{\mathbf{k}}$ and passes through the point $(7, 6, 2)$ and the line $\mathbf{L_2}$ is parallel to the vector $\vec{b} = 2\hat{i} + \hat{j} + 3\hat{k}$ and passes through the point (5, 3, 4). The shortest distance between the lines $\mathbf{L_1}$ and L_2 is :

A. $\frac{23}{\sqrt{38}}$

B. $\frac{21}{\sqrt{57}}$

C. $\frac{23}{\sqrt{57}}$

D. $\frac{21}{\sqrt{38}}$

Question 263 View solution online

If the image of the point $(4, 4, 3)$ in the line $\frac{x-1}{2} = \frac{y-2}{1} = \frac{z-1}{3}$ is (α, β, γ), then $\alpha + \beta + \gamma$ is equal to

A. 9

B. 12

C. 8

D. 7

Question 264 View solution online

Let P the point of intersection of the lines $\frac{x-2}{1} = \frac{y-4}{5} = \frac{z-2}{1}$ and $\frac{x-3}{2} = \frac{y-2}{3} = \frac{z-3}{2}$.

Then, the shortest distance of P from the line $\mathbf{4x = 2y = z}$ is

A. $\frac{5\sqrt{14}}{7}$

B. $\frac{\sqrt{14}}{7}$

C. $\frac{3\sqrt{14}}{7}$

D. $\frac{6\sqrt{14}}{7}$

Question 265 View solution online

If $Q(0,-1,-3)$ is the image of the point P in the plane $3x-y+4z=2$ and R is the point $(3,-1,-2)$, then the area (in sq. units) of $\triangle PQR$ is :

A. $\frac{\sqrt{65}}{2}$

B. $\frac{\sqrt{91}}{4}$

C. $2\sqrt{13}$

D. $\frac{\sqrt{91}}{2}$

Question 266 View solution online

Let the position vectors of two points P and Q be $3\hat{i}-\hat{j}+2\hat{k}$ and $\hat{i}+2\hat{j}-4\hat{k}$, respectively. Let R and S be two points such that the direction ratios of lines PR and QS are $(4,-1,2)$ and $(-2,1,-2)$, respectively. Let lines PR and QS intersect at T. If the vector $\overrightarrow{TA}$ is perpendicular to both $\overrightarrow{PR}$ and $\overrightarrow{QS}$ and the length of vector $\overrightarrow{TA}$ is $\sqrt{5}$ units, then the modulus of a position vector of A is:

A. $\sqrt{482}$

B. $\sqrt{171}$

C. $\sqrt{5}$

D. $\sqrt{227}$

Question 267 View solution online

Let A be the point of intersection of the lines $L_1: \frac{x-7}{1}=\frac{y-5}{0}=\frac{z-3}{-1}$ and $L_2: \frac{x-1}{3}=\frac{y+3}{4}=\frac{z+7}{5}$. Let B and C be the point on the lines L_1 and L_2 respectively such that $AB=AC=\sqrt{15}$. Then the square of the area of the triangle ABC is :

A. 54

B. 63

C. 57

D. 60

Question 268 View solution online

Let the position vectors of three vertices of a triangle be $4\vec{p}+\vec{q}-3\vec{r}, -5\vec{p}+\vec{q}+2\vec{r}$ and $2\vec{p}-\vec{q}+2\vec{r}$. If the position vectors of the orthocenter and the circumcenter of the triangle are $\frac{\vec{p}+\vec{q}+\vec{r}}{4}$ and $\alpha\vec{p}+\beta\vec{q}+\gamma\vec{r}$ respectively, then $\alpha+2\beta+5\gamma$ is equal to:

A. 3

B. 1

C. 6

D. 4

Question 269 View solution online

Let the line L pass through the point $(0,1,2)$, intersect the line $\frac{x-1}{2}=\frac{y-2}{3}=\frac{z-3}{4}$ and be parallel to the plane $2x+y-3z=4$. Then the distance of the point $P(1,-9,2)$ from the line L is

A. 9

B. $\sqrt{54}$

C. $\sqrt{69}$

D. $\sqrt{74}$

Question 270 View solution online

Let (α,β) be the centroid of the triangle formed by the lines $15x-y=82, 6x-5y=-4$ and $9x+4y=17$. Then $\alpha+2\beta$ and $2\alpha-\beta$ are the roots of the equation

A. $x^2-7x+12=0$

B. $x^2-13x+42=0$

C. $x^2-14x+48=0$

D. $x^2-10x+25=0$

Question 271 View solution online

Consider the line L passing through the points $(1,2,3)$ and $(2,3,5)$. The distance of the point $\left(\frac{11}{3},\frac{11}{3},\frac{19}{3}\right)$ from the line L along the line $\frac{3x-11}{2}=\frac{3y-11}{1}=\frac{3z-19}{2}$ is equal to :

A. 3

B. 5

C. 4

D. 6

Question 272 View solution online

Let the foot of perpendicular from the point $\mathbf{A(4,3}$, 1) on the plane $P: x-y+2z+3=0$ be N. If $B(5$, $\alpha, \beta), \alpha, \beta \in \mathbb{Z}$ is a point on plane P such that the area of the triangle ABN in $3\sqrt{2}$, then $\alpha^2+\beta^2+\alpha\beta$ is equal to .

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 273 View solution online

Let the line passing through the points $(-1,2,1)$ and parallel to the line $\frac{x-1}{2}=\frac{y+1}{3}=\frac{z}{4}$ intersect the line $\frac{x+2}{3}=\frac{y-3}{2}=\frac{z-4}{1}$ at the point P. Then the distance of P from the point $\mathbf{Q(4,-5,1)}$ is :

A. 5

B. 4

C. (2) 10

D. (3) $5\sqrt{6}$

Question 274 View solution online

Let the vertices Q and R of the triangle PQR lie on the line $\frac{x+3}{5}=\frac{y-1}{2}=\frac{z+4}{3}, \mathbf{QR}=5$ and the coordinates of the point P be $(0,2,3)$. If the area of the triangle PQR is $\frac{m}{n}$ then :

A. $\mathbf{m}-5\sqrt{21}\mathbf{n}=0$

B. $2\,\mathbf{m}-5\sqrt{21}\mathbf{n}=0$

C. $5\,\mathbf{m}-2\sqrt{21}\mathbf{n}=0$

D. $5\,\mathbf{m}-21\sqrt{2}\mathbf{n}=0$

Question 275 View solution online

Let (α, β, γ) be mirror image of the point $(2,3,5)$ in the line $\frac{x-1}{2}-\frac{y-2}{3}-\frac{z-3}{4}$.
Then $2\alpha+3\beta+4\gamma$ is equal to

A. 32

B. 33

C. 31

D. 34

Question 276 View solution online

Let P be the point of intersection of the lines

$$\frac{x-2}{1}=\frac{y-4}{5}=\frac{z-2}{1}$$

and

$$\frac{x-3}{2}=\frac{y-2}{3}=\frac{z-3}{2}.$$

Then, the shortest distance of P from the line $4x=2y=z$ is

A. $\frac{5\sqrt{14}}{7}$

B. $\frac{\sqrt{14}}{7}$

C. $\frac{3\sqrt{14}}{7}$

D. $\frac{6\sqrt{14}}{7}$

Question 277 View solution online

The shortest distance between lines $\mathbf{L_1}$ and $\mathbf{L_2}$, where $L_1: \frac{x-1}{2}=\frac{y+1}{-3}=\frac{z+4}{2}$ and L_2 is the line passing through the points $\mathbf{A(-4,4,3)\cdot B(-1,6,3)}$ and perpendicular to the line $\frac{x-3}{-2}=\frac{y}{3}=\frac{z-1}{1}$, is

A. $\frac{121}{\sqrt{221}}$

B. $\frac{24}{\sqrt{117}}$

C. $\frac{141}{\sqrt{221}}$

D. $\frac{42}{\sqrt{117}}$

Question 278 View solution online

The distance of the point $\mathbf{Q(0,2,-2)}$ form the line passing through the point $\mathbf{P(5,-4,3)}$ and perpendicular to the lines $\vec{\mathbf{r}}=(-3\hat{\mathbf{i}}+2\hat{\mathbf{k}})+\lambda(2\hat{\mathbf{i}}+3\hat{\mathbf{j}}+5\hat{\mathbf{k}}),\ \lambda\in\mathbb{R}$ and $\vec{\mathbf{r}}=(\hat{\mathbf{i}}-2\hat{\mathbf{j}}+\hat{\mathbf{k}})+\mu(-\hat{i}+3\hat{j}+2\hat{k}),\mu\in\mathbb{R}$ is

A. $\sqrt{86}$

B. $\sqrt{20}$

C. $\sqrt{54}$

D. $\sqrt{74}$

Question 279 View solution online

Let the line L pass through the point $(0,1,2)$, intersect the line $\frac{x-1}{2}=\frac{y-2}{3}=\frac{z-3}{4}$ and be parallel to the plane $\mathbf{2x+y-3z=4}$. Then the distance of the point $\mathbf{P(1,-9,2)}$ from the line L is

A. 9

B. $\sqrt{54}$

C. $\sqrt{69}$

D. $\sqrt{74}$

Question 280 View solution online

The vertices B and C of a $\triangle ABC$ lie on the line, $\frac{x+2}{3}=\frac{y-1}{0}=\frac{z}{4}$ such that $BC=5$ units. Then the area (in sq. units) of this triangle, given that the point $A(1,-1,2)$, is:

A. $5\sqrt{17}$

B. $\sqrt{34}$

C. 6

D. $2\sqrt{34}$

Question 281 View solution online

The distance of the line

$$\frac{x-2}{2}=\frac{y-6}{3}=\frac{z-3}{4}$$

from the point $(1,4,0)$ along the line

$$\frac{x}{1}=\frac{y-2}{2}=\frac{z+3}{3}$$

is :

A. $\sqrt{17}$

B. $\sqrt{14}$

C. $\sqrt{15}$

D. $\sqrt{13}$

Question 282 View solution online

Let in a $\triangle ABC$, the length of the side AC be 6, the vertex B be $(1,2,3)$ and the vertices A, C lie on the line

$$\frac{x-6}{3}=\frac{y-7}{2}=\frac{z-7}{-2}.$$

Then the area (in sq. units) of $\triangle ABC$ is

A. 42

B. 21

C. 56

D. 17

Question 283 View solution online

Let (α, β) be the centroid of the triangle formed by the lines $15x - y = 82, 6x - 5y = -4$ and $9x + 4y = 17$. Then $\alpha + 2\beta$ and $2\alpha - \beta$ are the roots of the equation

A. $x^2 - 7x + 12 = 0$

B. $x^2 - 13x + 42 = 0$

C. $x^2 - 14x + 48 = 0$

D. $x^2 - 10x + 25 = 0$

Question 284 View solution online

Let the point $(-1, \alpha, \beta)$ lie on the line of the shortest distance between the lines $\frac{x+2}{-3} = \frac{y-2}{4} = \frac{z-5}{2}$ and $\frac{x+2}{-1} = \frac{y+6}{2} = \frac{z-1}{0}$. Then $(\alpha - \beta)^2$ is equal to .

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 285 View solution online

If the shortest distance between the lines $\frac{x-1}{2} = \frac{y-2}{3} = \frac{z-3}{4}$ and $\frac{x}{1} = \frac{y}{\alpha} = \frac{z-5}{1}$ is $\frac{5}{\sqrt{6}}$, then the sum of all possible values of α is

A. $\frac{3}{2}$

B. $-\frac{3}{2}$

C. 3

D. -3

Question 286 View solution online

If the lines $\frac{x-1}{1} = \frac{y-2}{2} = \frac{z+3}{1}$ and $\frac{x-a}{2} = \frac{y+2}{3} = \frac{z-3}{1}$ intersect at the point P, then the distance of the point P from the plane $z = a$ is :

A. 28

B. 16

C. 10

D. 22

Question 287 View solution online

If two distinct point Q, R lie on the line of intersection of the planes $-x + 2y - z = 0$ and $3x - 5y + 2z = 0$ and $PQ = PR = \sqrt{18}$ where the point P is $(1, -2, 3)$, then the area of the triangle PQR is equal to

A. $\frac{2}{3}\sqrt{38}$

B. $\frac{4}{3}\sqrt{38}$

C. $\frac{8}{3}\sqrt{38}$

D. $\sqrt{\frac{152}{3}}$

Question 288 View solution online

Let in a $\triangle ABC$, the length of the side AC be 6 , the vertex B be $(1, 2, 3)$ and the vertices A, C lie on the line $\frac{x-6}{3} = \frac{y-7}{2} = \frac{z-7}{-2}$. Then the area (in sq. units) of $\triangle ABC$ is

A. 42

B. 21

C. 56

D. 17

Question 289 View solution online

If the line, $2x - y + 3 = 0$ is at a distance $\frac{1}{\sqrt{5}}$ and $\frac{2}{\sqrt{5}}$ from the lines $4x - 2y + \alpha = 0$ and $6x - 3y + \beta = 0$, respectively, then the sum of all possible values of α and β is

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 290 View solution online

The shortest distance between the lines $\frac{x-2}{3} = \frac{y+1}{2} = \frac{z-6}{2}$ and $\frac{x-6}{3} = \frac{1-y}{2} = \frac{z+8}{0}$ is _____.

Numerical answer: _____

Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 291 View solution online

Let two vertices of triangle ABC be $(2,4,6)$ and $(0,-2,-5)$, and its centroid be $(2,1,-1)$. If the image of third vertex in the plane $x+2y+4z=11$ is (α,β,γ), then $\alpha\beta+\beta\gamma+\gamma\alpha$ is equal to

A. 72

B. 74

C. 76

D. 70

Question 292 View solution online

Let a straight line L pass through the point $\mathrm{P}(2,-1,3)$ and be perpendicular to the lines $\frac{x-1}{2}=\frac{y+1}{1}=\frac{z-3}{-2}$ and $\frac{x-3}{1}=\frac{y-2}{3}=\frac{z+2}{4}$. If the line L intersects the yz -plane at the point Q , then the distance between the points P and Q is :

A. 2

B. $\sqrt{10}$

C. 3

D. $2\sqrt{3}$

Question 293 View solution online

If the two lines $l_1:\frac{x-2}{3}=\frac{y+1}{-2},z=2$ and $l_2:\frac{x-1}{1}=\frac{2y+3}{\alpha}=\frac{z+5}{2}$ perpendicular, then an angle between the lines l_2 and $l_3:\frac{1-x}{3}=\frac{2y-1}{-4}=\frac{z}{4}$ is :

A. $\cos^{-1}\left(\frac{29}{4}\right)$

B. $\sec^{-1}\left(\frac{29}{4}\right)$

C. $\cos^{-1}\left(\frac{2}{29}\right)$

D. $\cos^{-1}\left(\frac{2}{\sqrt{29}}\right)$

CHAPTER 21 / MATHEMATICS / HISTORICAL APPENDIX

Mathematical Reasoning

Questions 294-300 / 7 selected / 2.3% practice weight / Historical appendix

Topics to prioritise in this collection

- Mathematical reasoning: 5 questions / 71.4% of this chapter
- Propositional equivalence: 1 question / 14.3% of this chapter
- Translation of compound statements: 1 question / 14.3% of this chapter

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Question 294 View solution online

The compound statement $(\sim (P \wedge Q)) \vee ((\sim P) \wedge Q) \Rightarrow ((\sim P) \wedge (\sim Q))$ is equivalent to

A. $(\sim Q) \vee P$

B. $((\sim P) \vee Q) \wedge (\sim Q)$

C. $(\sim P) \vee Q$

D. $((\sim P) \vee Q) \wedge ((\sim Q) \vee P)$

Question 295 View solution online

The statement $(p \wedge (\sim q)) \Rightarrow (p \Rightarrow (\sim q))$ is

A. a tautology

B. a contradiction

C. equivalent to $p \vee q$

D. equivalent to $(\sim p) \vee (\sim q)$

Question 296 View solution online

(S1) $(p \Rightarrow q) \vee (p \wedge (\sim q))$ is a tautology
(S2) $((\sim p) \Rightarrow (\sim q)) \wedge ((\sim p) \vee q)$ is a contradiction.
Then

A. both (S1) and (S2) are correct

B. only (S1) is correct

C. only (S2) is correct

D. both (S1) and (S2) are wrong

Question 297 View solution online

The negation of the expression $q \vee ((\sim q) \wedge p)$ is equivalent to

A. $(\sim p) \vee (\sim q)$

B. $p \wedge (\sim q)$

C. $(\sim p) \vee q$

D. $(\sim p) \wedge (\sim q)$

Question 298 View solution online

The statement $B \Rightarrow ((\sim A) \vee B)$ is equivalent to :

A. $A \Rightarrow (A \Leftrightarrow B)$

B. $A \Rightarrow ((\sim A) \Rightarrow B)$

C. $A \wedge B$

D. $A \vee B$

The original exam question has multiple correct choices and a conflicting printed ALLEN answer label. Independent truth-table verification establishes that original options 2, 3 and 4 are equivalent. In this corrected single-answer practice version, original options 1 and 2 are preserved; options 3 and 4 are replaced by A AND B and A OR B. Only option 2 is correct. The original defective choices remain in the review evidence.

Question 299 View solution online

Which of the following statements is a tautology ?

A. $p \vee (p \wedge q)$

B. $(\mathrm{p} \wedge (\mathrm{p} \rightarrow \mathrm{q})) \rightarrow \sim \mathrm{q}$

C. $(\mathrm{p} \wedge \mathrm{q}) \rightarrow (\sim (\mathrm{p}) \rightarrow \mathrm{q})$

D. $\mathrm{p} \rightarrow (\mathrm{p} \wedge (\mathrm{p} \rightarrow \mathrm{q}))$

Question 300

View solution online

Consider the following statements:

P : I have fever
Q: I will not take medicine
R : I will take rest.
The statement "If I have fever, then I will take medicine and I will take rest" is equivalent to:

A. $((\sim \mathrm{P}) \vee \sim \mathrm{Q}) \wedge ((\sim \mathrm{P}) \vee \mathrm{R})$

B. $(\mathrm{P} \vee \mathrm{Q}) \wedge ((\sim \mathrm{P}) \vee \mathrm{R})$

C. $((\sim \mathrm{P}) \vee \sim \mathrm{Q}) \wedge ((\sim \mathrm{P}) \vee \sim \mathrm{R})$

D. $(\mathrm{P} \vee \sim \mathrm{Q}) \wedge (\mathrm{P} \vee \sim \mathrm{R})$

QUICK CHECK

Answer key

For numerical questions the stored answer value is shown. Follow the question's precision and units.

1. D	**2.** A	**3.** A	**4.** A	**5.** 19
6. 18	**7.** C	**8.** B	**9.** D	**10.** 4
11. 14	**12.** 3395	**13.** D	**14.** A	**15.** 4
16. B	**17.** B	**18.** 5	**19.** B	**20.** A
21. D	**22.** C	**23.** A	**24.** 7744	**25.** 16
26. A	**27.** 32	**28.** 81	**29.** A	**30.** B
31. C	**32.** 7	**33.** 31	**34.** 125	**35.** 75
36. 22	**37.** 10	**38.** 8	**39.** B	**40.** C
41. B	**42.** C	**43.** C	**44.** D	**45.** B
46. C	**47.** 2021	**48.** A	**49.** A	**50.** D
51. C	**52.** C	**53.** C	**54.** 321	**55.** 12
56. 4	**57.** 60	**58.** 754	**59.** C	**60.** B
61. 8	**62.** 40	**63.** 1944	**64.** 24	**65.** A
66. C	**67.** D	**68.** A	**69.** 56	**70.** 6
71. C	**72.** B	**73.** A	**74.** A	**75.** C
76. 16	**77.** C	**78.** A	**79.** D	**80.** 61
81. 1328	**82.** 72	**83.** A	**84.** C	**85.** D
86. D	**87.** A	**88.** 63	**89.** A	**90.** D
91. 19	**92.** B	**93.** 120	**94.** B	**95.** 15
96. A	**97.** 189	**98.** D	**99.** C	**100.** B
101. A	**102.** A	**103.** A	**104.** B	**105.** B
106. D	**107.** C	**108.** B	**109.** A	**110.** D
111. A	**112.** 37	**113.** B	**114.** 96	**115.** D
116. A	**117.** 96	**118.** B	**119.** 29	**120.** A
121. D	**122.** D	**123.** B	**124.** B	**125.** B
126. D	**127.** D	**128.** B	**129.** D	**130.** 18
131. B	**132.** C	**133.** 600	**134.** C	**135.** B
136. B	**137.** C	**138.** 18	**139.** B	**140.** 1
141. A	**142.** 5	**143.** A	**144.** C	**145.** 5
146. 3	**147.** 2	**148.** B	**149.** B	**150.** C

151. D **152.** 164 **153.** A **154.** 81 **155.** D

156. A **157.** C **158.** B **159.** 486 **160.** 44

161. 3 **162.** A **163.** B **164.** C **165.** D

166. A **167.** D **168.** C **169.** 1 **170.** A

171. 90 **172.** 11 **173.** 15 **174.** C **175.** C

176. C **177.** C **178.** A **179.** C **180.** A

181. 26 **182.** A **183.** B **184.** D **185.** A

186. D **187.** C **188.** D **189.** 11 **190.** A

191. A **192.** D **193.** D **194.** 11 **195.** 137

196. D **197.** B **198.** 7 **199.** A **200.** 216

201. 108 **202.** A **203.** 957 **204.** D **205.** B

206. C **207.** C **208.** C **209.** B **210.** C

211. B **212.** 26 **213.** 8 **214.** 180 **215.** 38

216. 158 **217.** 355 **218.** A **219.** 18 **220.** B

221. B **222.** A **223.** C **224.** B **225.** C

226. D **227.** A **228.** C **229.** B **230.** D

231. C **232.** D **233.** B **234.** C **235.** B

236. B **237.** A **238.** A **239.** A **240.** A

241. C **242.** C **243.** B **244.** D **245.** C

246. A **247.** D **248.** C **249.** 62 **250.** C

251. B **252.** A **253.** D **254.** D **255.** C

256. A **257.** B **258.** 153 **259.** B **260.** B

261. A **262.** A **263.** A **264.** C **265.** D

266. B **267.** A **268.** A **269.** D **270.** B

271. A **272.** 7 **273.** D **274.** B **275.** B

276. C **277.** C **278.** D **279.** D **280.** B

281. B **282.** B **283.** B **284.** 25 **285.** D

286. A **287.** B **288.** B **289.** 30 **290.** 14

291. B **292.** C **293.** B **294.** D **295.** A

296. B **297.** D **298.** B **299.** C **300.** A