LEARNE2I / PRIORITY PRACTICE

JEE Main 2026 Session 2

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.

learne2i.com/jee-main/revision-archive/2026-session-2/

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 2 collection, begin with **Current Electricity; Ray Optics and Optical Instruments; System of Particles and Rotational Motion**. 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 Dimensional analysis: 1 (25.0%) / Dimensional formulae of magnetic quantities: 1 (25.0%) / Dimensional formulae of physical quantities: 1 (25.0%) / More topics in chapter guide	Consolidate	1-4 (4)	1.3%
Motion in a Straight Line Kinematics: 8 (47.1%) / Equations of motion: 7 (41.2%) / & 03 Kinematics: 1 (5.9%) / More topics in chapter guide	Focus first	5-21 (17)	5.7%
Motion in a Plane Projectile motion: 3 (75.0%) / Equations of motion: 1 (25.0%)	Consolidate	22-25 (4)	1.3%
Laws of Motion Newtonian mechanics: 5 (41.7%) / Force balance using Newton's laws: 3 (25.0%) / Friction: 2 (16.7%) / More topics in chapter guide	Focus first	26-37 (12)	4.0%
Work, Energy and Power Work and energy: 10 (52.6%) / Work-energy theorem: 7 (36.8%) / Power on inclined plane: 1 (5.3%) / More topics in chapter guide	Focus first	38-56 (19)	6.3%
System of Particles and Rotational Motion Momentum and rotation: 5 (22.7%) / Rotational dynamics: 4 (18.2%) / Torque and angular-momentum relations: 3 (13.6%) / More topics in chapter guide	Focus first	57-78 (22)	7.3%
Gravitation Gravitational potential energy: 1 (100.0%)	Consolidate	79-79 (1)	0.3%
Mechanical Properties of Solids Elasticity: 8 (72.7%) / Longitudinal strain: 1 (9.1%) / Stress-strain relation in a solid: 1 (9.1%) / More topics in chapter guide	Focus first	80-90 (11)	3.7%
Mechanical Properties of Fluids Fluid mechanics: 1 (50.0%) / Viscosity: 1 (50.0%)	Consolidate	91-92 (2)	0.7%
Thermal Properties of Matter Calorimetry: 2 (33.3%) / Heat transfer: 2 (33.3%) / Thermal properties: 2 (33.3%)	Next	93-98 (6)	2.0%

NCERT chapter / leading topics	Priority	Questions	Weight
Thermodynamics Thermodynamic processes: 8 (61.5%) / First law of thermodynamics: 5 (38.5%)	Focus first	99-111 (13)	4.3%
Kinetic Theory Kinetic molecular theory: 3 (50.0%) / Degrees of freedom and equipartition: 1 (16.7%) / Ideal gas law: 1 (16.7%) / More topics in chapter guide	Next	112-117 (6)	2.0%
Oscillations Simple harmonic motion: 3 (37.5%) / Oscillatory motion: 2 (25.0%) / Oscillations: 1 (12.5%) / More topics in chapter guide	Next	118-125 (8)	2.7%
Waves Wave motion: 8 (100.0%)	Next	126-133 (8)	2.7%
Electric Charges and Fields Electric fields and forces: 3 (42.9%) / Electric field: 2 (28.6%) / Electric Charges and Fields: 1 (14.3%) / More topics in chapter guide	Next	134-140 (7)	2.3%
Electrostatic Potential and Capacitance Capacitors with dielectrics: 4 (80.0%) / Electric potential and capacitance: 1 (20.0%)	Consolidate	141-145 (5)	1.7%
Current Electricity Electric circuits: 24 (52.2%) / Ohm's law: 9 (19.6%) / Circuit analysis: 4 (8.7%) / More topics in chapter guide	Focus first	146-191 (46)	15.3%
Moving Charges and Magnetism Magnetic force and field: 9 (64.3%) / Biot-Savart law: 2 (14.3%) / Magnetic field due to currents: 2 (14.3%) / More topics in chapter guide	Focus first	192-205 (14)	4.7%
Magnetism and Matter Magnetism and Matter: 1 (100.0%)	Consolidate	206-206 (1)	0.3%
Electromagnetic Induction Inductance and induced emf: 5 (71.4%) / Electromagnetic Induction: 1 (14.3%) / Faraday-Lenz law and induced emf: 1 (14.3%)	Next	207-213 (7)	2.3%
Alternating Current AC circuit analysis: 2 (50.0%) / Alternating voltage and current: 2 (50.0%)	Consolidate	214-217 (4)	1.3%
Electromagnetic Waves Electromagnetic spectrum: 1 (50.0%) / Electromagnetic waves: 1 (50.0%)	Consolidate	218-219 (2)	0.7%
Ray Optics and Optical Instruments Lens formula: 15 (36.6%) / Geometrical optics: 11 (26.8%) / Image formation or refraction using ray optics: 5 (12.2%) / More topics in chapter guide	Focus first	220-260 (41)	13.7%
Wave Optics Young's double-slit interference: 8 (42.1%) / Interference of light: 5 (26.3%) / Image formation or refraction using ray optics: 1 (5.3%) / More topics in chapter guide	Focus first	261-279 (19)	6.3%

NCERT chapter / leading topics	Priority	Questions	Weight
Dual Nature of Radiation and Matter de Broglie wavelength: 2 (25.0%) / de Broglie wavelength of a particle: 1 (12.5%) / de Broglie wavelength of a particle accelerated through a potential difference: 1 (12.5%) / More topics in chapter guide	Next	280-287 (8)	2.7%
Atoms Excitation and ionisation energy: 1 (50.0%) / Hydrogen spectrum: 1 (50.0%)	Consolidate	288-289 (2)	0.7%
Semiconductor Electronics: Materials, Devices and Simple Circuits Logic gates: 4 (57.1%) / Electronic circuits and logic gates: 1 (14.3%) / Semiconductor devices: 1 (14.3%) / More topics in chapter guide	Next	290-296 (7)	2.3%
Communication Systems Historical appendix / omitted source chapter Communication systems: 2 (50.0%) / Amplitude modulation: 1 (25.0%) / Signal propagation and transmission: 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 1-4 / 4 selected / 1.3% practice weight / Consolidate

Topics to prioritise in this collection

- Dimensional analysis: 1 question / 25.0% of this chapter
- Dimensional formulae of magnetic quantities: 1 question / 25.0% of this chapter
- Dimensional formulae of physical quantities: 1 question / 25.0% of this chapter
- Significant figures: 1 question / 25.0% of this chapter

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

Question 1

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 2 View solution online

Match List-I with List-II.

List-I	List-II
(a) Spring constant	(i) (MT^{-2})
(b) Angular speed	(ii) (T^{-1})
(c) Angular momentum	(iii) (ML^2T^{-1})
(d) Moment of Inertia	(iv) (ML^2)

Choose the correct answer from the options given below:

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

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

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

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

Question 3 View solution online

Match List-I with List-II.

	List-I		List-II
A.	Coefficient of viscosity	I.	$[ML^{-1}T^{-2}]$
B.	Surface tension	II.	$[ML^2T^{-2}]$
C.	Pressure	III.	$[ML^0T^{-2}]$
D.	Surface energy	IV.	$[ML^{-1}T^{-1}]$

Choose the correct answer from the options given below.

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

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

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

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

Question 4

View solution online

Match the List-I with List-II

	List-I		List-II
A.	Magnetic induction	I.	$MLT^{-2}A^{-2}$
B.	Magnetic flux	II.	$ML^2T^{-2}A^{-2}$
C.	Magnetic permeability	III.	$ML^0T^{-2}A^{-1}$
D.	Self inductance	IV.	$ML^2T^{-2}A^{-1}$

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-IV,D-II

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

CHAPTER 02 / PHYSICS

Motion in a Straight Line

Questions 5-21 / 17 selected / 5.7% practice weight / Focus first

Topics to prioritise in this collection

- Kinematics: 8 questions / 47.1% of this chapter
- Equations of motion: 7 questions / 41.2% of this chapter
- & 03 Kinematics: 1 question / 5.9% of this chapter
- Uniformly accelerated motion: 1 question / 5.9% of this chapter

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

Question 5 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 6 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 $\frac{1}{3}\alpha^2\sqrt{Pm}$. 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 7 View solution online

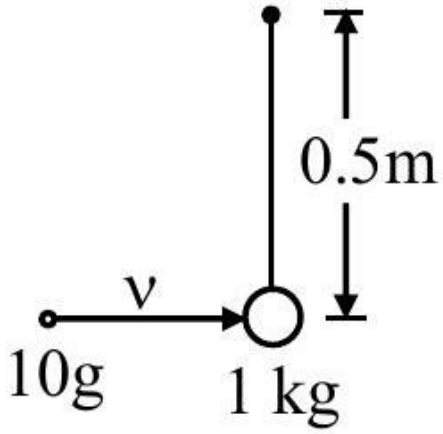
A particle excutes S.H.M with amplitude 'a' and time period T. The displacement of the particle when its speed is half of maximum speed is $\frac{\sqrt{x}a}{2}$. The value of x is

Numerical answer: _____

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

Question 8 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 9 View solution online

A body of mass 8 kg and another of mass 2 kg are moving with equal kinetic energy. The ratio of their respective momenta will be :

A. $1:1$

B. $2:1$

C. $1:4$

D. $4:1$

Question 10 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

Question 11 View solution online

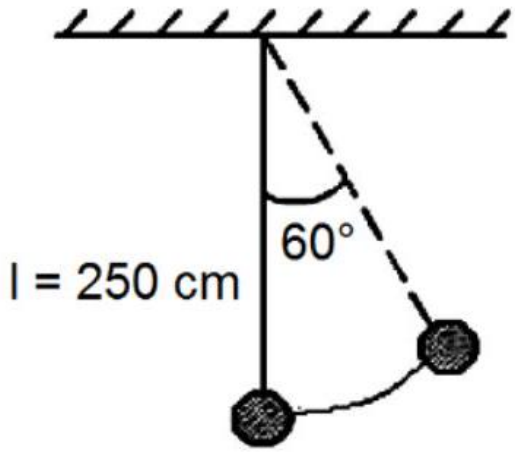
A ball of mass 0.5 kg is dropped from the height of 10 m . The height, at which the magnitude of velocity becomes equal to the magnitude of acceleration due to gravity, is m. (Use $g = 10\ m/s^2$).

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

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 13 View solution online

A stone tide to a string of length L is whirled in a vertical circle with the other end of the string at the centre. At a certain instant of time, the stone is at its lowest position and has a speed u. The magnitude of change in its velocity, as it reaches a position where the string is horizontal, is $\sqrt{x\left(u^2-gL\right)}$. The value of x is

A. 3

B. 2

C. 1

D. 5

Question 14 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 $\mathrm{g}=10\ \mathrm{ms}^{-2}$)

Numerical answer: _____

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

Question 15 View solution online

From the top of a tower, a ball is thrown vertically upward which reaches the ground in 6 s . A second ball thrown vertically downward from the same position with the same speed reaches the ground in 1.5 s . A third ball released, from the rest from the same location, will reach the ground in s.

Numerical answer: _____

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

Question 16 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 17 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 18 View solution online

A boy thrown a ball into air at 45° from the horizontal to land it on a roof of a building of height H . If the ball attains maximum height in 2 s and lands on the building in 3 s after launch, then value of H is

_____

m.

$$\left(\mathbf{g = 10\ m/s^2}\right)$$

A. 20

B. 10

C. 25

D. 15

Question 19 View solution online

A body is performing simple harmonic with an amplitude of 10 cm . The velocity of the body was tripled by air Jet when it is at 5 cm from its mean position. The new amplitude of vibration is $\sqrt{\mathbf{x}}$ 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 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

The distance between two consecutive points with phase difference of $60°$ in a wave of frequency 500 Hz is 6.0 m . The velocity with which wave is traveling is km/s

Numerical answer: _____

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

CHAPTER 03 / PHYSICS

Motion in a Plane

Questions 22-25 / 4 selected / 1.3% practice weight / Consolidate

Topics to prioritise in this collection

- Projectile motion: 3 questions / 75.0% of this chapter
- Equations of motion: 1 question / 25.0% of this chapter

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

Question 22 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 23 View solution online

A projectile is launched at an angle ' α ' with the horizontal with a velocity $20\ ms^{-1}$. After 10 s , its inclination with horizontal is ' β '. The value of $\tan\beta$ will be : $\left(g = 10\ ms^{-2}\right)$

A. $\tan\alpha + 5\sec\alpha$

B. $\tan\alpha - 5\sec\alpha$

C. $2\tan\alpha - 5\sec\alpha$

D. $2\tan\alpha + 5\sec\alpha$

Question 24 View solution online

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

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

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

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

D. Zero

Question 25 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. $\mathrm{Mg}\sin\theta\sqrt{1+\mu}$

CHAPTER 04 / PHYSICS

Laws of Motion

Questions 26-37 / 12 selected / 4.0% practice weight / Focus first

Topics to prioritise in this collection

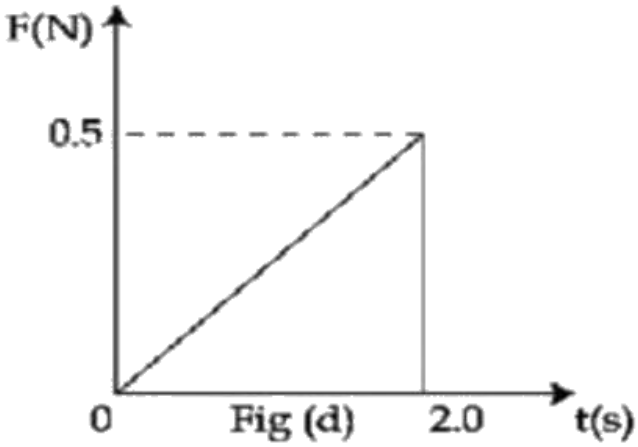
- Newtonian mechanics: 5 questions / 41.7% of this chapter
- Force balance using Newton's laws: 3 questions / 25.0% of this chapter
- Friction: 2 questions / 16.7% of this chapter
- Newton's second law: 2 questions / 16.7% of this chapter

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

---

Question 26 View solution online

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



A. Fig (c)

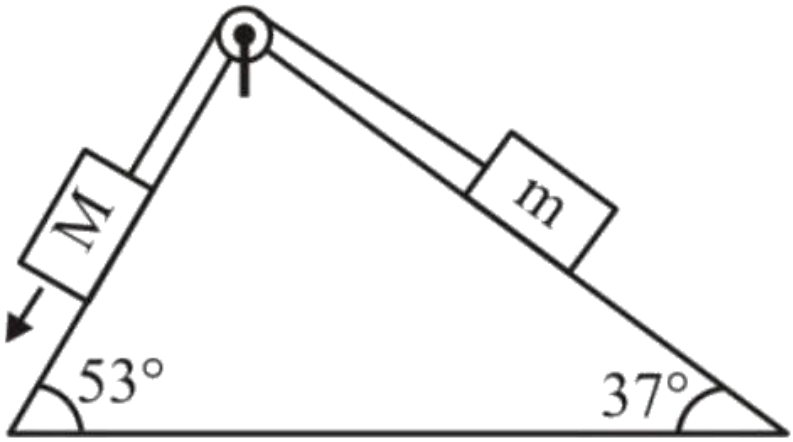
B. Fig (b)

C. Fig (d)

D. Fig (a)

Question 27 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 28 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 $\mathbf{g = 10\ m/s^2}$)

Numerical answer: _____

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

Question 29 View solution online

A cricket ball of mass 0.15 kg is thrown vertically up by a bowling machine so that it rises to a maximum height of 20 m after leaving the machine. If the part pushing the ball applies a constant force F on the ball and moves horizotally a distance of 0.2 m while launching the ball, the value of F (in N) is ($g = 10\ ms^{-2}$) .

Numerical answer: _____

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

Question 30 View solution online

A flexible chain of mass m hangs between two fixed points at the same level. The inclination of the chain with the horizontal at the two points of support is 30°. Considering the equilibrium of each half of the chain, the tension of the chain at the lowest point is

_____

.

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

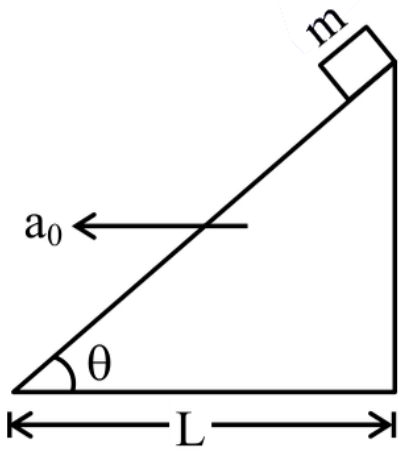
B. $\frac{1}{2}mg$

C. mg

D. $\sqrt{3}mg$

Question 31 View solution online

A small block of mass m slides down from the top of a frictionless inclined surface, while the inclined plane is moving towards left with constant acceleration $\mathbf{a_0}$. The angle between the inclined plane and ground is $\boldsymbol{\theta}$ and its base length is L. Assuming that initially the small block is at the top of the inclined plane, the time it takes to reach the lowest point of the inclined plane is _____.



A. $\sqrt{\frac{2\,L}{g\sin 2\theta - a_0(1+\cos 2\theta)}}$

B. $\sqrt{\frac{4\,L}{g\sin 2\theta - a_0(1+\cos 2\theta)}}$

C. $\sqrt{\frac{4\,L}{g\cos^2\theta - a_0\sin\theta\cos\theta}}$

D. $\sqrt{\frac{2\,L}{g\sin\theta - a_0\cos\theta}}$

Question 32 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 33 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 34 View solution online

A bullet 10 g leaves the barrel of gun with a velocity of $600\ m/s$. If the barrel of gun is 50 cm long and mass of gun is 3 kg , then value of impulse supplied to the gun will be :

A. 12 Ns

B. 6 Ns

C. 36 Ns

D. 3 Ns

Question 35 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 $2.0 \times 10^{11}\ N/m^2$. 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 36 View solution online

A wire of density $8 \times 10^3\ kg/m^3$ is stretched between two clamps 0.5 m apart. The extension developed in the wire is $3.2 \times 10^{-4}\ m$. If $Y = 8 \times 10^{10}\ N/m^2$, the fundamental frequency of vibration in the wire will be Hz.

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 block of mass 5 kg is moving on an inclined plane which makes an angle of 30° with the horizontal. Friction coefficient between the block and inclined plane surface is $\frac{\sqrt{3}}{2}$. The force to be applied on the block so that the block will move down without acceleration is _____N.

A. 25

B. 12.5

C. 7.5

D. 15

CHAPTER 05 / PHYSICS

Work, Energy and Power

Questions 38-56 / 19 selected / 6.3% practice weight / Focus first

Topics to prioritise in this collection

- Work and energy: 10 questions / 52.6% of this chapter
- Work-energy theorem: 7 questions / 36.8% of this chapter
- Power on inclined plane: 1 question / 5.3% of this chapter
- Work Energy and Power: 1 question / 5.3% of this chapter

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

Question 38 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 39 View solution online

The amplitude of a particle executing SHM is 3 cm . The displacement at which its kinetic energy will be 25% more than the potential energy is: cm.

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 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 41 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, $\mathbf{g : 10\ ms^{-2}}$]

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

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

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

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

Question 42 View solution online

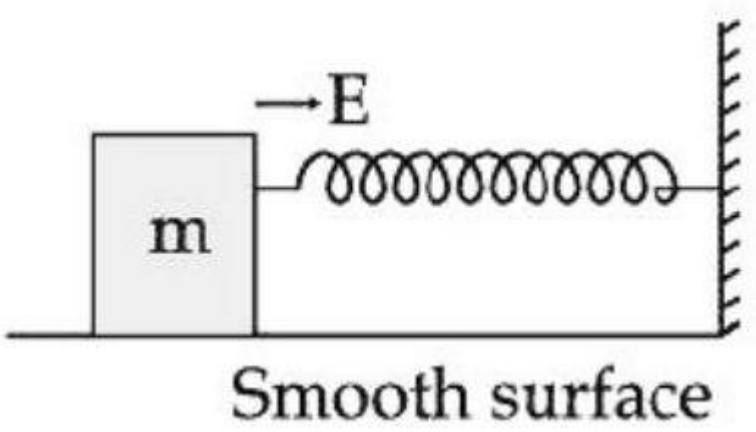
A uniform chain of length 3 meter and mass 3 kg overhangs a smooth table with 2 meter laying on the table. If k is the kinetic energy of the chain in joule as it completely slips off the table, then the value of k is (Take $\mathbf{g = 10\ m/s^2}$)

Numerical answer: _____

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

Question 43 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 $\mathbf{n =}$.

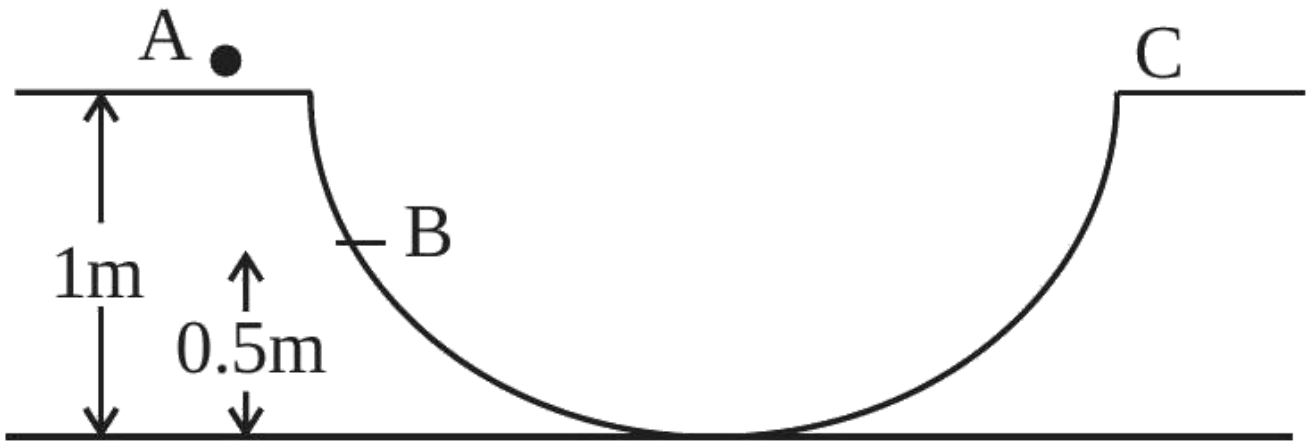


Numerical answer: _____

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

Question 44 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. $\mathbf{20\ m/s}$

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

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

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

Question 45 View solution online

A block of mass 100 kg slides over a distance of 10 m on a horizontal surface. If the co-efficient of friction between the surfaces is 0.4 , then the work done against friction (in J) is :

A. 4200

B. 3900

C. 4000

D. 4500

Question 46 View solution online

A body of mass 'm' dropped from a height 'h' reaches the ground with a speed of $\mathbf{0.8\sqrt{gh}}$. The value of workdone by the air-friction is :

A. -0.68 mgh

B. mgh

C. 1.64 mgh

D. 0.64 mgh

Question 47 View solution online

A body of mass 0.5 kg travels on straight line path with velocity $\mathbf{v} = (3\mathbf{x}^2 + 4)\mathbf{m/s}$. The net workdone by the force during its displacement from $\mathbf{x} = 0$ to $\mathbf{x} = 2\ \mathbf{m}$ is :

A. 64 J

B. 60 J

C. 120 J

D. 128 J

Question 48 View solution online

A body of mass 2 kg is driven by an engine delivering a constant power of $\mathbf{1\ J/s}$. 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 49 View solution online

A block of mass 5 kg starting from rest pulled up on a smooth incline plane making an angle of $\mathbf{30^\circ}$ with horizontal with an affective acceleration of 1 $\mathbf{ms^{-2}}$. The power delivered by the pulling force at $\mathbf{t = 10\ s}$ from the start is W.

[Use $\mathbf{g = 10\ ms^{-2}}$]

(calculate the nearest integer value)

Numerical answer: _____

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

Question 50 View solution online

A body of mass 5 kg is moving with a momentum of $\mathbf{10\ kg\ ms^{-1}}$. Now a force of 2 N acts on the body in the direction of its motion for 5 s . The increase in the Kinetic energy of the body is J.

Numerical answer: _____

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

Question 51 View solution online

A wooden block of mass 5 kg rests on soft horizontal floor. When an iron cylinder of mass 25 kg is placed on the top of the block, the floor yields and the block and the cylinder together go downwith an acceleration of $0.1\ \mathrm{ms}^{-2}$. The action force of the system on the floor is equal to:

A. 297 N

B. 294 N

C. 291 N

D. 196 N

Question 52 View solution online

The radius of curvature of each surface of a convex lens having refractive index 1.8 is 20 cm . The lens is now immersed in a liquid of refractive index 1.5. The ratio of power of lens in air to its power in the liquid will be $x : 1$. 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 53 View solution online

A block of mass 25 kg is pulled along a horizontal surface by a force at an angle 45° with the horizontal. The friction coefficient between the block and the surface is 0.25 . The displacement of 5 m of the block is:

A. 970 J

B. 735 J

C. 245 J

D. 490 J

Question 54 View solution online

The pressure and volume of an ideal gas are related as $\mathrm{PV}^{3/2} = \mathrm{K}$ (Constant). The work done when the gas is taken from state $\mathrm{A}\,(\mathrm{P}_1,\ \mathrm{V}_1,\ \mathrm{T}_1)$ to state $\mathrm{B}\,(\mathrm{P}_2,\ \mathrm{V}_2,\ \mathrm{T}_2)$ is :

A. $2\,(\mathrm{P}_1\,\mathrm{V}_1 - \mathrm{P}_2\,\mathrm{V}_2)$

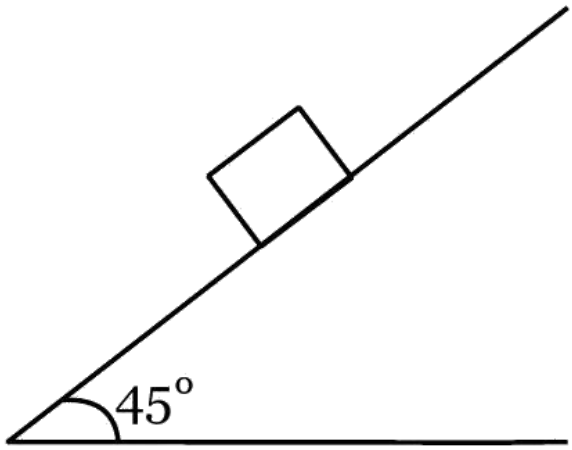
B. $2\,(\mathrm{P}_2\,\mathrm{V}_2 - \mathrm{P}_1\,\mathrm{V}_1)$

C. $2\left(\sqrt{\mathrm{P}_1}\,\mathrm{V}_1 - \sqrt{\mathrm{P}_2}\,\mathrm{V}_2\right)$

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

Question 55 View solution online

Consider a block kept on an inclined plane (inclined at $45°$) as shown in the figure. If the force required to just push it up the incline is 2 times the force required to just prevent it from sliding down, the coefficient of friction between the block and inclined plane (μ) is equal to :



A. 0.25

B. 0.50

C. 0.60

D. 0.33

Question 56 View solution online

The distance between an object and a screen is 100 cm . A lens can produce real image of the object on the screen for two different positions between the screen and the object. The distance between these two positions is 40 cm . If the power of the lens is close to $\left(\frac{N}{100}\right)D$ where N is an integer, 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.

CHAPTER 06 / PHYSICS

System of Particles and Rotational Motion

Questions 57-78 / 22 selected / 7.3% practice weight / Focus first

Topics to prioritise in this collection

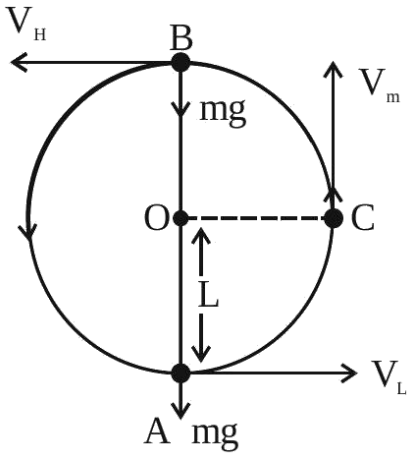
- Momentum and rotation: 5 questions / 22.7% of this chapter
- Rotational dynamics: 4 questions / 18.2% of this chapter
- Torque and angular-momentum relations: 3 questions / 13.6% of this chapter
- Moment of inertia: 2 questions / 9.1% of this chapter
- Angular momentum conservation in an inelastic rod collision: 1 question / 4.5% of this chapter
- Angular speed of a pivoted rod from rotational energy conservation: 1 question / 4.5% of this chapter
- Collisions: 1 question / 4.5% of this chapter
- Conservation of linear momentum during fragmentation of a body: 1 question / 4.5% of this chapter
- Energy conservation for coupled translating masses and a rotating pulley: 1 question / 4.5% of this chapter
- Flywheel dynamics and moment of inertia: 1 question / 4.5% of this chapter
- Rotation and equilibrium: 1 question / 4.5% of this chapter
- Rotational inertia of a pulley from an Atwood-machine acceleration: 1 question / 4.5% of this chapter

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

---

Question 57 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. $3:2$

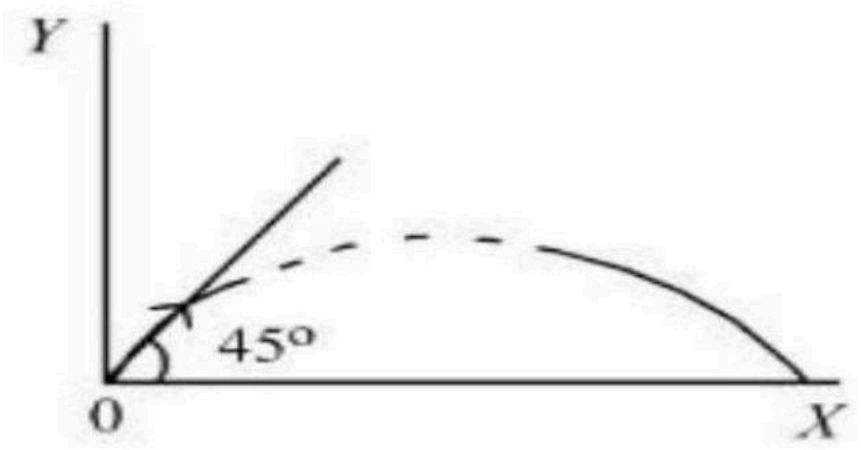
B. $5:1$

C. $2:5$

D. $1:5$

Question 58 View solution online

A particle of mass 100 g is projected at time $t = 0$ with a speed $20\ \text{ms}^{-1}$ at an angle $45°$ to the horizontal as given in the figure. The magnitude of the angular momentum of the particle about the starting point at time $t = 2\ \text{s}$ is found to be $\sqrt{K}\text{kgm}^2/\text{s}$. The value of K is .
(Take $g = 10\ \text{ms}^{-2}$)



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

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. $100\ \text{N}$

B. 90 N

C. $75\ \text{N}$

D. 70 N

Question 60 View solution online

γ_A is the specific heat ratio of monoatomic gas A having 3 translational degrees of freedom. γ_B is the specific heat ratio of polyatomic gas B having 3 translational, 3 rotational degrees of freedom and 1 vibrational mode. If $\frac{\gamma_A}{\gamma_B} = \left(1 + \frac{1}{n}\right)$, 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 61 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 ___ ms^{-1}. (Take $g = 10\ ms^{-2}$)

Numerical answer: _____

Enter the requested integer (0 decimal places).

Question 62 View solution online

A string of area of cross-section $4\ mm^2$ 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 $5\ m/s$ 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 $10^{11}\ N/m^2$ and $g = 10\ m/s^2$)

Numerical answer: _____

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

Question 63 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 $g = 9.8\ m/s^2$)

A. 97 N

B. 9.8 N

C. 8.82 N

D. 17.8 N

Question 64 View solution online

A stone of mass m , tied to a string is being whirled in a vertical circle with a uniform speed. The tension in the string is :

A. the same throughout the motion

B. minimum at the highest position of the circular path

C. minimum at the lowest position of the circular path

D. minimum when the rope is in the horizontal position

Question 65 View solution online

Two masses m and 2m are connected by a light string going over a pulley (disc) of mass 30m with radius $r = 0.1\ \mathrm{m}$. The pulley is mounted in a vertical plane and it is free to rotate about its axis. The 2m mass is released from rest and its speed when it has descended through a height of 3.6 m is _____ m/s. (Assume string does not slip and $g = 10\ \mathrm{m/s^2}$)

Numerical answer: _____

Enter an integer. Use the units and scaling requested in the question.

Question 66 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 .



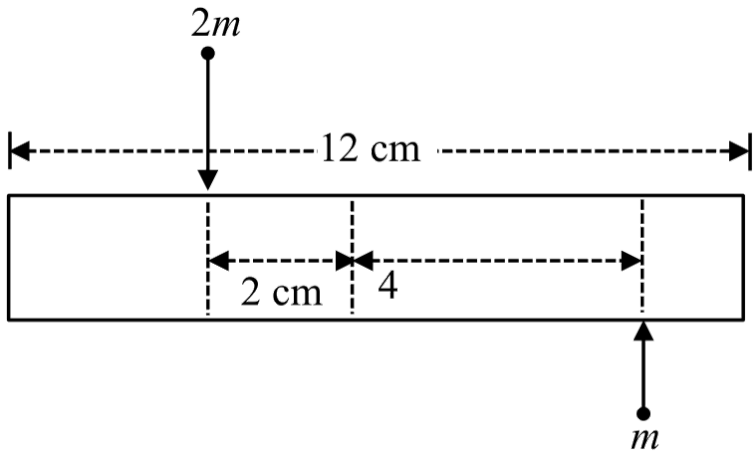
Numerical answer: _____

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

Question 67

View solution online

A uniform bar of length 12 cm and mass $20m$ lies on a smooth horizontal table. Two point masses m and $2m$ are moving in opposite directions with same speed of v and in the same plane as the bar, as shown in figure. These masses strike the bar simultaneously and get stuck to it. After collision the entire system is rotating with angular frequency ω. The ratio of v and ω is :



A. 33

B. $2\sqrt{88}$

C. 66

D. 32

Question 68 View solution online

Two masses 400 g and 350 g are suspended from the ends of a light string passing over a heavy pulley of radius 2 cm. When released from rest the heavier mass is observed to fall 81 cm in 9 s. The rotational inertia of the pulley is

_____ $\mathbf{kg.m^2}$.

$$(\mathbf{g = 9.8\ m/s^2})$$

A. 9.5×10^{-3}

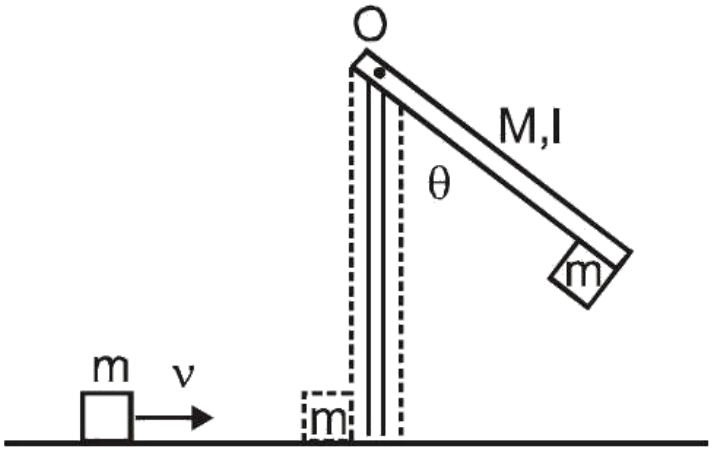
B. 4.75×10^{-3}

C. 1.86×10^{-2}

D. 8.3×10^{-3}

Question 69 View solution online

A block of mass $m = 1\ \mathbf{kg}$ slides with velocity $v = 6\ \mathbf{m/s}$ on a frictionless horizontal surface and collides with a uniform vertical rod and sticks to it as shown. The rod is pivoted about O and swings as a result of the collision making angle θ before momentarily coming to rest. If the rod has mass $\mathbf{M = 2\ kg}$, and length $\mathbf{I = 1\ m}$, the value of θ is approximately : (take $\mathbf{g = 10\ m/s^2}$)



A. $49°$

B. $63°$

C. $69°$

D. $55°$

Question 70 View solution online

A body of mass 14 kg initially at rest explodes and breaks into three fragments of masses in the ratio 2 : 2 : 3. The two pieces of equal masses fly off perpendicular to each other with a speed of 18 m/s each. The velocity of the heavier fragment is

_____

m/s.

A. $10\sqrt{2}$

B. $12\sqrt{2}$

C. 12

D. $24\sqrt{2}$

Question 71 View solution online

A solid sphere of mass 5 kg and radius 10 cm is kept in contact with another solid sphere of mass 10 kg and radius 20 cm. The moment of inertia of this pair of spheres about the tangent passing through the point of contact is

_____

$\mathbf{kg.m^2}$.

A. 0.36

B. 0.72

C. 0.18

D. 0.63

Question 72 View solution online

A fly wheel having mass 3 kg and radius 5 m is free to rotate about a horizontal axis. A string having negligible mass is wound around the wheel and the loose end of the string is connected to a 3 kg mass. The mass is kept at rest initially and released. Kinetic energy of the wheel when the mass descends by 3 m is_____$J.\left(\mathbf{g}=\mathbf{10\ m/s^2}\right)$

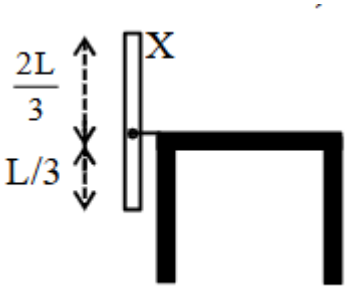
Numerical answer: _____

Enter an integer. Use the units and scaling requested in the question.

Question 73

View solution online

A thin uniform rod (X) of mass M and length L is pivoted at a height $\left(\frac{L}{3}\right)$ as shown in the figure. The rod is allowed to fall from a vertical position and lie horizontally on the table. The angular velocity of this rod when it hits the table top, is



A. $\sqrt{\frac{3}{2}\frac{g}{L}}$

B. $\frac{3}{\sqrt{2}}\sqrt{\frac{g}{L}}$

C. $\frac{1}{\sqrt{2}}\sqrt{\frac{g}{L}}$

D. $\sqrt{\frac{3g}{L}}$

Question 74

View solution online

Two small balls with masses m and 2m are attached to both ends of a rigid rod of length d and negligible mass. If angular momentum of this system is L about an axis (A) passing through its centre of mass and perpendicular to the rod then angular velocity of the system about A is :

A. $\frac{3}{2}\frac{L}{md^2}$

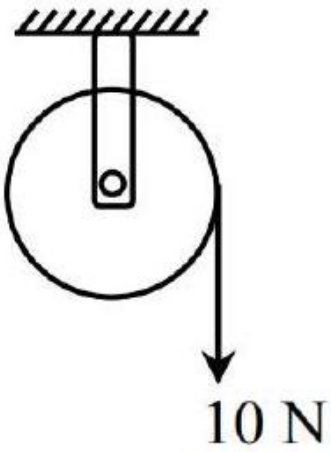
B. $\frac{2L}{md^2}$

C. $\frac{4}{3}\frac{L}{md^2}$

D. $\frac{2L}{5md^2}$

Question 75

View solution online



A wheel of radius 0.2 m rotates freely about its center when a string that is wrapped over its rim is pulled by force of 10 N as shown in figure. The established torque produces an angular acceleration of 2rad/s^2. Moment of inertia of the wheel is kgm^2.
(Acceleration due to gravity $= 10\ \text{m/s}^2$)

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

Question 77 View solution online

A cord is wound round the circumference of wheel of radius r. The axis of the wheel is horizontal and the moment of inertia about it is I. A weight mg is attached to the cord at the end. The weight falls from rest. After falling through a distance ' h ', the square of angular velocity of wheel will be:

A. $\frac{2gh}{I+mr^2}$

B. 2 gh

C. $\frac{2mgh}{I+2mr^2}$

D. $\frac{2mgh}{I+mr^2}$

Question 78

View solution online

The moment of inertia of a square loop made of four uniform solid cylinders, each having radius R and length $\mathbf{L(R < L)}$ about an axis passing through the mid points of opposite sides, is (Take the mass of the entire loop as M) :

A. $\frac{3}{8}\mathrm{MR}^2+\frac{7}{12}\mathrm{ML}^2$

B. $\frac{3}{4}MR^2+\frac{1}{6}ML^2$

C. $\frac{3}{4}MR^2+\frac{7}{12}ML^2$

D. $\frac{3}{8}\mathrm{MR}^2+\frac{1}{6}\mathrm{ML}^2$

CHAPTER 07 / PHYSICS

Gravitation

Questions 79-79 / 1 selected / 0.3% practice weight / Consolidate

Topics to prioritise in this collection

- Gravitational potential energy: 1 question / 100.0% of this chapter

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

Question 79

View solution online

Given below are two statements : one is labelled as Assertion A and the other is labelled as Reason RAssertion A : The kinetic energy needed to project a body of mass m from earth surface to infinity is $\frac{1}{2}mgR$, where R is the radius of earth.Reason $\mathbf{R}$: The maximum potential energy of a body is zero when it is projected to infinity from earth surface.In the light of the above statements, choose the correct answer from the option given below

A. A False but $\mathbf{R}$ is true

B. Both $\mathbf{A}$ and $\mathbf{R}$ are true and $\mathbf{R}$ is the correct explanation of $\mathbf{A}$

C. $\mathbf{A}$ is true but $\mathbf{R}$ is false

D. Both $\mathbf{A}$ and $\mathbf{R}$ are true but $\mathbf{R}$ is NOT the correct explanation of $\mathbf{A}$

CHAPTER 08 / PHYSICS

Mechanical Properties of Solids

Questions 80-90 / 11 selected / 3.7% practice weight / Focus first

Topics to prioritise in this collection

- Elasticity: 8 questions / 72.7% of this chapter
- Longitudinal strain: 1 question / 9.1% of this chapter
- Stress-strain relation in a solid: 1 question / 9.1% of this chapter
- Young's modulus: 1 question / 9.1% of this chapter

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

Question 80 View solution online

Two wires A and B made of different materials of length 6.0 cm and 5.4 cm, respectively and area of cross sections $3.0 \times 10^{-5}\ \mathrm{m}^2$ and $4.5 \times 10^{-5}\ \mathrm{m}^2$, respectively are stretched by the same magnitude under a given load. The ratio of the Young's modulus of A to that of B is x:3. The value of x is _____.

A. 1

B. 4

C. 2

D. 5

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 $\mathrm{P} \times 10^{11}\mathrm{Nm}^{-2}$, where the value of P is : $\left(\text{Take } \mathrm{g} = 3\pi\ \mathrm{m/s^2}\right)$

A. 5

B. 10

C. 25

D. 2.5

Question 82 View solution online

One end of a metal wire is fixed to a ceiling and a load of 2 kg hangs from the other end. A similar wire is attached to the bottom of the load and another load of 1 kg hangs from this lower wire. Then the ratio of longitudinal strain of upper wire to that of the lower wire will be .
[Area of cross section of wire $= 0.005\ \mathrm{cm}^2$, $\mathrm{Y} = 2 \times 10^{11}\mathrm{Nm}^{-2}$ and $\mathrm{g} = 10\ \mathrm{ms}^{-2}$]

Numerical answer: _____

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

Question 83 View solution online

A uniform heavy rod of mass 20 kg . Cross sectional area $0.4\ \mathrm{m}^2$ 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 $\mathrm{x} \times 10^{-9}\ \mathrm{m}$. The value of x is .
:(Given. Young's modulus $\mathrm{Y} = 2 \times 10^{11}\mathrm{Nm}^{-2}$ and $\mathrm{g} = 10\ \mathrm{ms}^{-2}$)

Numerical answer: _____

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

Question 84 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. $f = \frac{1}{2\pi}\sqrt{\frac{YL}{mA}}$

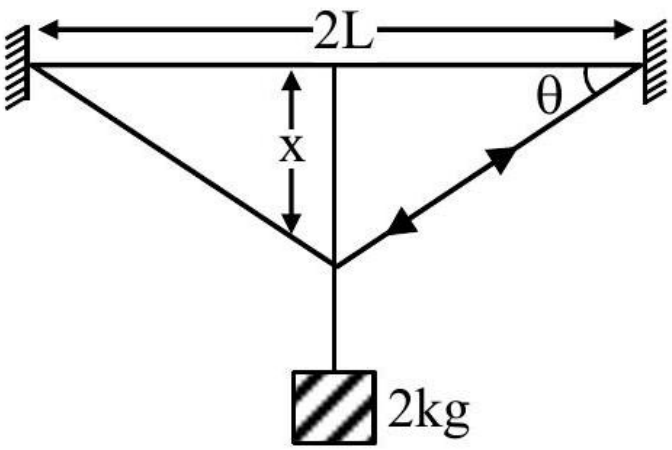
D. $f = \frac{1}{2\pi}\sqrt{\frac{mA}{YL}}$

Question 85 View solution online

A wire of cross sectional area A, modulus of elasticity $2 \times 10^{11} \mathrm{Nm}^{-2}$ and length 2 m is stretched between two vertical rigid supports. When a mass of 2 kg is suspended at the middle it sags lower from its original position making angle $\theta = \frac{1}{100}$ radian on the points of support. The value of A is

$\times 10^{-4}\ \mathrm{m}^2$ (consider $\mathrm{x} \ll \mathrm{L}$).

(given : $\mathrm{g} = 10\ \mathrm{m/s}^2$)



Numerical answer: _____

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

Question 86 View solution online

A wire of length ' L ' and radius ' r ' is clamped rigidly at one end. When the other end of the wire is pulled by a force f , its length increases by ' ℓ '. Another wire of same material of length ' 2 L ' and radius ' $2r$ ' is pulled by a force ' $2f$ '. Then the increase in its length will be :

A. 2ℓ

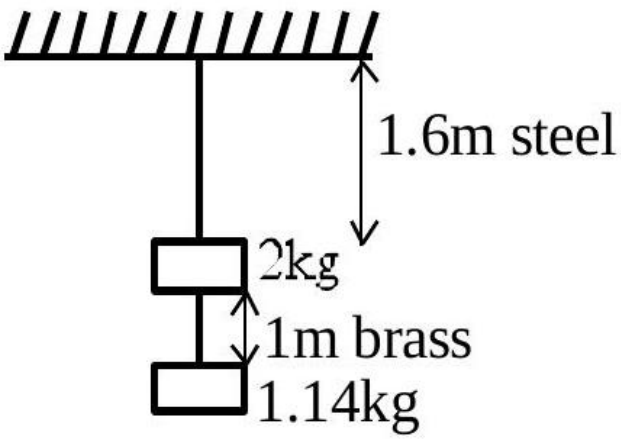
B. ℓ

C. 4ℓ

D. $\ell/2$

Question 87 View solution online

Two wires each of radius 0.2 cm and negligible mass, one made of steel and other made of brass are loaded as shown in the figure.The elongation of the steel wire is $\times 10^{-6}\ \mathbf{m}$. [Young ' s modulus for steel $= 2 \times 10^{11} \mathbf{Nm}^{-2}$ and $\mathbf{g} = 10\ \mathbf{ms}^{-2}$]



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

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 $\times 10^{14}\ \mathbf{Hz}$.

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

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

Numerical answer: _____

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

Question 90

View solution online

Match List-I with List-II.

List-I	List-II
(a) Angular momentum	(i) $[ML^2T^{-1}]$
(b) Torque	(ii) $[ML^2T^{-2}]$
(c) Stress	(iii) $[ML^{-1}T^{-2}]$
(d) Pressure gradient	(iv) $[ML^{-2}T^{-2}]$

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 - II, C - I, D - III

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

CHAPTER 09 / PHYSICS

Mechanical Properties of Fluids

Questions 91-92 / 2 selected / 0.7% practice weight / Consolidate

Topics to prioritise in this collection

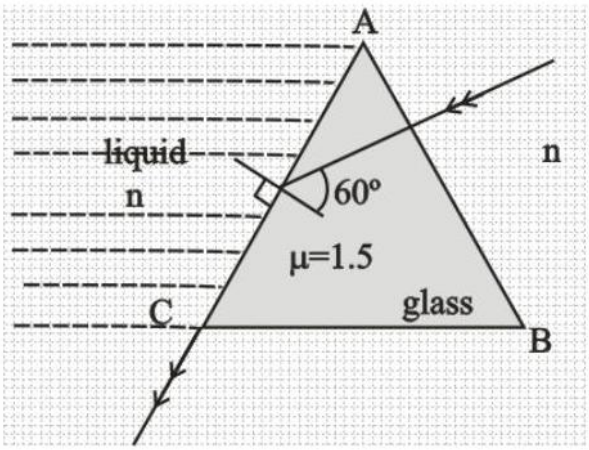
- Fluid mechanics: 1 question / 50.0% of this chapter
- Viscosity: 1 question / 50.0% of this chapter

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

Question 91

View solution online

In the given figure, the face AC of the equilateral prism is immersed in a liquid of refractive index 'n'. For incident angle $60°$ at the side AC, the refracted light beam just grazes along face AC. The refractive index of the liquid $n = \frac{\sqrt{x}}{4}$. The value of x is .
(Given refractive index of glass $= 1.5$)



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

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

CHAPTER 10 / PHYSICS

Thermal Properties of Matter

Questions 93-98 / 6 selected / 2.0% practice weight / Next

Topics to prioritise in this collection

- Calorimetry: 2 questions / 33.3% of this chapter
- Heat transfer: 2 questions / 33.3% of this chapter
- Thermal properties: 2 questions / 33.3% of this chapter

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

Question 93 View solution online

A thin rod having a length of 1 m and area of cross-section $3 \times 10^{-6}\ \mathrm{m}^2$ is suspended vertically from one end. The rod is cooled from $210^{\circ}\mathrm{C}$ to $160^{\circ}\mathrm{C}$. After cooling, a mass M is attached at the lower end of the rod such that the length of rod again becomes 1 m . Young's modulus and coefficient of linear expansion of the rod are $2 \times 10^{11}\ \mathrm{N\,m^{-2}}$ and $2 \times 10^{-5}\ \mathrm{K^{-1}}$, respectively. The value of M is kg. (Take $\mathrm{g} = 10\ \mathrm{m\,s^{-2}}$)

Numerical answer: _____

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

Question 94 View solution online

Two moles a monoatomic gas is mixed with six moles of a diatomic gas. The molar specific heat of the mixture at constant volume is :

A. $\frac{9}{4}R$

B. $\frac{7}{4}R$

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

D. $\frac{5}{2}\mathrm{R}$

Question 95 View solution online

Pressure of an ideal gas, contained in a closed vessel, is increased by 0.4% when heated by $1°C$. Its initial temperature must be :

A. $25°C$

B. 2500 K

C. 250 K

D. $250°C$

Question 96 View solution online

When a gas filled in a closed vessel is heated by raising the temperature by $1°C$, its pressure increase by 0.4%. The initial temperature of the gas is K.

Numerical answer: _____

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

Question 97 View solution online

For an ideal gas the instantaneous change in pressure ' p ' with volume ' v ' is given by the equation $\frac{dp}{dv} = -ap$. If $p = p_0$ at $v = 0$ is the given boundary condition, then the maximum temperature one mole of gas can attain is :(Here R is the gas constant)

A. $\frac{p_0}{aeR}$

B. $\frac{ap_0}{eR}$

C. infinity

D. $0°C$

Question 98 View solution online

The specific heat at constant pressure of a real gas obeying $PV^2 = RT$ equation is :

A. $C_V + R$

B. $\frac{R}{3} + C_V$

C. R

D. $C_V + \frac{R}{2V}$

CHAPTER 11 / PHYSICS

Thermodynamics

Questions 99-111 / 13 selected / 4.3% practice weight / Focus first

Topics to prioritise in this collection

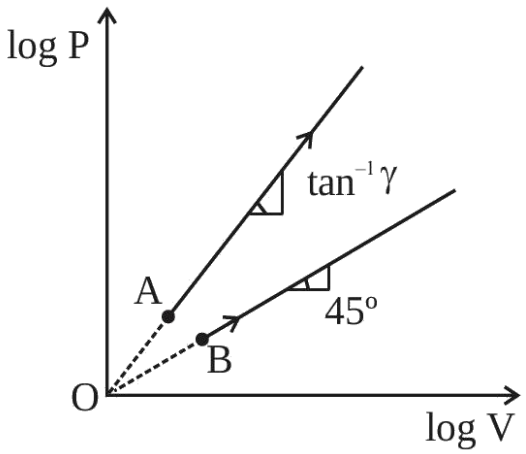
- Thermodynamic processes: 8 questions / 61.5% of this chapter
- First law of thermodynamics: 5 questions / 38.5% of this chapter

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

---

Question 99 View solution online

Two thermodynamical process are shown in the figure. The molar heat capacity for process A and B are C_A and C_B. The molar heat capacity at constant pressure and constant volume are represented by $\mathbf{C_P}$ and $\mathbf{C_V}$, respectively. Choose the correct statement.



A. $C_B = \infty, C_A = 0$

B. $C_A = 0$ and $C_B = \infty$

C. $C_P > C_B > C_A > C_V$

D. $C_A > C_P > C_V$

Question 100 View solution online

A sample of gas with $\gamma = 1.5$ is taken through an adiabatic process in which the volume is compressed from $1200\ cm^3$ to $300\ cm^3$. If the initial pressure is 200 kPa . The absolute value of the workdone by the gas in the process = J.

Numerical answer: _____

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

Question 101 View solution online

A diatomic gas $(\gamma = 1.4)$ does 200 J of work when it is expanded isobarically. The heat given to the gas in the process is :

A. 850 J

B. 800 J

C. 600 J

D. 700 J

Question 102 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 103 View solution online

Match List-I with List-II.

List-I	List-II
(a) Isothermal Process	(i) No change in internal energy
(b) Adiabatic Process	(ii) Work done by the gas decreases internal energy
(c) Isochoric Process	(iii) No work is done on or by the gas
(d) Isobaric Process	(iv) The heat absorbed goes partly to increase internal energy and partly to do work

Choose the correct answer from the options given below:

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

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

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

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

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 Process	I.	Work done by the gas decreases internal energy
B.	Adiabatic Process	II.	No change in internal energy
C.	Isochoric Process	III.	The heat absorbed goes partly to increase internal energy and partly to do work
D.	Isobaric Process	IV.	No work is done on or by the gas

Choose the correct answer from the options given below:

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

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

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

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

Question 106

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)

Question 107 View solution online

Match List-I with List-II.

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

Where: ΔQ = Heat supplied, ΔW = Work done by the system, ΔU = Change in internal energy, P = Pressure of the system, ΔV = Change in volume of the system.

Choose the correct answer from the options given below:

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

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

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

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

Question 108 View solution online

The initial pressure and volume of an ideal gas are $\mathbf{P_0}$ and $\mathbf{V_0}$. The final pressure of the gas when the gas is suddenly compressed to volume $\frac{\mathbf{V_0}}{\mathbf{4}}$ will be : (Given $\gamma =$ ratio of specific heats at constant pressure and at constant volume)Option :}

A. $\mathbf{P_0(4)^{\frac{1}{\gamma}}}$

B. $\mathbf{P_0(4)^{\gamma}}$

C. $\mathbf{P_0}$

D. $\mathbf{4P_0}$

Question 109 View solution online

An ideal gas goes from an initial state to final state. During the process, the pressure of gas increases linearly with temperature (A) The work done by gas during the process is zero. (B) The heat added to gas is different from change in its internal energy (C) The volume of the gas is increased (D) The internal energy of the gas is increased (E) The process is isochoric (constant volume process)Choose the correct answer from the options given below :-

A. A, B, C, D Only

B. A, D, E Only

C. E Only

D. A, C Only

Question 110 View solution online

An ideal gas at an initial temperature $300K$ is compressed adiabatically ($\gamma = 1.4$) to its initial volume. The gas is then expanded isobarically to double its volume. Then the final temperature of the gas rounded off to nearest integer is.

Numerical answer: _____

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

Question 111 View solution online

Given below are two statements. One is labelled as Assertion (A) and the other is labelled as Reason (R).Assertion (A) : With the increase in the pressure of an ideal gas, the volume falls off more rapidly in an isothermal process in comparison to the adiabatic process.Reason (R) : In isothermal process, $\mathbf{PV} =$ constant, while in adiabatic process $\mathbf{PV}^{\gamma} =$ constant. Here γ is the ratio of specific heats, P is the pressure and V is the volume of the ideal gas.In the light of the above statements, choose the correct answer from the options given below :

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

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

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

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

CHAPTER 12 / PHYSICS

Kinetic Theory

Questions 112-117 / 6 selected / 2.0% practice weight / Next

Topics to prioritise in this collection

- Kinetic molecular theory: 3 questions / 50.0% of this chapter
- Degrees of freedom and equipartition: 1 question / 16.7% of this chapter
- Ideal gas law: 1 question / 16.7% of this chapter
- Kinetic Theory of Gases: 1 question / 16.7% of this chapter

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

Question 112 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 113 View solution online

The volume V of an enclosure contains a mixture of three gases, 16 g of oxygen, 28 g of nitrogen and 44 g of carbon dioxide at absolute temperature T. Consider R as universal gas constant. The pressure of the mixture of gases is :

A. $\frac{88RT}{V}$

B. $\frac{3RT}{V}$

C. $\frac{5}{2}\frac{\mathrm{RT}}{\mathrm{V}}$

D. $\frac{4RT}{V}$

Question 114 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 115 View solution online

If one mole of the polyatomic gas is having two vibrational modes and β is the ratio of molar specific heats for polyatomic gas $\left(\beta = \frac{C_P}{C_V}\right)$ then the value of β is :

A. 1.02

B. 1.2

C. 1.25

D. 1.35

Question 116 View solution online

Match List-I with List-II.

List-I	List-II
(A) Heat capacity of body	(II) $\mathrm{J\,K^{-1}}$
(B) Specific heat capacity of body	(III) $\mathrm{J\,kg^{-1}\,K^{-1}}$
(C) Latent heat	(I) $\mathrm{J\,kg^{-1}}$
(D) Thermal conductivity	(IV) $\mathrm{J\,m^{-1}\,K^{-1}\,s^{-1}}$

Choose the correct answer from the options given below:

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

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

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

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

Question 117 View solution online

The internal energy (U), pressure (P) and volume (V) of an ideal gas are related as $U = 3PV + 4$. The gas is:

A. polyatomic only

B. monoatomic only

C. either monoatomic or diatomic

D. diatomic only.

CHAPTER 13 / PHYSICS

Oscillations

Questions 118-125 / 8 selected / 2.7% practice weight / Next

Topics to prioritise in this collection

- Simple harmonic motion: 3 questions / 37.5% of this chapter
- Oscillatory motion: 2 questions / 25.0% of this chapter
- Oscillations: 1 question / 12.5% of this chapter
- Restoring-force model and time period: 1 question / 12.5% of this chapter
- Spring-mass oscillation: 1 question / 12.5% of this chapter

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

Question 118 View solution online

A cylindrical block of mass M and area of cross section A is floating in a liquid of density ρ and with its axis vertical. When depressed a little and released the block starts oscillating. The period of oscillation is _____.

A. $2\pi\sqrt{\frac{\mathrm{M}}{\rho \mathrm{Ag}}}$

B. $\pi\sqrt{\frac{2\mathrm{M}}{\rho \mathrm{Ag}}}$

C. $\pi\sqrt{\frac{\rho \mathrm{A}}{\mathrm{Mg}}}$

D. $2\pi\sqrt{\frac{\rho \mathrm{A}}{\mathrm{Mg}}}$

Question 119 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 ' $\mathrm{L}/2$ ' 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

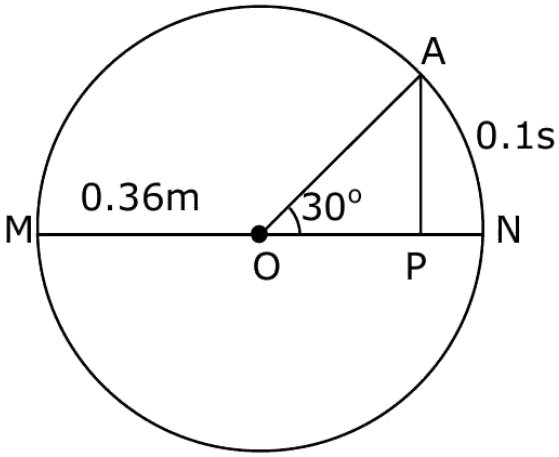
B. 0.37

C. 0.57

D. 0.77

Question 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

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 $\mathrm{xm}(\mathrm{x}<2)$ from the wall. the speed of the block will be :

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

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

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

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

Question 122 View solution online

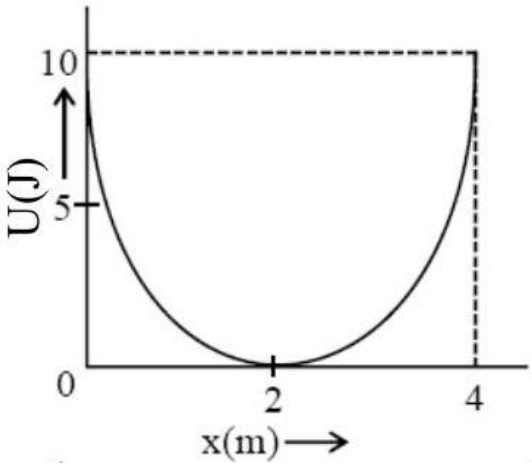
A mass 0.9 kg , attached to a horizontal spring, executes SHM with an amplitude A_1. When this mass passes through its mean position, then a smaller mass of 124 g is placed over it and both masses move together with amplitude A_2. If the ratio $\frac{A_1}{A_2}$ is $\frac{\alpha}{\alpha-1}$, then the 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 123 View solution online

A mass of 5 kg is connected to a spring. The potential energy curve of the simple harmonic motion executed by the system is shown in the figure. A simple pendulum of length 4 m has the same period of oscillation as the spring system. What is the value of acceleration due to gravity on the planet where these experiments are performed?



A. $10\ m/s^2$

B. $5\ m/s^2$

C. $4\ m/s^2$

D. $9.8\ m/s^2$

Question 124 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 $\mathbf{g = 10\ m/s^2}$)

Numerical answer: _____

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

Question 125 View solution online

Displacement of a wave is expressed as $x(t) = 5\cos\left(628t + \frac{\pi}{2}\right)m$. The wavelength of the wave when its velocity is $\mathbf{300\ m/s}$ is :

A. 5 m

B. 3 m

C. 0.5 m

D. 0.33 m

CHAPTER 14 / PHYSICS

Waves

Questions 126-133 / 8 selected / 2.7% practice weight / Next

Topics to prioritise in this collection

- Wave motion: 8 questions / 100.0% of this chapter

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

Question 126 View solution online

A fringe width of 6 mm was produced for two slits separated by 1 mm apart. The screen is placed 10 m away. The wavelength of light used is ' x ' nm . 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 127 View solution online

The equation of wave is given by
$Y = 10^{-2} \sin 2\pi \left(160t - 0.5x + \frac{\pi}{4}\right)$
Where x and Y are in m and t in s. The speed of the wave is kmh^{-1}

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

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 130 View solution online

In a double slit experiment with monochromatic light, fringes are obtained on a screen placed at some distance from the plane of slits. If the screen is moved by $5 \times 10^{-2}\ \mathrm{m}$ towards the slits, the change in fringe width is $3 \times 10^{-3}\ \mathrm{cm}$. If the distance between the slits is 1 mm , then the wavelength of the light will be nm.

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 Young's double slit experiment the two slits are 0.6 mm distance apart. Interference pattern is observed on a screen at a distance 80 cm from the slits. The first dark fringe is observed on the screen directly opposite to one of the slits. The wavelength of light will be nm.

Numerical answer: _____

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

Question 132 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 $\mathrm{n} \times 10^{-5}\ \mathrm{m}$. 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 133 View solution online

A parallel beam of monochromatic light of wavelength $5000\AA$ is incident normally on a single narrow slit of width 0.001 mm . The light is focused by convex lens on screen, placed on its focal plane. The first minima will be formed for the angle of diffraction of (degree).

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 134-140 / 7 selected / 2.3% practice weight / Next

Topics to prioritise in this collection

- Electric fields and forces: 3 questions / 42.9% of this chapter
- Electric field: 2 questions / 28.6% of this chapter
- Electric Charges and Fields: 1 question / 14.3% of this chapter
- Electrostatic charge and fields: 1 question / 14.3% of this chapter

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

---

Question 134 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 135 View solution online

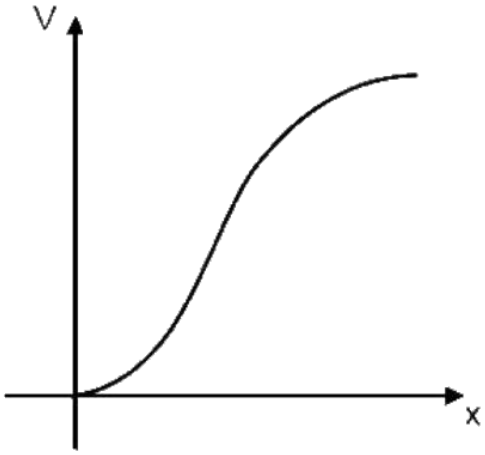
A proton is moving undeflected in a region of crossed electric and magnetic fields at a constant speed of $2 \times 10^5\ \mathrm{ms}^{-1}$. When the electric field is switched off, the proton moves along a circular path of radius 2 cm . The magnitude of electric field is $x \times 10^4\ \mathrm{N/C}$.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

Numerical answer: _____

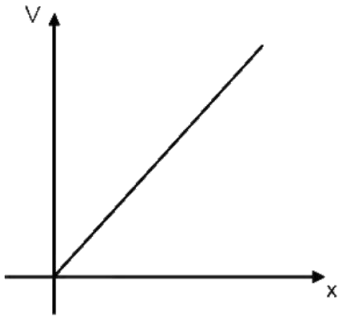
Enter the requested value (an integer; 0 decimal places). Use the units and scaling stated in the question.

Question 136 View solution online

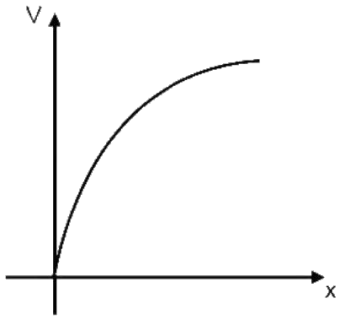
A charge particle of mass m and charge q is released from rest in uniform electric fiel(4) Its graph between velocity (v) and distance (x) will be :



A.

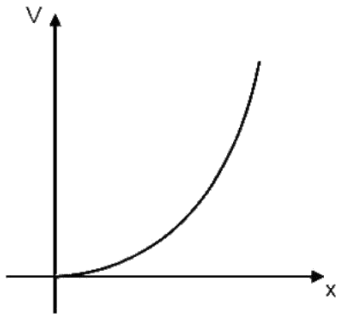


B.



C.

D.



Question 137 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 138 View solution online

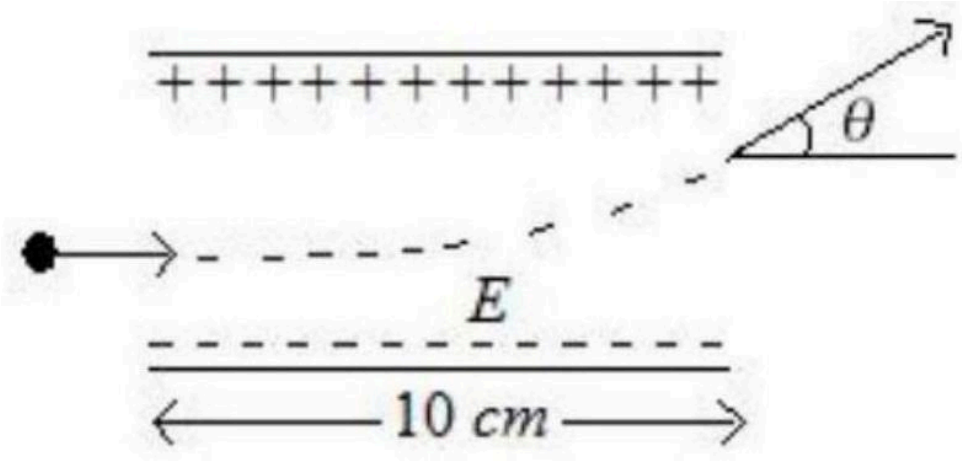
A particle of mass 1 mg and charge q is lying at the mid-point of two stationary particles kept at distance '2 m' when each is carrying same charge 'q'. If the free charged particle is displaced from its equilibrium position through distance 'x' $(\mathbf{x} \ll 1\ \mathbf{m})$. The particle executes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

Numerical answer: _____

Enter the requested integer (0 decimal places).

Question 139 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).

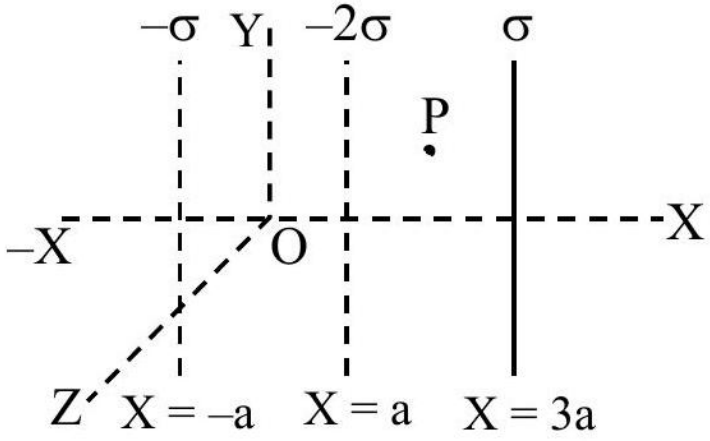


Numerical answer: _____

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

Question 140 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.

CHAPTER 16 / PHYSICS

Electrostatic Potential and Capacitance

Questions 141-145 / 5 selected / 1.7% practice weight / Consolidate

Topics to prioritise in this collection

- Capacitors with dielectrics: 4 questions / 80.0% of this chapter
- Electric potential and capacitance: 1 question / 20.0% of this chapter

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

---

Question 141

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 142 View solution online

A parallel-plate capacitor of capacitance $40\mu\ \mathrm{F}$ is connected to a 100 V power supply. Now the intermediate space between the plates is filled with a dielectric material of dielectric constant $\mathrm{K} = 2$. Due to the introduction of dielectric material, the extra charge and the change in the electrostatic energy in the capacitor, respectively, are -

A. 2 mC and 0.2 J

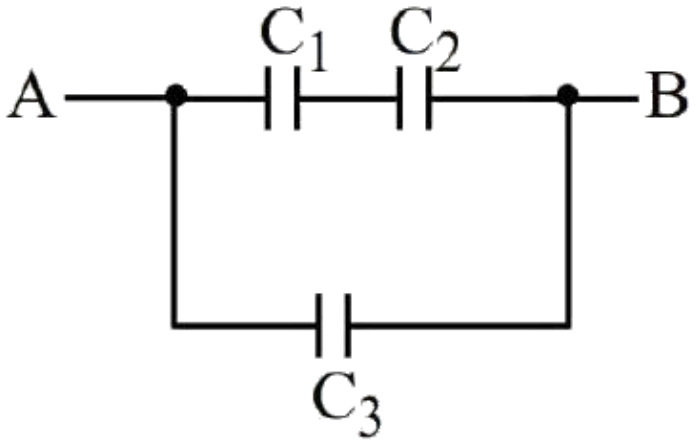
B. 8 mC and 2.0 J

C. 4 mC and 0.2 J

D. 2 mC and 0.4 J

Question 143 View solution online

Three parallel plate capacitors $\mathrm{C_1}, \mathrm{C_2}$ and $\mathrm{C_3}$ each of capacitance $5\mu\ \mathrm{F}$ are connected as shown in figure. The effective capacitance between points A and B , when the space between the parallel plates of $\mathrm{C_1}$ capacitor is filled with a dielectric medium having dielectric constant of 4 , is :



A. $22.5\mu\ \mathrm{F}$

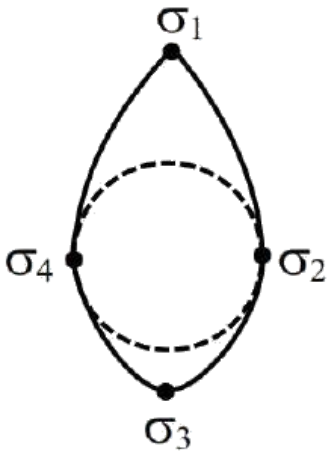
B. $7.5\mu\ \mathrm{F}$

C. $9\mu\ \mathrm{F}$

D. $30\mu\ \mathrm{F}$

Question 144 View solution online

Electric charge is transferred to an irregular metallic disk as shown in figure. If $\sigma_1, \sigma_2, \sigma_3$ and σ_4 are charge densities at given points then, choose the correct answer from the options given below: (A) $\sigma_1 > \sigma_3; \sigma_2 = \sigma_4$ (B) $\sigma_1 > \sigma_2; \sigma_3 > \sigma_4$ (C) $\sigma_1 > \sigma_3 > \sigma_2 = \sigma_4$ (D) $\sigma_1 < \sigma_3 < \sigma_2 = \sigma_4$ (E) $\sigma_1 = \sigma_2 = \sigma_3 = \sigma_4$



A. A, B and C Only

B. A and C Only

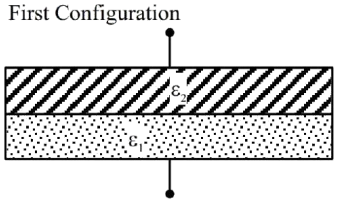
C. D and E Only

D. B and C Only

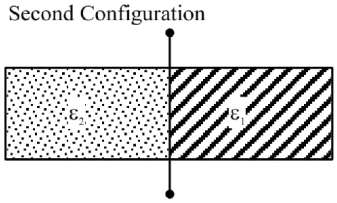
Question 145 View solution online

A parallel plate capacitor is filled equally (half) with two dielectrics of dielectric constant ε_1 and ε_2, as shown in figures. The distance between the plates is d and area of each plate is A . If capacitance in first configuration and second configuration are C_1 and C_2 respectively, then $\frac{C_1}{C_2}$ is :

First Configuration



Second Configuration



A. $\frac{\varepsilon_1\varepsilon_2^2}{(\varepsilon_1+\varepsilon_2)^2}$

B. $\frac{4\varepsilon_1\varepsilon_2}{(\varepsilon_1+\varepsilon_2)^2}$

C. $\frac{\varepsilon_1\varepsilon_2}{\varepsilon_1+\varepsilon_2}$

D. $\frac{\varepsilon_0(\varepsilon_1+\varepsilon_2)}{2}$

CHAPTER 17 / PHYSICS

Current Electricity

Questions 146-191 / 46 selected / 15.3% practice weight / Focus first

Topics to prioritise in this collection

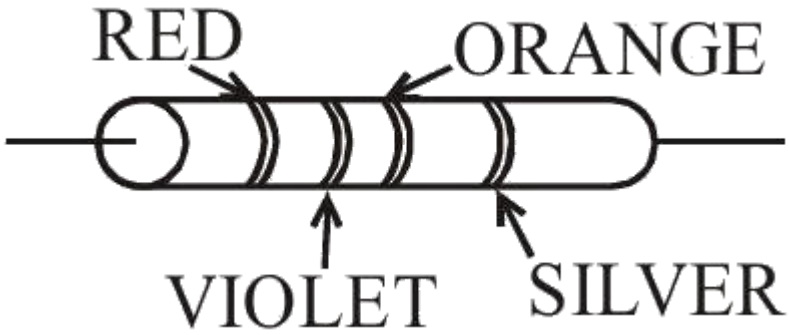
- Electric circuits: 24 questions / 52.2% of this chapter
- Ohm's law: 9 questions / 19.6% of this chapter
- Circuit analysis: 4 questions / 8.7% of this chapter
- Application of circuit laws and resistance relations: 3 questions / 6.5% of this chapter
- Equivalent resistance: 2 questions / 4.3% of this chapter
- Cells in series and parallel: 1 question / 2.2% of this chapter
- Current & Electricity: 1 question / 2.2% of this chapter
- Meter bridge: 1 question / 2.2% of this chapter
- Wheatstone bridge: 1 question / 2.2% of this chapter

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

Question 146

View solution online

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



A. $27\ K\Omega, 20\%$

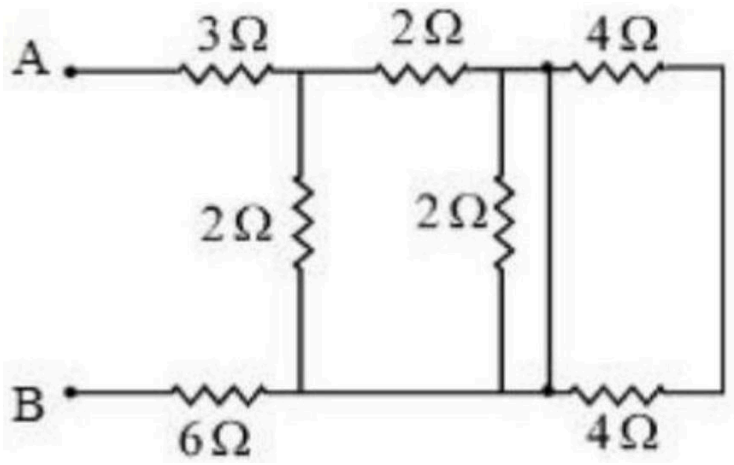
B. $270\ K\Omega, 5\%$

C. $270\ K\Omega, 10\%$

D. $27\ K\Omega, 10\%$

Question 147 View solution online

In the given circuit, the equivalent resistance between the terminal A and B is Ω.

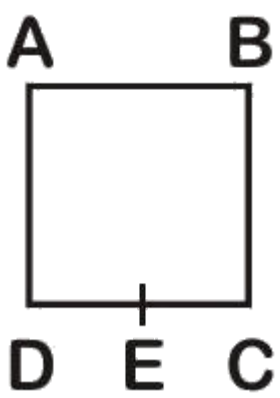


Numerical answer: _____

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

Question 148 View solution online

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

Question 149 View solution online

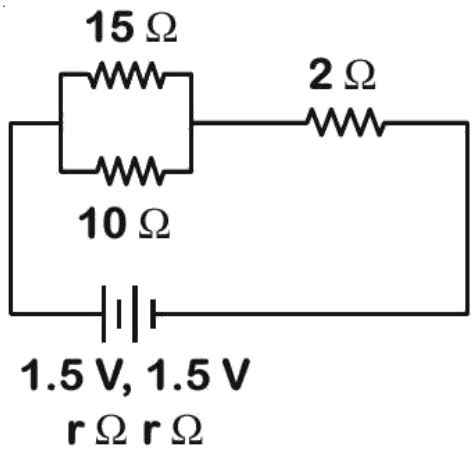
A battery of unknown emf connected to a potentiometer has balancing length 560 cm . If a resistor of resistance 10Ω is connected in parallel with the cell the balancing length change by 60 cm . If the internal resistance of the cell is $\frac{n}{10}\Omega$, the value of ' n ' is

Numerical answer: _____

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

Question 150 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

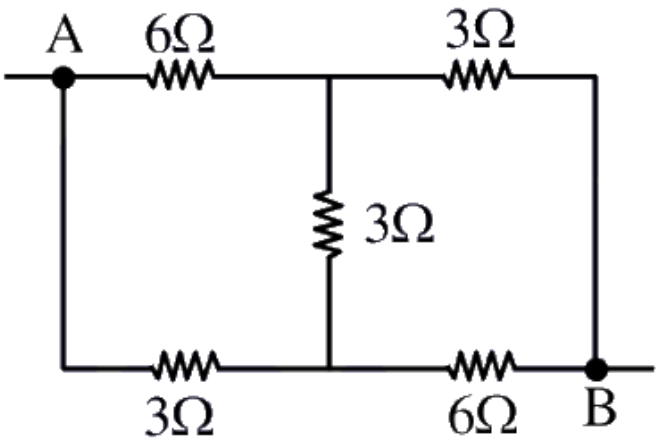
B. 0Ω

C. 1.5Ω

D. 1Ω

Question 151 View solution online

The equivalent resistance between the points A and B in the following circuit is $\frac{x}{5}\Omega$. The value of x is _____.

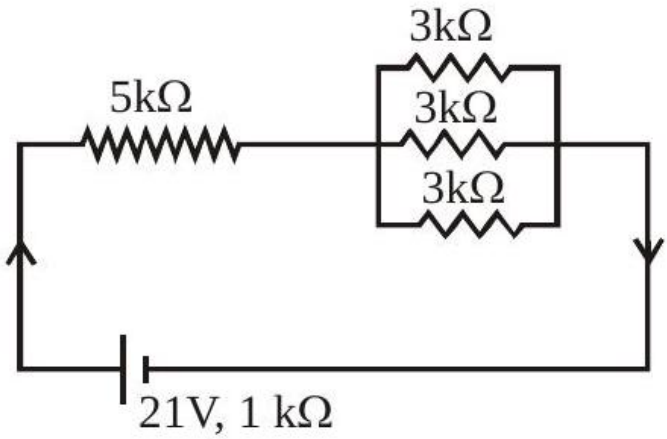


Numerical answer: _____

Enter an integer. Use the units and scaling requested in the question.

Question 152 View solution online

In the figure given, the electric current flowing through the $5k\Omega$ resistor is ' x ' mA .



The value of x to the nearest integer is

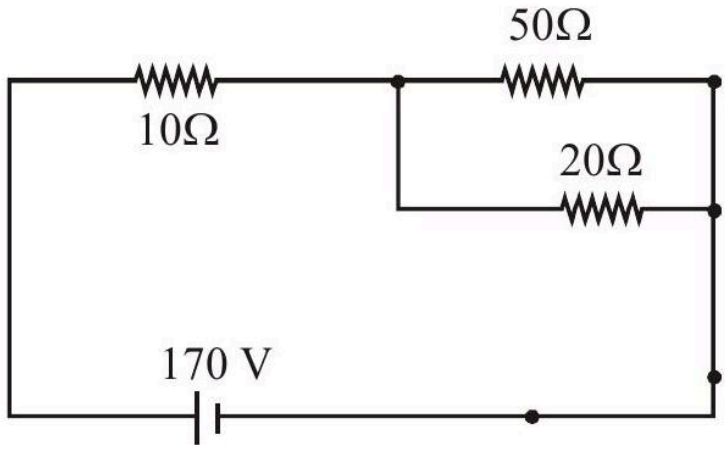
.

Numerical answer: _____

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

Question 153 View solution online

The voltage across the 10Ω resistor in the given circuit is x volt.



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 154 View solution online

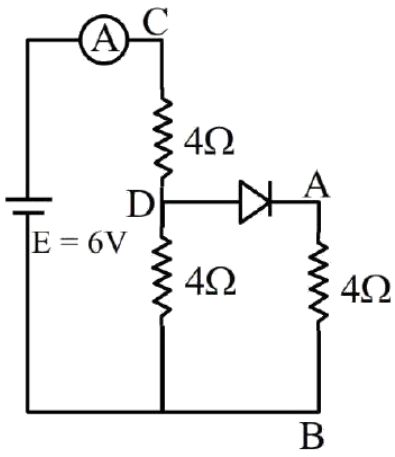
The energy dissipated by a resistor is 10 mJ in 1 s when an electric current of 2 mA flows through it. The resistance is Ω.
(Round off to the Nearest Integer)

Numerical answer: _____

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

Question 155 View solution online

Refer to the circuit diagram given in the figure, which of the following observation are correct?A. Total resistance of circuit is 6Ω.B. Current in Ammeter is 1 AC. Potential across AB is 4 Volts.D. Potential across CD is 4 Volts.E. Total resistance of the circuit is 8Ω.Choose the correct answer from the options given below:



A. A, B and D only

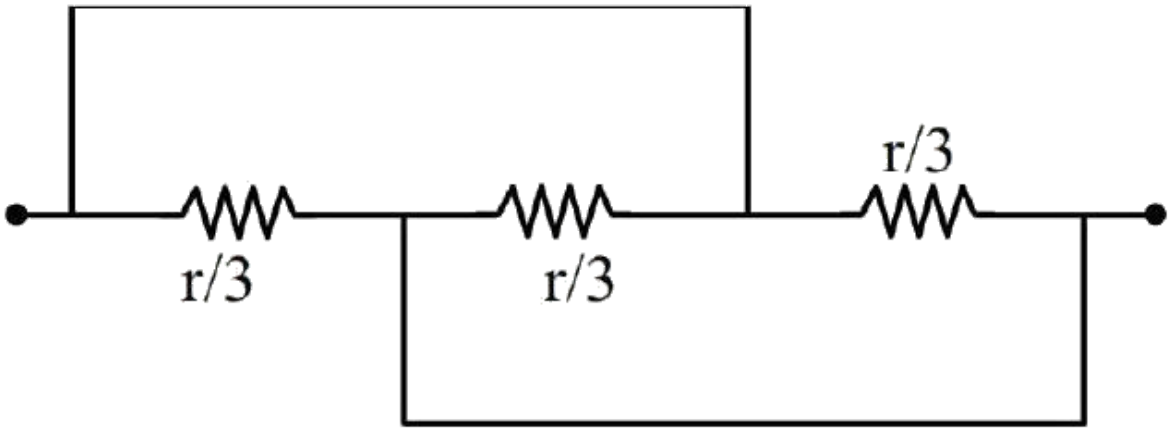
B. A, C and D only

C. B, C and E only

D. A, B and C only

Question 156 View solution online

Find the equivalent resistance between two ends of the following circuit.



A. r

B. $\frac{r}{6}$

C. $\frac{r}{9}$

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

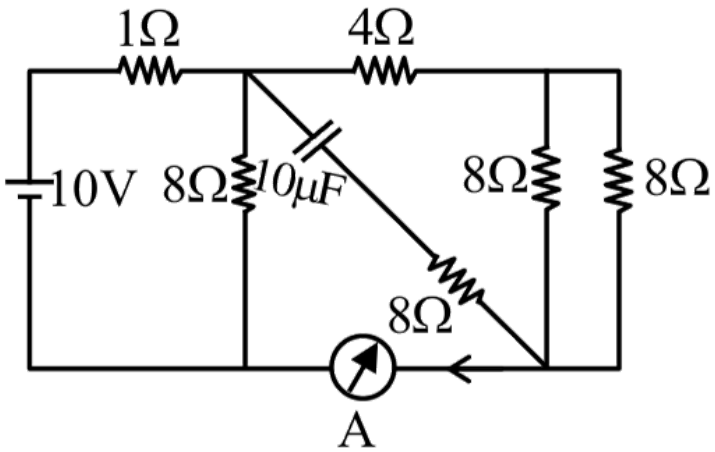
Question 157

View solution online

The reading of the ammeter (A) in steady state in the following circuit (assuming negligible internal resistance of the ammeter) is

_____

A.



A. 2

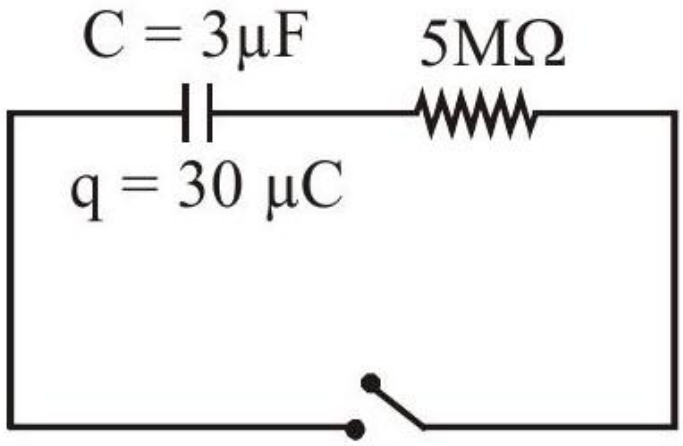
B. 1

C. 1/2

D. 0

Question 158 View solution online

The circuit shown in the figure consists of a charged capacitor of capacity $3\mu\ \mathrm{F}$ and a charge of $30\mu\mathrm{C}$. At time $t = 0$, when the key is closed, the value of current flowing through the $5\mathrm{M}\Omega$ resistor is ' x ' $\mu - \mathrm{A}$. The value of ' x to the nearest integer is .

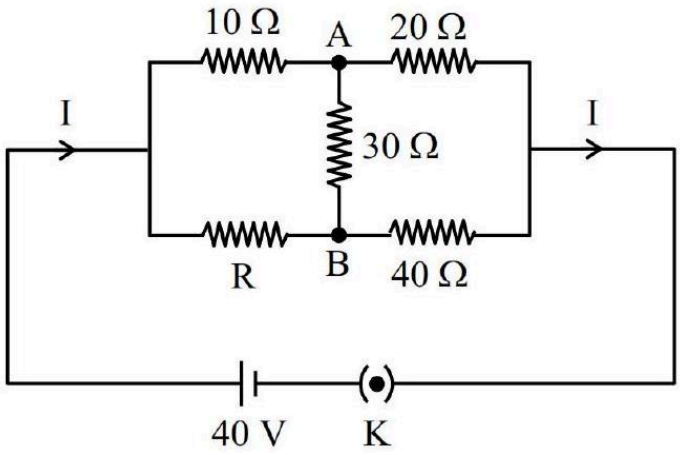


Numerical answer: _____

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

Question 159 View solution online

The value of current I in the electrical circuit as given below, when potential at A is equal to the potential at B, will be A.



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.

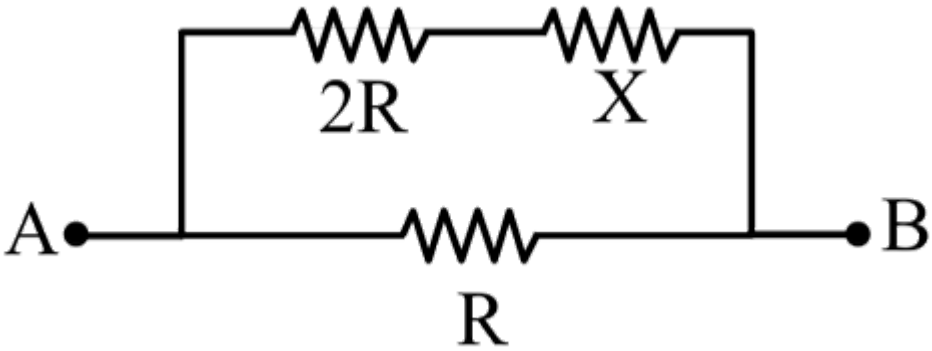
Question 160

View solution online

Two known resistance of $\mathbf{R\Omega}$ and $\mathbf{2R\Omega}$ and and one unknown resistance $\mathbf{X\Omega}$ are connected in a circuit as shown in the figure. If the equivalent resistance between points A and B in the circuit is $\mathbf{X\Omega}$, then the value of X is

_____

$\mathbf{\Omega}$.



A. $(\sqrt{3}-1)\mathbf{R}$

B. R

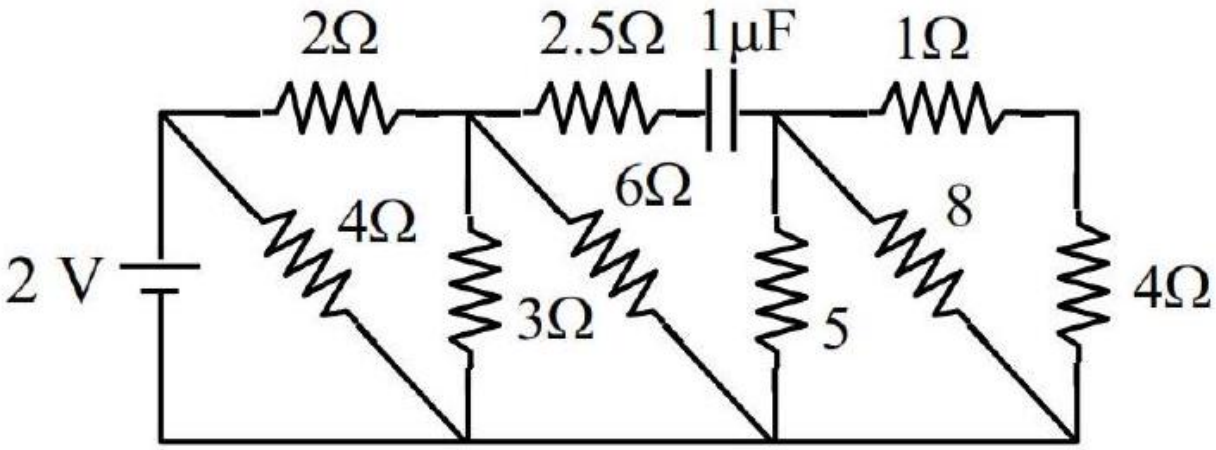
C. $2(\sqrt{3}-1)\mathbf{R}$

D. $(\sqrt{3}+1)\mathbf{R}$

Question 161 View solution online

The net current flowing in the given circuit is

A.



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 162 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 163 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 164 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 165 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

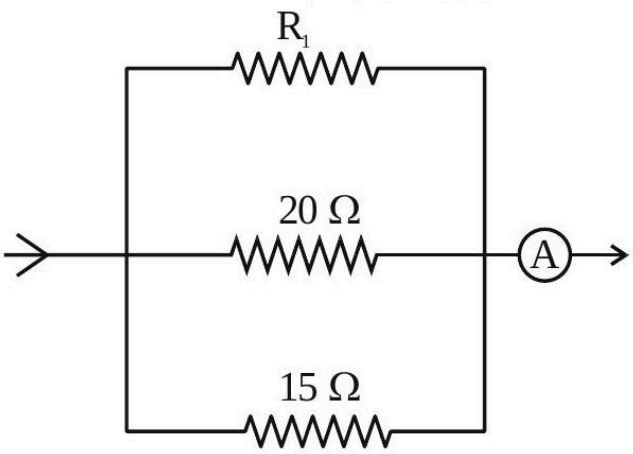
B. 70

C. 66

D. 35

Question 166 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.

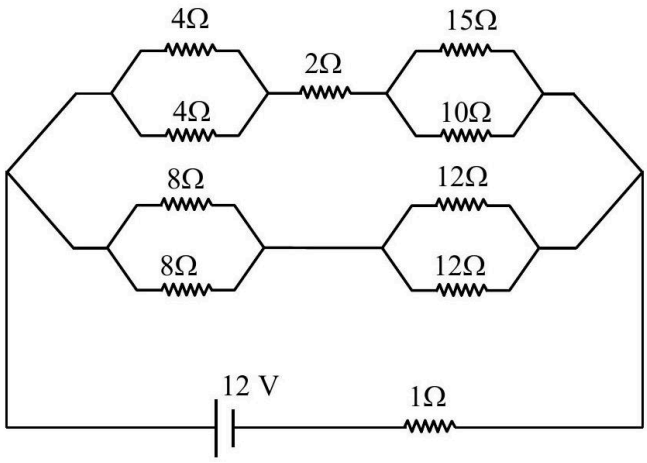


Numerical answer: _____

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

Question 167 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 168 View solution online

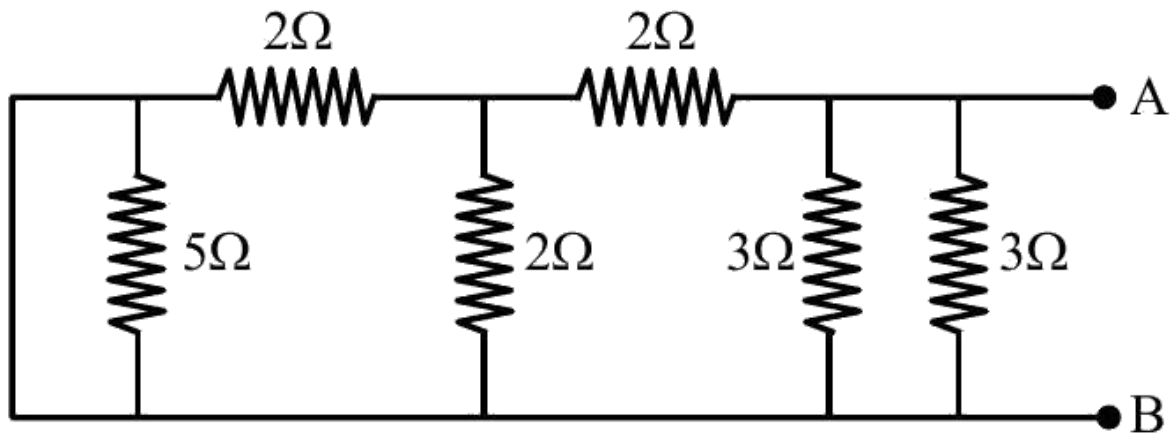
A resistor dissipates 192 J of energy in 1 s when a current of 4A is passed through it. Now, when the current is doubled, the amount of thermal energy dissipated in 5 s in J.

Numerical answer: _____

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

Question 169 View solution online

The equivalent resistance of the given circuit between the terminals A and B is :



A. 0Ω

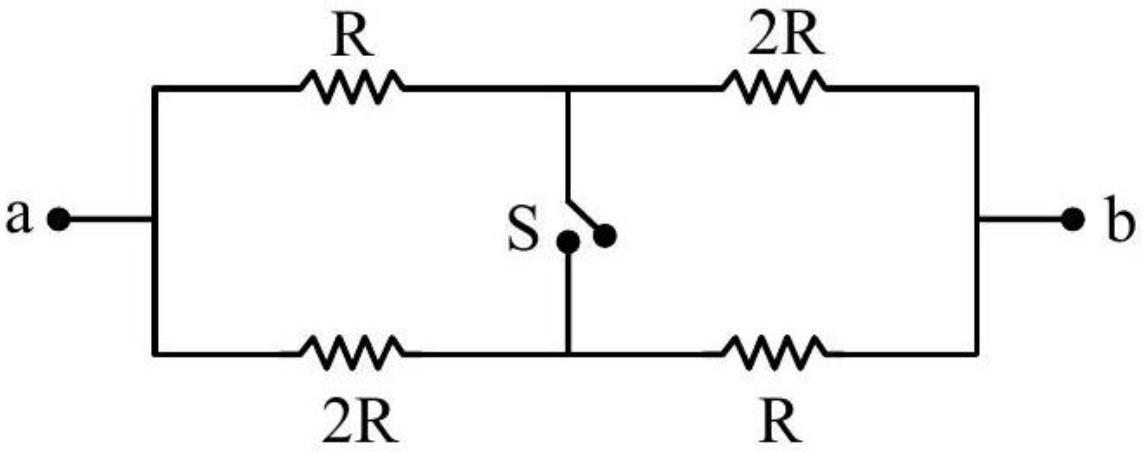
B. 3Ω

C. $\frac{9}{2}\Omega$

D. 1Ω

Question 170 View solution online

The ratio of the equivalent resistance of the network (shown in figure) between the points a and b when switch is open and switch is closed is $x : 8$. 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 171 View solution online

Consider a galvanometer shunted with 5Ω resistance and 2% of current passes through it.What is the resistance of the given galvanometer?

A. 300Ω

B. 344Ω

C. 245Ω

D. 226Ω

Question 172 View solution online

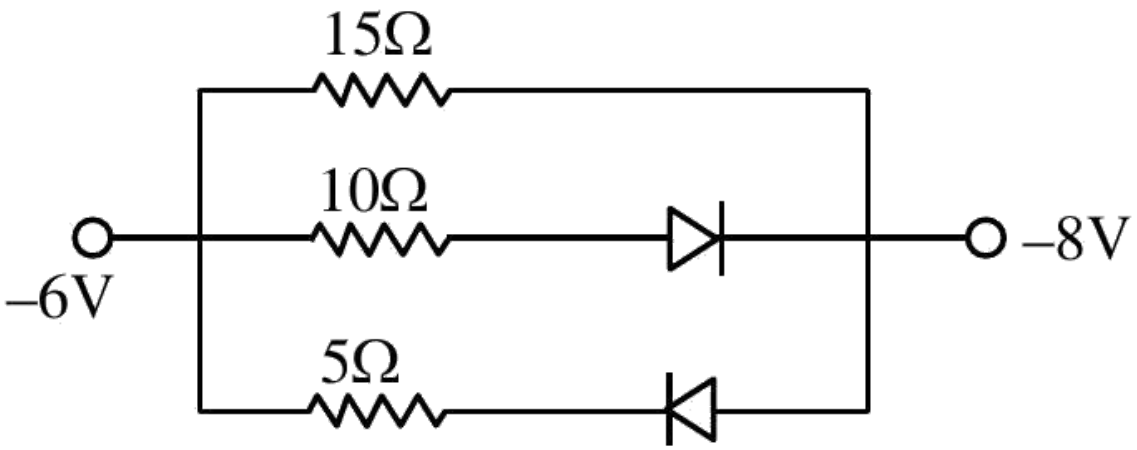
A 2 A current carrying straight metal wire of resistance 1Ω, resistivity $2 \times 10^{-6}\Omega\,\mathrm{m}$, area of cross-section $10\,\mathrm{mm}^2$ and mass 500 g is suspended horizontally in mid air by applying a uniform magnetic field $\vec{B}$. The magnitude of B is $\times 10^{-1}\,\mathrm{T}$ (given, $\mathrm{g} = 10\,\mathrm{m/s^2}$)

Numerical answer: _____

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

Question 173 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 174 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 175 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

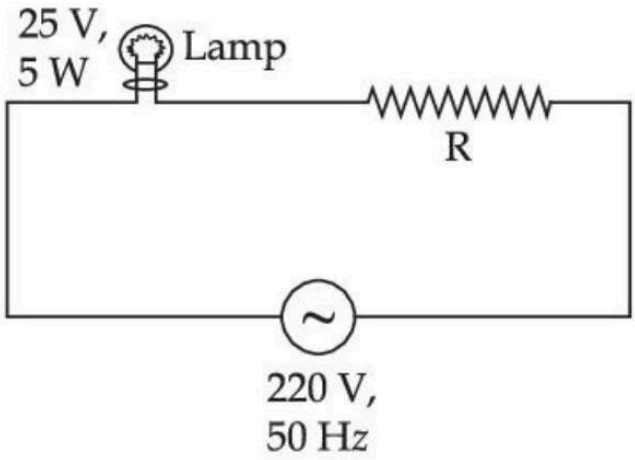
C. 5Ω

D. 10Ω

Question 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

.

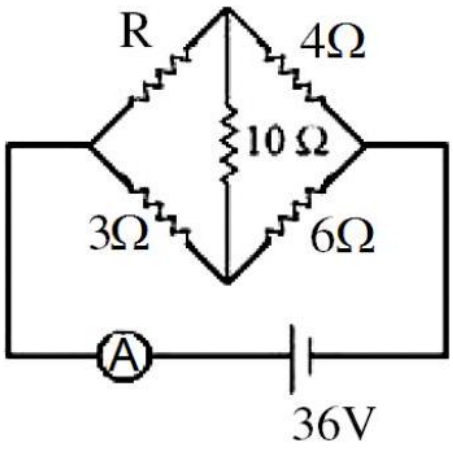


Numerical answer: _____

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

Question 177 View solution online

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

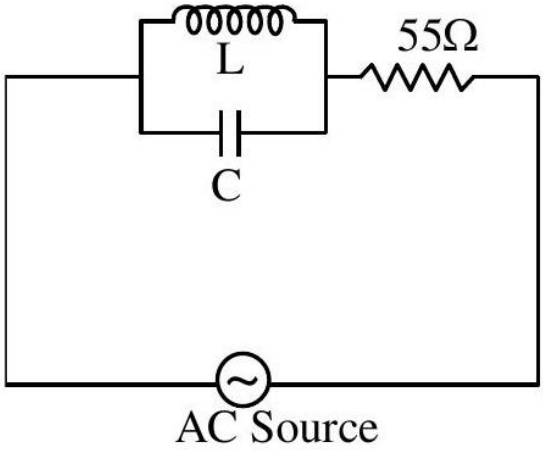


Numerical answer: _____

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

Question 178 View solution online

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

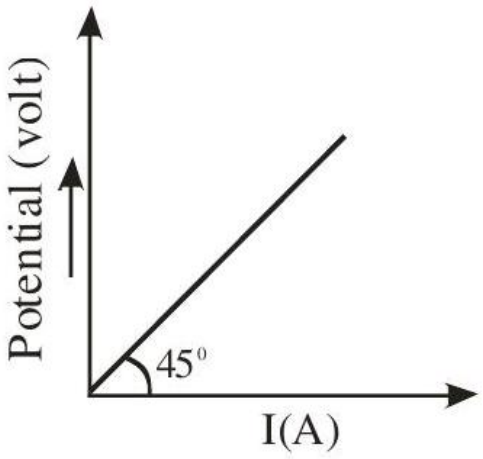


Numerical answer: _____

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

Question 179 View solution online

The variation of applied potential and current flowing through a given wire is shown in figure. The length of wire is 31.4 cm . The diameter of wire is measured as 2.4 cm . The resistivity of the given wire is measured as $\mathbf{x \times 10^{-3}\Omega\ cm}$. The value of x is [Take $\pi = 3.14$]

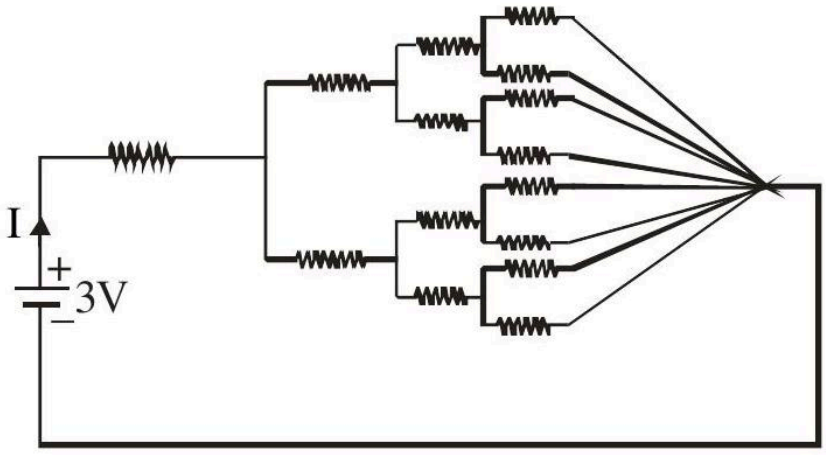


Numerical answer: _____

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

Question 180 View solution online

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 181 View solution online

The length of a given cylindrical wire is increased to double of its original length. The percentage increase in the resistance of the wire will be

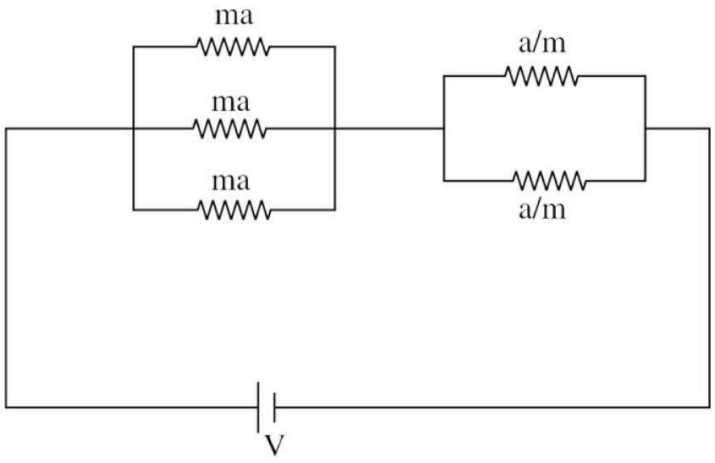
%.

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

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 183 View solution online

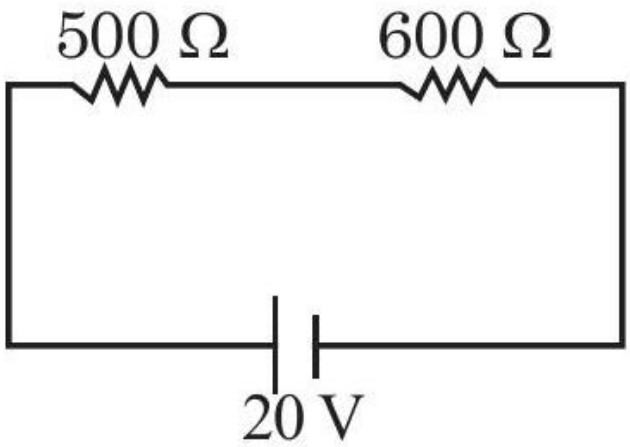
A cell, shunted by a 8Ω resistance, is balanced across a potentiometer wire of length 3 m . The balancing length is 2 m when the cell is shunted by 4Ω resistance. The value of internal resistance of the cell will be Ω.

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

Two resistors are connected in series across a battery as shown in figure. If a voltmeter of resistance 2000Ω is used to measure the potential difference across 500Ω resister, the reading of the voltmeter will be V.

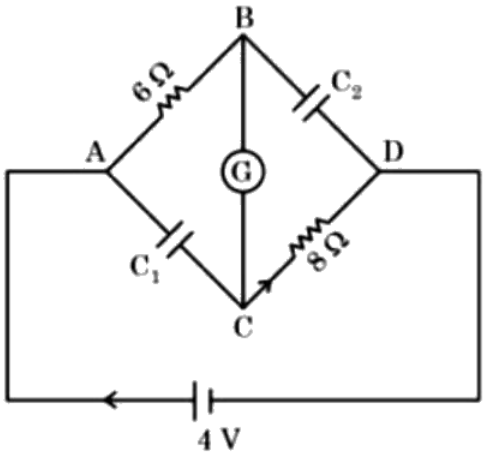


Numerical answer: _____

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

Question 185 View solution online

In this figure the resistance of the coil of galvanometer G is 2Ω. The emf of the cell is 4 V . The ratio of potential difference across C_1 and C_2 is:



A. 1

B. $\frac{4}{5}$

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

D. $\frac{5}{4}$

Question 186 View solution online

When a resistance of 5Ω is shunted with a moving coil galvanometer, it shows a full scale deflection for a current of 250 mA , however when 1050Ω resistance is connected with it in series, it gives full scale deflection for 25 volt. The resistance of galvanometer is Ω.

Numerical answer: _____

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

Question 187 View solution online

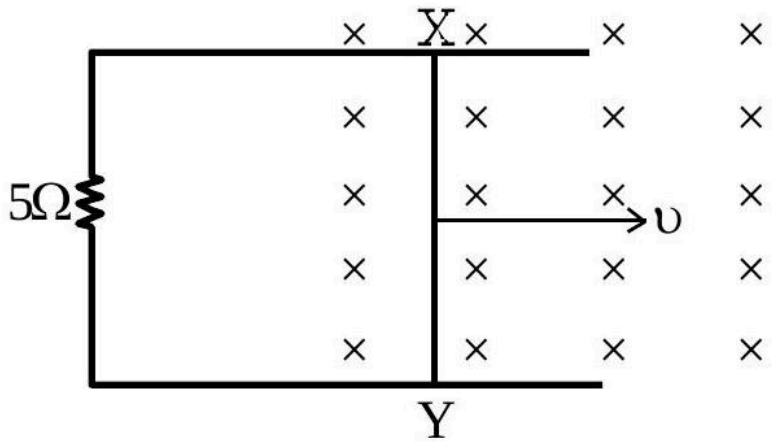
Two identical cells each of emf 1.5 V are connected in series across a 10Ω resistance. An ideal voltmeter connected across 10Ω resistance reads 1.5 V . The internal resistance of each cell is Ω.

Numerical answer: _____

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

Question 188 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 189 View solution online

An insulated copper wire of 100 turns is wrapped around a wooden cylindrical core of the crosssectional area $24\ cm^2$. The two ends of the wire are connected to a resistor. The total resistance in the circuit is 12Ω. If an externally applied uniform magnetic field in the core along its axis changes from 1.5 T in one direction to 1.5 T in the opposite direction, the charge flowing through a point in the circuit during the change of magnetic field will be
mC .

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

The length of a metallic wire is increased by 20% and its area of cross section is reduced by 4%. The percentage change in resistance of the metallic wire is .

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

Two cells of emf 1 V and 2 V and internal resistance 2Ω and 1Ω, respectively, are connected in series with an external resistance of 6Ω. The total current in the circuit is I_1. Now the same two cells in parallel configuration are connected to same external resistance. In this case, the total current drawn is I_2. The value of $\left(\frac{I_1}{I_2}\right)$ is $\frac{x}{3}$. 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.

CHAPTER 18 / PHYSICS

Moving Charges and Magnetism

Questions 192-205 / 14 selected / 4.7% practice weight / Focus first

Topics to prioritise in this collection

- Magnetic force and field: 9 questions / 64.3% of this chapter
- Biot-Savart law: 2 questions / 14.3% of this chapter
- Magnetic field due to currents: 2 questions / 14.3% of this chapter
- Ampere's circuital law: 1 question / 7.1% of this chapter

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

Question 192 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. $1.2 \times 10^3\ \mathrm{A\,m^{-1}}$

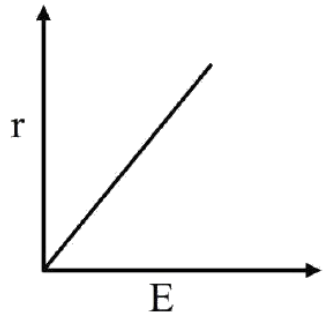
C. $2.4 \times 10^{-3}\ \mathrm{A\,m^{-1}}$

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

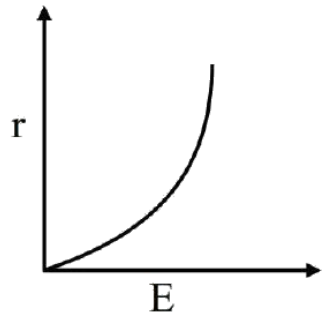
Question 193 View solution online

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 ?

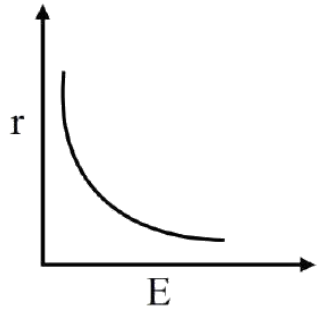
A.



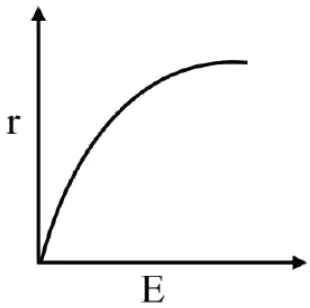
B.



C.



D.



Question 194 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. $\left(\frac{R_2}{R_1}\right)^2$

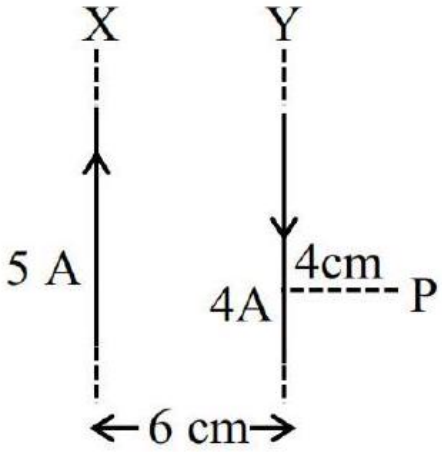
B. $\left(\frac{R_1}{R_2}\right)^2$

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

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

Question 195 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 196 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 197 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 198 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 199 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 200 View solution online

A coil having 100 turns, area of $\mathrm{5 \times 10^{-3}\ m^2}$, 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 μJ.

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 solenoid of length 0.5 m has a radius of 1 cm and is made up of ' m ' number of turns. It carries a current of 5 A . If the magnitude of the magnetic field inside the solenoid is $\mathrm{6.28 \times 10^{-3}\ T}$, then the value of m is :

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

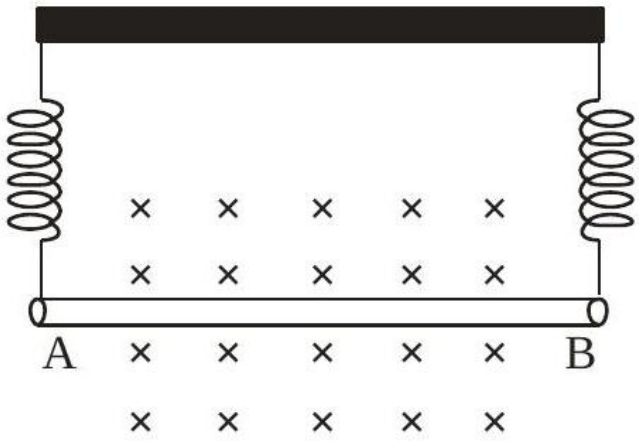
B. $3.2\ \mathrm{ms}^{-1}$

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

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

Question 203 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 204 View solution online

A 20 cm long metallic rod is rotated with 210 rpm about an axis normal to the rod passing through its one end. The order end of the rod is in contact with a circular metallic ring. A constant and uniform magnetic field 0.2 T parallel to the axis exists everywhere. The emf developed between the centre and the ring is mV .

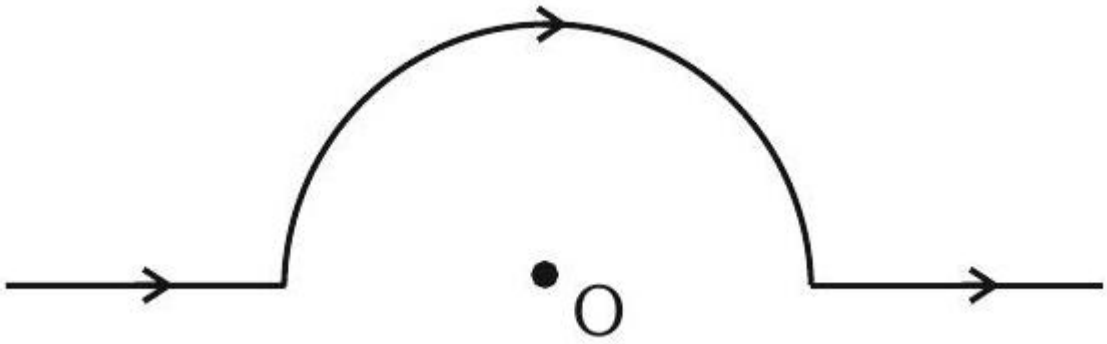
Take $\pi = \frac{22}{7}$

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

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 $\times 10^{-4}$ T



Numerical answer: _____

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

CHAPTER 19 / PHYSICS

Magnetism and Matter

Questions 206-206 / 1 selected / 0.3% practice weight / Consolidate

Topics to prioritise in this collection

- Magnetism and Matter: 1 question / 100.0% of this chapter

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

Question 206 View solution online

The current required to be passed through a solenoid of 15 cm length and 60 turns in order to demagnetise a bar magnet of magnetic intensity $2.4 \times 10^3 \mathrm{Am}^{-1}$ is A.

Numerical answer: _____

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

CHAPTER 20 / PHYSICS

Electromagnetic Induction

Questions 207-213 / 7 selected / 2.3% practice weight / Next

Topics to prioritise in this collection

- Inductance and induced emf: 5 questions / 71.4% of this chapter
- Electromagnetic Induction: 1 question / 14.3% of this chapter
- Faraday-Lenz law and induced emf: 1 question / 14.3% of this chapter

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

Question 207 View solution online

A simple pendulum made of mass 10 g and a metallic wire of length 10 cm is suspended vertically in a uniform magnetic field of 2 T. The magnetic field direction is perpendicular to the plane of oscillations of the pendulum. If the pendulum is released from an angle of 60° with vertical, then maximum induced EMF between the point of suspension and point of oscillation is _____ $\mathbf{mV}$. (Take $\mathbf{g = 10\ m/s^2}$)

Numerical answer: _____

Enter an integer. Use the units and scaling requested in the question.

Question 208 View solution online

A square loop of side 10 cm and resistance $\mathbf{0.7\Omega}$ 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 $\sqrt{\mathbf{x}} \times \mathbf{10^{-3}\ V}$. 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 209 View solution online

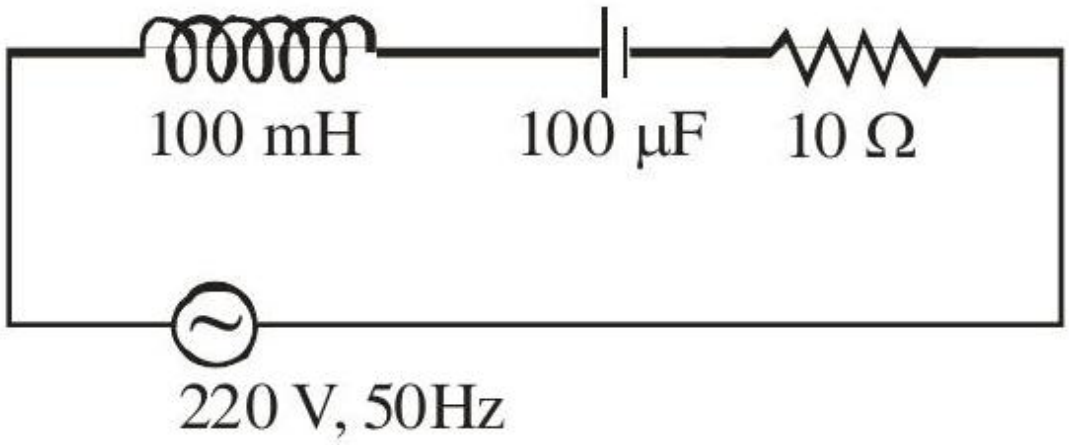
When a coil is connected across a 20 V dc supply, it draws a current of 5 A. When connected across a 20 V, 50 Hz ac supply, it draws a current of 4 A. The self-inductance of the coil is _____ mH. (Take $\pi = 3$.)

Numerical answer: _____

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

Question 210 View solution online

In a series LCR circuit, the inductance, capacitance and resistance are $\mathbf{L = 100mH, C = 100\mu\,F}$ and $\mathbf{R = 10\Omega}$ 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.



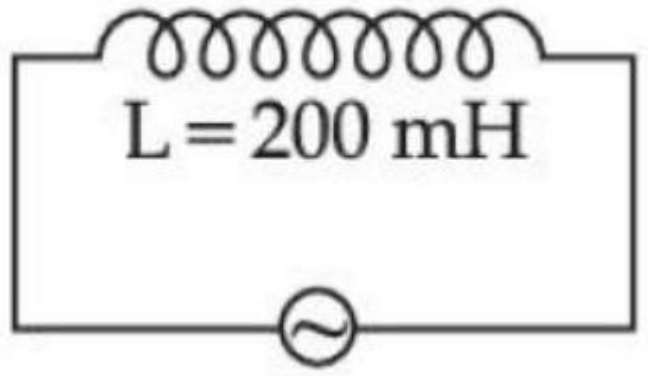
Numerical answer: _____

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

Question 211 View solution online

As shown in the figure an inductor of inductance 200 mH is connected to an AC source of emf 220 V and frequency 50 Hz . The instantaneous voltage of the source is 0 V when the peak value of current is $\frac{\sqrt{a}}{\pi}$ 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 212 View solution online

A square loop of side 2.0 cm is placed inside a long solenoid that has 50 turns per centimetre and carries a sinusoidally varying current of amplitude 2.5 A and angular frequency 700rads^{-1}. The central axes of the loop and solenoid coincide. The amplitude of the emf induced in the loop is $x \times 10^{-4}$ V. The value of x is

(Take, $\pi = \frac{22}{7}$)

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

A conducting circular loop is placed in a uniform magnetic field of 0.4 T with its plane perpendicular to the field. Somehow, the radius of the loop starts expanding at a constant rate of $1\ \mathrm{mm/s}$. The magnitude of induced emf in the loop at an instant when the radius of the loop is 2 cm will be

$\mu\mathrm{V}$.

Numerical answer: _____

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

CHAPTER 21 / PHYSICS

Alternating Current

Questions 214-217 / 4 selected / 1.3% practice weight / Consolidate

Topics to prioritise in this collection

- AC circuit analysis: 2 questions / 50.0% of this chapter
- Alternating voltage and current: 2 questions / 50.0% of this chapter

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

Question 214 View solution online

A bulb and a capacitor are connected in series across an ac supply. A dielectric is then placed between the plates of the capacitor. The glow of the bulb:

A. increases

B. remains same

C. becomes zero

D. decreases

Question 215 View solution online

An electric bulb rated as $\mathbf{100\ W - 220\ V}$ is connected to an ac source of rms voltage 220 V . The peak value of current through the bulb is :

A. 0.64 A

B. 0.45 A

C. 2.2 A

D. 0.32 A

Question 216 View solution online

An ac current is represented as$\mathbf{i = 5\sqrt{2} + 10\cos\left(650\pi t + \frac{\pi}{6}\right)Amp}$The r.m.s value of the current is

A. 50 Amp

B. 100 Amp

C. 10 Amp

D. $\mathbf{5\sqrt{2}Amp}$

Question 217 View solution online

An alternating current is represented by the equation, $\mathbf{i = 100\sqrt{2}\sin(100\pi t)}$ ampere. The RMS value of current and the frequency of the given alternating current are

A. $\mathbf{100\sqrt{2}\ A, 100\ Hz}$

B. $\mathbf{\frac{100}{\sqrt{2}}\ A, 100\ Hz}$

C. $\mathbf{100\ A, 50\ Hz}$

D. $\mathbf{50\sqrt{2}\ A, 50\ Hz}$

CHAPTER 22 / PHYSICS

Electromagnetic Waves

Questions 218-219 / 2 selected / 0.7% practice weight / Consolidate

Topics to prioritise in this collection

- Electromagnetic spectrum: 1 question / 50.0% of this chapter
- Electromagnetic waves: 1 question / 50.0% of this chapter

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

Question 218 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 219 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

CHAPTER 23 / PHYSICS

Ray Optics and Optical Instruments

Questions 220-260 / 41 selected / 13.7% practice weight / Focus first

Topics to prioritise in this collection

- Lens formula: 15 questions / 36.6% of this chapter
- Geometrical optics: 11 questions / 26.8% of this chapter
- Image formation or refraction using ray optics: 5 questions / 12.2% of this chapter
- Mirror formula: 3 questions / 7.3% of this chapter
- Prism and dispersion: 3 questions / 7.3% of this chapter
- Ray Optics and Optical Instruments: 2 questions / 4.9% of this chapter
- Angular geometry at a common focal plane: 1 question / 2.4% of this chapter
- Snell's law: 1 question / 2.4% of this chapter

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

Question 220 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 221 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 222 View solution online

A collimated beam of light of diameter 2 mm is propagating along x-axis. The beam is required to be expanded in a collimated beam of diameter 14 mm using a system of two convex lenses. If first lens has focal length 40 mm , then the focal length of second lens is ___ mm.

Numerical answer: _____

Enter an integer in the units and scaling requested in the question.

Question 223 View solution online

A thin prism with angle 5° of refractive index 1.72 is combined with another prism of refractive index 1.9 to produce dispersion without deviation. The angle of second prism is

_____

.

A. 4.5°

B. 6°

C. 4°

D. 5°

Question 224 View solution online

Consider an equilateral prism (refractive index $\sqrt{2}$). A ray of light is incident on its one surface at a certain angle i. If the emergent ray is found to graze along the other surface then the angle of refraction at the incident surface is close to

_____

.

A. 15°

B. 20°

C. 40°

D. 30°

Question 225 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 226 View solution online

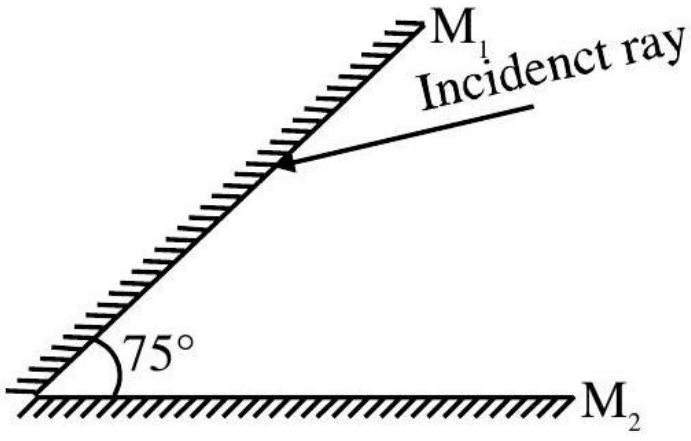
Light from a point source in air falls on a spherical glass surface (refractive index, $\mu = 1.5$ and radius of curvature $= 50\ \text{cm}$). The image is formed at a distance of 200 cm from the glass surface inside the glass. The magnitude of distance of the light source from the glass surface is m.

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

A light ray is incident, at an incident angle θ_1, on the system of two plane mirrors M_1 and M_2 having an inclination angle $75°$ between them (as shown in figure). After reflecting from mirror M_1 it gets reflected back by the mirror M_2 with an angle of reflection $30°$. The total deviation of the ray will be degree.



Numerical answer: _____

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

Question 228 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. $\sin^{-1}(\sqrt{n})$

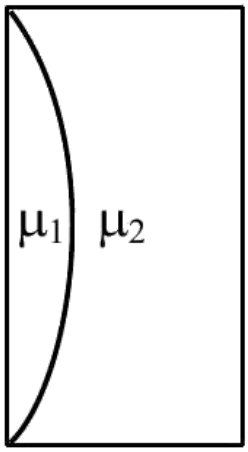
B. $\cos^{-1}\left(\sqrt{\frac{n}{2}}\right)$

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

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

Question 229 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. $\frac{1}{\mu_2-\mu_1}$

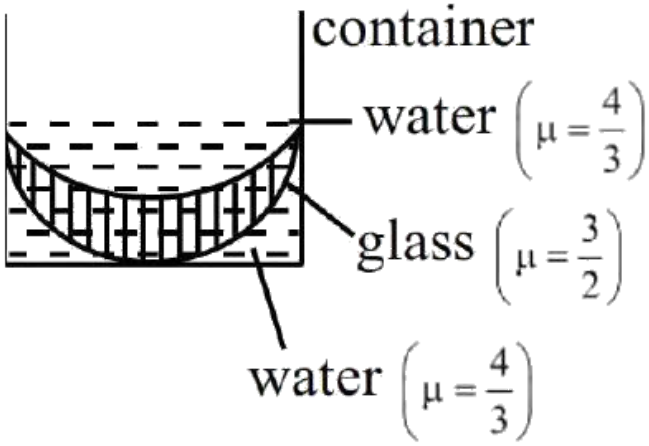
B. $\mu_1-\mu_2$

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

D. $\mu_2-\mu_1$

Question 230 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 231 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 232 View solution online

A parallel beam of light travelling in air (refractive index 1.0) is incident on a convex spherical glass surface of radius of curvature 50 cm. Refractive index of glass is 1.5. The rays converge to a point at a distance x cm from the centre of the curvature of the spherical surface. The value of x is

_____

cm.

Numerical answer: _____

Enter an integer. Use the units and scaling requested in the question.

Question 233 View solution online

The refractive index of the material of a glass prism is $\sqrt{3}$. The angle of minimum deviation is equal to the angle of the prism. What is the angle of the prism?

A. 50°

B. 60°

C. 58°

D. 48°

Question 234 View solution online

The refractive index of prism is $\mu = \sqrt{3}$ and the ratio of the angle of minimum deviation to the angle of prism is one. The value of angle of prism 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

A ray of light suffers minimum deviation when incident on a prism having angle of the prism equal to $60°$. The refractive index of the prism material is $\sqrt{2}$. The angle of incidence (in degrees) is .

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

Two objects A and B are placed at 15 cm and 25 cm from the pole in front of a concave mirror having radius of curvature 40 cm . The distance between images formed by the mirror is ..... .

A. 100 cm

B. 60 cm

C. 160 cm

D. 40 cm

Question 237 View solution online

The magnitudes of power of a biconvex lens (refractive index 1.5) and that of a plano-concave lens (refractive index $= 1.7$) are same. If the curvature of plano-concave lens exactly matches with the curvature of back surface of the biconvex lens, then ratio of radius of curvature of front and back surface of the biconvex lens is _____.

A. 5 : 2

B. 5 : 12

C. 12 : 5

D. 2 : 5

Question 238 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

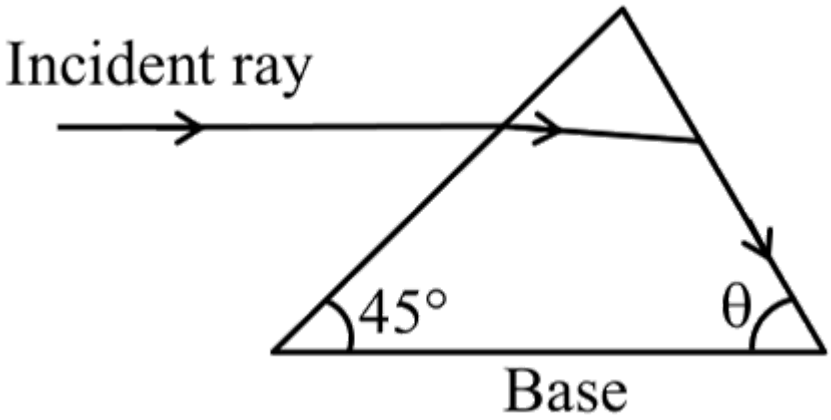
B. $\frac{1}{3}$ cm

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

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

Question 239 View solution online

As shown in the diagram, when the incident ray is parallel to base of the prism, the emergent ray grazes along the second surface.
If refractive index of the material of prism is $\sqrt{2}$, the angle θ of prism is.



A. 60°

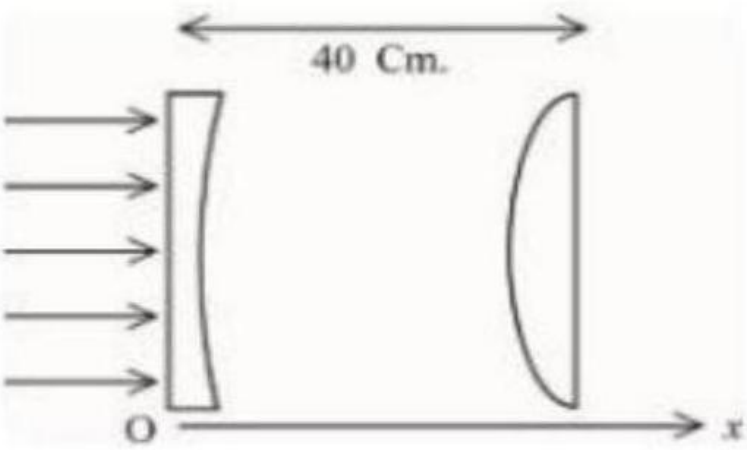
B. 75°

C. 90°

D. 45°

Question 240 View solution online

As shown in the figure, a combination of a thin plano concave lens and a thin plano convex lens is used to image an object placed at infinity. The radius of curvature of both the lenses is 30 cm and refraction index of the material for both the lenses is 1.75 . Both the lenses are placed at distance of 40 cm from each other. Due to the combination, the image of the object is formed at distance = cm, from concave lens.



Numerical answer: _____

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

Question 241 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 242 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 243 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 244 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

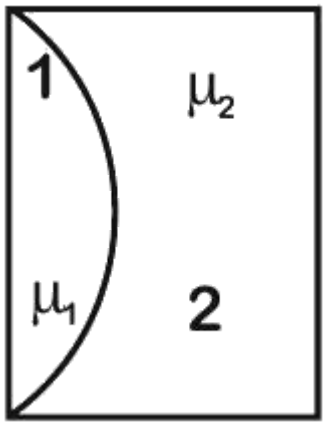
B. 1.4

C. 1.5

D. 1.8

Question 245 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 246 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

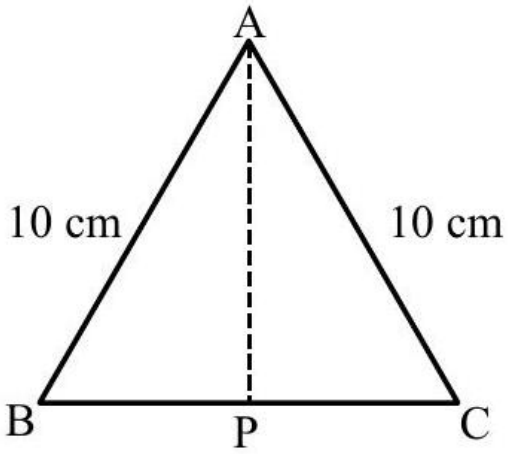
B. 0.10 m

C. 0.20 m

D. 0.25 m

Question 247 View solution online

Cross-section view of a prism is the equilateral triangle ABC in the figure. The minimum deviation is observed using this prism when the angle of incidence is equal to the prism angle. The time taken by light to travel from P (midpoint of BC) to A is $\times 10^{-10}$ s. (Given, speed of light in vacuum $= 3 \times 10^8$ m/s and $\cos 30° = \frac{\sqrt{3}}{2}$)



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

The eye can be regarded as a single refracting surface . The radius of curvature of this surface is equal to that of cornea (7.8 mm). This surface separates two media of refractive indices 1 and 1.34. Calculate the distance from the refracting surface at which a parallel beam of light will come to focus.

A. 2 cm

B. 1 cm

C. 3.1 cm

D. 4.0 cm

Question 249 View solution online

Consider following statements for refraction of light through prism, when angle of deviation is minimum. (A) The refracted ray inside prism becomes parallel to the base.(B) Larger angle prisms provide smaller angle of minimum deviation.(C) Angle of incidence and angle of emergence becomes equal.(D) There are always two sets of angle of incidence for which deviation will be same except at minimum deviation setting. (E) Angle of refraction becomes double of prism angle.Choose the correct answer from the options given below.

A. A, C and D Only

B. B, C and D Only

C. A, B and E Only

D. B, D and E Only

Question 250 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 251 View solution online

A convex lens of refractive index 1.5 and focal length 18 cm in air is immersed in water. The change in focal length of the lens will be cm
(Given refractive index of water $= \frac{4}{3}$)

Numerical answer: _____

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

Question 252 View solution online

A ray of light passing through a prism $(\mu = \sqrt{3})$ suffers minimum deviation. It is found that the angle of incidence is double the angle of refraction within the prism. Then, the angle of prism is ___ (in degrees)

Numerical answer: _____

Enter the requested integer (0 decimal places).

Question 253 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 254 View solution online

Light from a point source in air falls on a convex curved surface of radius 20 cm and refractive index 1.5. If the source is located at 100 cm from the convex surface, the image will be formed at cm from the object.

Numerical answer: _____

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

Question 255 View solution online

A convex lens of focal length 40 cm forms an image of an extended source of light on a photoelectric cell. A current I is produced. The lens is replaced by another convex lens having the same diameter but focal length 20 cm . The photoelectric current now is :

A. $\frac{I}{2}$

B. 4 I

C. 2 I

D. I

Question 256 View solution online

A thin prism, $\mathbf{P_1}$ with an angle $\mathbf{6^{th}}$ and made of glass of refractive index 1.54 is combined with another prism $\mathbf{P_2}$ made from glass of refractive index 1.72 to produce dispersion without average deviation. The angle of prism $\mathbf{P_2}$ is

A. $1.3°$

B. $6°$

C. $4.5°$

D. $7.8°$

Question 257 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. $\frac{3}{2}$

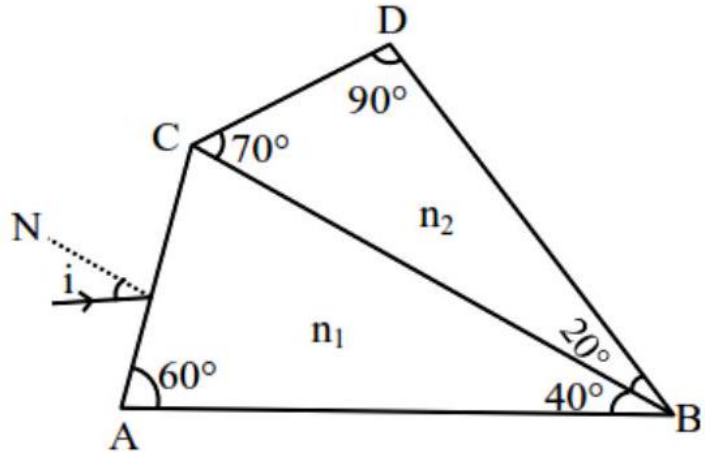
D. $\frac{4}{3}$

Question 258 View solution online

Two prisms of refractive indices n1 and n2 are joined as shown. For wavelength λ measured in metres,

$$n_1 = 1.2 + \frac{10.8 \times 10^{-14}}{\lambda^2}, \qquad n_2 = 1.45 + \frac{1.8 \times 10^{-14}}{\lambda^2}.$$

Find the wavelength in nm for which rays incident at any angle on interface BC pass through that interface without bending.



Numerical answer: _____

Corrected practice version: Rejoined the cross-page statement and restored lambda-squared notation and consistent powers of ten; source key 600 nm is independently verified. The original wording and worked answer are retained in the review package. Enter the requested integer (0 decimal places).

Question 259 View solution online

A prism of refractive index μ and angle of prism A is placed in the position of minimum angle of deviation. If minimum angle of deviation is also A, then in terms of refractive index

A. $2\cos^{-1}\left(\frac{\mu}{2}\right)$

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

C. $\sin^{-1}\left(\sqrt{\frac{\mu-1}{2}}\right)$

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

Question 260 View solution online

For an object placed at a distance 2.4 m from a lens, a sharp focused image is observed on a screen placed at a distance 12 cm from the lens. A glass plate of refractive index 1.5 and thickness 1 cm is introduced between lens and screen such that the glass plate plane faces parallel to the screen. By what distance should the object be shifted so that a sharp focused image is observed again on the screen?

A. 0.8 m

B. 3.2 m

C. 1.2 m

D. 5.6 m

CHAPTER 24 / PHYSICS

Wave Optics

Questions 261-279 / 19 selected / 6.3% practice weight / Focus first

Topics to prioritise in this collection

- Young's double-slit interference: 8 questions / 42.1% of this chapter
- Interference of light: 5 questions / 26.3% of this chapter
- Image formation or refraction using ray optics: 1 question / 5.3% of this chapter
- Optical path difference: 1 question / 5.3% of this chapter
- Superposition and wave nature of light: 1 question / 5.3% of this chapter
- Wave Optics: 1 question / 5.3% of this chapter
- Wave propagation, superposition or resonance: 1 question / 5.3% of this chapter
- Young double-slit interference: 1 question / 5.3% of this chapter

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

Question 261 View solution online

In YDSE path difference at a point on the screen is 8λ. Find ratio of intensity at this point with maximum intensity.

A. 0.533

B. 0.853

C. 0.234

D. 0.123

Question 262 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 263 View solution online

Two light beams of intensities in the ratio of $9:4$ are allowed to interfere. The ratio of the intensity of maxima and minima will be :

A. $2:3$

B. $16:81$

C. $25:169$

D. $25:1$

Question 264 View solution online

The interference pattern is obtained with two coherent light sources of intensity ratio $4:1$. And the ratio $\frac{I_{max}+I_{min}}{I_{max}-I_{min}}$ is $\frac{5}{x}$. Then, the value of x will be equal to :

A. 3

B. 4

C. 2

D. 1

Question 265 View solution online

Using Young's double slit experiment, a monochromatic light of wavelength $5000\AA$ produces fringes of fringe width 0.5 mm . If another monochromatic light of wavelength $6000\AA$ is used and the separation between the slits is doubled, then the new fringe width will be :

A. 0.5 mm

B. 1.0 mm

C. 0.6 mm

D. 0.3 mm

Question 266 View solution online

In a Young's double slit experiment, light of 500 nm is used to produce an interference pattern. When the distance between the slits is 0.05 mm , the angular width (in degree) of the fringes formed on the distance screen is close to :

A. 0.17°

B. 0.07°

C. 0.57°

D. 1.7°

Question 267 View solution online

A beam of light consisting of wavelengths 650 nm and 550 nm illuminates the Young's double slits with separation of 2 mm such that the interference fringes are formed on a screen, placed at a distance of 1.2 m from the slits. The least distance of a point from the central maximum, where the bright fringes due to both the wavelengths coincide, is_____$\times 10^{-5}$ $\mathbf{m}$.

Numerical answer: _____

Enter an integer. Use the units and scaling requested in the question.

Question 268 View solution online

In a double slit experiment the distance between the slits is 0.1 cm and the screen is placed at 50 cm from the slits plane. When one slit is covered with a transparent sheet having thickness t and refractive index $\mathbf{n}(=1.5)$, the central fringe shifts by 0.2 cm. The value of t is ___ cm.

A. 8×10^{-4}

B. 6.0×10^{-3}

C. 5.6×10^{-4}

D. 5.0×10^{-3}

Question 269 View solution online

In Young's double slit arrangement, slits are separated by a gap of 0.5 mm , and the screen is placed at a distance of 0.5 m from them. The distance between the first and the third bright fringe formed when the slits are illuminated by a monochromatic light of $5890\AA$ is :-

A. $1178 \times 10^{-9}\ \mathrm{m}$

B. $1178 \times 10^{-6}\ \mathrm{m}$

C. $1178 \times 10^{-12}\ \mathrm{m}$

D. $5890 \times 10^{-7}\ \mathrm{m}$

Question 270 View solution online

In a Young's double slit experiment set up, the two slits are kept 0.4. mm apart and screen is placed at 1 m from slits. If a thin transparent sheet of thickness $20\mu\ \mathrm{m}$ is introduced in front of one of the slits then centre bring fringe shifts by 20 mm on the screen. The refractive index of transparent sheet is given by $\frac{\alpha}{10}$, where α is

_____

.

Numerical answer: _____

Enter an integer. Use the units and scaling requested in the question.

Question 271 View solution online

The Young's double slit interference experiment is performed using light consisting of 480 nm and 600 nm wavelengths to form interference patterns. The least number of the bright fringes of 480 nm light that are required for the first coincidence with the bright fringes formed by 600 nm light is :-

A. 4

B. 8

C. 6

D. 5

Question 272 View solution online

In the Young's double slit experiment the intensity produced by each one of the individual slits is I_0. The distance between two slits is 2 mm. The distance of screen from slits is 10 m. The wavelength of light is $6000\AA$. The intensity of light on the screen in front of one of the slits is

_____

.

A. $2I_0$

B. I_0

C. $\frac{I_0}{2}$

D. $4I_0$

Question 273 View solution online

In a Young's double slit experiment, the slits are placed 0.320 mm apart. Light of wavelength $\lambda = 500\ \text{nm}$ is incident on the slits. The total number of bright fringes that are observed in the angular range $-30° \leq \theta \leq 30°$ is:

A. 320

B. 641

C. 321

D. 640

Question 274 View solution online

Two coherent light sources having intensity in the ratio $2x$ produce an interference pattern. The ratio $\frac{I_{max}-I_{min}}{I_{max}+I_{min}}$ will be :

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

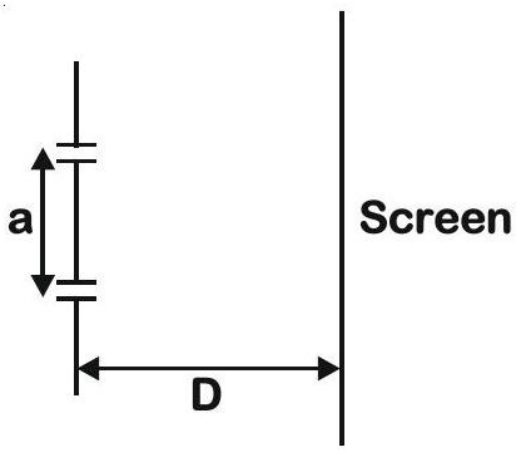
B. $\frac{\sqrt{2x}}{2x+1}$

C. $\frac{2\sqrt{2x}}{2x+1}$

D. $\frac{\sqrt{2x}}{x+1}$

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 a Young's double slits experiment, the ratio of amplitude of light coming from slits is $2:1$. The ratio of the maximum to minimum intensity in the interference pattern is :Option :}

A. $9:4$

B. $9:1$

C. $2:1$

D. $25:9$

Question 277 View solution online

The width of one of the two slits in a Young's double slit experiment is three times the other slit. If the amplitude of the light coming from a slit is proportional to the slit-width, the ratio of minimum to maximum intensity in the interference pattern is x : 4 where x is ___.

Numerical answer: _____

Enter the requested integer (0 decimal places).

Question 278 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. $1/4$

Question 279 View solution online

Interference fringes are observed on a screen by illuminating two thin slits 1 mm apart with a light source ($\lambda = 632.8\ \text{nm}$). The distance between the screen and the slits is 100 cm . If a bright fringe is observed on screen at a distance of 1.27 mm from the central bright fringe, then the path difference between the waves, which are reaching this point from the slits is close to:

A. $2.05\mu\ \text{m}$

B. 2.87 nm

C. 2 nm

D. $1.27\mu\ \text{m}$

CHAPTER 25 / PHYSICS

Dual Nature of Radiation and Matter

Questions 280-287 / 8 selected / 2.7% practice weight / Next

Topics to prioritise in this collection

- de Broglie wavelength: 2 questions / 25.0% of this chapter
- de Broglie wavelength of a particle: 1 question / 12.5% of this chapter
- de Broglie wavelength of a particle accelerated through a potential difference: 1 question / 12.5% of this chapter
- Dual Nature of Radiation and Matter: 1 question / 12.5% of this chapter
- Einstein photoelectric equation: 1 question / 12.5% of this chapter
- Photon energy and momentum: 1 question / 12.5% of this chapter
- Quantum nature of radiation: 1 question / 12.5% of this chapter

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

Question 280 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 281 View solution online

The ratio of de Broglie wavelength of a deutron with kinetic energy E to that of an alpha particle with kinetic energy $2E$, is $n : 1$. The value of n is _____.
(Assume mass of proton = mass of neutron) :

Numerical answer: _____

Enter an integer. Use the units and scaling requested in the question.

Question 282 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 283 View solution online

A parallel beam of light of wavelength 900 nm and intensity $100\mathrm{Wm}^{-2}$ is incident on a surface perpendicular to the beam. Tire number of photons crossing $1\ \mathrm{cm}^2$ area perpendicular to the beam in one second is :

A. 3×10^{16}

B. 4.5×10^{16}

C. 4.5×10^{17}

D. 4.5×10^{20}

Question 284 View solution online

A particle having electric charge $3 \times 10^{-19}\mathrm{C}$ and mass $6 \times 10^{-27}\ \mathrm{kg}$ is accelerated by applying an electric potential of 1.21 V. Wavelength of the matter wave associated with the particle is $\alpha \times 10^{-12}\ \mathrm{m}$. The value of α is

_____

.

(Take Planck's constant $= 6.6 \times 10^{-34}\ \mathrm{J.s}$)

Numerical answer: _____

Enter an integer. Use the units and scaling requested 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

Light is incident on a metallic plate having work function 110×10^{-20} J. If the produced photoelectrons have zero kinetic energy then the angular frequency of the incident light is

_____

rad/s. $\left(\mathrm{h} = 6.63 \times 10^{-34}\ \mathrm{J.s}\right)$

A. 1.04×10^{16}

B. 1.04×10^{13}

C. 1.66×10^{16}

D. 1.66×10^{15}

Question 287 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 26 / PHYSICS

Atoms

Questions 288-289 / 2 selected / 0.7% practice weight / Consolidate

Topics to prioritise in this collection

- Excitation and ionisation energy: 1 question / 50.0% of this chapter
- Hydrogen spectrum: 1 question / 50.0% of this chapter

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

Question 288 View solution online

Find the ratio of energies of photons produced due to transition of an election of hydrogen atom from its(i) second permitted energy level to the first level, and (ii) the highest permitted energy level to the first permitted level.

A. $3:4$

B. $4:3$

C. $1:4$

D. $4:1$

Question 289 View solution online

The minimum energy required by a hydrogen atom in ground state to emit radiation in Balmer series is nearly :

A. 1.5 eV

B. 13.6 eV

C. 1.9 eV

D. 12.1 eV

CHAPTER 27 / PHYSICS

Semiconductor Electronics: Materials, Devices and Simple Circuits

Questions 290-296 / 7 selected / 2.3% practice weight / Next

Topics to prioritise in this collection

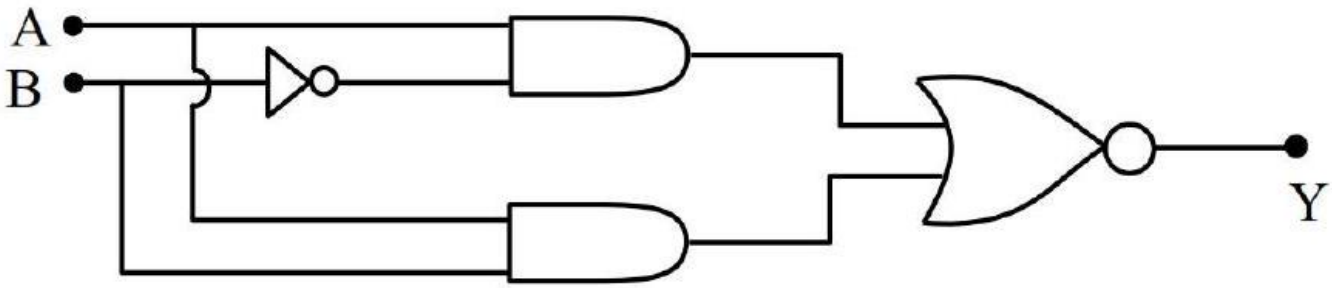
- Logic gates: 4 questions / 57.1% of this chapter
- Electronic circuits and logic gates: 1 question / 14.3% of this chapter
- Semiconductor devices: 1 question / 14.3% of this chapter
- Zener regulation: 1 question / 14.3% of this chapter

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

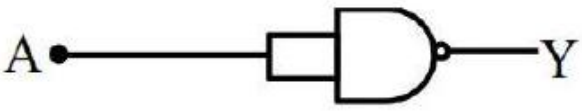
Question 290

View solution online

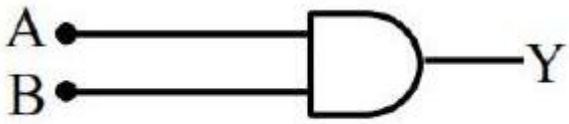
Which of the following circuits has the same output as that of the given circuit?



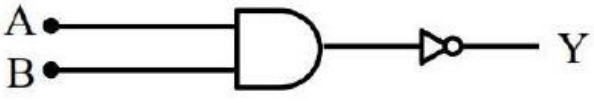
A.



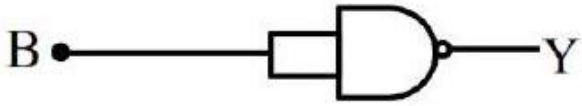
B.



C.



D.



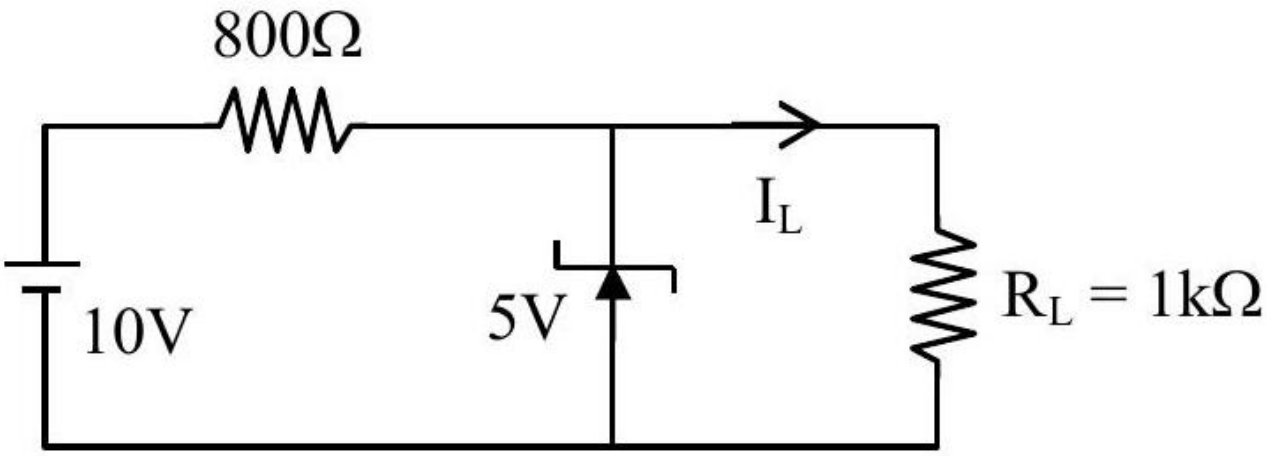
(3)

Question 291 View solution online

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

mA .

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

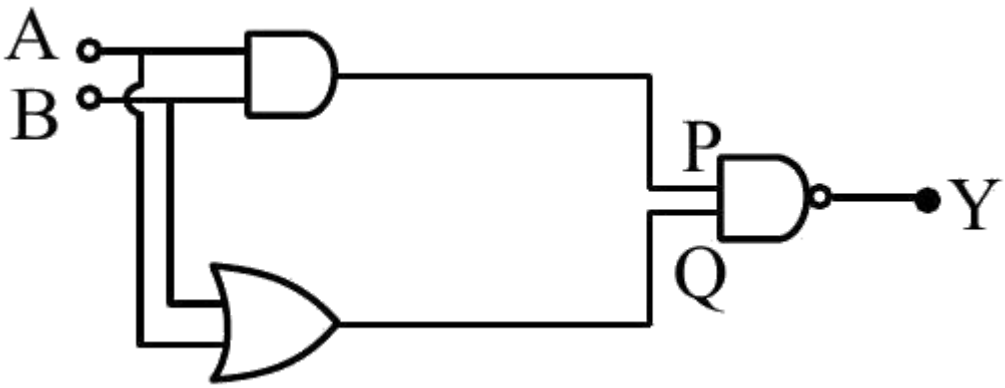


Numerical answer: _____

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

Question 292 View solution online

In the following logic circuit the sequence of the inputs A, B are $(0,0), (0,1), (1,0)$ and $(1,1)$. The output Y for this sequence will be :



A. $1,0,1,0$

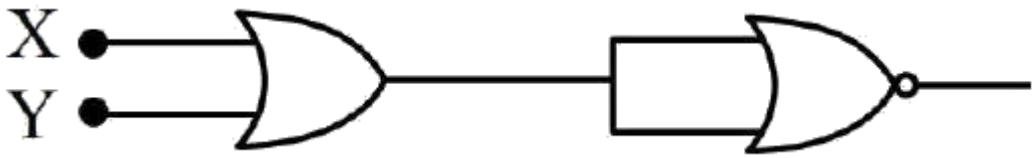
B. $0,1,0,1$

C. $1,1,1,0$

D. $0,0,1,1$

Question 293 View solution online

The output of the circuit is low (zero) for :(A) $\mathbf{X = 0, Y = 0}$(B) $\mathbf{X = 0, Y = 1}$(C) $\mathbf{X = 1, Y = 0}$(D) $\mathbf{X = 1, Y = 1}$Choose the correct answer from the options given below:



A. (A), (C) and (D) only

B. (A), (B) and (C) only

C. (B), (C) and (D) only

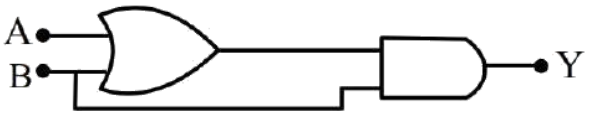
D. (A), (B) and (D) only

Question 294 View solution online

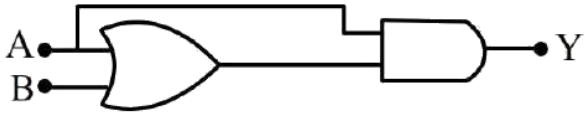
Choose the correct logic circuit for the given truth table having inputs A and B.

A	B	Y
0	0	0
0	1	0
1	0	1
1	1	1

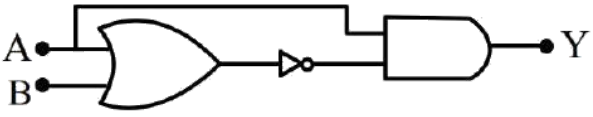
A.



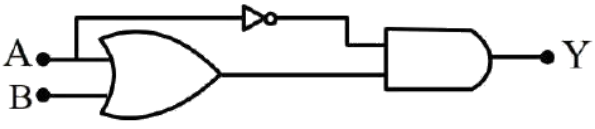
B.



C.



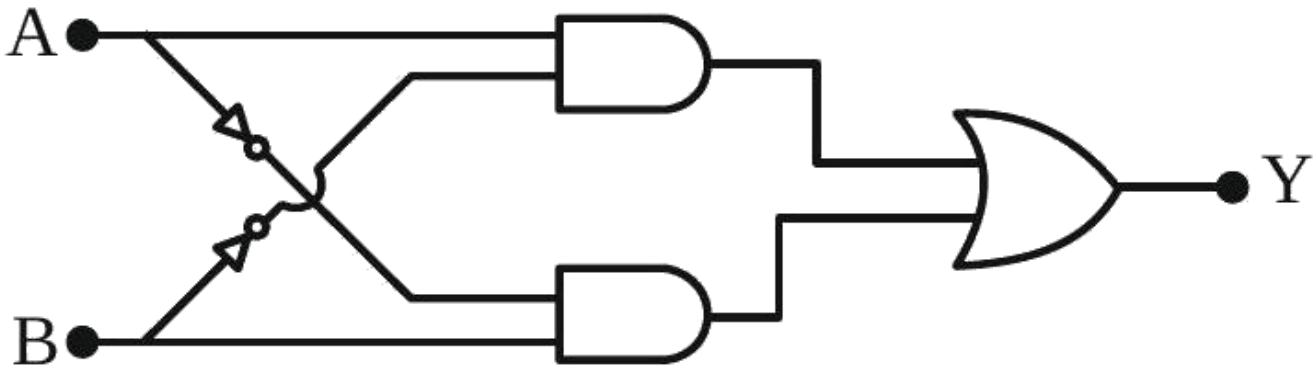
D.



Question 295

View solution online

The truth table of the given circuit diagram is :A B Y0 0 1



A.

A	B	Y
0	0	0
0	1	0
1	0	0
1	1	1

B.

A	B	Y
0	0	0
0	1	1
1	0	1
1	1	0

C.

A	B	Y
0	0	0
0	1	0
1	0	0
1	1	1

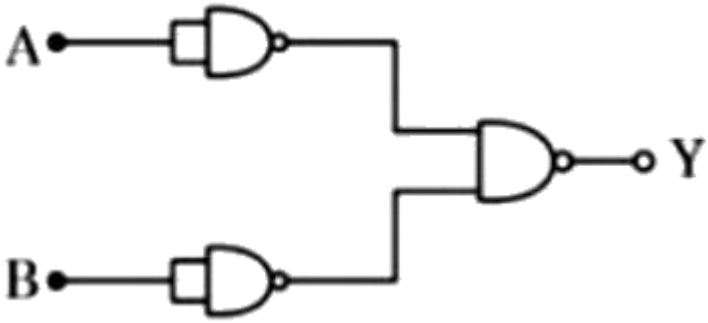
D.

A	B	Y
0	0	1
0	1	1
1	0	1
1	1	0

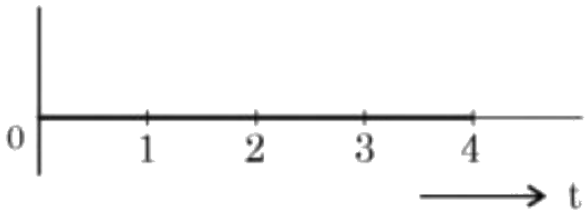
Question 296

View solution online

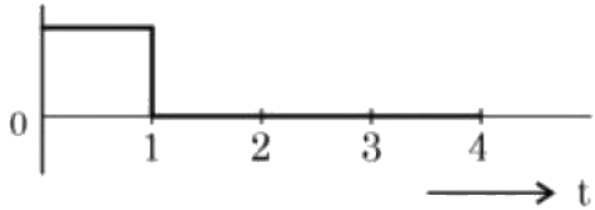
For the logic circuit shown, the output waveform at Y is:



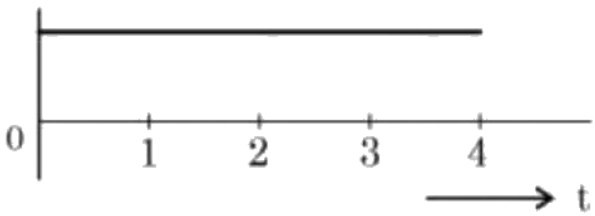
A.



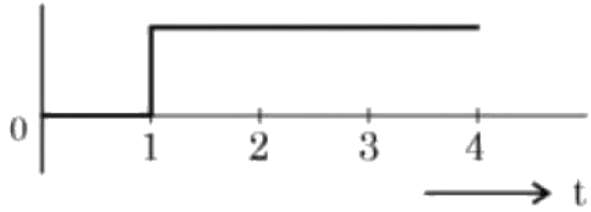
B.



C.



D.



CHAPTER 28 / 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
- Signal propagation and transmission: 1 question / 25.0% of this chapter

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

Question 297 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 298 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 299 View solution online

Match List-I with List-II.

List-I	List-II
(A) Facsimile	(I) Static Document Image
(B) Guided media Channel	(IV) Optical Fiber
(C) Frequency Modulation	(II) Local Broadcast Radio
(D) Digital Signal	(III) Rectangular wave

Choose the correct answer from the following options:

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

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

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

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

Question 300 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

QUICK CHECK

Answer key

For numerical questions the stored answer value is shown. Follow the question's precision and units.

1. C	**2.** A	**3.** B	**4.** D	**5.** B
6. 4	**7.** 3	**8.** 400	**9.** B	**10.** A
11. 5	**12.** 5	**13.** B	**14.** 20	**15.** 3
16. C	**17.** D	**18.** D	**19.** 700	**20.** B
21. 18	**22.** C	**23.** B	**24.** A	**25.** A
26. B	**27.** B	**28.** 3	**29.** 150	**30.** A
31. B	**32.** 20	**33.** D	**34.** B	**35.** 25
36. 80	**37.** B	**38.** A	**39.** 2	**40.** 40
41. A	**42.** 40	**43.** 24	**44.** B	**45.** C
46. A	**47.** B	**48.** 18	**49.** 300	**50.** 30
51. C	**52.** 4	**53.** C	**54.** A	**55.** D
56. 5	**57.** B	**58.** 800	**59.** A	**60.** 3
61. 6	**62.** 30	**63.** B	**64.** B	**65.** 2
66. 20	**67.** A	**68.** A	**69.** B	**70.** B
71. D	**72.** 30	**73.** D	**74.** A	**75.** 1
76. A	**77.** D	**78.** D	**79.** A	**80.** D
81. A	**82.** 3	**83.** 25	**84.** A	**85.** 1
86. B	**87.** 20	**88.** 5	**89.** 200	**90.** A
91. 27	**92.** C	**93.** 60	**94.** A	**95.** C
96. 250	**97.** A	**98.** D	**99.** C	**100.** 480
101. D	**102.** B	**103.** B	**104.** D	**105.** B
106. C	**107.** C	**108.** B	**109.** B	**110.** 1819
111. C	**112.** C	**113.** C	**114.** 500	**115.** B
116. D	**117.** A	**118.** A	**119.** B	**120.** C
121. B	**122.** 16	**123.** C	**124.** 10	**125.** B
126. 600	**127.** 1152	**128.** 4	**129.** 3	**130.** 600
131. 450	**132.** 462	**133.** 30	**134.** 20	**135.** 2
136. B	**137.** B	**138.** 6	**139.** 45	**140.** 2
141. D	**142.** C	**143.** C	**144.** A	**145.** B
146. D	**147.** 10	**148.** D	**149.** 12	**150.** A

151. 21 **152.** 3 **153.** 70 **154.** 2500 **155.** A

156. C **157.** B **158.** 2 **159.** 2 **160.** A

161. 1 **162.** D **163.** 3 **164.** 20 **165.** C

166. 30 **167.** 6 **168.** 3840 **169.** D **170.** 9

171. C **172.** 5 **173.** C **174.** 25 **175.** C

176. 975 **177.** 10 **178.** 0 **179.** 144 **180.** 8

181. 300 **182.** 3 **183.** 8 **184.** 8 **185.** B

186. 50 **187.** 5 **188.** 18 **189.** 60 **190.** 25

191. 4 **192.** B **193.** D **194.** B **195.** 1

196. 10 **197.** 48 **198.** B **199.** 4 **200.** 100

201. 500 **202.** A **203.** 2 **204.** 88 **205.** 2

206. 6 **207.** 100 **208.** 2 **209.** 10 **210.** 22

211. 242 **212.** 44 **213.** 50 **214.** A **215.** A

216. C **217.** C **218.** 2 **219.** B **220.** 32

221. 60 **222.** 280 **223.** C **224.** A **225.** D

226. 4 **227.** 210 **228.** D **229.** B **230.** B

231. D **232.** 100 **233.** B **234.** 60 **235.** 45

236. C **237.** A **238.** C **239.** A **240.** 120

241. C **242.** B **243.** B **244.** C **245.** C

246. B **247.** 5 **248.** C **249.** A **250.** D

251. 54 **252.** 60 **253.** A **254.** 200 **255.** D

256. C **257.** B **258.** 600 **259.** A **260.** B

261. B **262.** B **263.** D **264.** B **265.** D

266. C **267.** 429 **268.** A **269.** B **270.** 14

271. D **272.** B **273.** B **274.** C **275.** A

276. B **277.** 1 **278.** A **279.** D **280.** 125

281. 2 **282.** 1 **283.** B **284.** 10 **285.** B

286. A **287.** A **288.** A **289.** D **290.** A

291. 5 **292.** C **293.** C **294.** B **295.** B

296. D **297.** 224 **298.** 200 **299.** B **300.** B

LEARNE2I / PRIORITY PRACTICE

JEE Main 2026 Session 2

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-2/

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 2 collection, begin with **Hydrocarbons; Alcohols, Phenols and Ethers; Equilibrium**. 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: 3 (50.0%) / Mole concept: 2 (33.3%) / Solution preparation: 1 (16.7%)	Next	1-6 (6)	2.0%
Structure of Atom Quantum numbers: 2 (100.0%)	Consolidate	7-8 (2)	0.7%
Classification of Elements and Periodicity in Properties Classification of Elements and Periodicity in Properties: 3 (37.5%) / Ionisation enthalpy trend: 2 (25.0%) / Periodic trends: 2 (25.0%) / More topics in chapter guide	Next	9-16 (8)	2.7%
Chemical Bonding and Molecular Structure Chemical bonding: 4 (44.4%) / Molecular orbital theory: 3 (33.3%) / Hybridisation: 1 (11.1%) / More topics in chapter guide	Next	17-25 (9)	3.0%
Thermodynamics Thermodynamics: 4 (40.0%) / Thermodynamic energy and spontaneity: 2 (20.0%) / Enthalpy change: 1 (10.0%) / More topics in chapter guide	Focus first	26-35 (10)	3.3%
Equilibrium Chemical and ionic equilibrium: 10 (55.6%) / Acid-base equilibrium: 1 (5.6%) / Basic buffer: 1 (5.6%) / More topics in chapter guide	Focus first	36-53 (18)	6.0%
Redox Reactions Redox Reactions: 2 (50.0%) / Oxidation states and redox reactions: 1 (25.0%) / Oxidation-reduction principles: 1 (25.0%)	Consolidate	54-57 (4)	1.3%
Organic Chemistry - Some Basic Principles and Techniques Organic reaction mechanisms: 4 (40.0%) / Organic Chemistry - Some Basic Principles and Techniques: 2 (20.0%) / Organic reaction principles: 1 (10.0%) / More topics in chapter guide	Next	58-67 (10)	3.3%
Hydrocarbons Reactions of hydrocarbons: 117 (95.9%) / Aromaticity: 2 (1.6%) / Alkyne reduction and alkene oxidation: 1 (0.8%) / More topics in chapter guide	Focus first	68-189 (122)	40.7%
Solutions Boiling point elevation: 1 (20.0%) / Concentration of solutions: 1 (20.0%) / Freezing point depression: 1 (20.0%) / More topics in chapter guide	Consolidate	190-194 (5)	1.7%

NCERT chapter / leading topics	Priority	Questions	Weight
Electrochemistry Electrochemical cells: 1 (50.0%) / Electrode potentials and electrolysis: 1 (50.0%)	Consolidate	195-196 (2)	0.7%
Chemical Kinetics Initial-rate method: 1 (50.0%) / Reaction stoichiometry from a concentration-time graph: 1 (50.0%)	Consolidate	197-198 (2)	0.7%
The p-Block Elements Main group element chemistry: 4 (66.7%) / Acidic, basic and amphoteric oxides of group 14 elements: 1 (16.7%) / Gas-evolution reactions: 1 (16.7%)	Next	199-204 (6)	2.0%
The d- and f-Block Elements The d- and f- Block Elements: 6 (60.0%) / Properties of transition elements: 3 (30.0%) / Magnetic properties of transition ions: 1 (10.0%)	Next	205-214 (10)	3.3%
Coordination Compounds Coordination chemistry: 9 (60.0%) / Coordination Compounds: 2 (13.3%) / Coordination number and geometry: 1 (6.7%) / More topics in chapter guide	Focus first	215-229 (15)	5.0%
Haloalkanes and Haloarenes Nucleophilic substitution: 10 (76.9%) / Haloalkanes and Haloarenes: 1 (7.7%) / Reactivity of aryl halides: 1 (7.7%) / More topics in chapter guide	Focus first	230-242 (13)	4.3%
Alcohols, Phenols and Ethers Reactions of alcohols, phenols and ethers: 15 (71.4%) / Reactions of alcohols and phenols: 3 (14.3%) / Acid-catalysed dehydration: 2 (9.5%) / More topics in chapter guide	Focus first	243-263 (21)	7.0%
Aldehydes, Ketones and Carboxylic Acids Reactivity of the carbonyl group: 2 (50.0%) / Aldehydes, Ketones and Carboxylic Acids: 1 (25.0%) / Cyanohydrin reaction sequence: 1 (25.0%)	Consolidate	264-267 (4)	1.3%
Amines Amines: 3 (42.9%) / Reactions of amines: 2 (28.6%) / Amines and diazonium salts: 1 (14.3%) / More topics in chapter guide	Next	268-274 (7)	2.3%
Biomolecules Carbohydrates: 6 (54.5%) / Biomolecules: 3 (27.3%) / Proteins and amino acids: 1 (9.1%) / More topics in chapter guide	Focus first	275-285 (11)	3.7%
Practical Chemistry (NCERT Laboratory Manual) Practical and qualitative chemistry: 3 (75.0%) / Qualitative chemical analysis: 1 (25.0%)	Consolidate	286-289 (4)	1.3%
States of Matter Historical appendix / omitted source chapter Gas laws: 2 (66.7%) / Omitted Chapter : States of Matter: 1 (33.3%)	Historical appendix	290-292 (3)	1.0%
Hydrogen Historical appendix / omitted source chapter Hydrogen and its compounds: 2 (66.7%) / Hydrogen and water chemistry: 1 (33.3%)	Historical appendix	293-295 (3)	1.0%

NCERT chapter / leading topics	Priority	Questions	Weight
The s-Block Elements Historical appendix / omitted source chapter s-Block Elements: 1 (100.0%)	Historical appendix	296-296 (1)	0.3%
Surface Chemistry Historical appendix / omitted source chapter Adsorption: 1 (50.0%) / Adsorption isotherms: 1 (50.0%)	Historical appendix	297-298 (2)	0.7%
General Principles and Processes of Isolation of Elements Historical appendix / omitted source chapter Extraction and purification of metals: 1 (50.0%) / Metallurgy: 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 1-6 / 6 selected / 2.0% practice weight / Next

Topics to prioritise in this collection

- Mole concept and stoichiometry: 3 questions / 50.0% of this chapter
- Mole concept: 2 questions / 33.3% of this chapter
- Solution preparation: 1 question / 16.7% of this chapter

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

---

Question 1 View solution online

Aqueous HCl reacts with $\mathbf{MnO_2(\ s)}$ to form $\mathbf{MnCl_2(aq)}$, $\mathbf{Cl_2(\ g)}$ and $\mathbf{H_2O(}\mathit{l}\mathbf{)}$. What is the weight (in g) of $\mathbf{Cl_2}$ liberated when 8.7 g of $\mathbf{MnO_2(\ s)}$ is reacted with excess aqueous HCl solution ? (Given Molar mass in $\mathbf{gmol^{-1}Mn = 55, Cl = 35.5, O = 16, H = 1}$)

A. 7.1

B. 71

C. 21.3

D. 14.2

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 $(\mathbf{X})$ is
$\times 10^{-1}$
(Given molar mass in $\mathbf{g mol^{-1}}$ of $\mathbf{C : 12, H : 1, O : 16, Cl : 35.5}$)

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

For the given reaction;

$$\mathbf{CaCO_3 + 2HCl \rightarrow CaCl_2 + H_2O + CO_2}$$

If $\mathbf{90\ g CaCO_3}$ is added to 300 mL of HCl which
contains 38.55% HCl by mass and has density $\mathbf{1.13\ g\ mL^{-1}}$, then which of the following option is correct?
Given molar mass of H, Cl, Ca and O are 1, 35.5, 40 and $\mathbf{16\ g\ mol^{-1}}$ respectively.

A. 64.97 g of HCl remains unreacted

B. 32.85 g of $\mathbf{CaCO_3}$ remains unreacted

C. 97.30 g of HCl reacted

D. 60.32 g of HCl reamains unreacted

Question 5 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 6

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

CHAPTER 02 / CHEMISTRY

Structure of Atom

Questions 7-8 / 2 selected / 0.7% practice weight / Consolidate

Topics to prioritise in this collection

- Quantum numbers: 2 questions / 100.0% of this chapter

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

Question 7

View solution online

According to Bohr's atomic theory :
(A) Kinetic energy of electron is $\propto \frac{Z^2}{n^2}$
(B) The product of velocity (v) of electron and principal quantum number (n). ' vn ' $\propto Z^2$.
(C) Frequency of revolution of electron in an orbit is $\propto \frac{Z^3}{n^3}$.
(D) Coulombic force of attraction on the electron is $\propto \frac{z^3}{n^4}$.

Choose the most appropriate answer from the options given below:

A. (C) only

B. (A) and (D) only

C. (A) only

D. (A), (C) and (D) only

Question 8 View solution online

In a multielectron atom, which of the following orbitals described by three quantum numbers with have same energy in absence of electric and magnetic fields?

A. $\mathbf{n = 1, 1 = 0,\ m_1 = 0}$

B. $\mathbf{n = 2, 1 = 0,\ m_1 = 0}$

C. $\mathbf{n = 2, 1 = 1,\ m_1 = 1}$

D. $\mathbf{n = 3, 1 = 2,\ m_1 = 1}$

E. $\mathbf{n = 3, 1 = 2,\ m_1 = 0}$

Choose the correct answer from the options given below:

A. A and B only

B. B and C only

C. C and D only

D. D and E only

CHAPTER 03 / CHEMISTRY

Classification of Elements and Periodicity in Properties

Questions 9-16 / 8 selected / 2.7% practice weight / Next

Topics to prioritise in this collection

- Classification of Elements and Periodicity in Properties: 3 questions / 37.5% of this chapter
- Ionisation enthalpy trend: 2 questions / 25.0% of this chapter
- Periodic trends: 2 questions / 25.0% of this chapter
- Electron gain enthalpy trend: 1 question / 12.5% of this chapter

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

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. $2LiNO_3 \xrightarrow{\Delta} 2NaNO_2 + O_2$

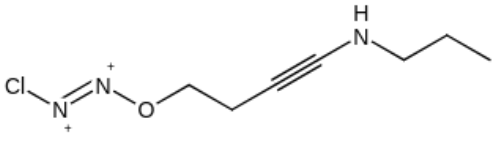
C. $2LiNO_3 \rightarrow 2Li + 2NO_2 + O_2$

D. $4LiNO_3 \xrightarrow{\Delta} 2Li_2O + 4NO_2 + O_2$

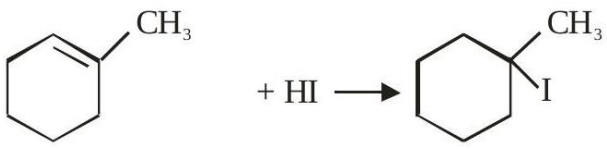
Question 10 View solution online

Which of the following reaction is correct ?

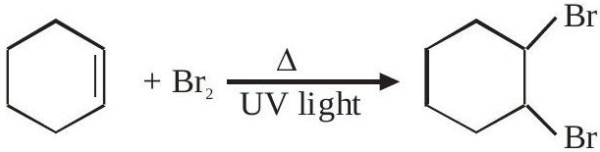
A.



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

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 12 View solution online

Which of the following statements are correct?
A. The process of the addition an electron to a neutral gaseous atom is always exothermic
B. The process of removing an electron from an isolated gaseous atom is always endothermic
C. The 1st ionization energy of the boron is less than that of the beryllium
D. The electronegativity of C is 2.5 in CH_4 and CCl_4
E. Li is the most electropositive among elements of group I

Choose the correct answer from the options gives below

A. B and C only

B. A, C and D only

C. B and D only

D. B, C and E only

Question 13 View solution online

Given below are two statements :

Statement (I) : The first ionisation enthalpy of group 14 elements is higher than the corresponding elements of group 13.
Statement (II) : Melting points and boiling points of group 13 elements are in general much higher than those the corresponding elements of group 14. In the light of the above statements, choose the most appropriate answer from the options given below :

A. Statement I is correct but Statement II is incorrect

B. Statement I is incorrect but Statement II is correct

C. Both Statement I and Statement II are incorrect

D. Both Statement I and Statement II are correct

Question 14 View solution online

Which of the following statements are correct?

A. The M^{3+}/M^{2+} reduction potential for iron is greater than manganese

B. The higher oxidation states of first row dblock elements get stabilized by oxide ion.

C. Aqueous solution of Cr^{2+} can liberate hydrogen from dilute acid.

D. Magnetic moment of V^{2+} is observed between $4.4 - 5.2BM$
Choose the correct answer from the options given below:
(1) (B), (C) only
(C), (D) only
(2) (A), (B), (D) only
(A), (B) only

Question 15 View solution online

Select the correct statements among the following:

A. B, C, D

B. A, B, C, D

C. A, B, C

D. C, D

Question 16

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 04 / CHEMISTRY

Chemical Bonding and Molecular Structure

Questions 17-25 / 9 selected / 3.0% practice weight / Next

Topics to prioritise in this collection

- Chemical bonding: 4 questions / 44.4% of this chapter
- Molecular orbital theory: 3 questions / 33.3% of this chapter
- Hybridisation: 1 question / 11.1% of this chapter
- Ionic and covalent bonding: 1 question / 11.1% of this chapter

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

Question 17 View solution online

An element ' E ' has the ionisation enthalpy value of $374\ \text{kJ mol}^{-1}$. 'E' reacts with elements A, B, C and D with electron gain enthalpy values of $-328, -349$, -325 and $-295\ \text{kJ mol}^{-1}$, respectively.

The correct order of the products EA, EB, EC and ED in terms of ionic character is :

A. $\text{EB} > \text{EA} > \text{EC} > \text{ED}$

B. $\text{ED} > \text{EC} > \text{EA} > \text{EB}$

C. $\text{EA} > \text{EB} > \text{EC} > \text{ED}$

D. $\text{ED} > \text{EC} > \text{EB} > \text{EA}$

Question 18 View solution online

The bond order and magnetic behaviour of O_2^- ion are, respectively :

A. 1.5 and paramagnetic

B. 1.5 and diamagnetic

C. 2 and diamagnetic

D. 1 and paramagnetic

Question 19 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 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	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 22 View solution online

Match List-I with List-II

	List-I (Species)		List-II (Hybrid Orbitals)
(a)	SF_4	(i)	$sp^3 d^2$
(b)	IF_5	(ii)	d^2sp^3
\multirow[t]{2}{*}{(c)}	\multirow[t]{2}{*}{NO_2^+}	(iii)	$sp^3 d$
		(iv)	sp^3
(d)	NO_4^+	(v)	sp

Choose the correct answer from the options given below :

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

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

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

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

Question 23

View solution online

Match List-I with List-II

List-I	List-II (B.P. : L.P.)
A. ICl_2^-	*I*. 4 : 2
B. H_2O	*II*. 4 : 1
C. SO_2	*III*. 2 : 3
D. XeF_4	*IV*. 2 : 2

Choose the correct answer from the options given below :

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

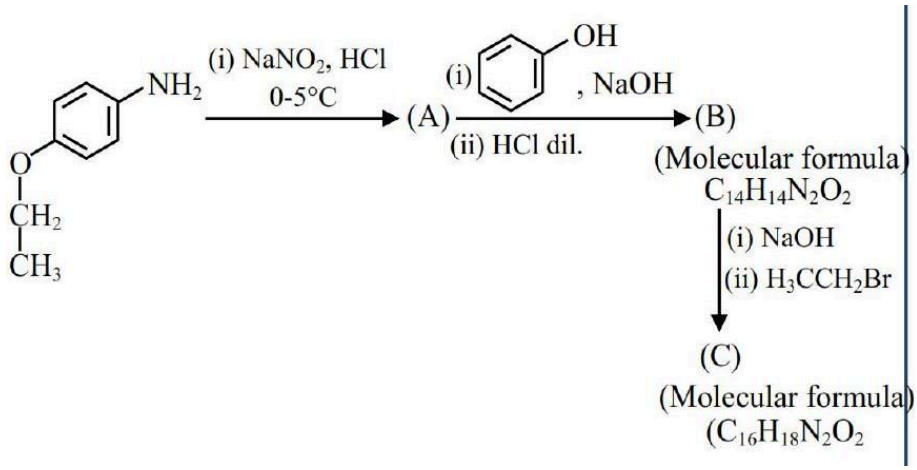
B. A-III, B-IV, C-II, D-I

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

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

Question 24 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 25 View solution online

Match List - I with List - II

List - I	List - II
(A) $\Psi_{MO} = \Psi_A - \Psi_B$	(I) Dipole moment
(B) $\mu = Q \times r$	(II) Bonding molecular orbital
(C) $\frac{N_b - N_a}{2}$	(III) Anti-bonding molecular orbital
(D) $\Psi_{MO} = \Psi_A + \Psi_B$	(IV) Bond order

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

CHAPTER 05 / CHEMISTRY

Thermodynamics

Questions 26-35 / 10 selected / 3.3% practice weight / Focus first

Topics to prioritise in this collection

- Thermodynamics: 4 questions / 40.0% of this chapter
- Thermodynamic energy and spontaneity: 2 questions / 20.0% of this chapter
- Enthalpy change: 1 question / 10.0% of this chapter
- Equilibrium constant: 1 question / 10.0% of this chapter
- Gibbs free energy: 1 question / 10.0% of this chapter
- Relation among standard enthalpy, entropy and equilibrium constant: 1 question / 10.0% of this chapter

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

Question 26 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 27 View solution online

Use the following data :

Substance	$\frac{\Delta_f H^{\ominus}(500\ K)}{kJmol^{-1}}$	$\frac{S^{\ominus}(500\ K)}{JK^{-1}\ mol^{-1}}$
AB(g)	32	222
$A_2(g)$	6	146
$B_2(g)$	X	280

One mole each of $A_2(g)$ and $B_2(g)$ are taken in a 1L closed flask and allowed to establish the equilibrium at 500K.

$$A_2(g) + B_2(g) \rightleftharpoons 2AB(g)$$

The value of x (in $kJmol^{-1}$) is

_____

(Nearest integer)

(Given: $\log K = 2.2R = 8.3JK^{-1}\ mol^{-1}$)

Numerical answer: _____

Enter an integer. Use the units and scaling requested in the question.

Question 28 View solution online

The value of $\log K$ for the reaction $A \leftrightharpoons B$ at 298 K is ..... (Nearest integer)

Given: $\Delta H^0 = -54.07\ kJ\ mol^{-1}$

$\Delta S^\circ = 10JK^{-1}\ mol^{-1}$

(Take $2.303 \times 8.314 \times 298 = 5705$)

Numerical answer: _____

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

Question 29

View solution online

Match List - I with List - II.

List -I

(Processes/Reactions)
(A) $2SO_2(g) + O_2(g) \rightarrow 2SO_3(g)$
(B) $4NH_3(g) + 5O_2(g) \rightarrow 4NO(g) + 6H_2O(g)$
(C) $N_2(g) + 3H_2(g) \rightarrow 2NH_3(g)$
(D) Vegetable oil $(l) + H_2 \rightarrow$ Vegetable ghee(s)

List - II
(Catalyst)
(I) $Fe(s)$
(II) $Pt(s) - Rh(s)$
(III) V_2O_5
(IV) $Ni(s)$

Choose the correct answer from the options given below:

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

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

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

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

Question 30 View solution online

28.0 L of CO_2 is produced on complete combustion of 16.8 L gaseous mixture of ethene and methane at $25°C$ and 1 atm . Heat evolved during the combustion process is kJ .

Given : $\Delta H_c\left(CH_4\right)=-900 kJ mol^{-1}$
$\Delta H_c\left(C_2H_4\right)=-1400\ kJ\ mol^{-1}$

Numerical answer: _____

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

Question 31 View solution online

Enthalpies of formation of $CCl_4(g), H_2O(g), CO_2(g)$ and $HCl(g)$ are $-105, -242, -394$ and $92\ kJ\ mol^{-1}$ respectively. The magnitude of enthalpy of the reaction given below is $kJ mol^{-1}$. (nearest integer)

$$CCl_4(g)+2H_2O(g) \rightarrow CO_2(g)+4HCl(g)$$

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

The group 14 elements A and B have the first ionisation enthalpy values of 708 and $715\ kJ\ mol^{-1}$ respectively. The above values are lowest among their group members. The nature of their ions A^{2+} B^{4+} respectively is

A. both reducing

B. both oxidising

C. reducing and oxidising

D. oxidising and reducing

Question 33 View solution online

Which of the following is not correct?

A. ΔG is negative for a spontaneous reaction

B. ΔG is positive for a spontaneous reaction

C. ΔG is zero for a reversible reaction

D. ΔG is positive for a non-spontaneous reaction

Question 34 View solution online

Which of the following statement is incorrect?

A. Low solubility of LiF in water is due to its small hydration enthalpy.

B. KO_2 is paramagnetic.

C. Sol of sodium in liquid ammonia is conducting in nature.

D. Sodium metal has higher density than potassium metal

Question 35

View solution online

Match List-I with List-II.

List-I

List-II

Alkali Metal

Emission Wavelength in nm

(A) Li

(I) 589.2

(B) Na

(II) 455.5

(C) Rb

(III) 670.8

(D) Cs

(IV) 780.0

Choose the correct answer from the options given below:

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

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

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

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

CHAPTER 06 / CHEMISTRY

Equilibrium

Questions 36-53 / 18 selected / 6.0% practice weight / Focus first

Topics to prioritise in this collection

- Chemical and ionic equilibrium: 10 questions / 55.6% of this chapter
- Acid-base equilibrium: 1 question / 5.6% of this chapter
- Basic buffer: 1 question / 5.6% of this chapter
- Chemical equilibrium: 1 question / 5.6% of this chapter
- Dissociation equilibrium and degree of dissociation from Gibbs energy: 1 question / 5.6% of this chapter
- Equilibrium: 1 question / 5.6% of this chapter
- Equilibrium constants: 1 question / 5.6% of this chapter
- Heterogeneous equilibrium: 1 question / 5.6% of this chapter
- Le Chatelier's principle: 1 question / 5.6% of this chapter

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

---

Question 36 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.

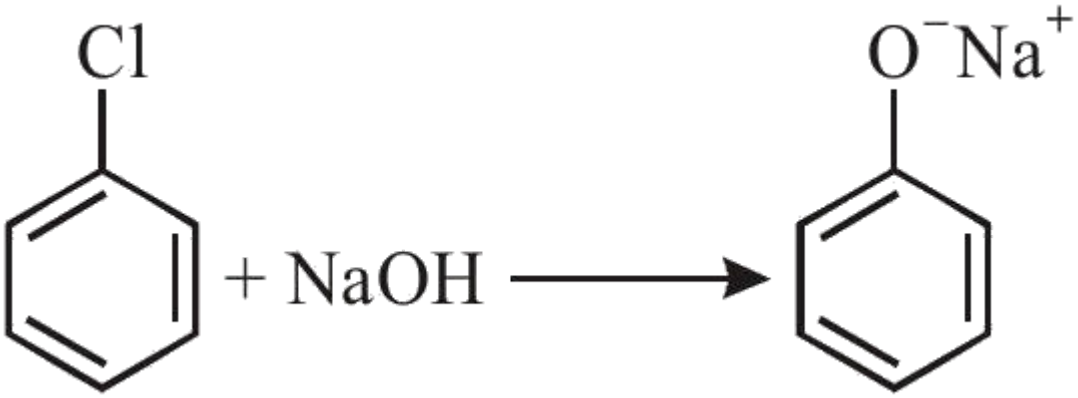
B. The addition of inert gas at constant volume will not affect the equilibrium constant.

C. The equilibrium will shift in forward direction as the pressure increases.

D. The equilibrium constant decreases as the temperature increases.

Question 37 View solution online

The above reaction requires which of the following reaction conditions?



A. $573\ \text{K}, \text{Cu}, 300\ \text{atm}$

B. $623\ \text{K}, \text{Cu}, 300\ \text{atm}$

C. $573\ \text{K}, 300\ \text{atm}$

D. $623\ \text{K}, 300\ \text{atm}$

Question 38 View solution online

When 5.1 g of solid NH_4HS is introduced into a two litre evacuated flask at $27°\text{C}, 20\%$ of the solid decomposes into gaseous ammonia and hydrogen sulphide. The K_p for the reaction at $27°\text{C}$ is $\text{x} \times 10^{-2}$. The value of x is . (Integer answer)
[Given $\text{R} = 0.082\ \text{L atm K}^{-1}\ \text{mol}^{-1}$]

Numerical answer: _____

Enter the requested integer (0 decimal places).

Question 39

View solution online

Dissociation of a gas $\mathbf{A_2}$ takes place according to the following chemical reactions. At equilibrium, the total pressure is 1 bar at 300K.

$$\mathbf{A_2(g) \rightleftharpoons 2\,A(g)}$$

The standard Gibbs energy of formation of the involved substances has been provided below:

Substance	$\mathbf{\Delta G_t^\circ / kJ mol^{-1}}$
$\mathbf{A_2}$	-100.00
A	-50.832

The degree of dissociation of $\mathbf{A_2(g)}$ is given by $\left(\mathbf{x \times 10^{-2}}\right)^{1/2}$ where $\mathbf{x} =$

_____

.

(Nearest integer).

[Given : $\mathbf{R = 8\ J\ mol^{-1}\ K^{-1}, \log 2 = 0.3010}$, $\mathbf{\log 3 = 0.48}$]

Numerical answer: _____

Enter an integer. Use the units and scaling requested in the question.

Question 40 View solution online

Consider the general reaction given below at 400 K

$$xA(g) \rightleftharpoons yB(g)$$

The values of K_p and K_c are studied under the same condition of temperature but variation in x and y.
(i) $K_p = 85.87$ and $K_c = 2.586$ appropriate units
(ii) $K_p = 0.862$ and $K_c = 28.62$ appropriate units
The value of x and y in (i) and (ii) respectively are:

A. (i) 3, 1 ; (ii) 3, 1

B. (i) 4, 1 ; (ii) 4, 1

C. (i) 1, 3 ; (ii) 2, 1

D. (i) 1, 2 ; (ii) 2, 1

Question 41 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 42 View solution online

The equilibrium composition for the reaction $PCl_3 + Cl_2 \rightleftharpoons PCl_5$ at 298 K is given below.
$[PCl_3]_{eq} = 0.2\ mol\ L^{-1}$ $[Cl_2]_{eq} = 0.1\ mol\ L^{-1}$, $[PCl_5]_{eq} = 0.40\ mol\ L^{-1}$

If 0.2 mol of Cl_2 is added at the same temperature, the equilibrium concentrations of PCl_5 is $\times 10^{-2}\ mol\ L^{-1}$.

Given : K_c for the reaction at 298 K is 20

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

$37.8\ g\ N_2O_5$ was taken in a 1 L reaction vessel and allowed to undergo the following reaction at 500 K

$2\ N_2O_{5(g)} \rightarrow 2\ N_2O_{4(g)} + O_{2(g)}$

The total pressure at equilibrium was found to be 18.65 bar.

Then, $Kp =$ $\times 10^{-2}$ [nearest integer]

Assume N_2O_5 to behave ideally under these conditions

Given : $R = 0.082$ bar $Lmol^{-1}\ K^{-1}$

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

For complete combustion of ethene.

$C_2H_4(g) + 3O_2(g) \rightarrow 2CO_2(g) + 2H_2O(l)$ the amount of heat produced as measured in bomb calorimeter is $1406\ kJ\ mol^{-1}$ at 300 K . The minimum value of $T\Delta S$ needed to reach equilibrium is $(-)$ kJ. (Nearest integer)

Given : $R = 8.3JK^{-1}\ mol^{-1}$

Numerical answer: _____

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

Question 45 View solution online

Assuming that $Ba(OH)_2$ is completely ionised in aqueous solution under the given conditions the concentration of H_3O^+ions in 0.005 M aqueous solution of $Ba(OH)_2$ at 298 K is ___ $\times 10^{-12}\ mol\ L^{-1}$. (Nearest integer)

Numerical answer: _____

Enter the requested integer (0 decimal places).

Question 46 View solution online

Consider the following reaction approaching equilibrium at $27^\circ C$ and 1 atm pressure

$$A + B \underset{k_r=10^2}{\overset{k_f=10^3}{\rightleftharpoons}} C + D$$

The standard Gibb's energy change ($\Delta_r G^\theta$) at $27^\circ C$ is (-) $\quad KJmol^{-1}$
(Nearest integer).
(Given: $R = 8.3\ J\ K^{-1}\ mol^{-1}$ and $\ln 10 = 2.3$)

Numerical answer: _____

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

Question 47 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

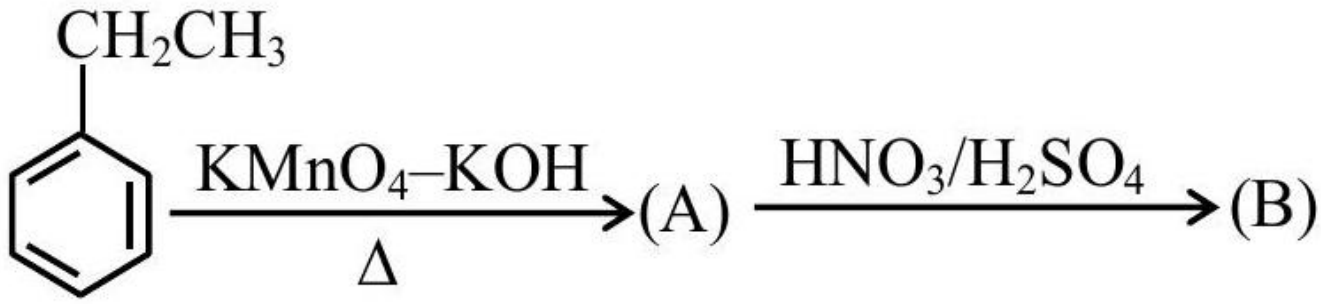
B. A-III, B-I, C-II, D-IV

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

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

Question 48 View solution online

Major product B of the following reaction has
π-bond.



Numerical answer: _____

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

Question 49

View solution online

Match List-I with List-II

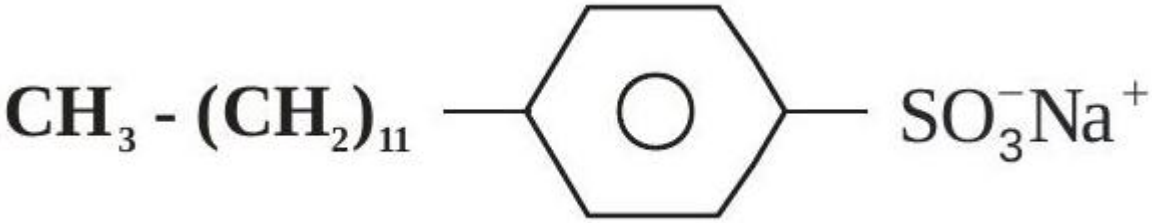
List-I

(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 50 View solution online

Match List - I with List II :

List - I		List - II	
(a)	Li	(i)	photoelectric cell
(b)	Na	(ii)	absorbent of CO_2
(c)	K	(iii)	coolant in fast breeder nuclear reactor
(d)	Cs	(iv)	treatment of cancer
		(v)	bearings for motor engines

Choose the correct answer from the options given below:

TEST PAPER WITH ANSWER

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

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

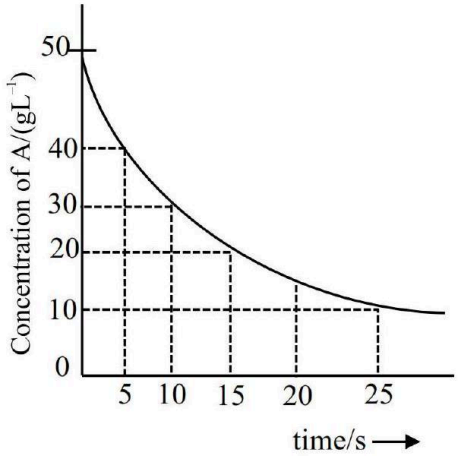
C. (a) - (iv), (b) - (iii), (c) - (i), (d) - (ii)

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

Question 51 View solution online

For the reaction $\mathbf{A} \rightarrow \mathbf{B}$ the following graph was obtained. The time required (in seconds) for the concentration of A to reduce to $\mathbf{2.5\ g\ L^{-1}}$ (if the initial concentration of A was $\mathbf{50\ g\ L^{-1}}$) is (Nearest integer)

Given : $\log 2 = 0.3010$



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

Match List I with List II.

List-I		List-II	
A.	Sulphate	I.	Pesticide
B.	Fluoride	II.	Bending of bones
C.	Nicotine	III.	Laxative effect
D.	Sodium arsinite	IV.	Herbicide

Choose the correct answer from the options given below:

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

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

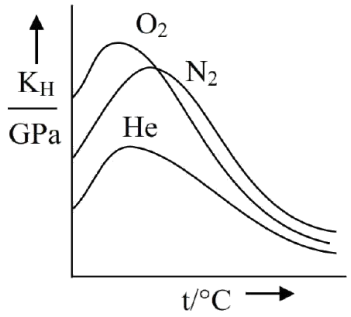
C. A-III, B-II, C-I, D-IV

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

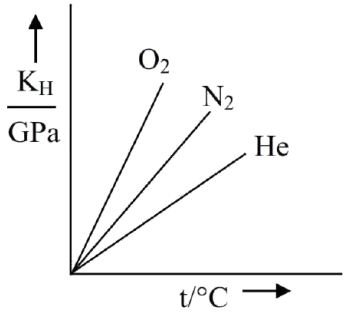
Question 53 View solution online

Which of the following graph correctly represents the plots of K_H at 1 bar gases in water versus temperature?

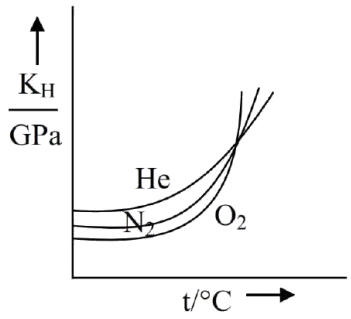
A.



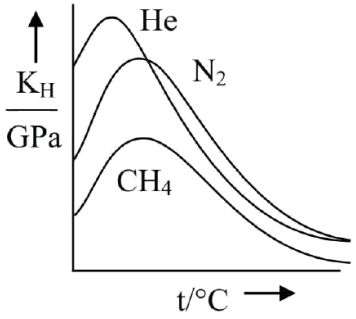
B.



C.



D.



CHAPTER 07 / CHEMISTRY

Redox Reactions

Questions 54-57 / 4 selected / 1.3% practice weight / Consolidate

Topics to prioritise in this collection

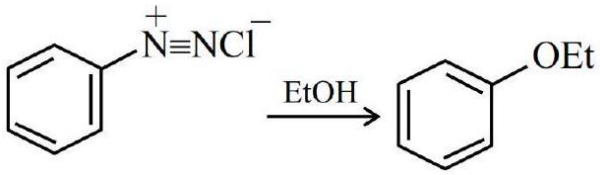
- Redox Reactions: 2 questions / 50.0% of this chapter
- Oxidation states and redox reactions: 1 question / 25.0% of this chapter
- Oxidation-reduction principles: 1 question / 25.0% of this chapter

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

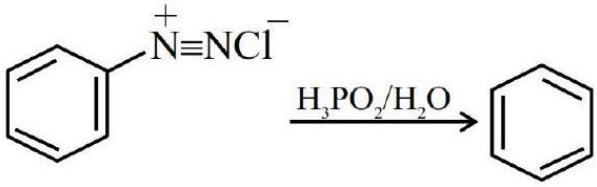
Question 54 View solution online

In the following reactions, which one is NOT correct?

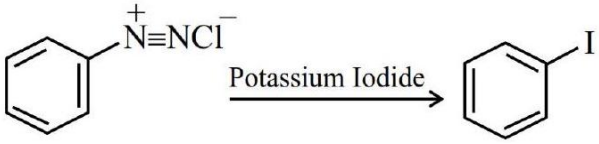
A.



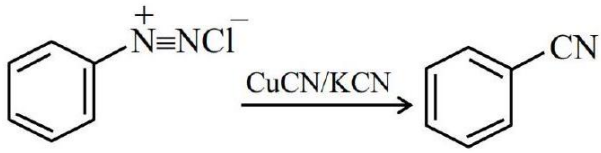
B.



C.



D.



Question 55 View solution online

Consider the following elements **In, Tl, Al, Pb, Sn** and Ge .
The most stable oxidation states of elements with highest and lowest first ionisation enthalpies, respectively, are

A. +2 and +3

B. +4 and +3

C. +4 and +1

D. +1 and +4

Question 56 View solution online

Given below are two statements :

Statements : $SbCl_5$ is more covalent than $SbCl_3$

Statements : The higher oxides of halogens also tend to be more stable than the lower ones.

In the light of the above statements, choose the most appropriate answer from the options given below

A. Both statement I and Statement II are correct

B. Both statement I and Statement II are incorrect

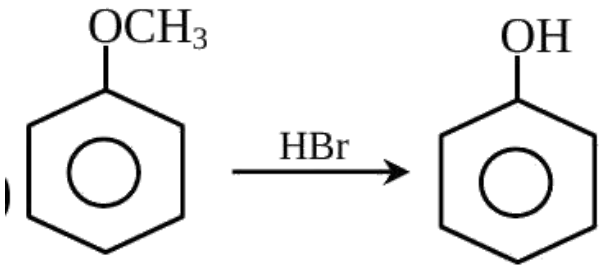
C. Statement I is correct but Statement II is incorrect

D. Statement I is incorrect but Statement II is correct

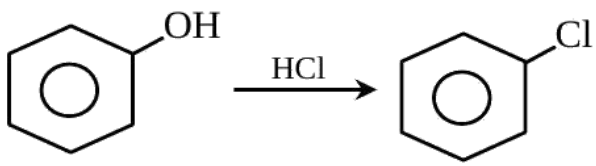
Question 57 View solution online

Which one of the following reactions is NOT possible?

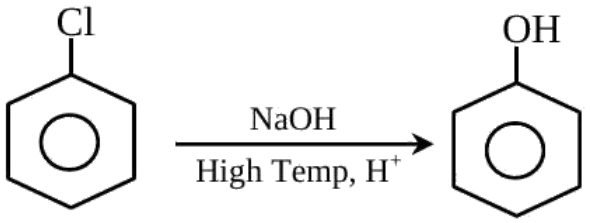
A.



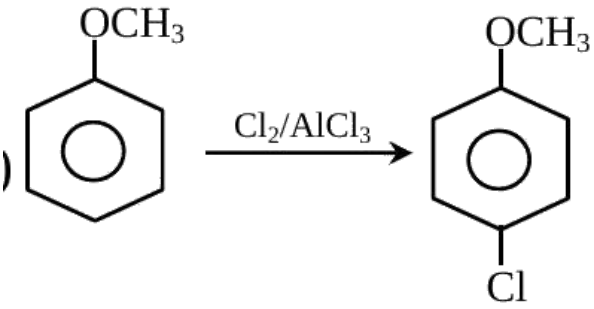
B.



C.



D.



CHAPTER 08 / CHEMISTRY

Organic Chemistry - Some Basic Principles and Techniques

Questions 58-67 / 10 selected / 3.3% practice weight / Next

Topics to prioritise in this collection

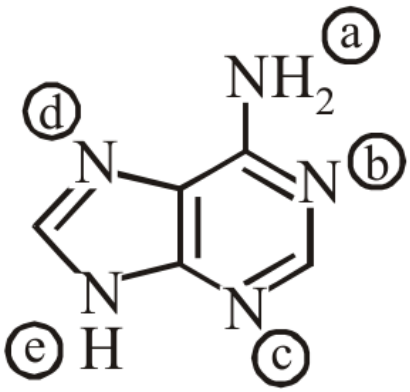
- Organic reaction mechanisms: 4 questions / 40.0% of this chapter
- Organic Chemistry - Some Basic Principles and Techniques: 2 questions / 20.0% of this chapter
- Organic reaction principles: 1 question / 10.0% of this chapter
- Organic structure and analysis: 1 question / 10.0% of this chapter
- Reaction intermediates: 1 question / 10.0% of this chapter
- Reactions of hydrocarbons: 1 question / 10.0% of this chapter

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

Question 58

View solution online

In the following compound,
the favourable site/s for protonation is/are :-



A. (b), (c) and (d)

B. (a)

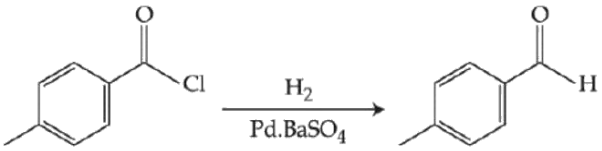
C. (a) and (e)

D. (a) and (d)

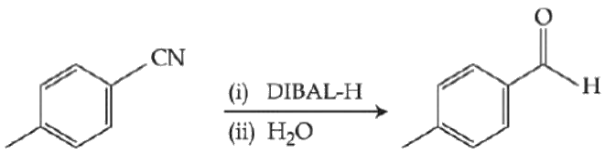
Question 59 View solution online

Which one of the following reactions does not represent correct combination of substrate and product under the given conditions ?

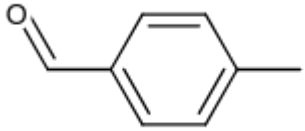
A.



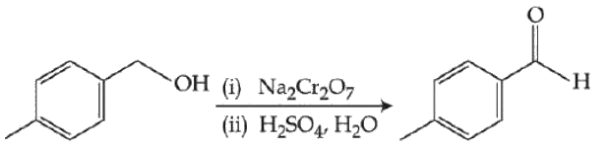
B.



C.

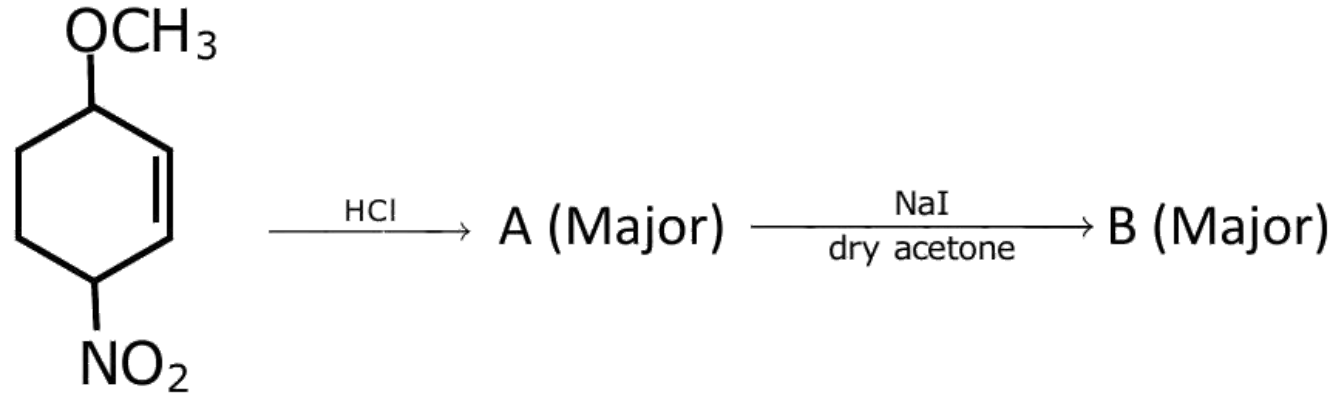


D.



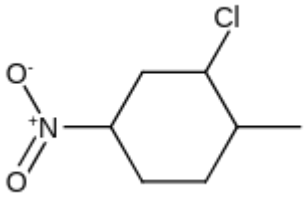
Question 60 View solution online

Identify A and B in the chemical reaction.

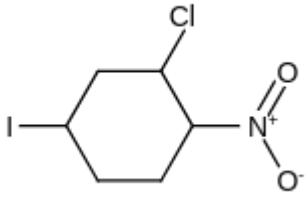


A. $A =$

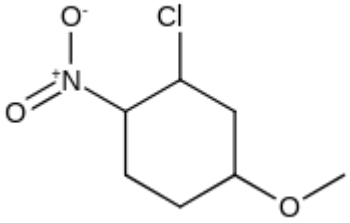
$B =$



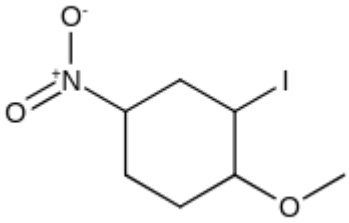
B. $B =$



C. $B =$

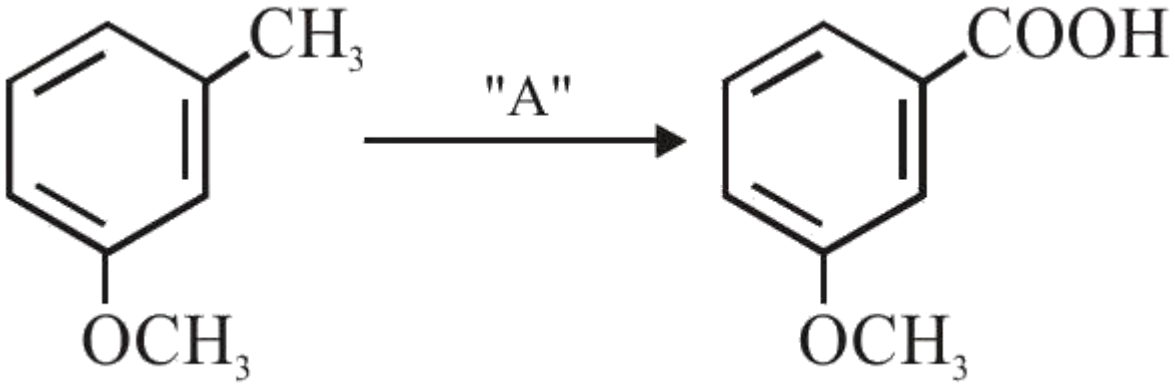


D. $B =$



Question 61 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 62 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 63 View solution online

(iii) $\mathbf{NaOH, CaO, \Delta}$

Consider the above reaction sequence and identify the major product P .

$$CH_3CH_2{-}OH \xrightarrow[(ii)\ KMnO_4]{(i)\ \text{Jone's Reagent}} P$$

A. Methane

B. Methanal

C. Methoxymethane

D. Methanoic acid

Question 64

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 65 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 66 View solution online

Match List-I with List-II :

List-I

(a) $[Co(NH_3)_6]\,[Cr(CN)_6]$
(b) $[Co(NH_3)_3(NO_2)_3]$
(c) $[Cr(H_2O)_6]Cl_3$
(d) cis $-[CrCl_2(ox)_2]^{3-}$

List-II

(i) Linkage isomerism
(ii) Solvate isomerism
(iii) Co-ordination isomerism
(iv) Optical isomerism Choose the correct answer from the options given below :

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

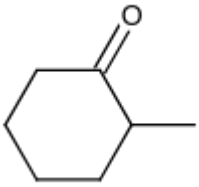
B. (a)-(iv), (b)-(ii), (c)-(iii), (d)-(i)

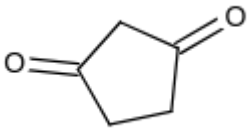
C. (a)-(ii), (b)-(i), (c)-(iii), (d)-(iv)

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

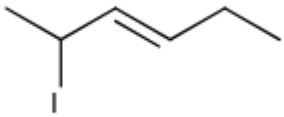
Question 67 View solution online

Total number of compounds with Chiral carbon atoms from following is .





$CH_3 - CH_2 - CH(NO_2) - COOH$
$CH_3 - CH_2 - CHBr - CH_2 - CH_3$
$CH_3 - CH(I) - CH_2 - NO_2$
$CH_3 - CH_2 - CH(OH) - CH_2OH$



Numerical answer: _____

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

CHAPTER 09 / CHEMISTRY

Hydrocarbons

Questions 68-189 / 122 selected / 40.7% practice weight / Focus first

Topics to prioritise in this collection

- Reactions of hydrocarbons: 117 questions / 95.9% of this chapter
- Aromaticity: 2 questions / 1.6% of this chapter
- Alkyne reduction and alkene oxidation: 1 question / 0.8% of this chapter
- Evaluation of reagent-controlled hydrocarbon reactions: 1 question / 0.8% of this chapter
- Ozonolysis: 1 question / 0.8% of this chapter

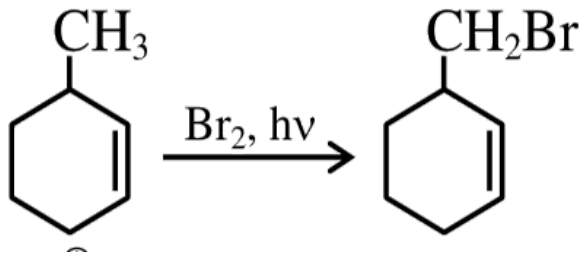
Open this chapter's solutions on mobile / Back to chapter guide

Question 68

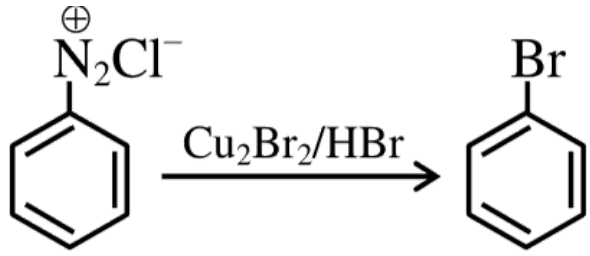
View solution online

Which of the following reaction is NOT correctly represented?

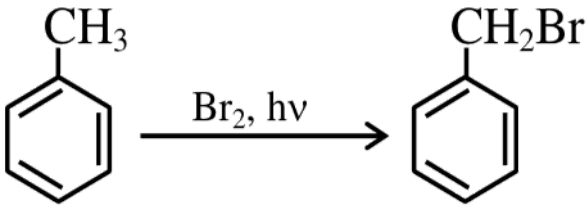
A.



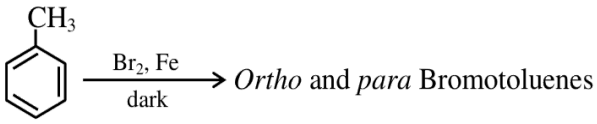
B.



C.



D.



Question 69 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

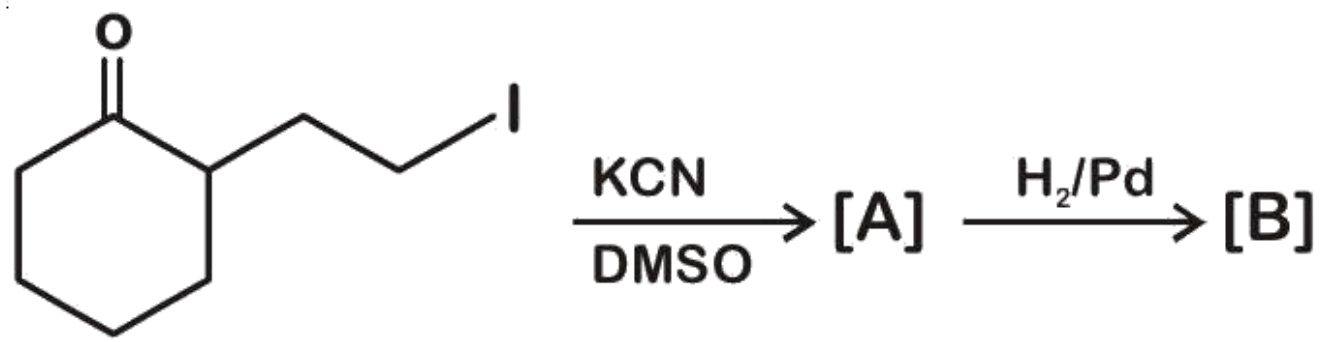
B. (A) - II, (B) -I, (C) - III, (D) - IV

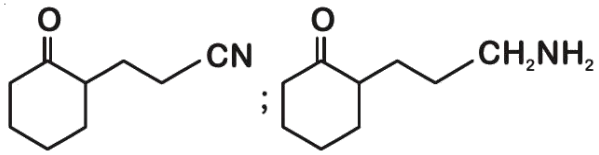
C. (A) - III, (B) - IV, (C) - II, (D) - I

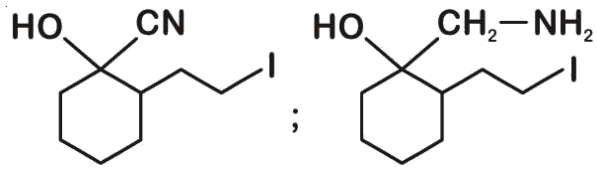
D. (A) -II , (B) -IV , (C) -I , (D) -III

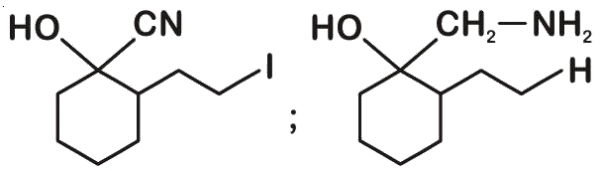
Question 70 View solution online

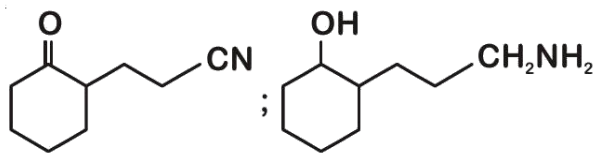
The major products A and B for the following reactions are, respectively



A. 

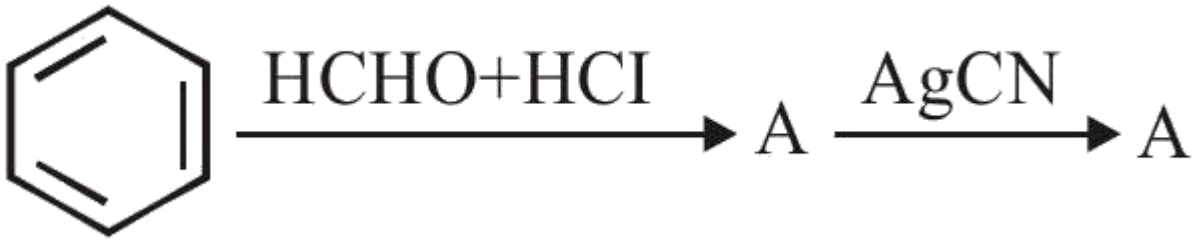
B. 

C. 

D. 

Question 71 View solution online

The compounds A and B in the following reaction are, respectively:



A. $\mathbf{A}$ = Benzyl alcohol, $\mathbf{B}$ = Benzyl isocyanide

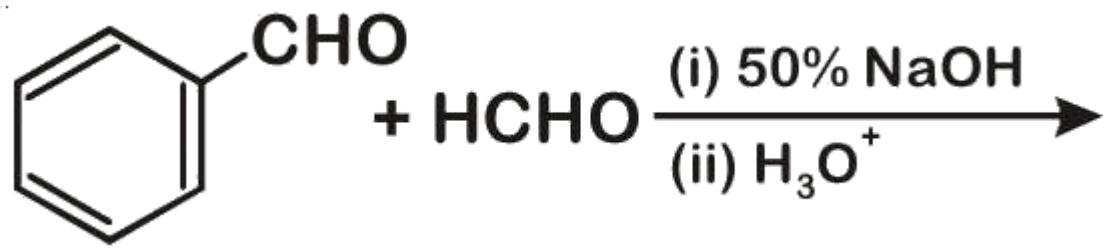
B. $\mathbf{A}$ = Benzyl alcohol, $\mathbf{B}$ = Benzyl cyanide

C. $\mathbf{A}$ = Benzyl chloride, $\mathbf{B}$ = Benzyl cyanide

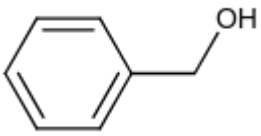
D. A = Benzyl chloride, B = Benzyl isocyanide

Question 72 View solution online

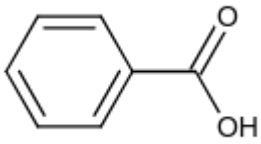
Major products of the following reaction are :



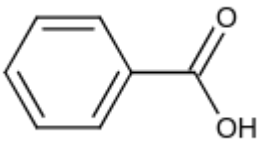
A. HCOOH and



B.



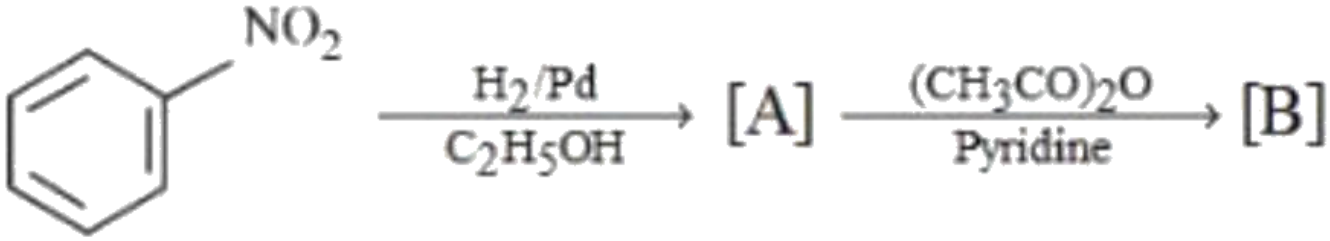
C. CH_3OH and



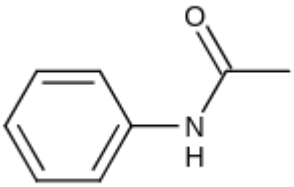
D. CH_3OH and HCO_2H

Question 73 View solution online

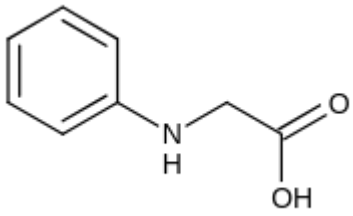
Consider the above reaction and identify the product B. Options



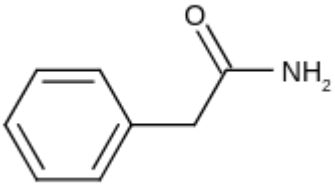
A.



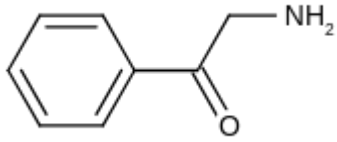
B.



C.

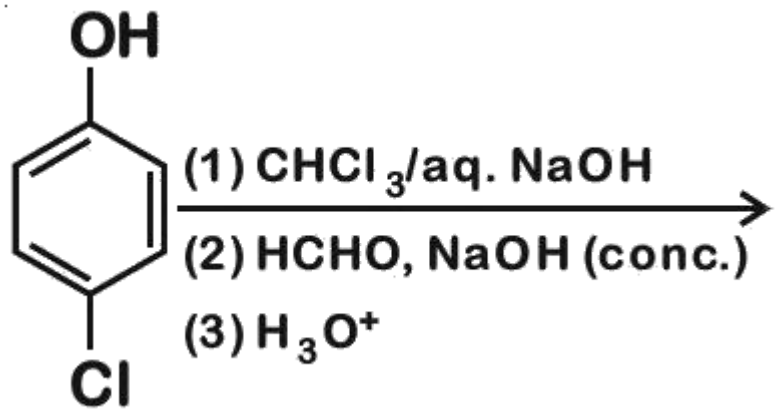


D.

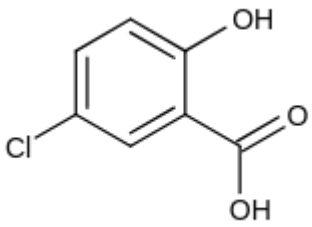


Question 74 View solution online

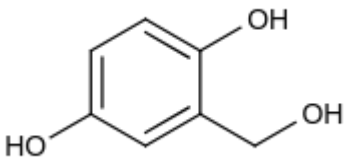
The major products of the following reaction are :



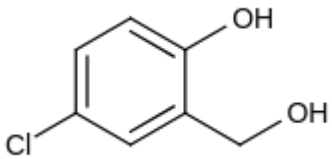
A.



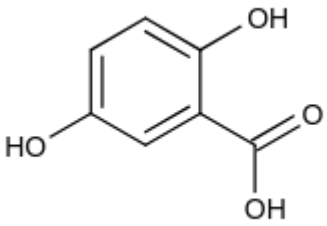
B.



C.

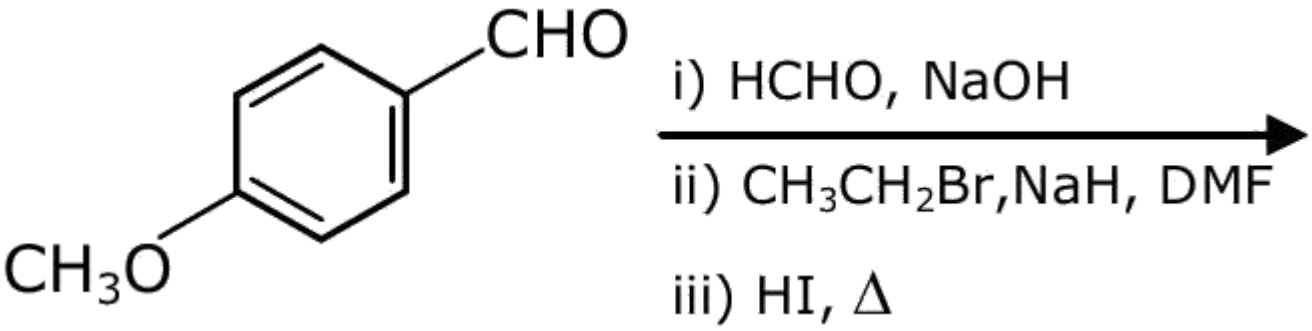


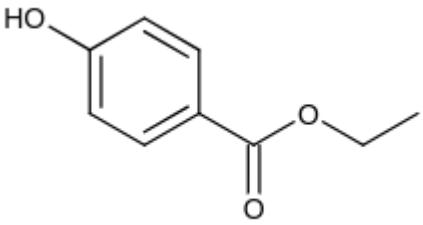
D.



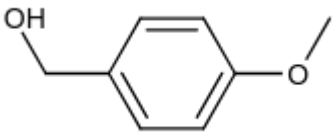
Question 75 View solution online

Identify A in the following chemical reaction.

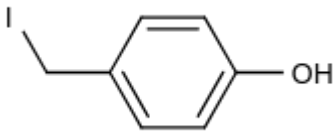




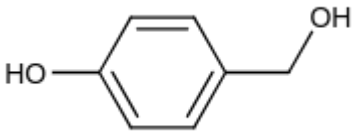
A.



B.



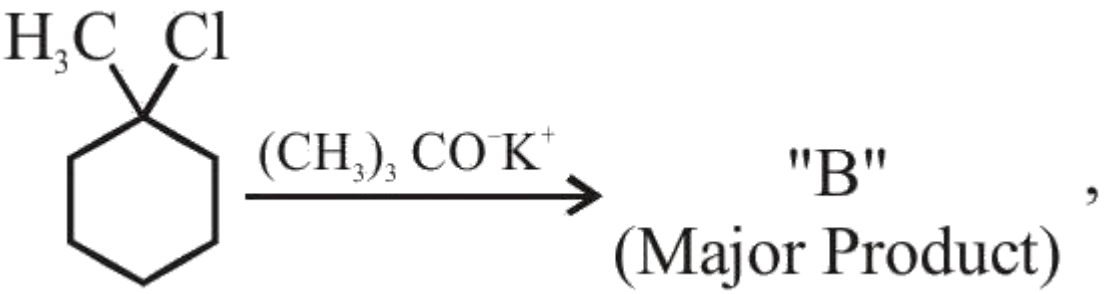
C.



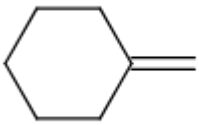
D.

Question 76 View solution online

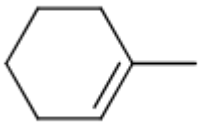
The product " A " and " B " formed in above reactions are :



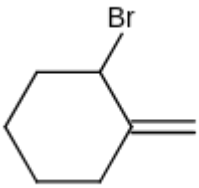
A. B-



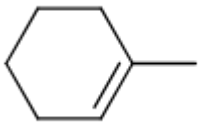
B. B-



C.

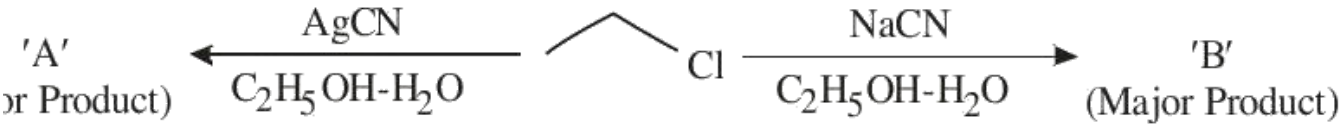


D.

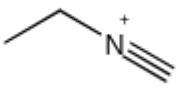


Question 77 View solution online

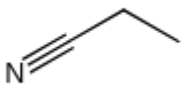
Considering the above reactions, the compound ' A ' and compound ' B ' respectively are :



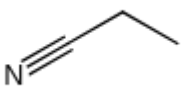
A.



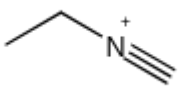
B.



C.



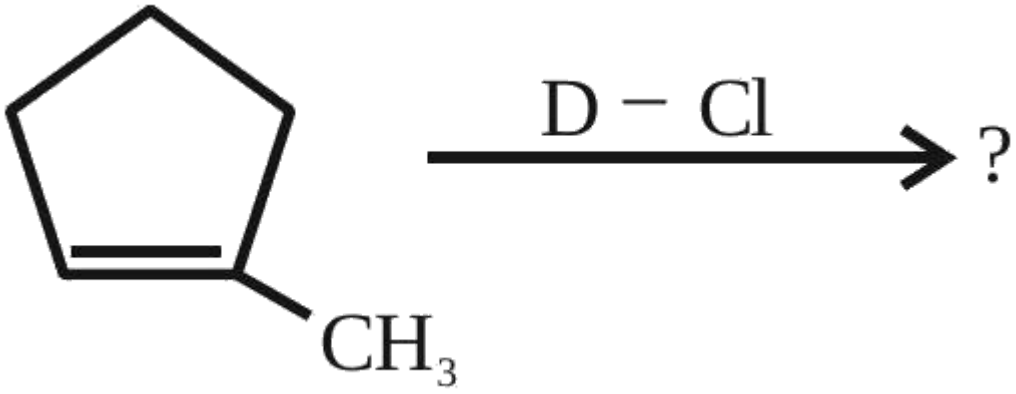
D.



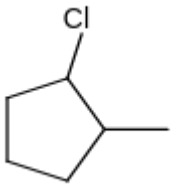
Question 78

View solution online

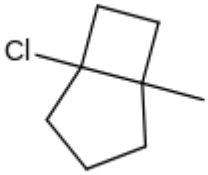
Major product of the following reaction is -



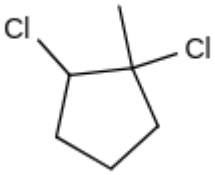
A.



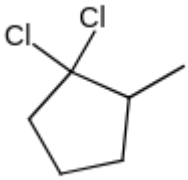
B.



C.

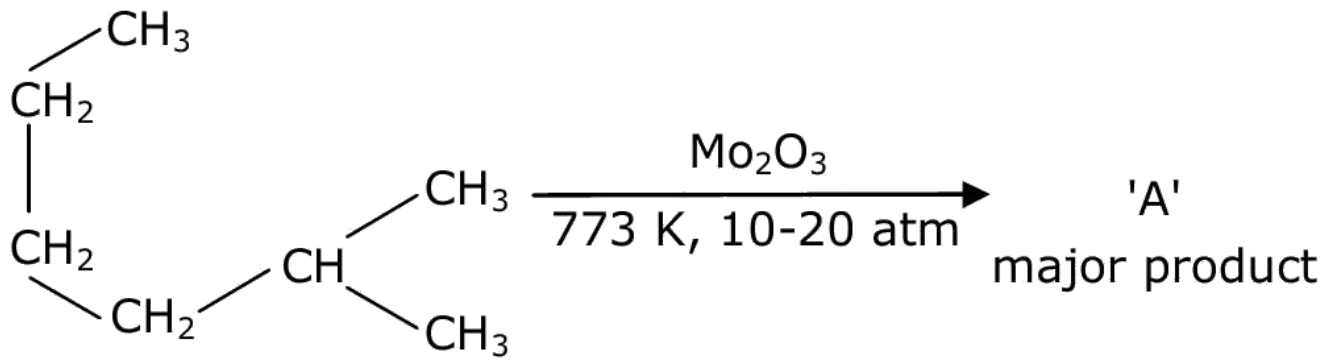


D.



Question 79 View solution online

Identify A in the given chemical reaction.



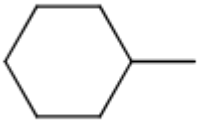
A.



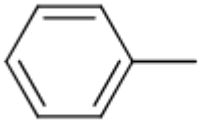
B.



C.

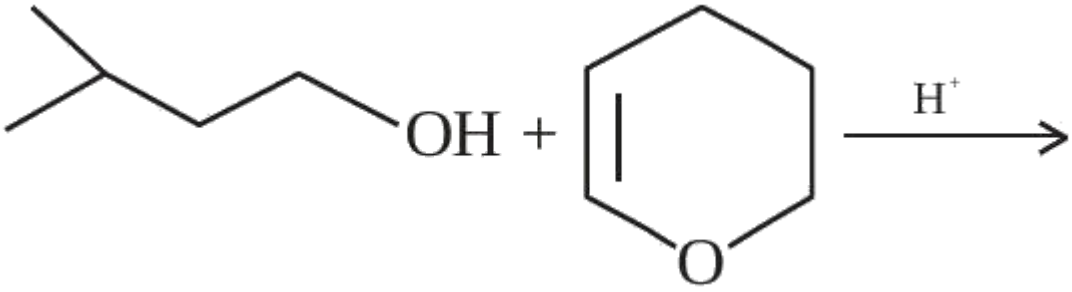


D.

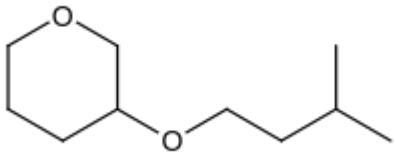


Question 80 View solution online

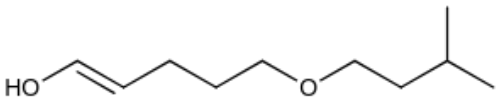
The major product formed in the following reaction, is



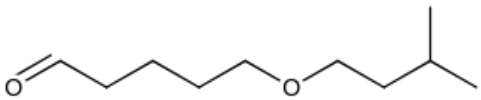
A.



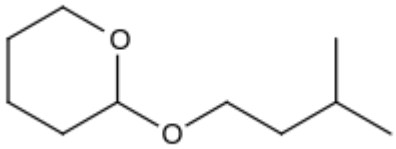
B.



C.

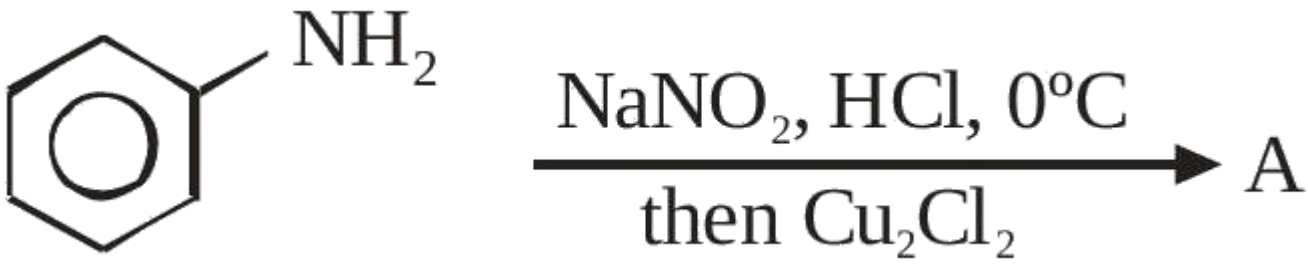


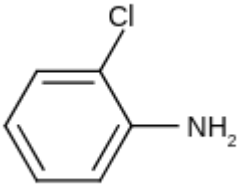
D.



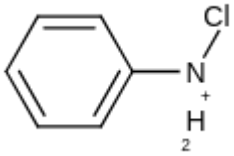
Question 81 View solution online

The product A formed in the following reaction is:

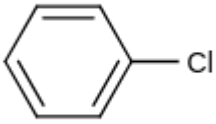




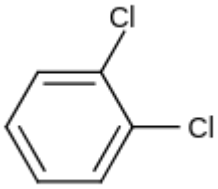
A.



B.



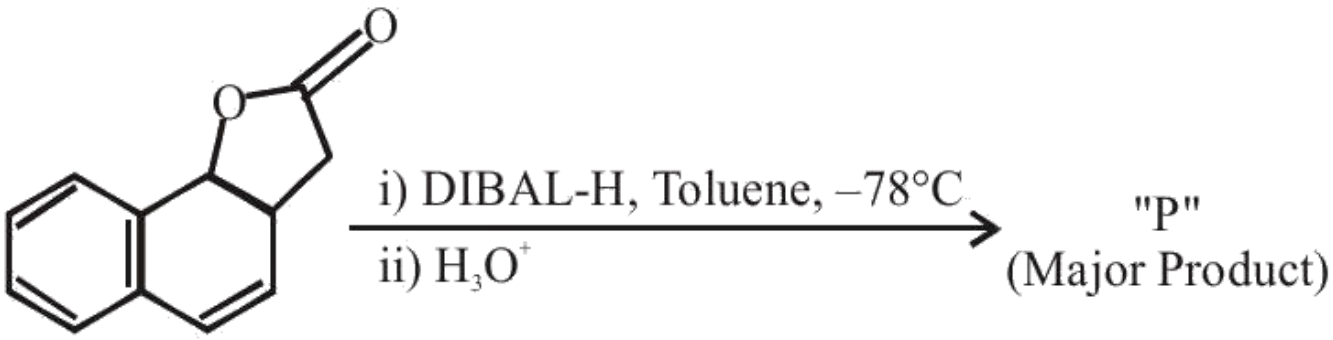
C.



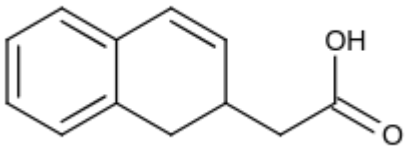
D.

Question 82 View solution online

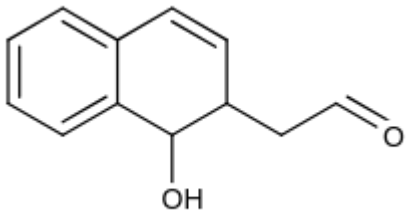
The product " P " in the above reaction is :



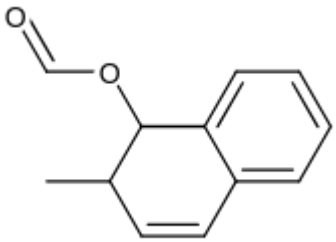
A.



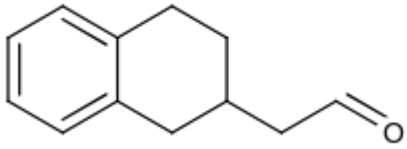
B.



C.

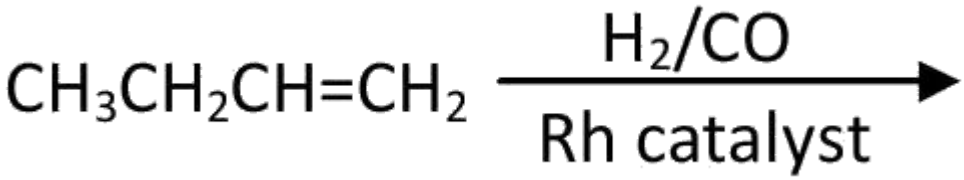


D.



Question 83 View solution online

The major product of the following reaction is :



A. $CH_3CH_2CH_2CHO$

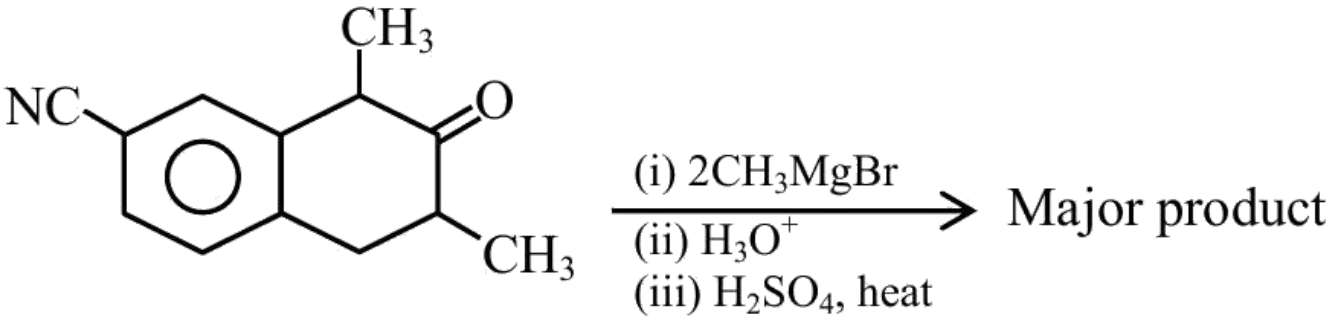
B. $CH_3CH_2CH = CH - CHO$

C. $CH_3CH_2CH_2CH_2CHO$

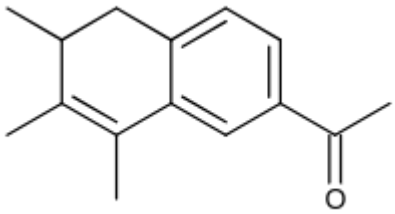
D. $CH_3CH_2C = CH_2$

Question 84 View solution online

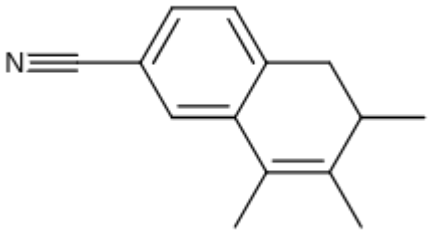
Which one of the following is the major product of the given reaction?



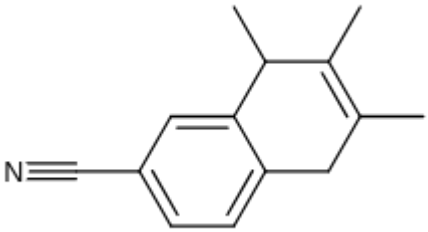
A.



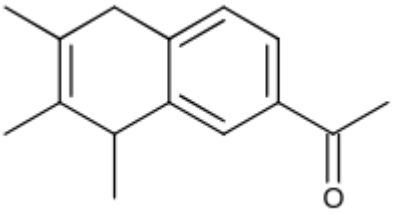
B.



C.



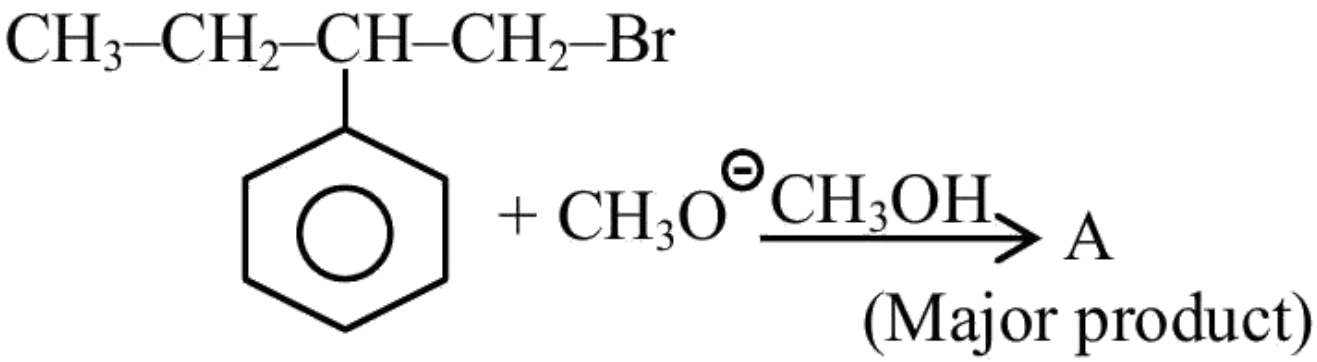
D.



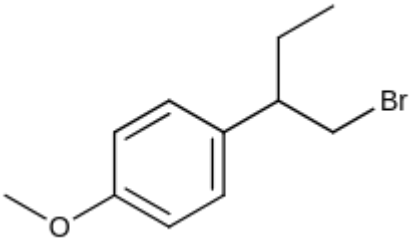
Question 85

View solution online

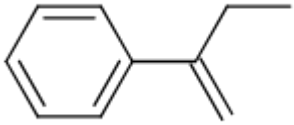
The major product (A) formed in the reaction given below is :



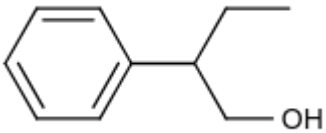
A.



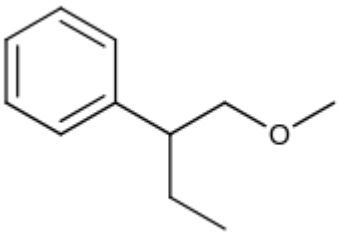
B.



C.

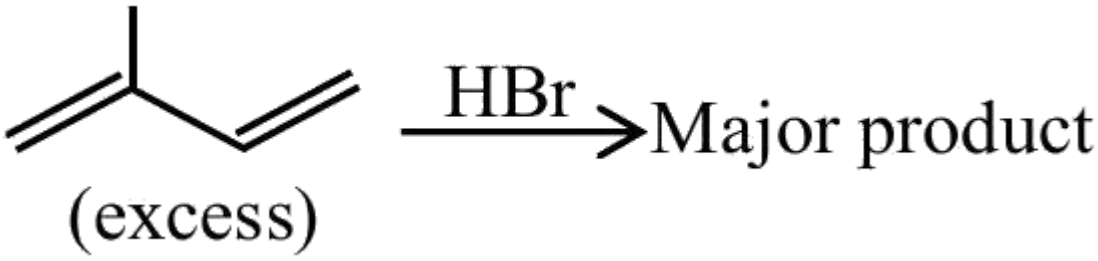


D.

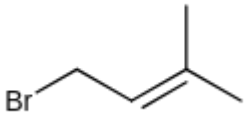


Question 86 View solution online

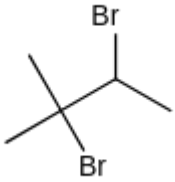
The major product formed in the following reaction is :



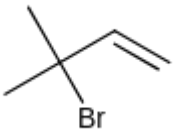
A.



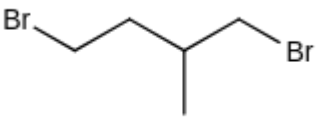
B.



C.



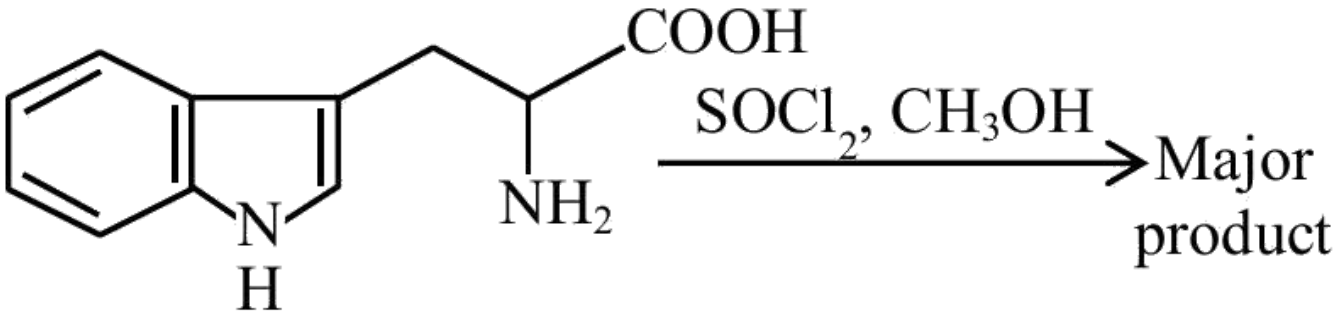
D.

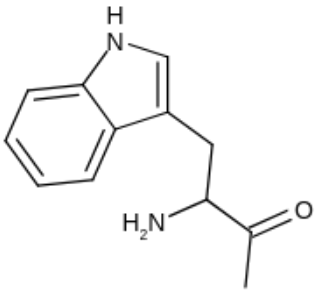


Question 87

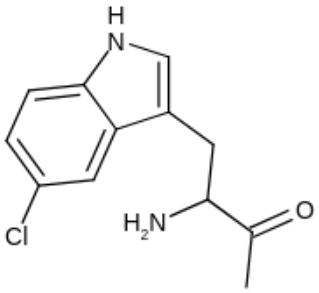
View solution online

The major product formed in the following reaction is :

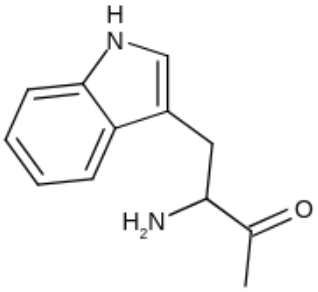




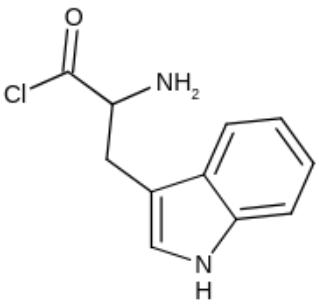
A.



B.



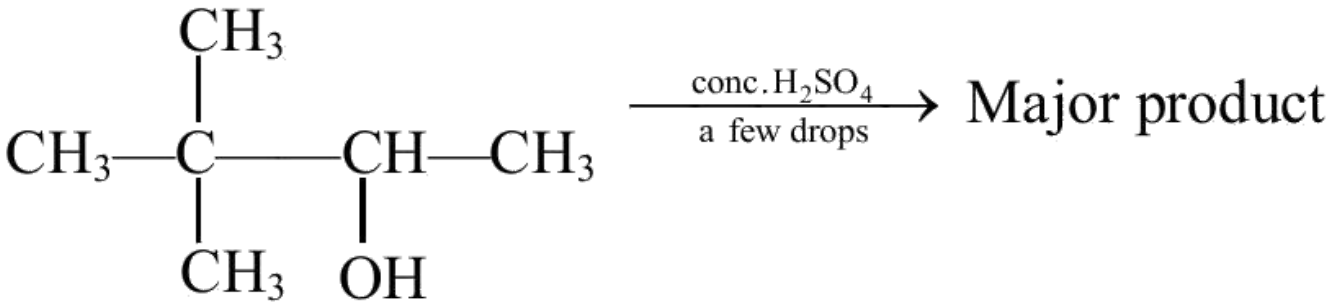
C.



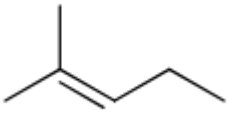
D.

Question 88 View solution online

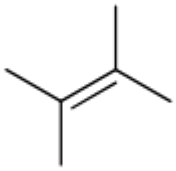
The major product formed in the following reaction is :



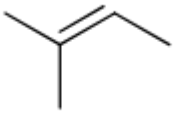
A.



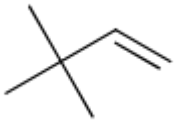
B.



C.



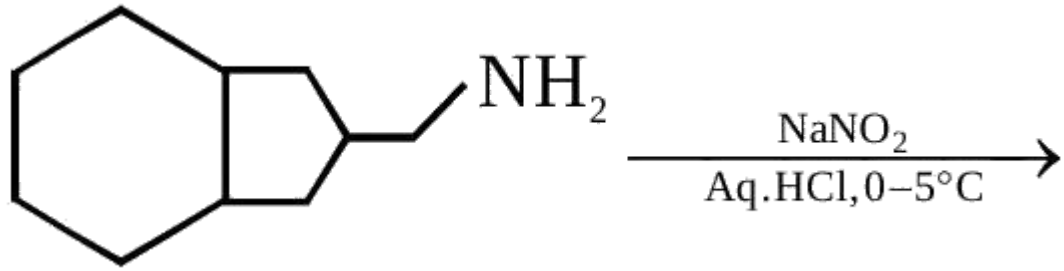
D.



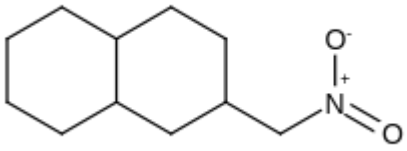
Question 89

View solution online

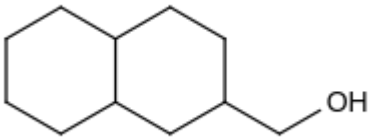
The major product formed in the reaction given below will be :



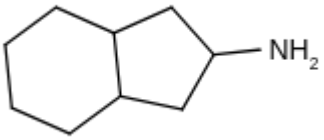
A.



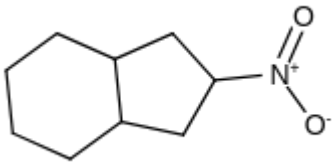
B.



C.

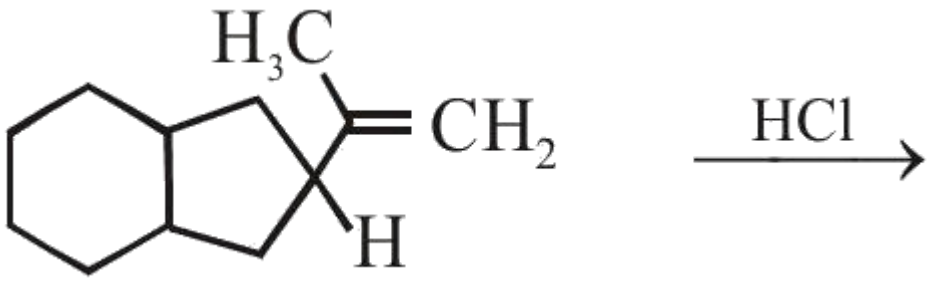


D.

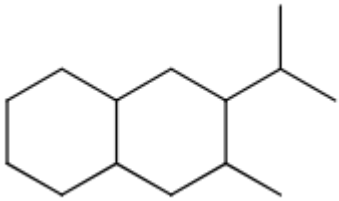


Question 90 View solution online

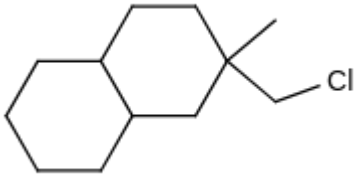
The major product of the following reaction is:



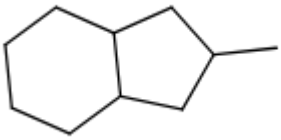
A.



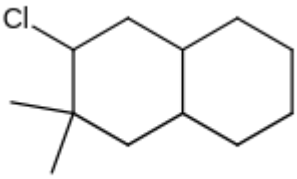
B.



C.

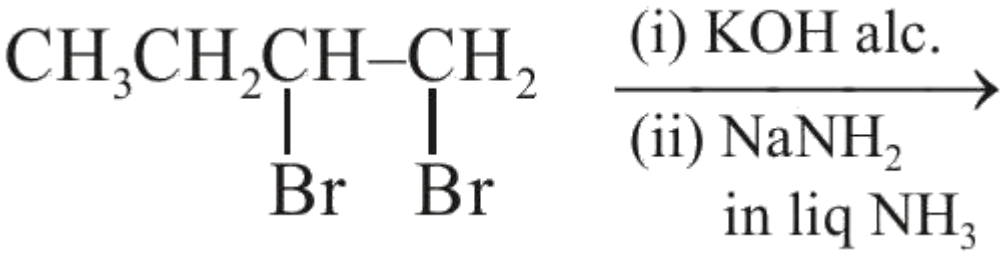


D.



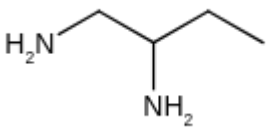
Question 91 View solution online

The major product of the following reaction is:



A. $CH_3CH_2C \equiv CH$

B.



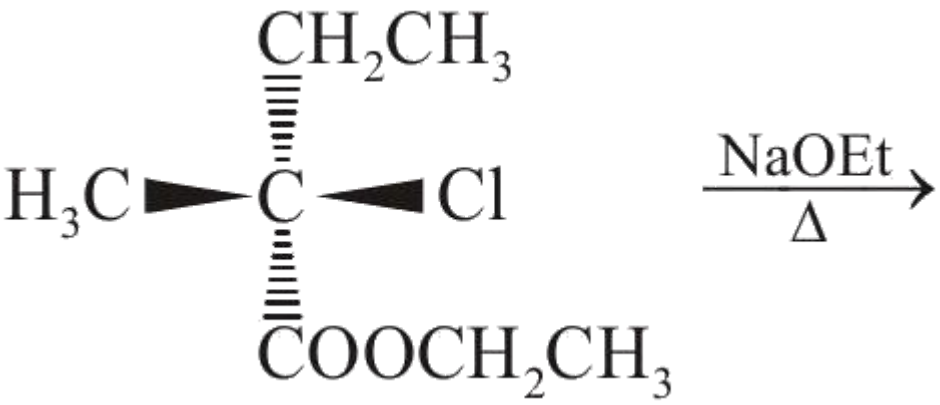
C. $CH_3CH = C = CH_2$

D. $CH_3CH = CHCH_2NH_2$

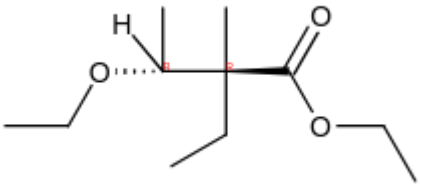
Question 92

View solution online

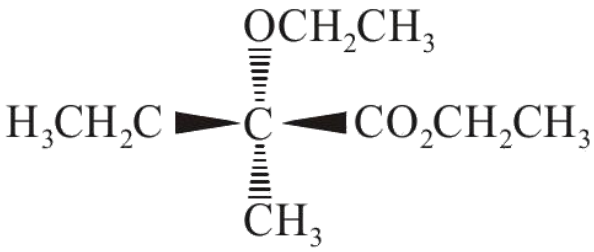
The major product of the following reaction is:



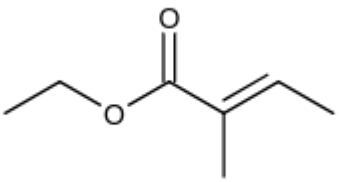
A.



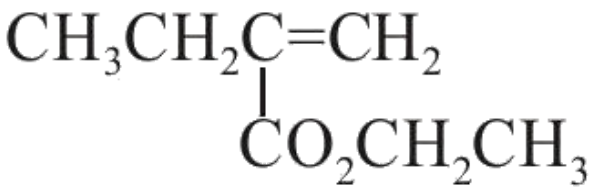
B.



C.

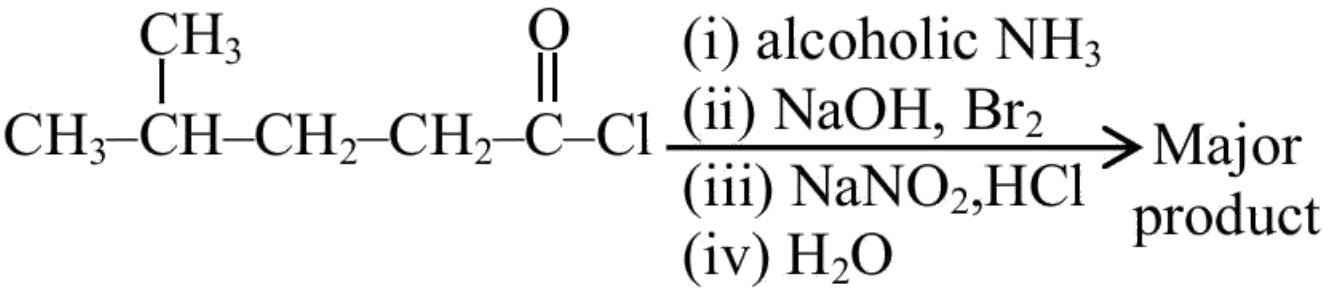


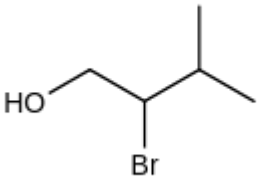
D.



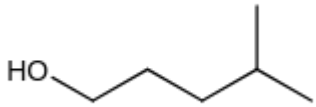
Question 93 View solution online

The major product of the following reaction is :

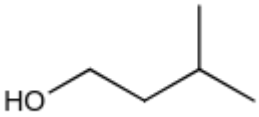




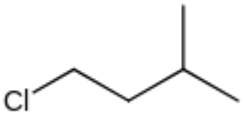
A.



B.



C.

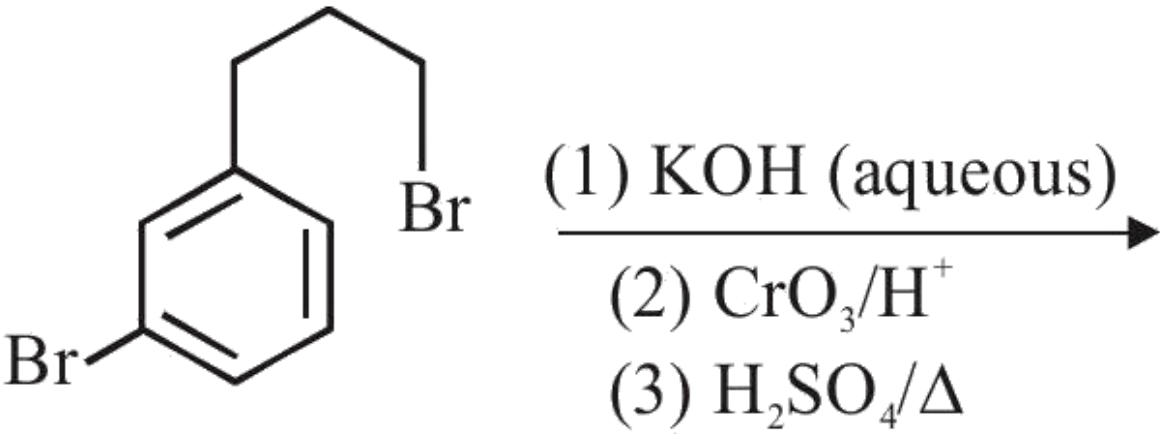


D.

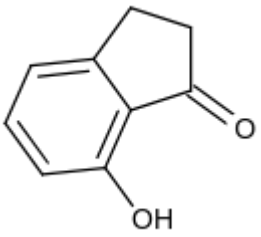
Question 94

View solution online

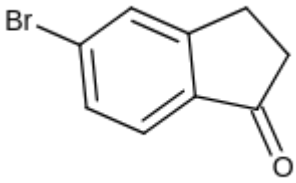
The major product of the following reaction is:



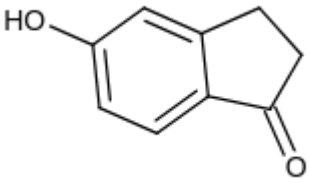
A.



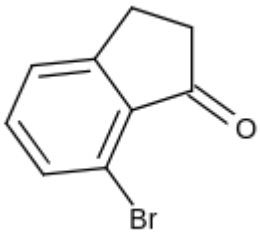
B.



C.



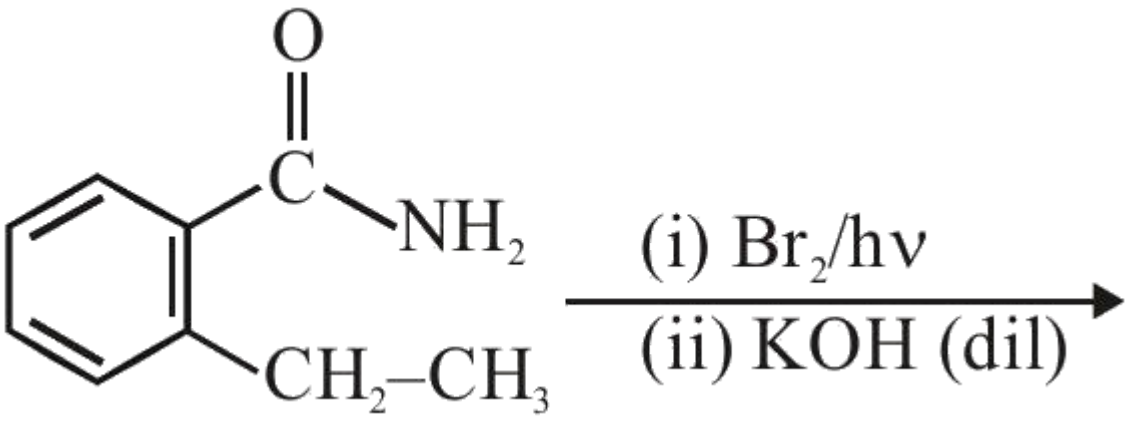
D.



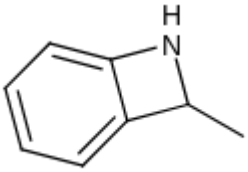
Question 95

View solution online

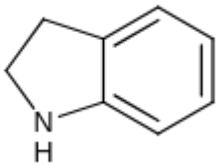
The major product of the following reaction is :



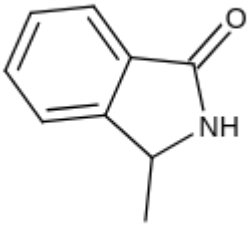
A.



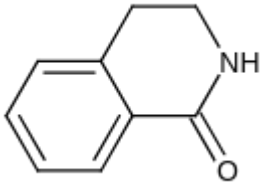
B.



C.



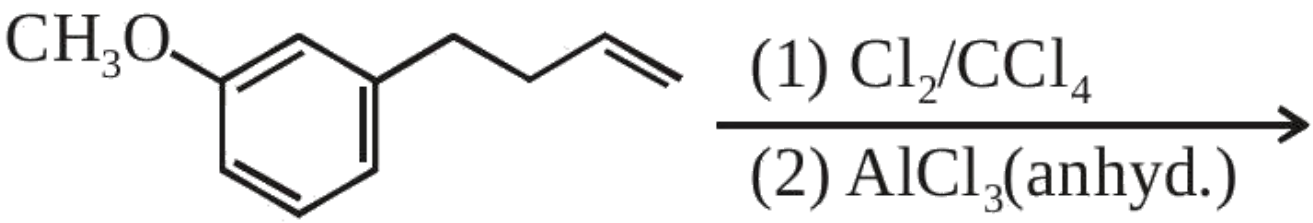
D.



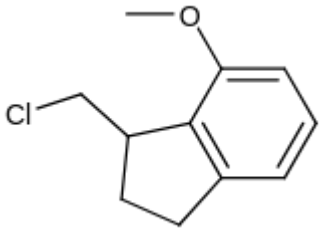
Question 96

View solution online

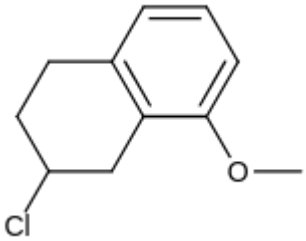
The major product of the following reaction is:



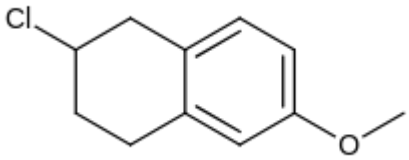
A.



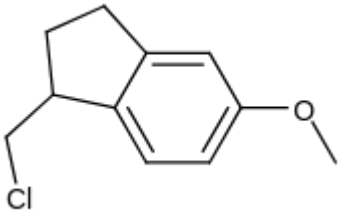
B.



C.



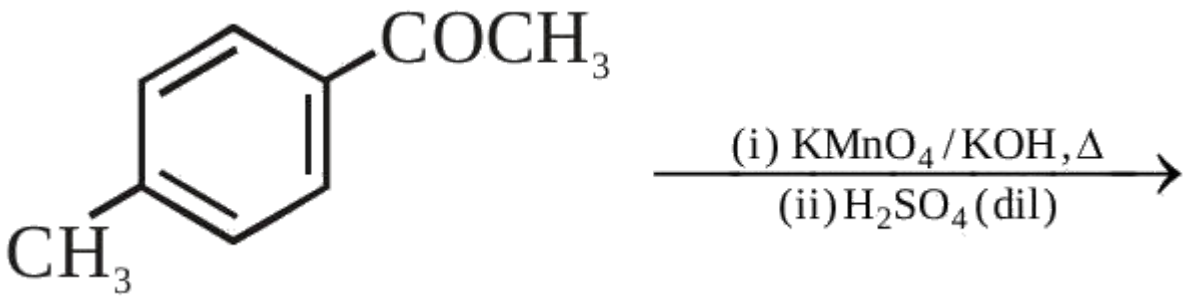
D.



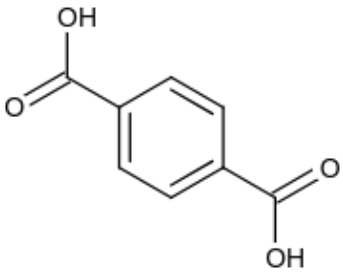
Question 97

View solution online

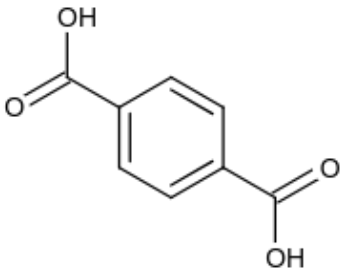
The major product of the following reaction is :



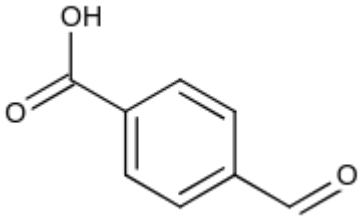
A.



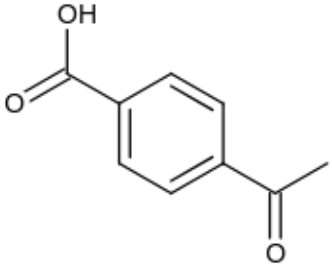
B.



C.

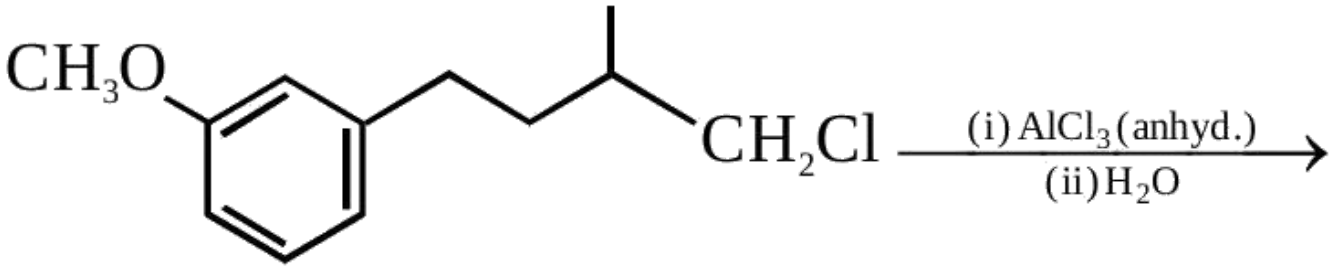


D.

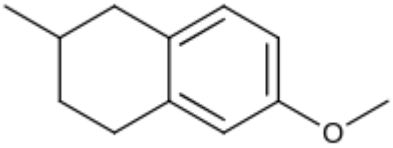


Question 98 View solution online

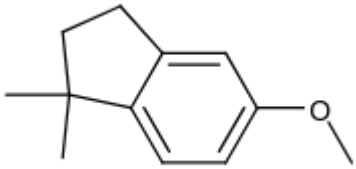
The major product of the following reaction is:



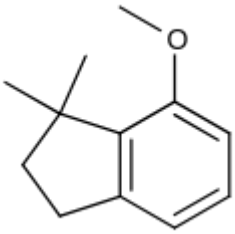
A.



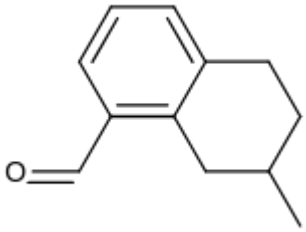
B.



C.

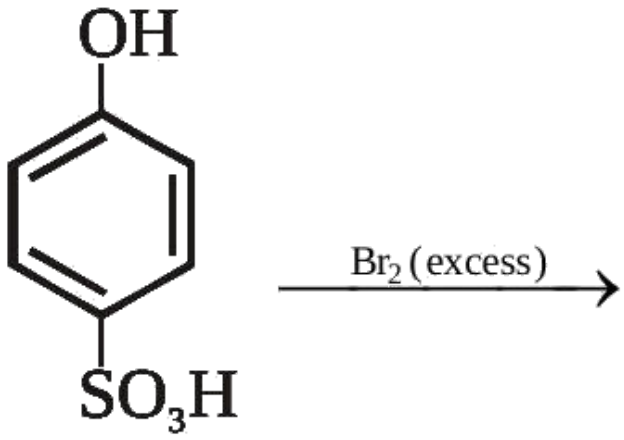


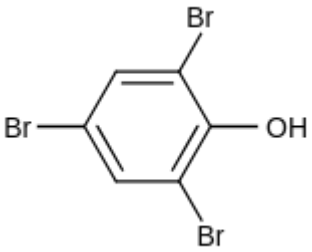
D.



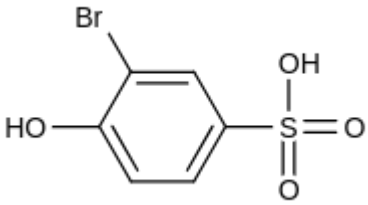
Question 99 View solution online

The major product of the following reaction is :

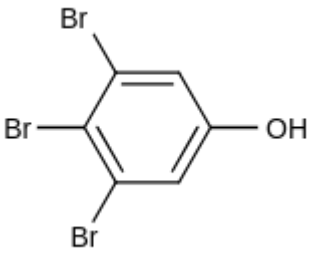




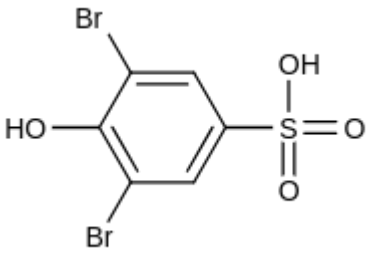
A.



B.



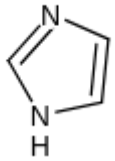
C.



D.

Question 100 View solution online

The increasing order of basicity of the following compounds is:



A. (D) < (A) < (B) < (C)

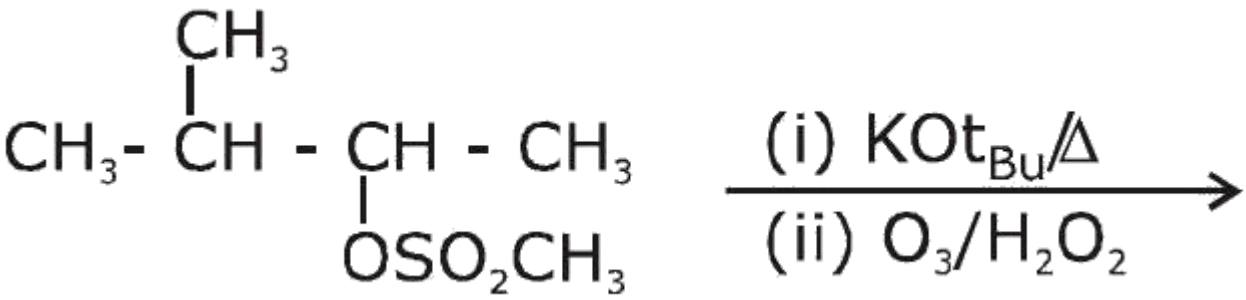
B. (A) < (B) < (C) < (D)

C. (B) < (A) < (D) < (C)

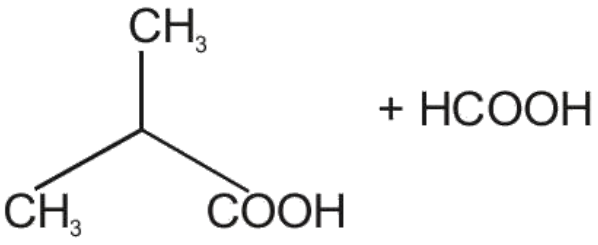
D. (B) < (A) < (C) < (D)

Question 101 View solution online

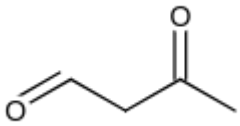
The major products of the following reactions are :



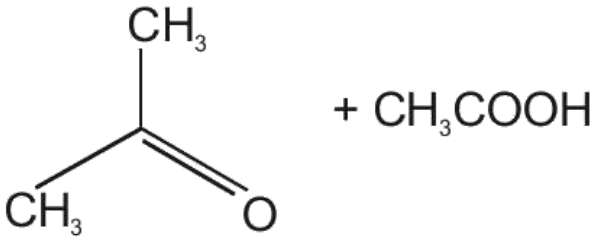
A.



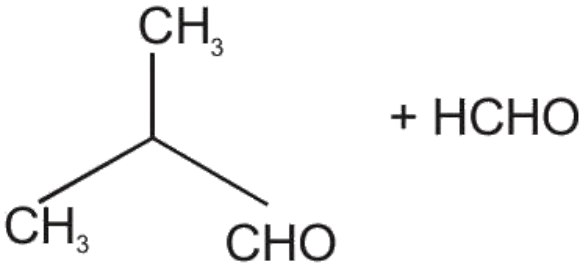
B.



C.

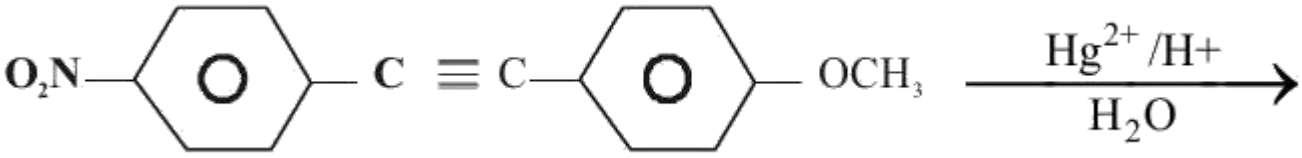


D.

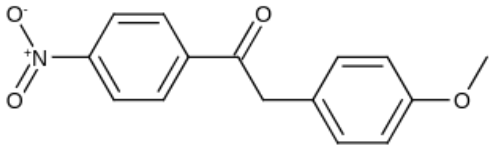


Question 102 View solution online

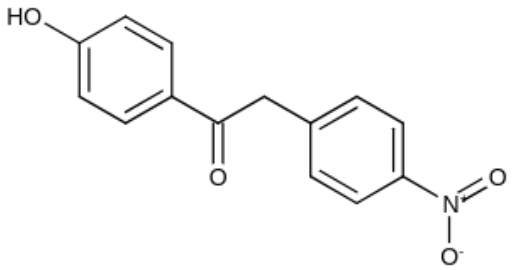
The major product obtained from the following reactions is :



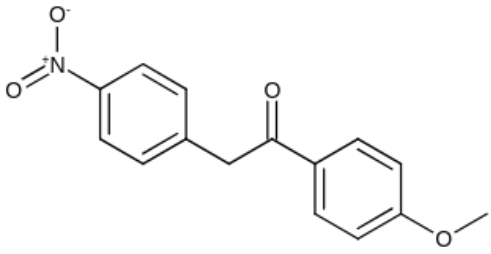
A.



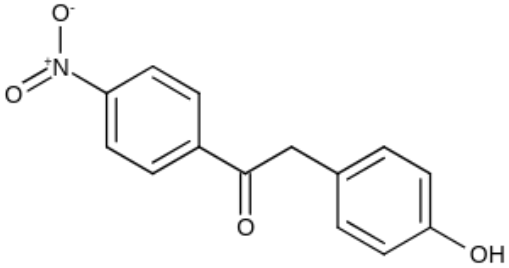
B.



C.

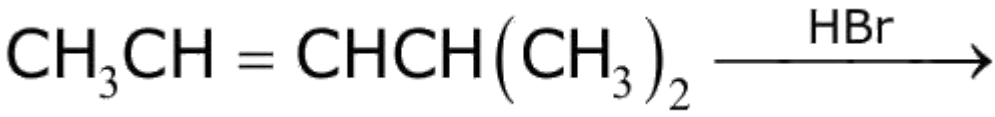


D.



Question 103 View solution online

The major product formed in the following reaction is :



A. $CH_3CH(Br)CH_2CH(CH_3)_2$

B. $CH_3CH_2CH_2C(Br)(CH_3)_2$

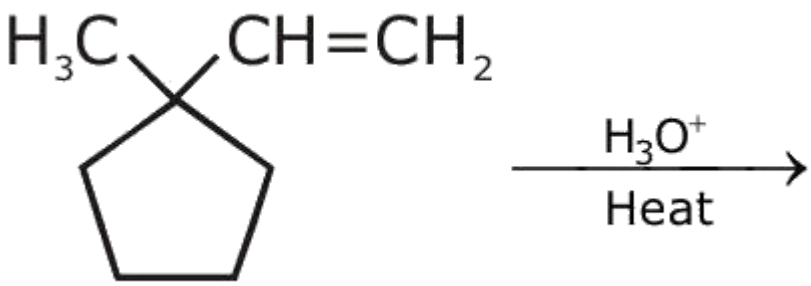
C. $CH_3CH_2CH(Br)CH(CH_3)_2$

D. $Br(CH_2)_3CH(CH_3)_2$

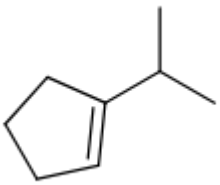
Question 104

View solution online

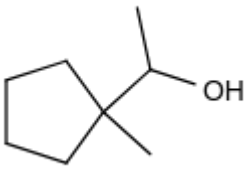
The major product in the following reaction is:



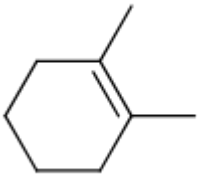
A.



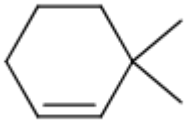
B.



C.



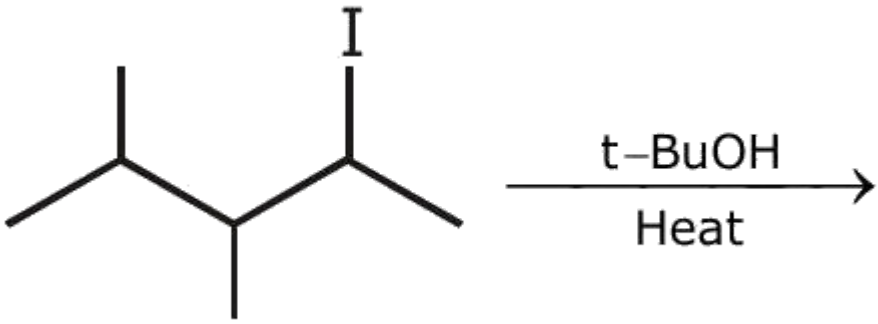
D.



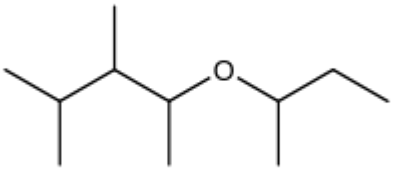
Question 105

View solution online

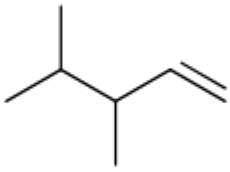
The major product in the following reaction is:



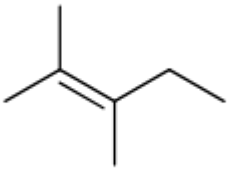
A.



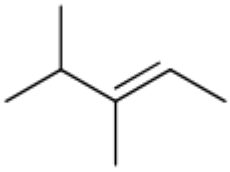
B.



C.

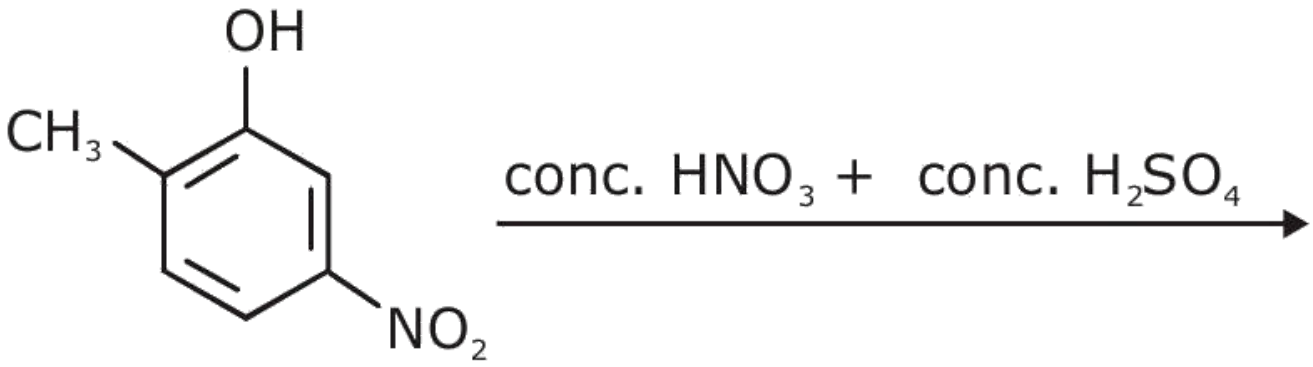


D.

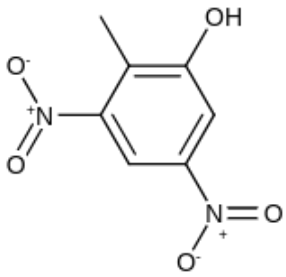


Question 106 View solution online

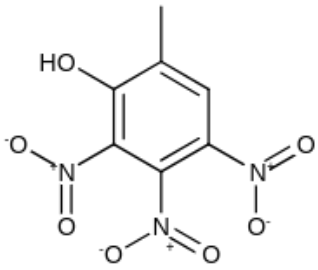
The major product of the following reaction is :



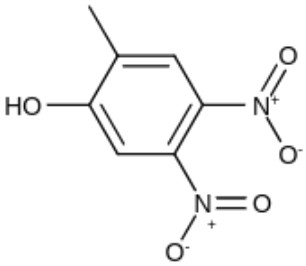
A.



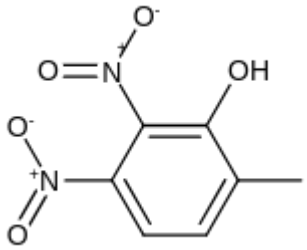
B.



C.



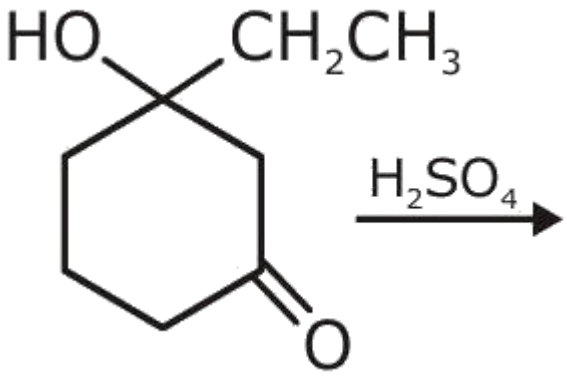
D.



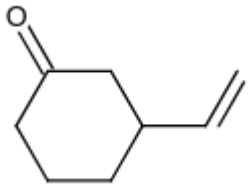
Question 107

View solution online

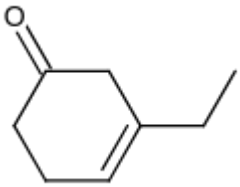
The major product of the following reaction is:



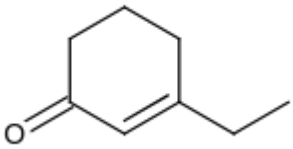
A.



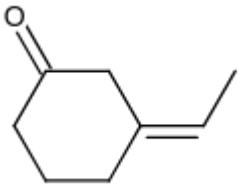
B.



C.

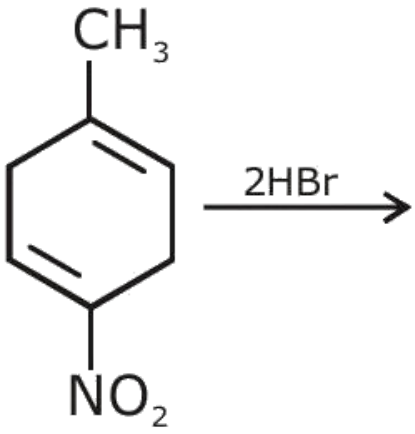


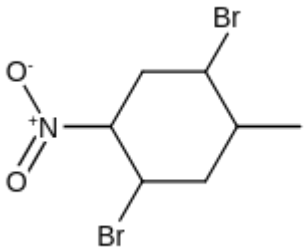
D.



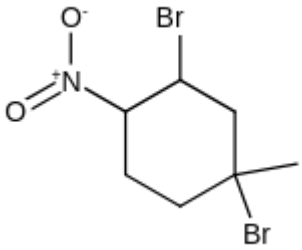
Question 108 View solution online

The major product of the following reaction is:

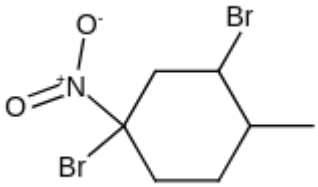




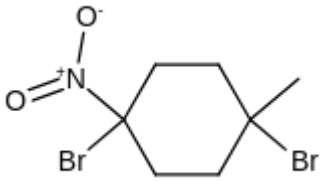
A.



B.



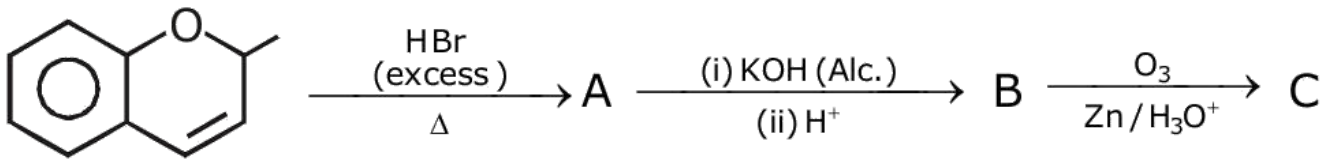
C.



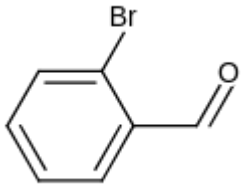
D.

Question 109 View solution online

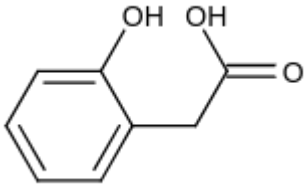
The major aromatic product C in the following reaction sequence will be :



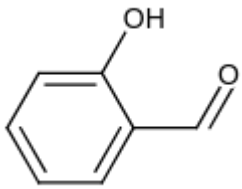
A.



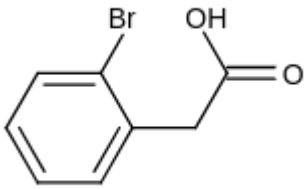
B.



C.



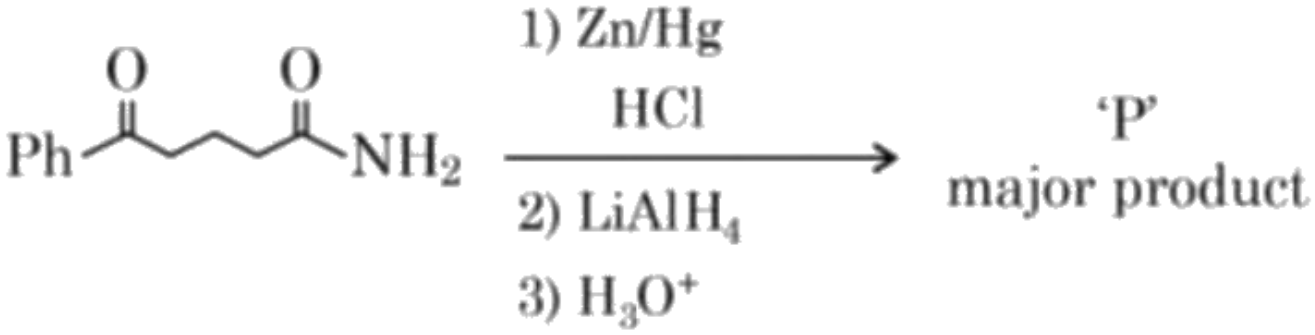
D.

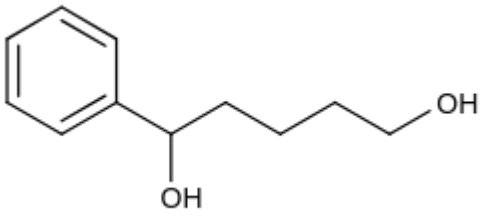


Question 110

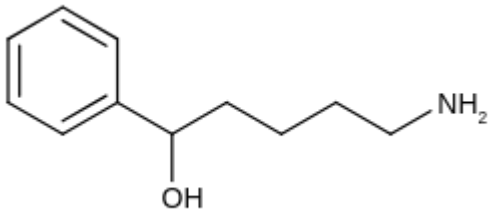
View solution online

The major product ' P ' for the following sequence of reactions is:

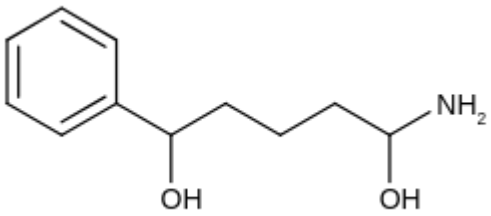




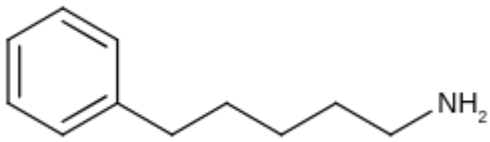
A.



B.



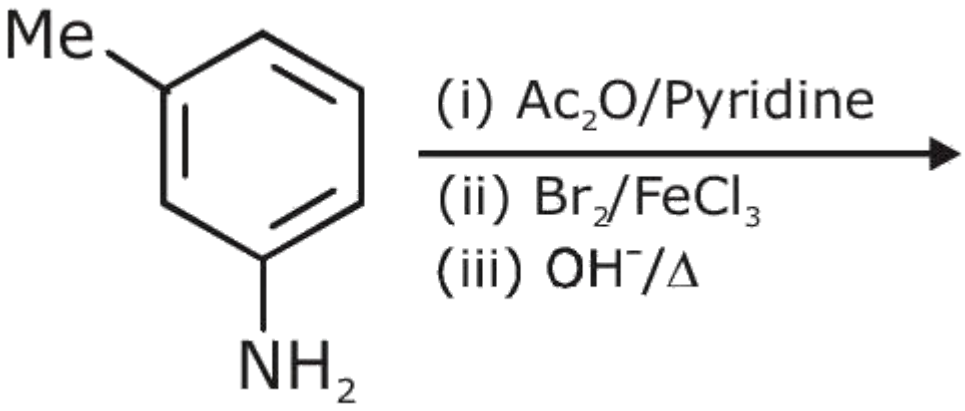
C.



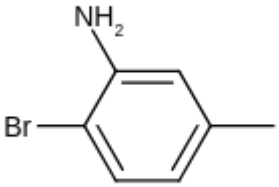
D.

Question 111 View solution online

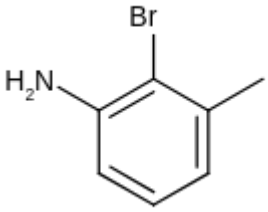
The final major product of the following reaction is :



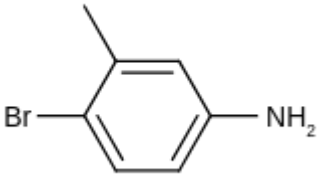
A.



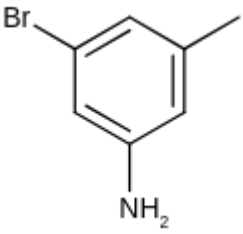
B.



C.

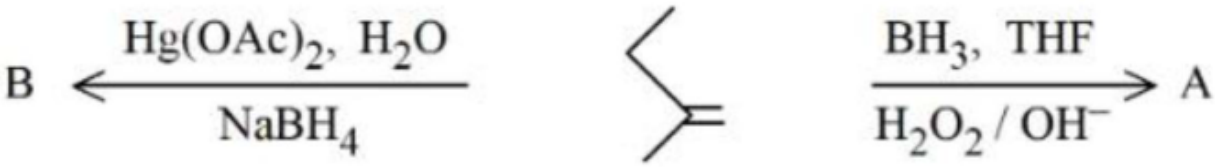


D.



Question 112 View solution online

Find out the major products from the following reaction



A. 

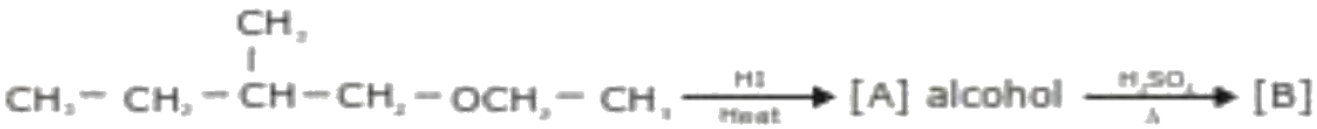
B. 

C. 

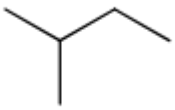
D. 

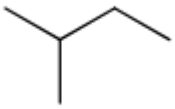
Question 113 View solution online

The major product $[B]$ in the following reactions is :



A. $CH_3 - CH_2 - CH = CH - CH_3$

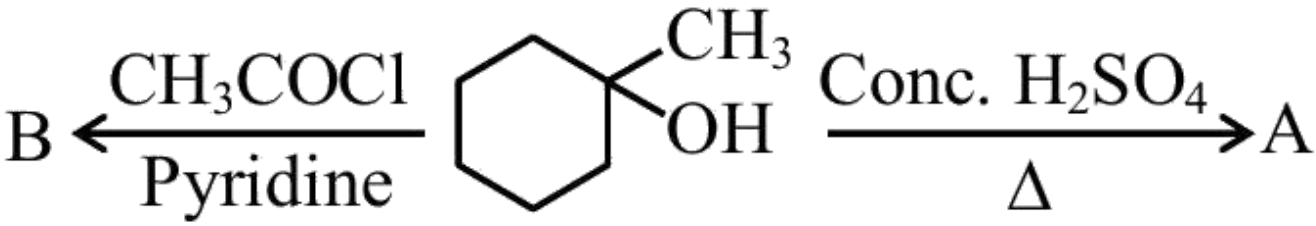
B. 

C. 

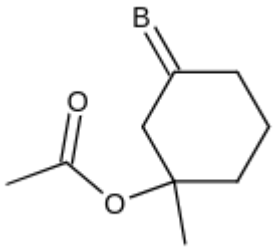
D. $CH_2 = CH_2$

Question 114 View solution online

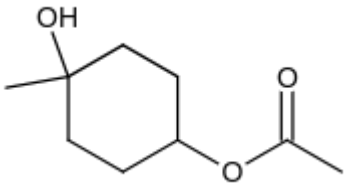
Identify the major products A and B respectively in the following set of reactions.



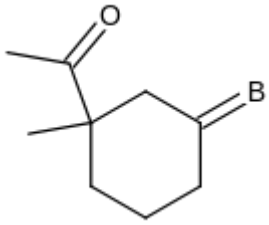
A.



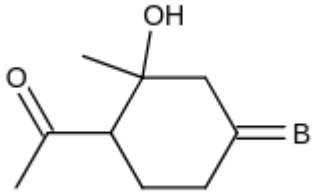
B.



C.

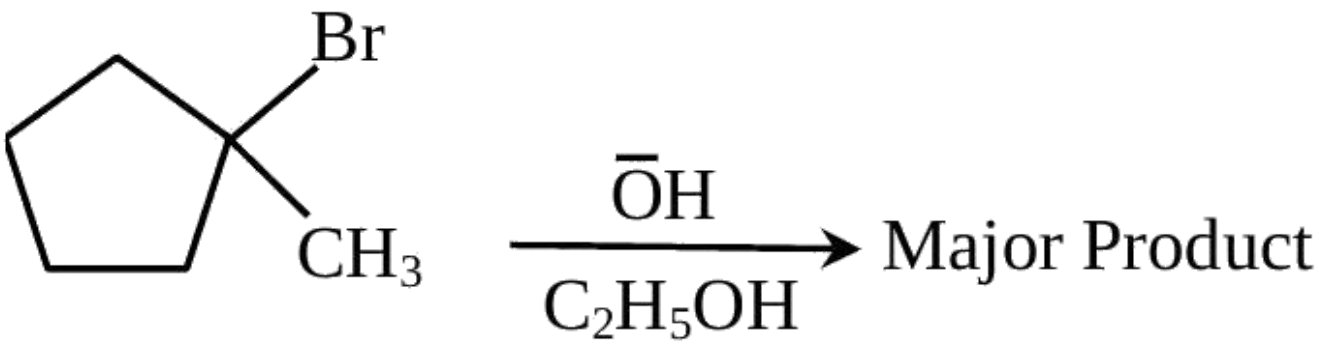


D.

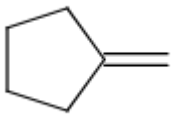


Question 115 View solution online

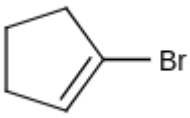
Identify the major product in the following reaction.



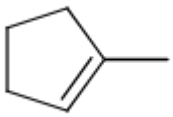
A.



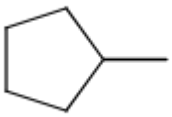
B.



C.



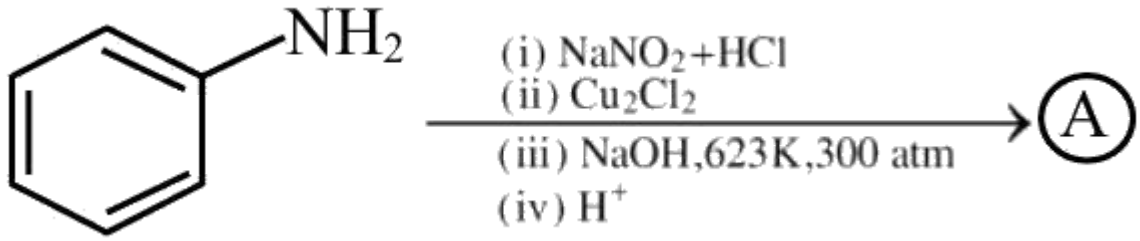
D.

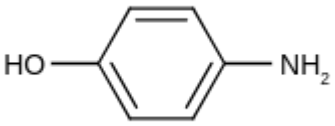


Question 116

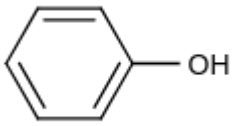
View solution online

Identify the product (A) in the following reaction.

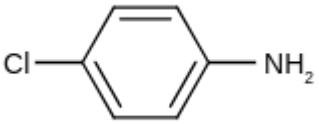




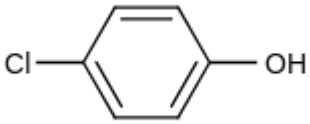
A.



B.



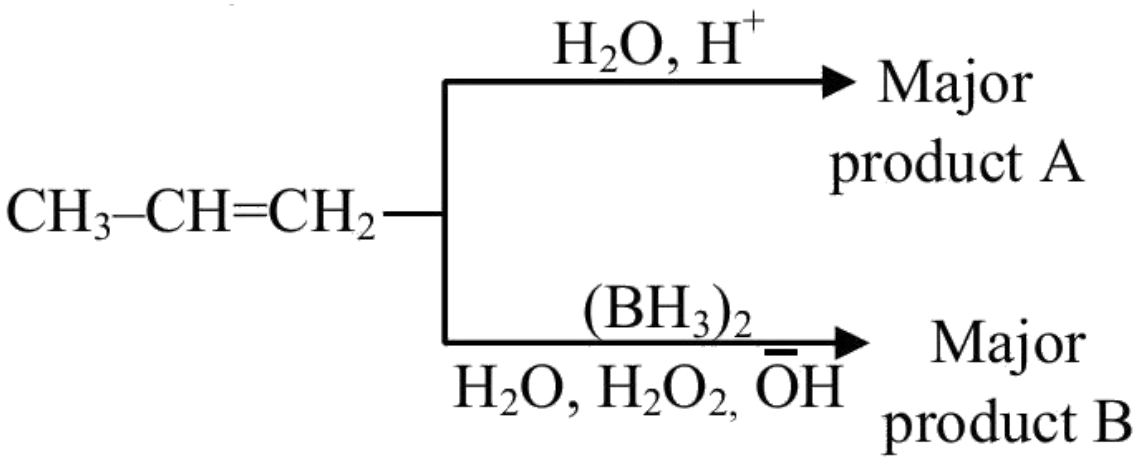
C.



D.

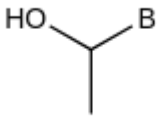
Question 117 View solution online

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. $A - CH_3CH_2CH_2 - OH$,



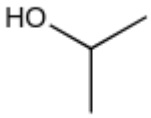
C. (2) Hydroboration Oxidation Reaction :}

(B)

$$3CH_3–CH=CH_2 + B_2H_6 \xrightarrow{THF} 2(CH_3CH_2CH_2)_3B$$

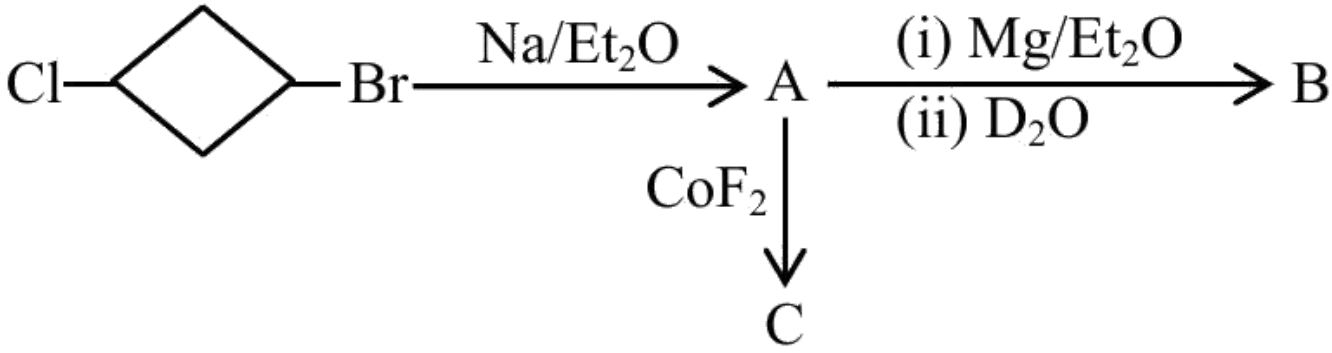
$$(CH_3CH_2CH_2)_3B + 3H_2O_2 \xrightarrow{OH^-} \underset{(B)}{3CH_3CH_2CH_2OH} + H_3BO_3$$

D. (3)

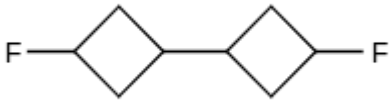


Question 118 View solution online

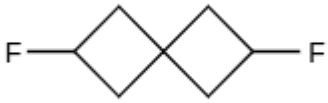
In the following sequence of reaction, the major products B and C respectively are :



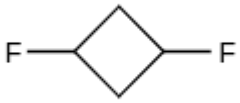
A.



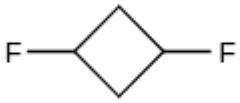
B.



C.

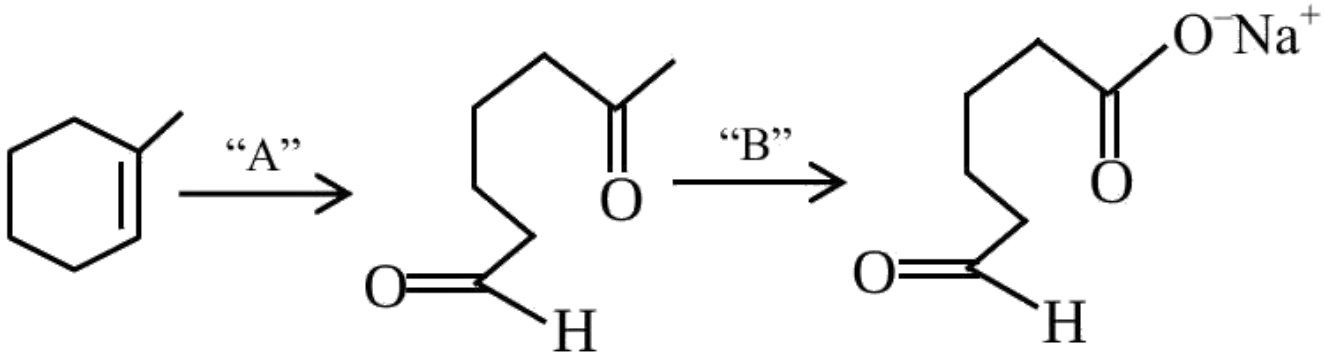


D.



Question 119 View solution online

In the above chemical reaction sequence "A" and " B " respectively are :



A. $O_3, Zn/H_2O$ and $NaOH_{(alc.)}/I_2$

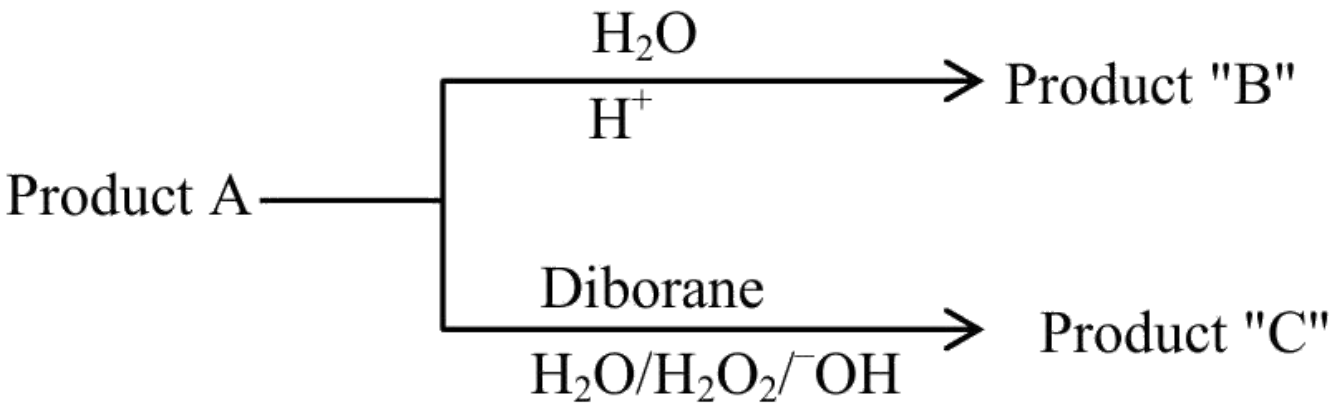
B. H_2O, H^+ and $NaOH_{(alc.)}/I_2$

C. H_2O, H^+ and $KMnO_4$

D. $O_3, Zn/H_2O$ and $KMnO_4$

Question 120 View solution online

Consider the above reactions, identify product B and product C .



A. $\mathbf{B} = \mathbf{C} = \mathbf{2}$-Propanol

B. $\mathbf{B} = \mathbf{2}$-Propanol $\mathbf{C} = \mathbf{1}$-Propanol

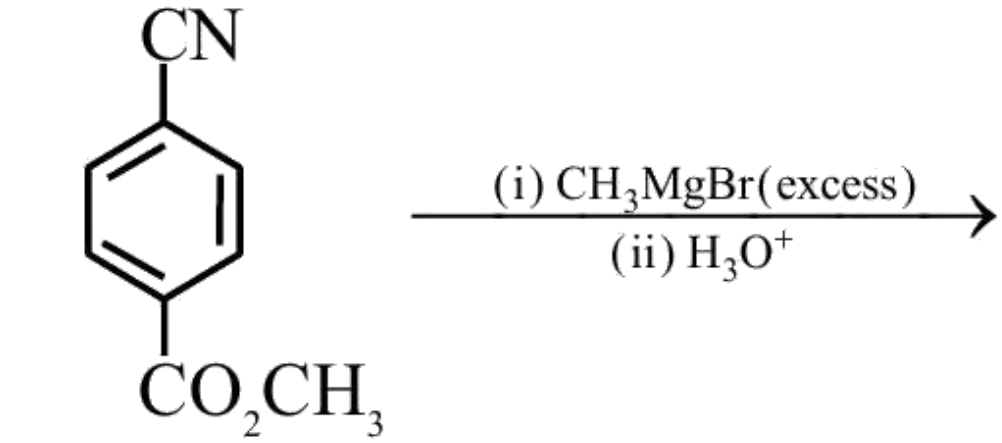
C. $\mathbf{B} = \mathbf{1}$-Propanol $\mathbf{C} = \mathbf{2}$-Propanol

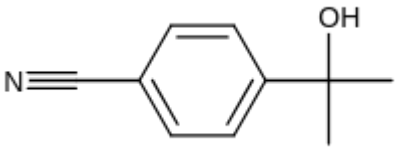
D. $\mathbf{B} = \mathbf{C} = \mathbf{1}$-Propanol

Question 121

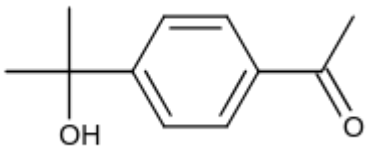
View solution online

Major product of the following reaction is

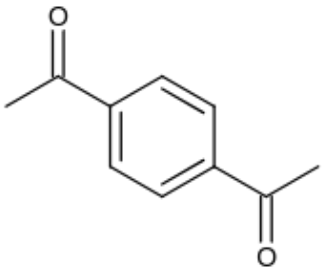




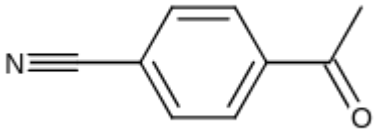
A.



B.



C.



D.

Question 122 View solution online

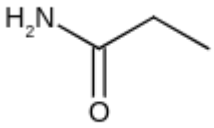
Consider the given reaction, identify the major product P .

$$CH_3-COOH \xrightarrow[(iv)\ H_2O/\bar{O}H,\Delta]{(i)\ LiAlH_4 \quad (ii)\ PCC \quad (iii)\ HCN/\bar{O}H} \text{"P"}$$

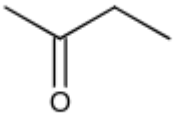
A.



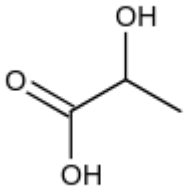
B.



C.

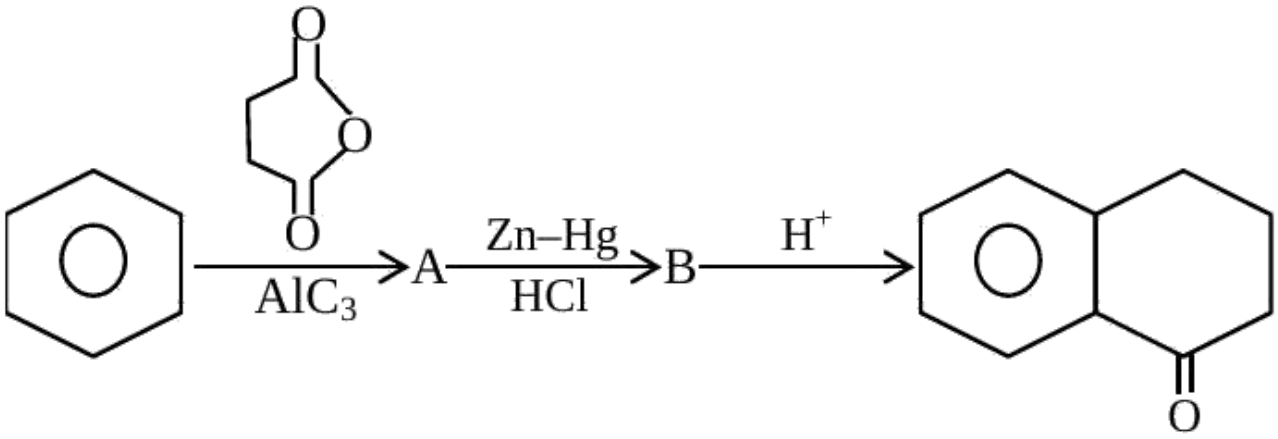


D.

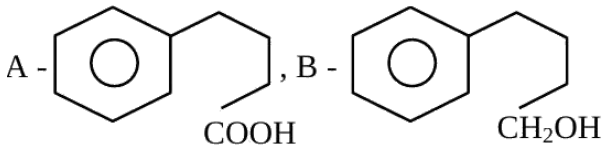


Question 123 View solution online

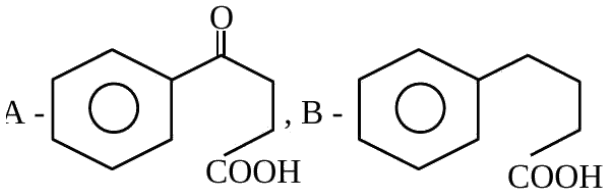
Identify A and B in the given chemical reaction sequence : -



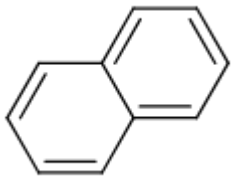
A.



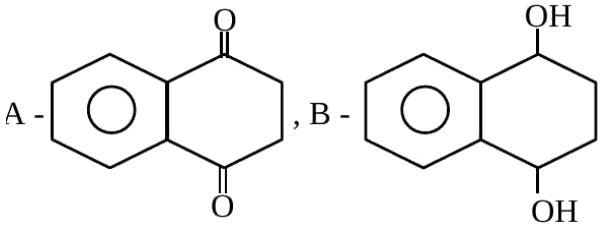
B.



C.



D.



Question 124 View solution online

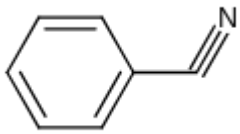
The increasing order of reactivity of the following compounds towards aromatic electrophilic substitution reaction is

A

B

C

D



A. $D < B < A < C$

B. D < A < C < B

C. $B < C < A < D$

D. A < B < C < D

Question 125 View solution online

Decreasing order of reactivity towards electrophilie substitution for the following compounds is :

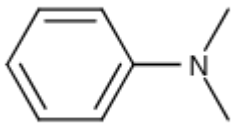
(a)

(b)

(c)

(d)

(e)



A. $c > b > a > d > e$

B. $e > d > a > b > c$

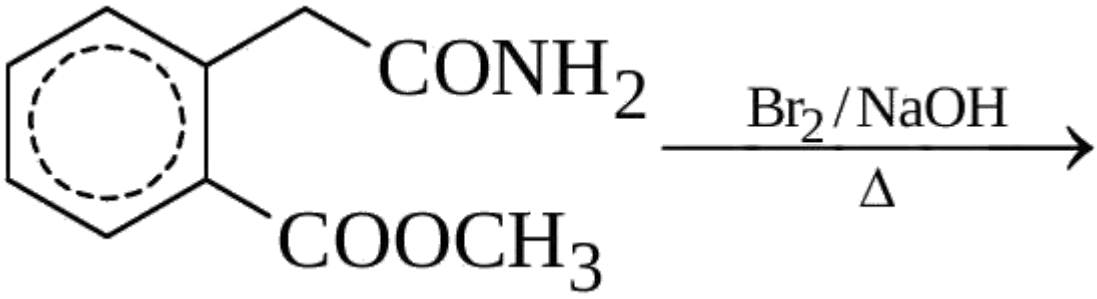
C. $a > d > e > b > c$

D. $d > a > e > c > b$

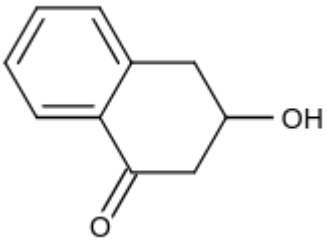
Question 126

View solution online

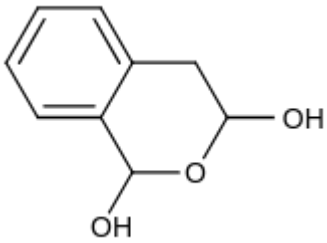
The major product formed in the following reaction is



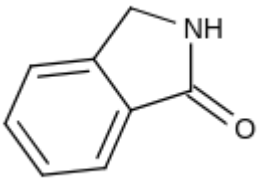
A.



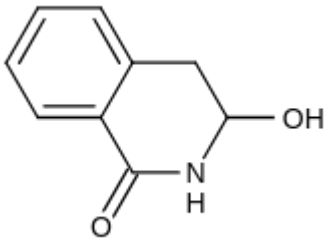
B.



C.

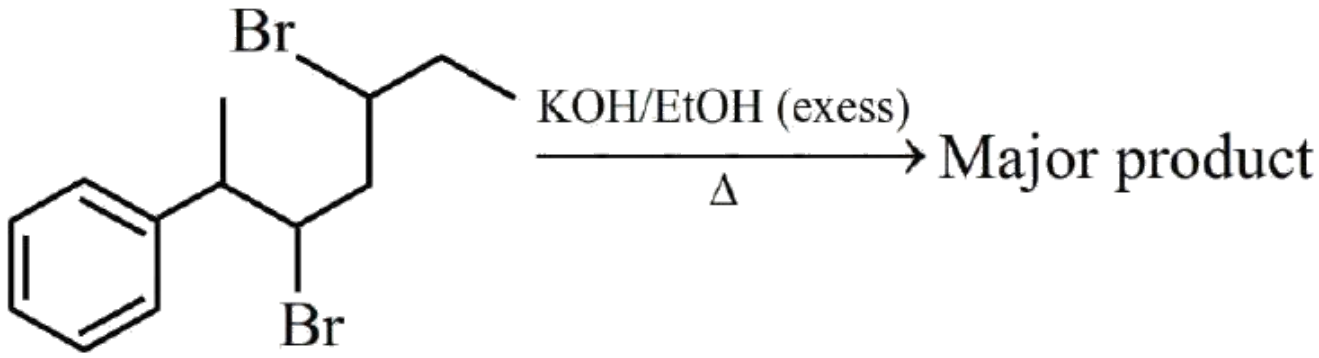


D.



Question 127 View solution online

The major product of the following reaction is :



A. 6-Phenylhepta-2,4-diene

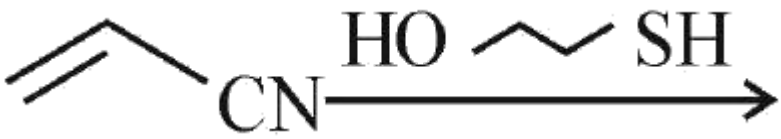
B. 2-Phenylhepta-2,5-diene

C. 6-Phenylhepta-3,5-diene

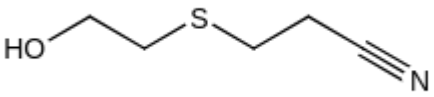
D. 2-Phenylhepta-2,4-diene

Question 128 View solution online

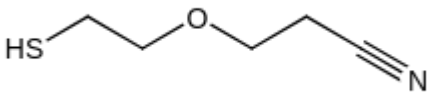
The major product for the following reaction is:



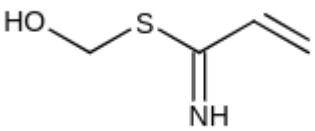
A.



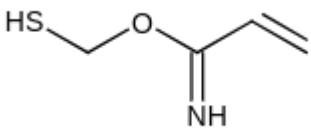
B.



C.

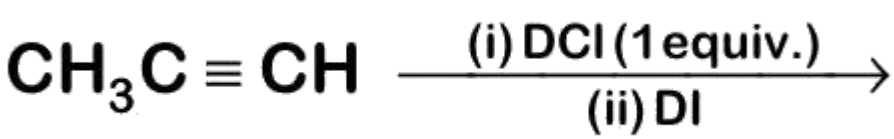


D.



Question 129 View solution online

The major product of the following reaction is



A. $CH_3C(I)(Cl)CHD_2$

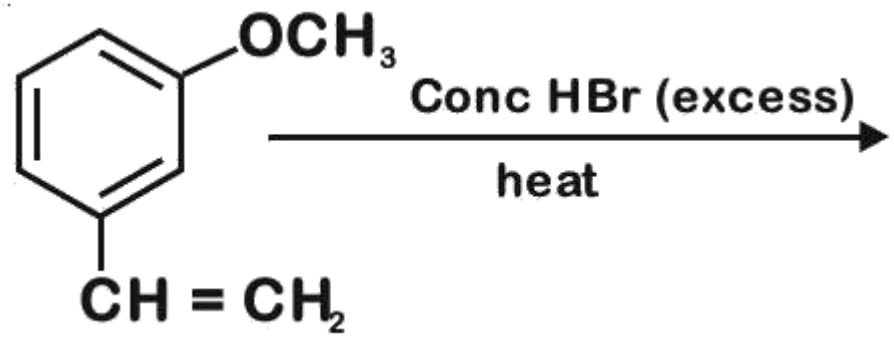
B. $CH_3CD(I)CHD(Cl)$

C. $CH_3CD(Cl)CHD(I)$

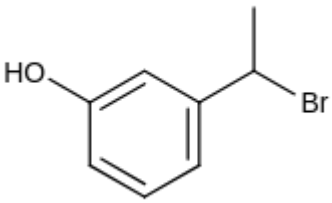
D. $CH_3CD_2CH(Cl)(I)$

Question 130 View solution online

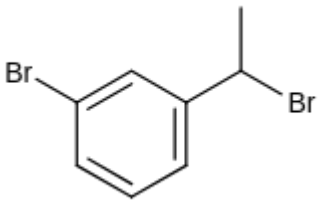
The major product of the following reaction is



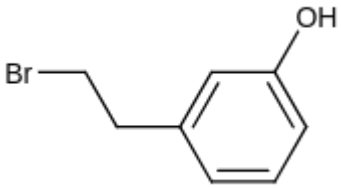
A.



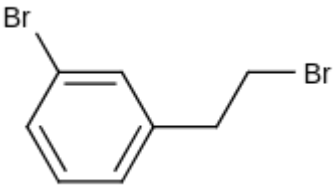
B.



C.



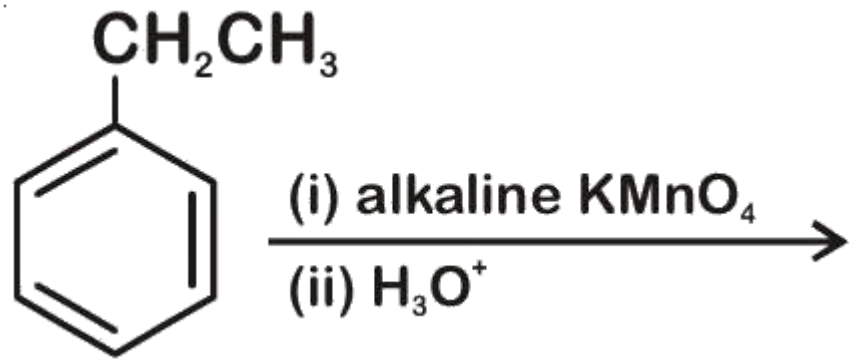
D.



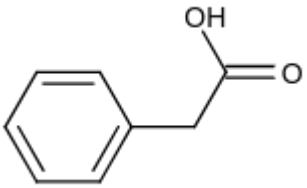
Question 131

View solution online

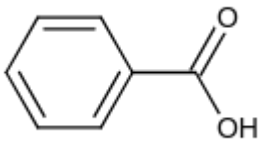
The major product of the following reaction is



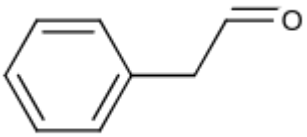
A.



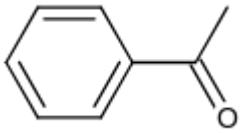
B.



C.



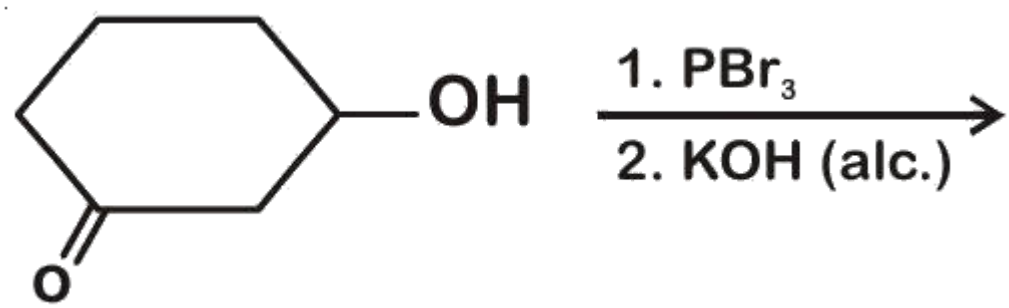
D.



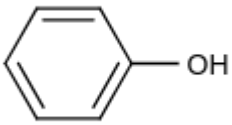
Question 132

View solution online

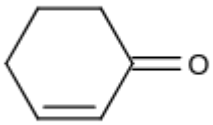
The major product of the following reaction is



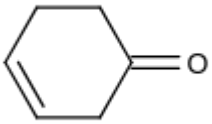
A.



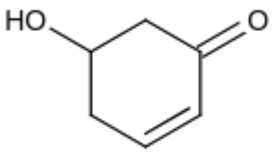
B.



C.



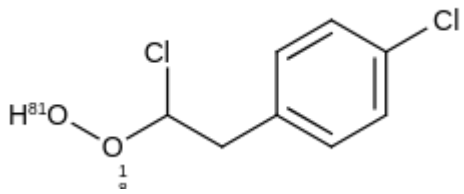
D.



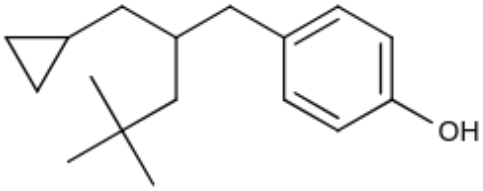
Question 133

View solution online

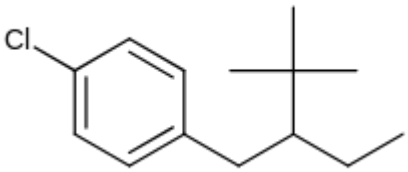
The major product of the following reaction is



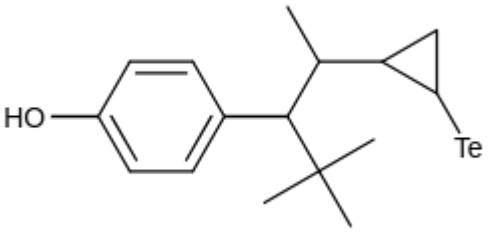
A.



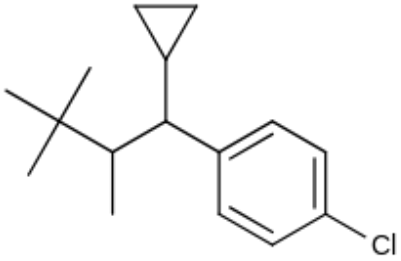
B.



C.



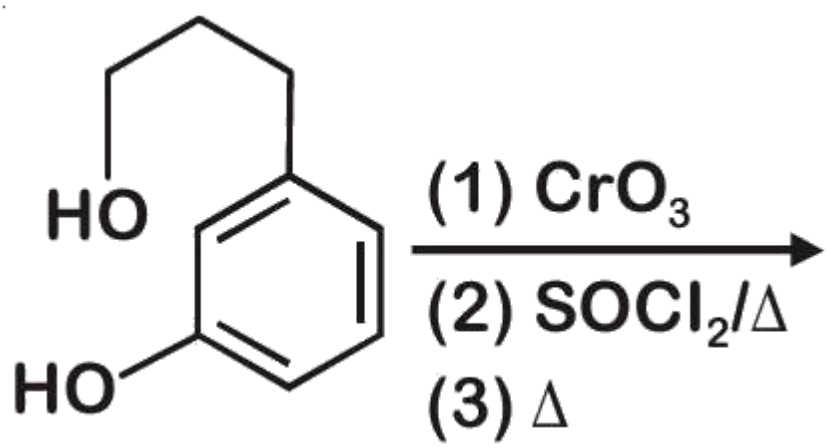
D.

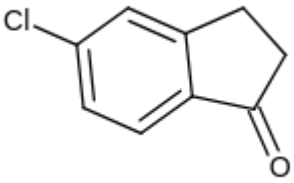


Question 134

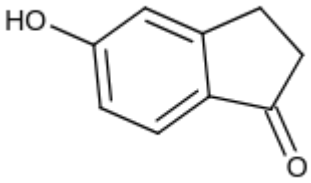
View solution online

The major product of the following reaction is

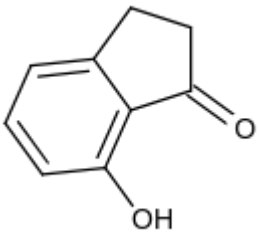




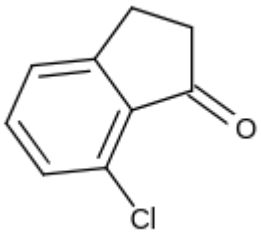
A.



B.



C.

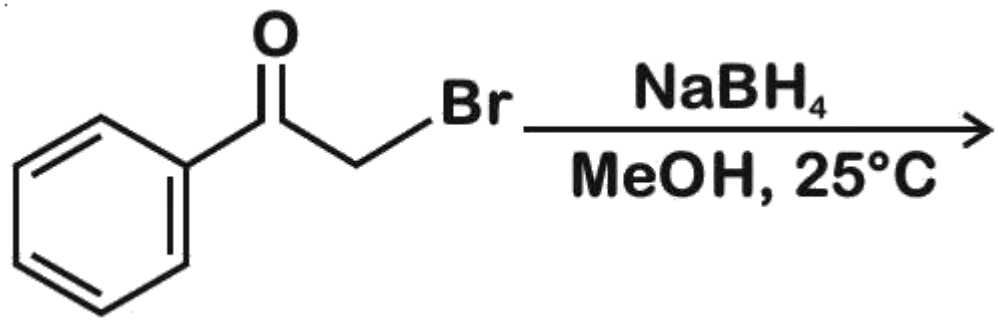


D.

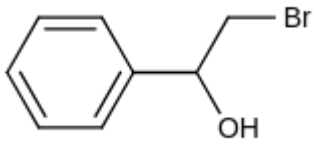
Question 135

View solution online

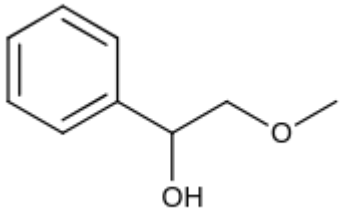
The major product of the following reaction is



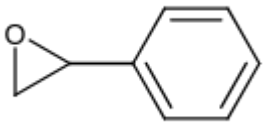
A.



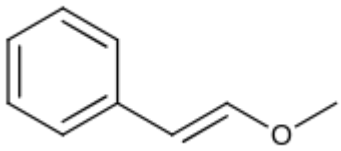
B.



C.

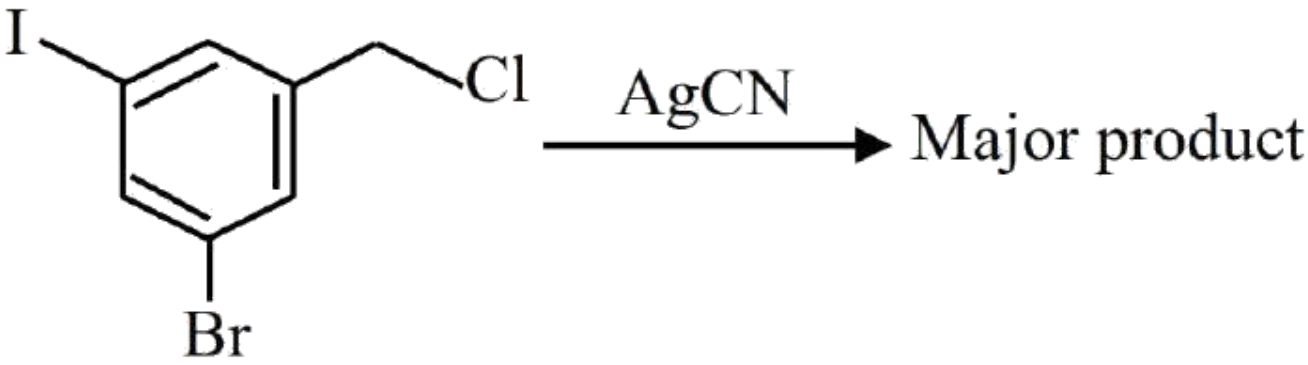


D.

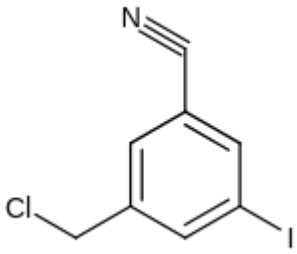


Question 136 View solution online

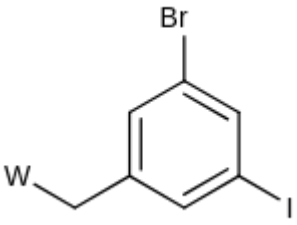
The structure of the major product formed in the following reaction is:



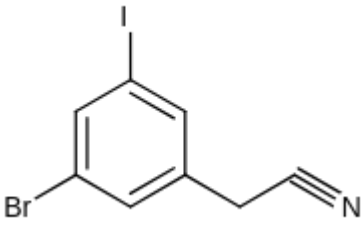
A.



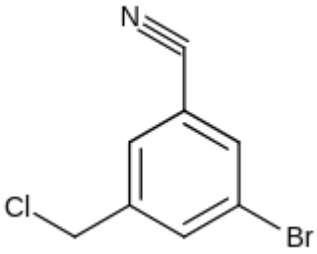
B.



C.

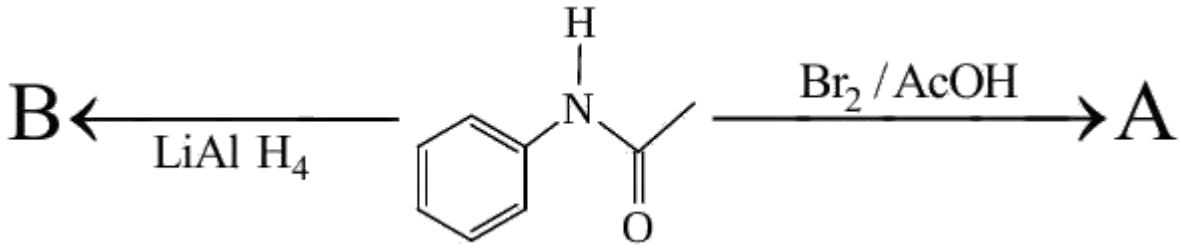


D.

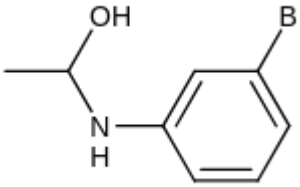


Question 137 View solution online

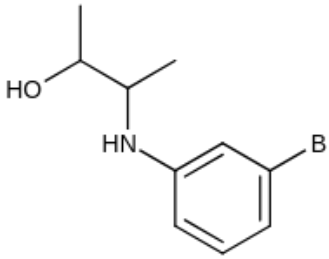
The major products A and B from the following reactions are:



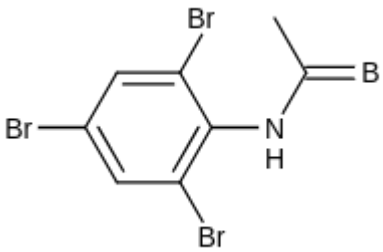
A.



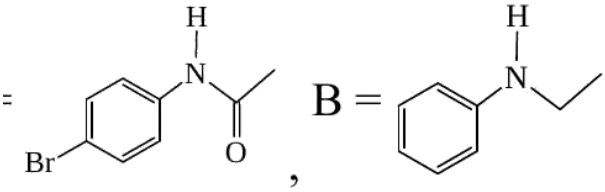
B.



C.

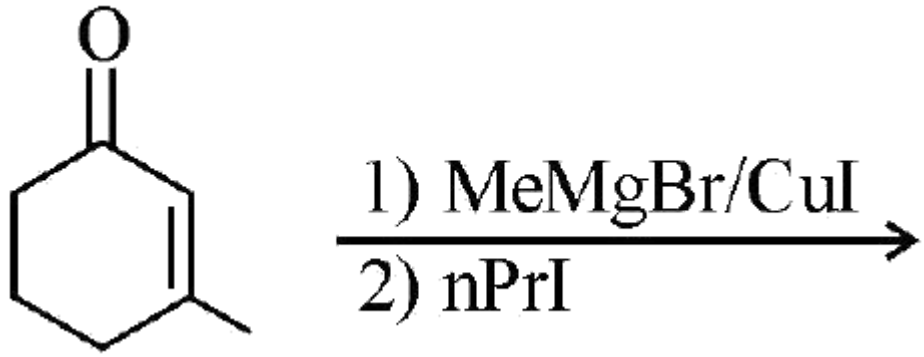


D.

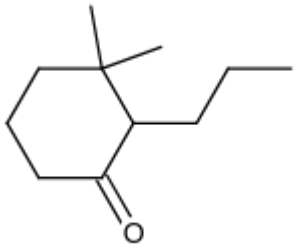


Question 138 View solution online

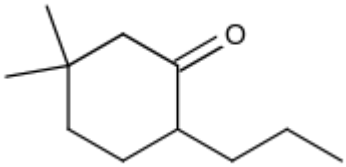
Find out the major product from the following reaction



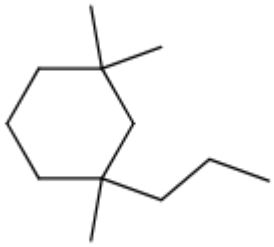
A.



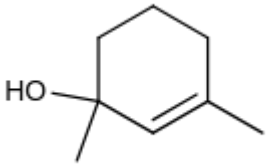
B.



C.

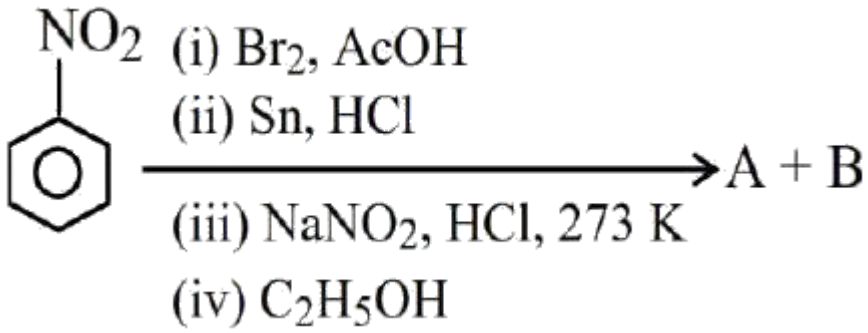


D.

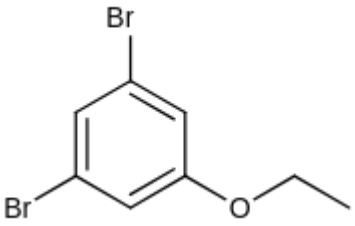


Question 139 View solution online

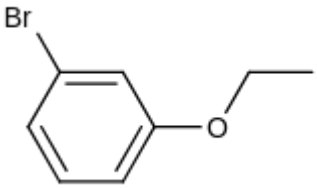
The products formed in the following reaction sequence are :



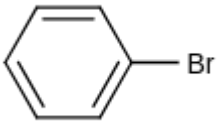
A.



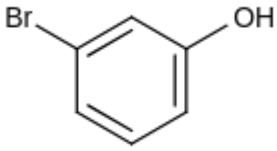
B.



C. $CH_3 - CHO$



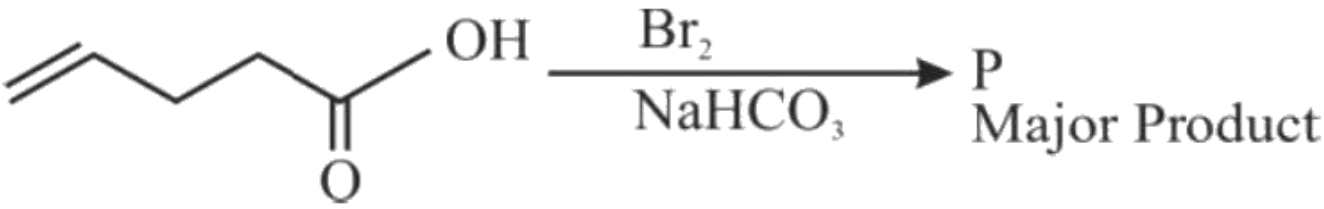
D.



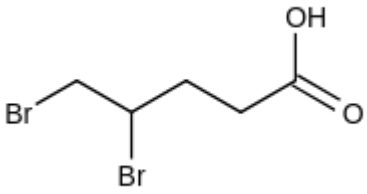
Question 140

View solution online

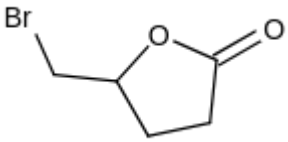
Major product ' P ' formed in the following reaction is :-



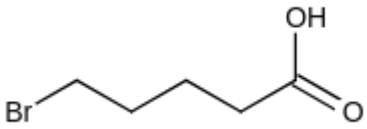
A.



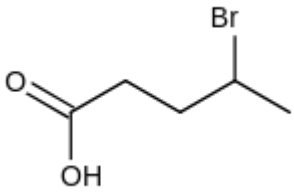
B.



C.

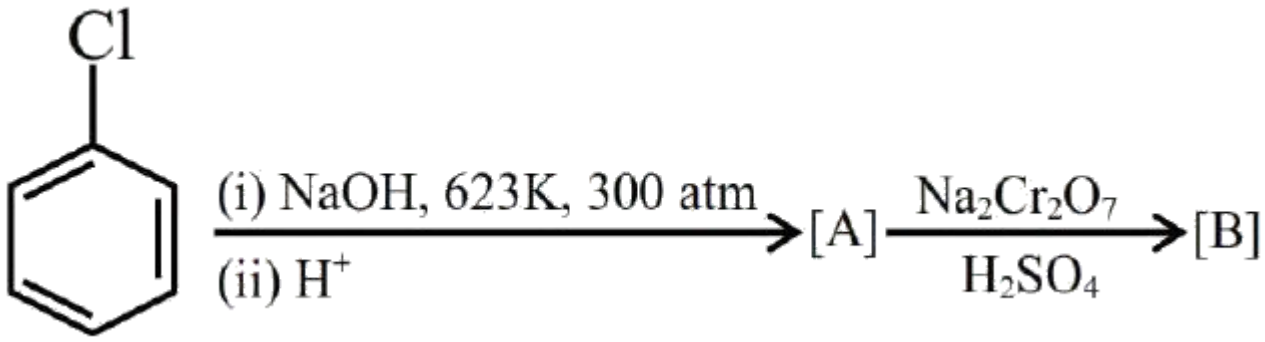


D.

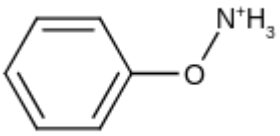


Question 141 View solution online

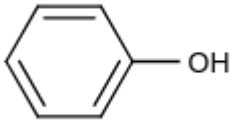
Identify the products [A] and [B], respectively in the following reaction :



A.



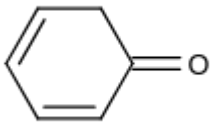
B.



C.



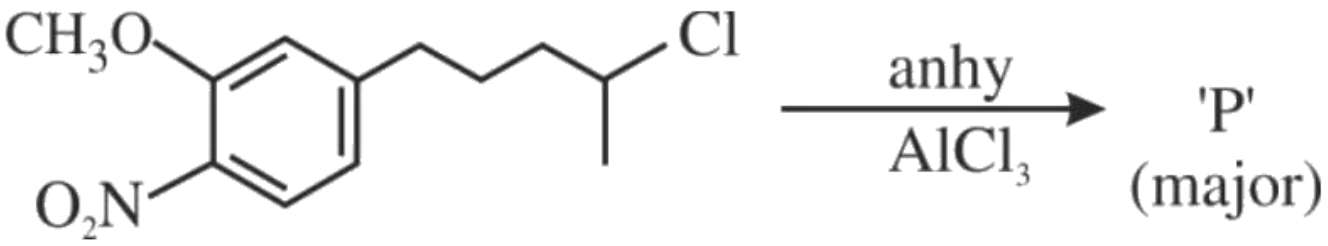
D.



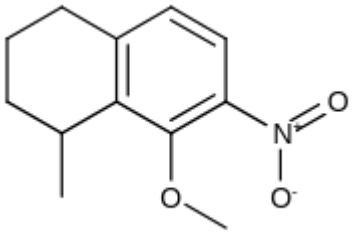
Question 142

View solution online

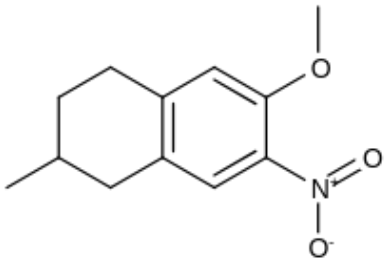
The major product ' P ' formed in the given reaction is:



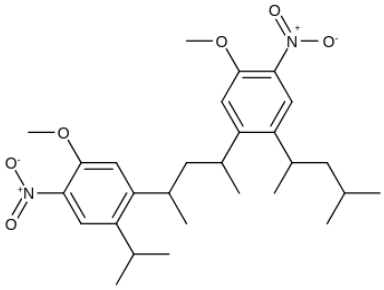
A.



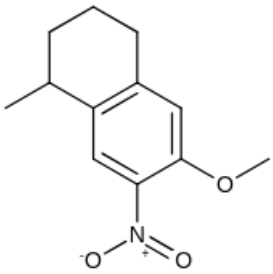
B.



C.



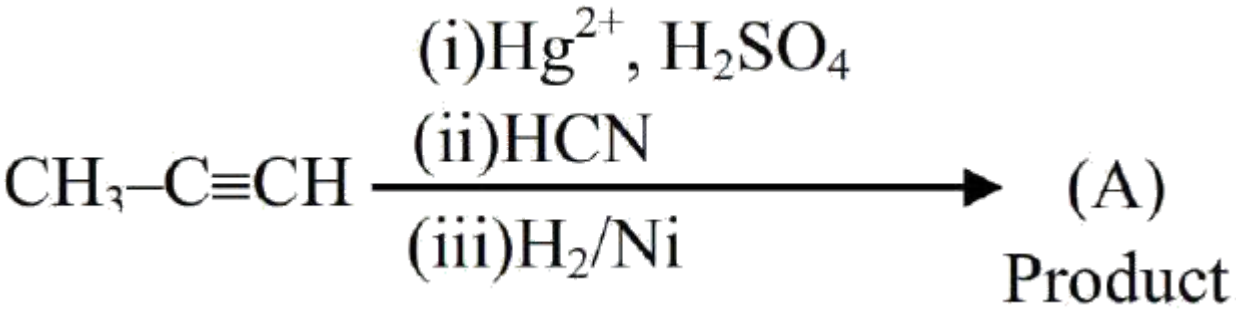
D.



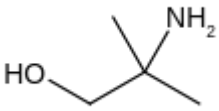
Question 143

View solution online

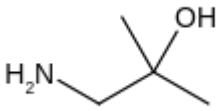
The product (A) formed in the following reaction sequence is :



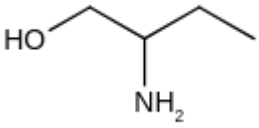
A.



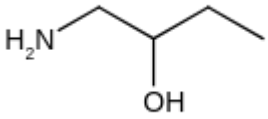
B.



C.

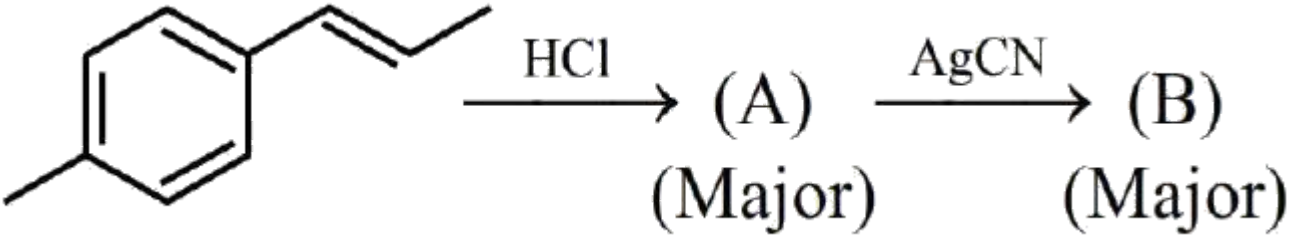


D.

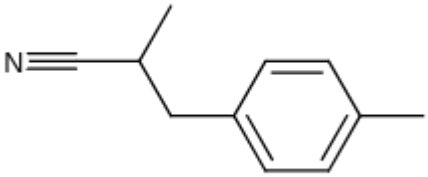


Question 144 View solution online

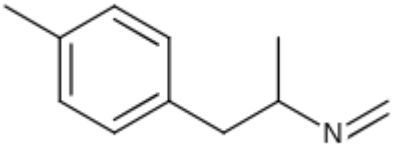
The product B formed in the following reaction sequence is :



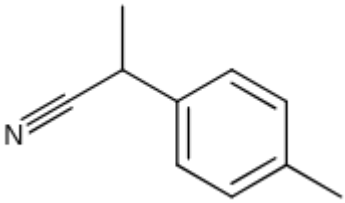
A.



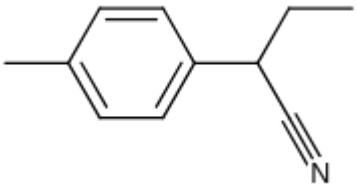
B.



C.

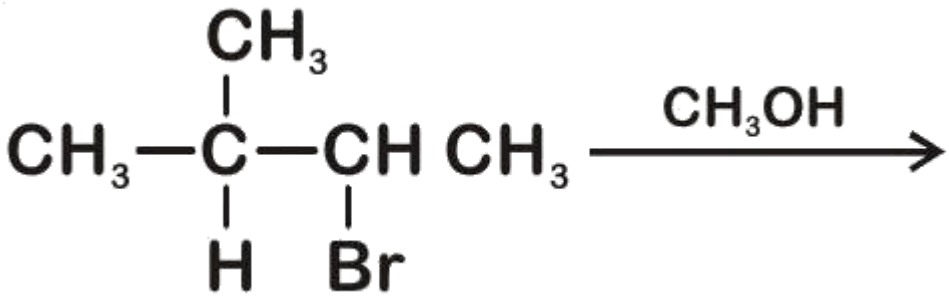


D.



Question 145 View solution online

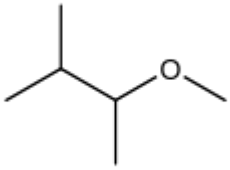
The major product of the following reaction is :



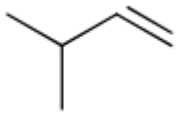
A.



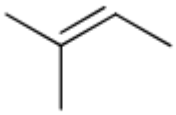
B.



C.



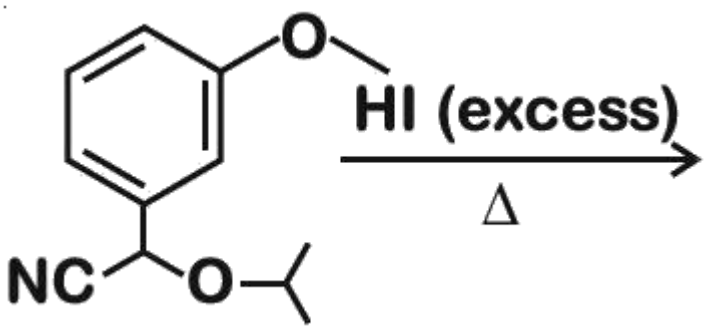
D.



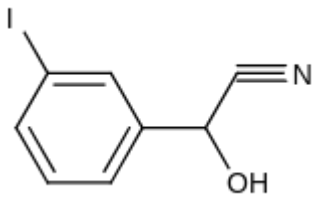
Question 146

View solution online

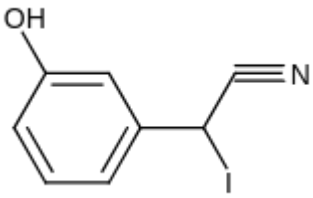
The major product of the following reaction is:



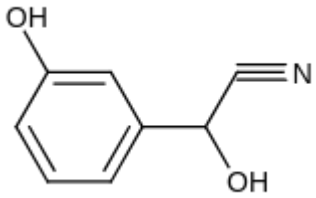
A.



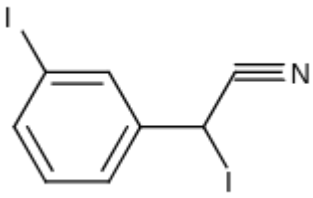
B.



C.

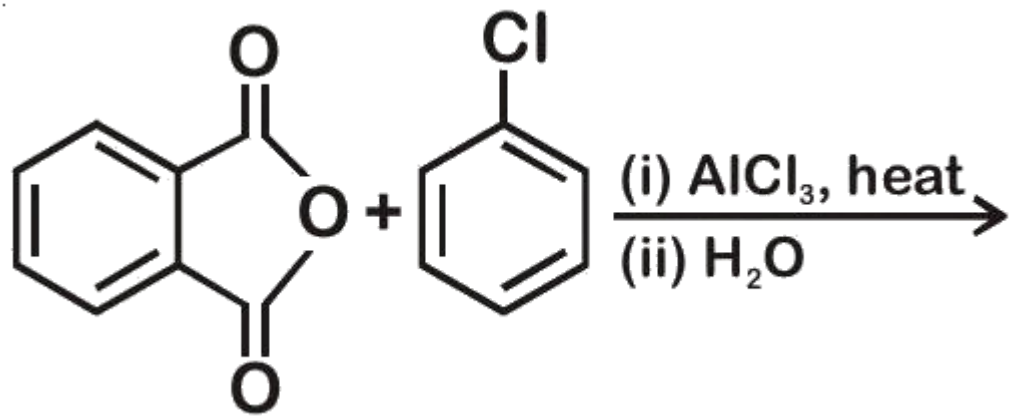


D.

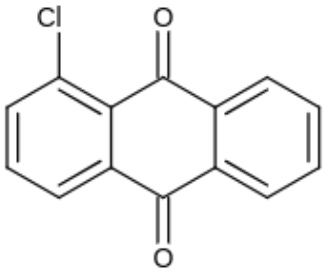


Question 147 View solution online

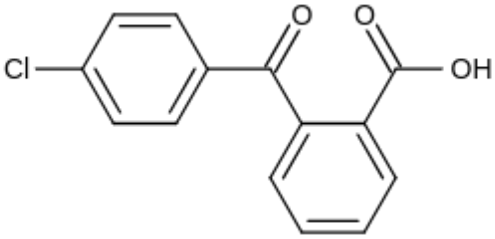
The major product of the following reaction is :



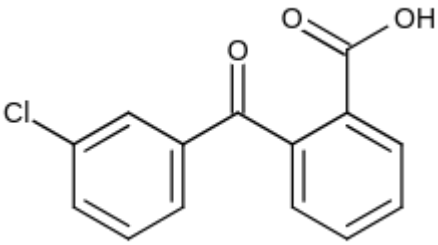
A.



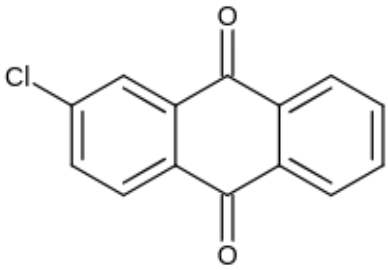
B.



C.



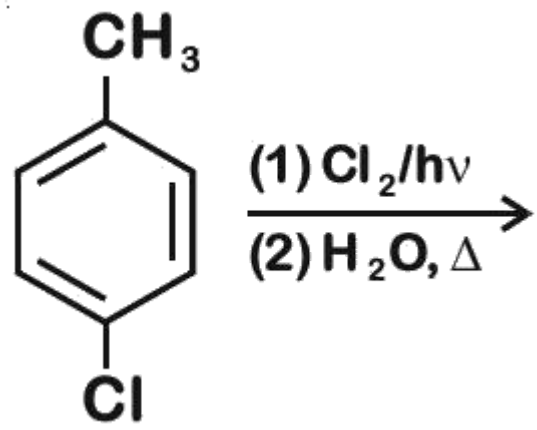
D.



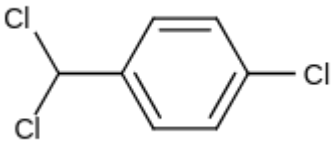
Question 148

View solution online

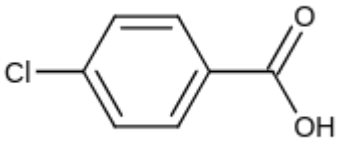
The major product of the following reaction is:



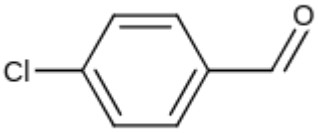
A.



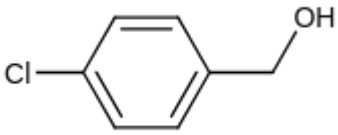
B.



C.



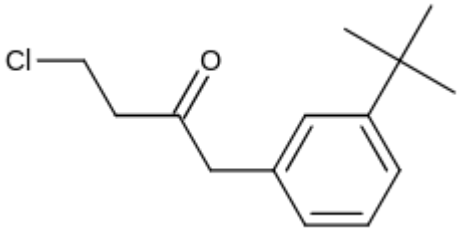
D.



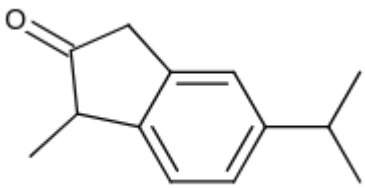
Question 149

View solution online

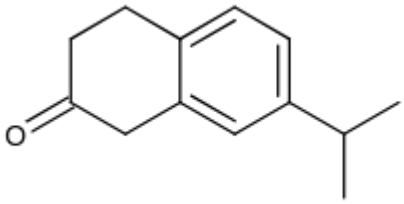
The major product of the following reaction is :



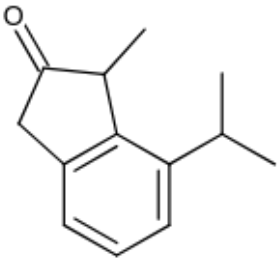
A. $\xrightarrow[(2)\ \text{Conc. } H_2SO_4/\Delta]{(1)\ \text{t BuOK}}$



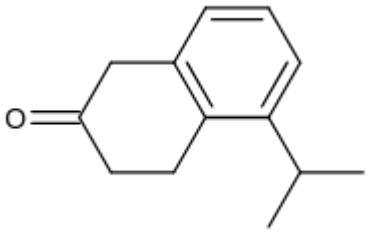
B.



C.



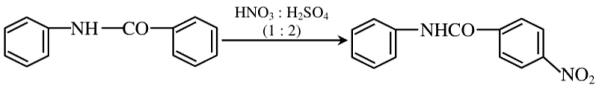
D.



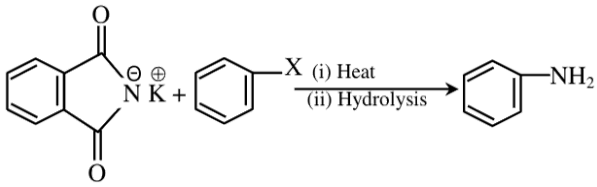
Question 150 View solution online

Consider the following reactions giving major product. Identify the correct reaction.

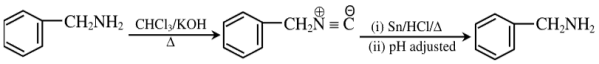
A.



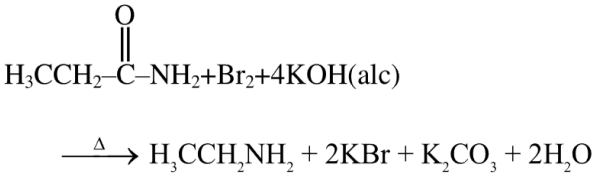
B.



C.



D.



Question 151 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

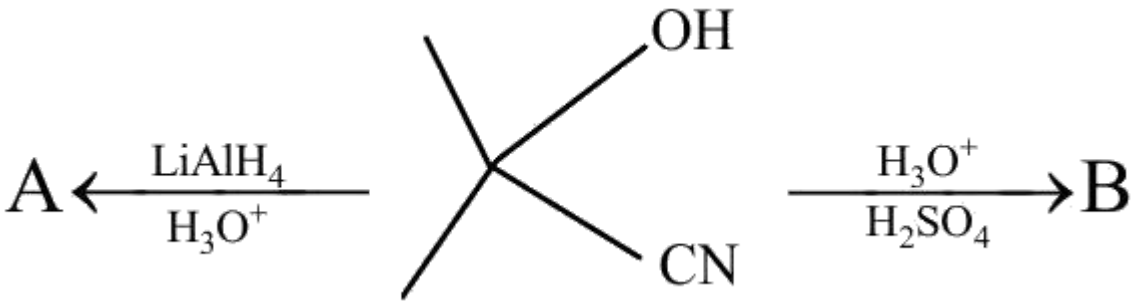
B. A-II, B-III, C-IV, D-I

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

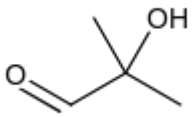
D. A-IV, B-I, C-II, D-III

Question 152 View solution online

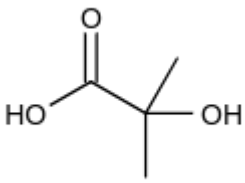
The major products A and B in the following set of reactions are :



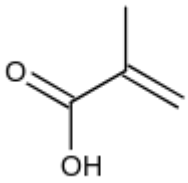
A.



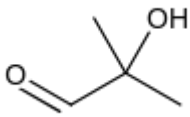
B.



C.



D.



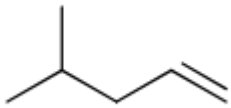
Question 153

View solution online

Match List-I with List-II.

List-I (Structure)		List-II (IUPAC Name)	
(B)	$(CH_3)_2C(C_3H_7)_2$	(II)	3-Ethyl-5methylheptane

Choose the correct answer from the options given below:



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

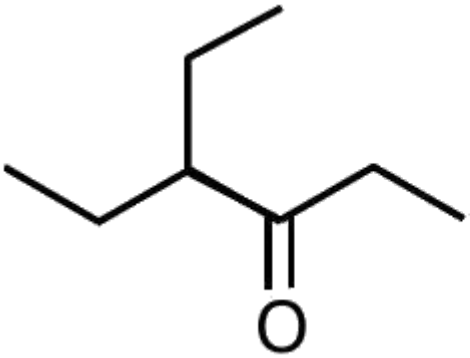
B. (A)-(III), (B)-(II), (C)-(I), (D)-(IV)

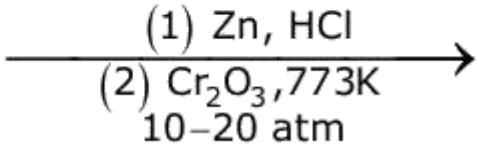
C. (A)-(II), (B)-(III), (C)-(IV), (D)-(I)

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

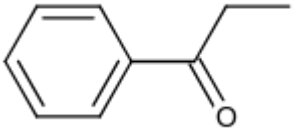
Question 154 View solution online

Considering the above reaction, the major product among the following is:

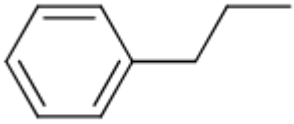




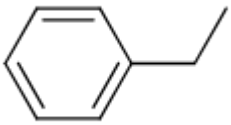
A.



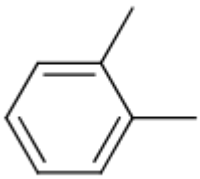
B.



C.



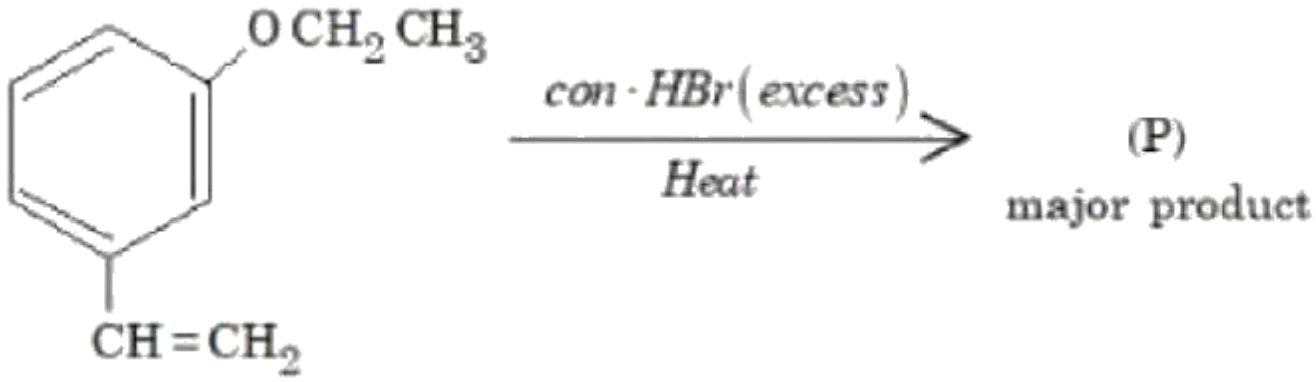
D.

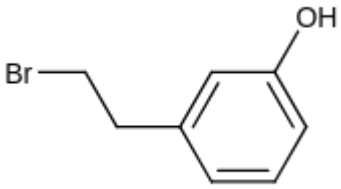


Question 155

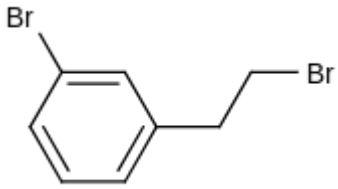
View solution online

The major product(P) in the following reaction is

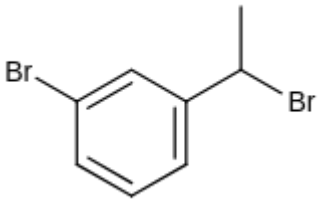




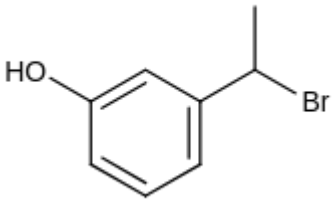
A.



B.



C.

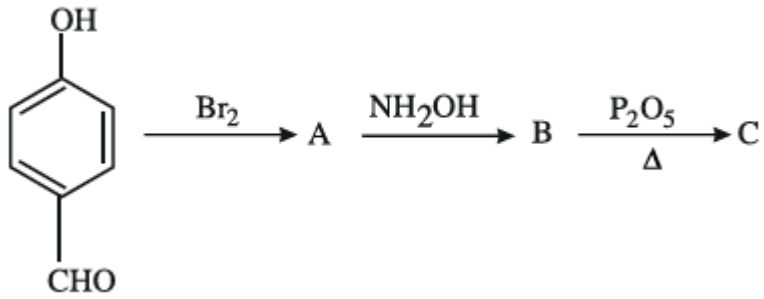


D.

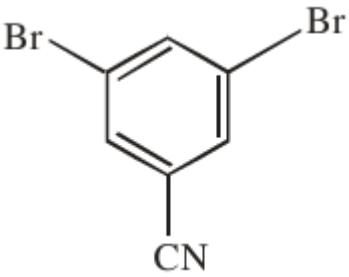
Question 156

View solution online

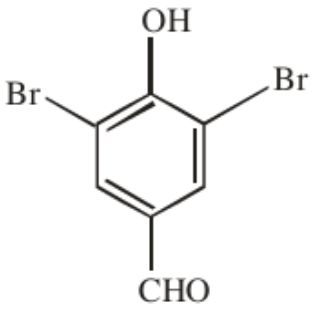
Consider the above reaction sequence, the Product ' C ' is :



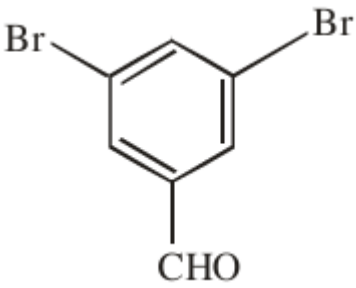
A.



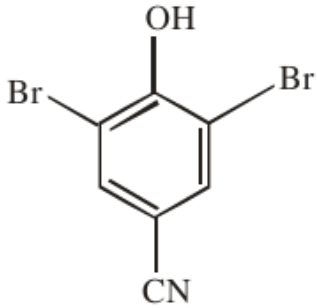
B.



C.



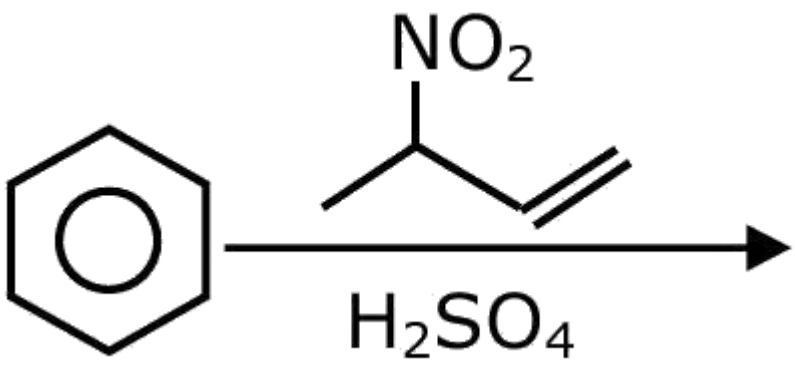
D.



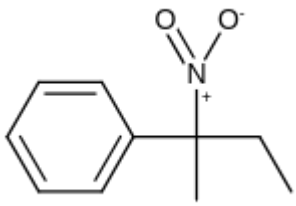
Question 157

View solution online

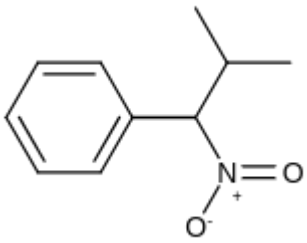
The major product of the following reaction is :



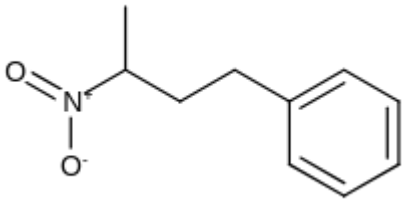
A.



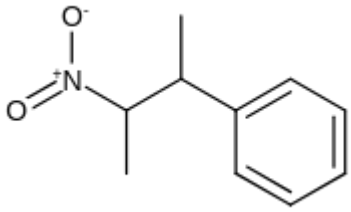
B.



C.



D.

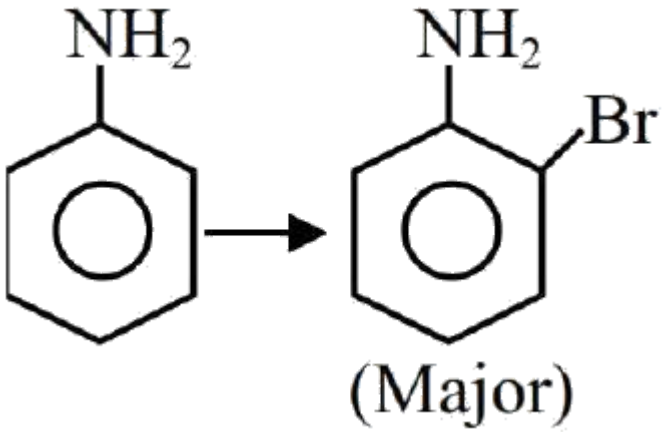


Question 158

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. $H_2SO_4, Ac_2O, Br_2, H_2O(\Delta), NaOH$

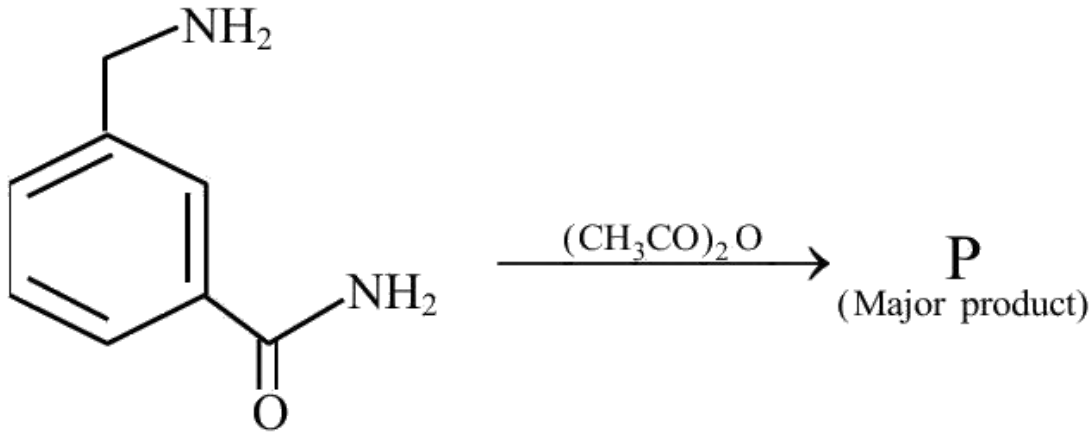
C. $Ac_2O, Br_2, H_2O(\Delta), NaOH$

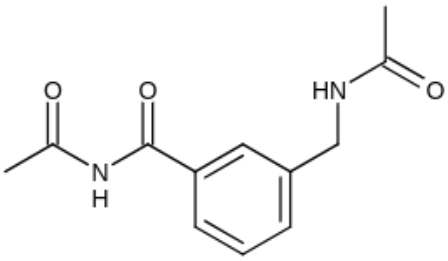
D. $Ac_2O, H_2SO_4, Br_2, NaOH$

Question 159

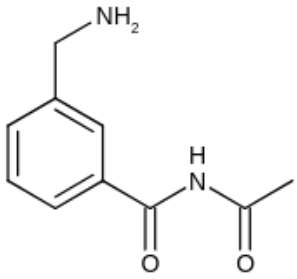
View solution online

The major product in the above reaction is :

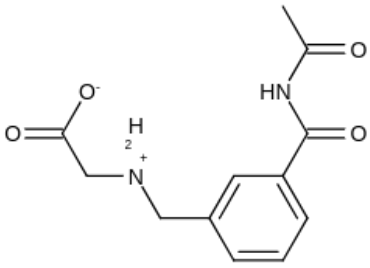




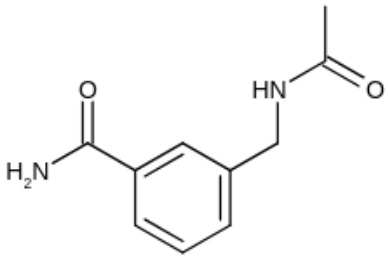
A.



B.



C.



D.

Question 160 View solution online

The major product of the following reaction is P .

$$CH_3C \equiv C - CH_3 \xrightarrow[\substack{(ii)\text{dil. } KMnO_4 \\ 273\ K}]{(i)\ Na/\ liq\cdot NH_3} 'P'$$

Number of oxygen atoms present in product ' P ' is

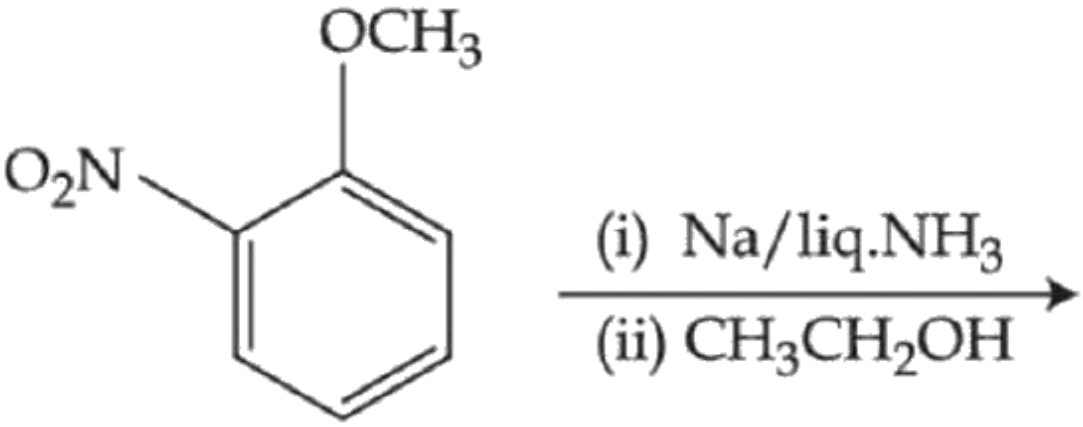
(nearest integer).

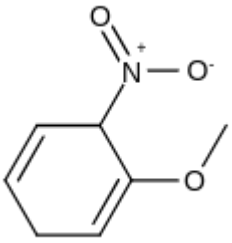
Numerical answer: _____

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

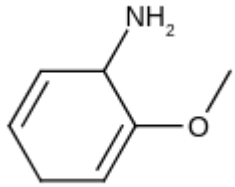
Question 161 View solution online

The major product of the following reaction is

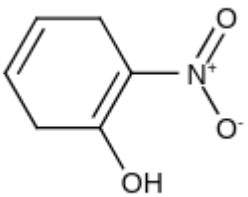




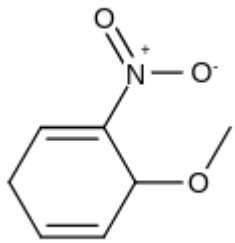
A.



B.



C.

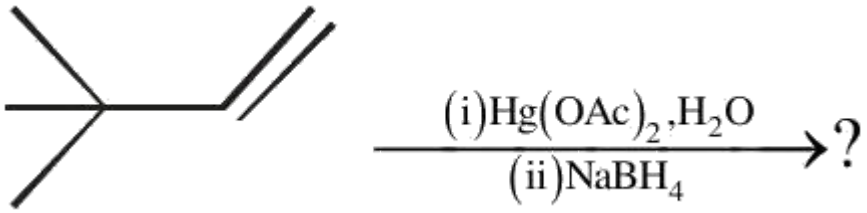


D.

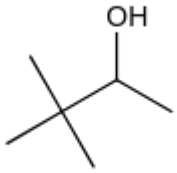
Question 162

View solution online

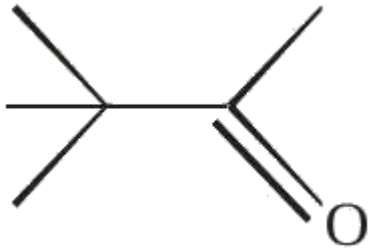
The major product in the following reaction



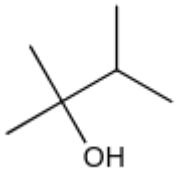
A.



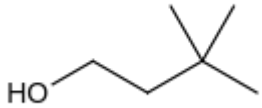
B.



C.

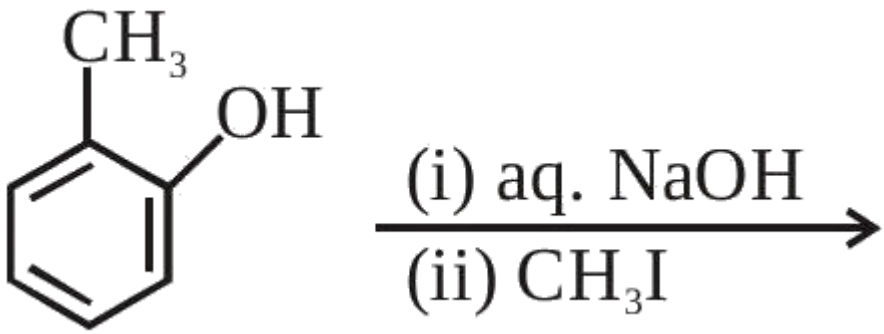


D.

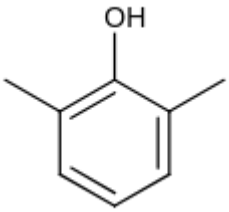


Question 163 View solution online

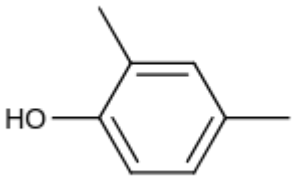
The major product of the following reaction is:



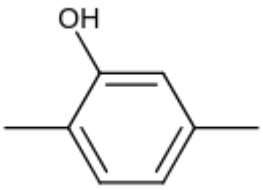
A.



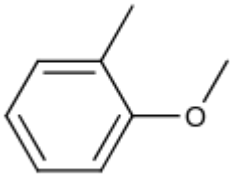
B.



C.



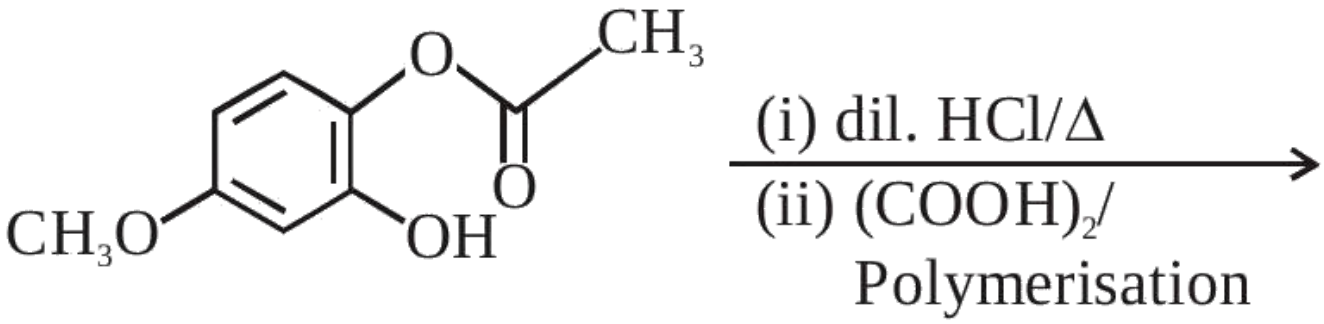
D.



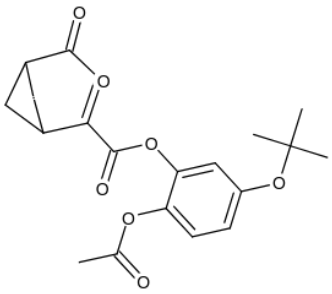
Question 164

View solution online

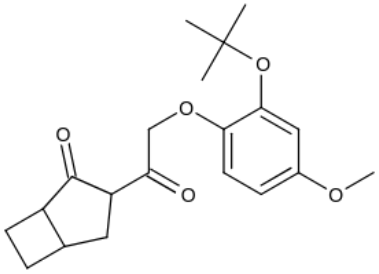
The major product of the following reaction is:



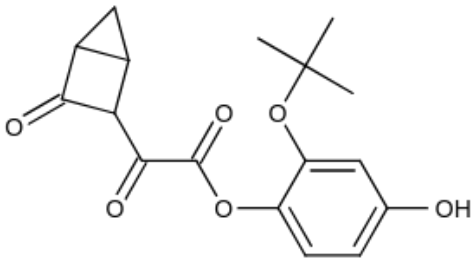
A.



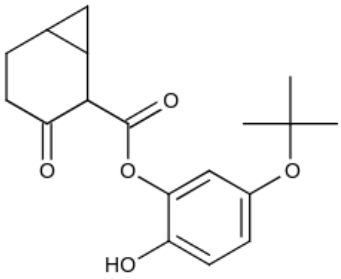
B.



C.



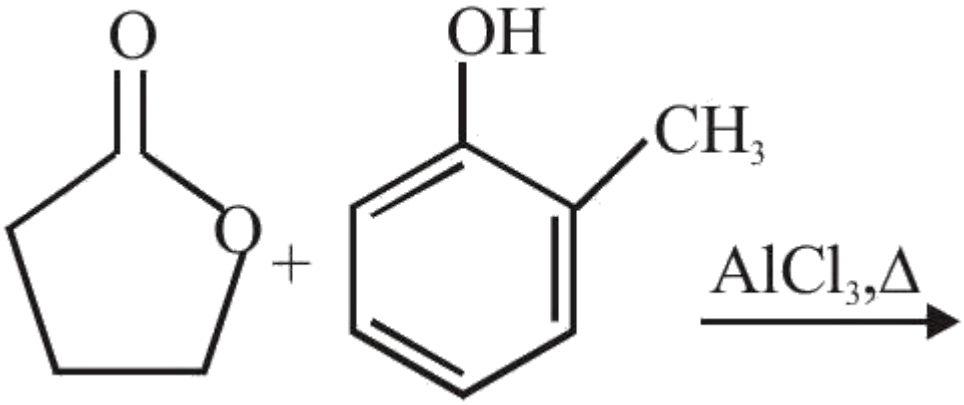
D.



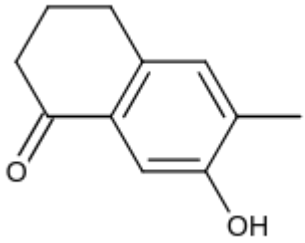
Question 165

View solution online

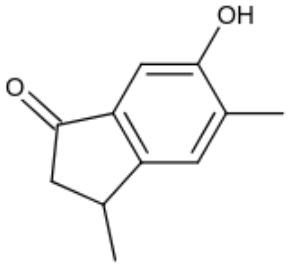
The major product of the following reaction is:



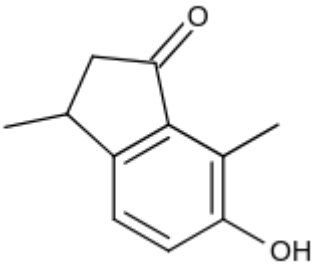
A.



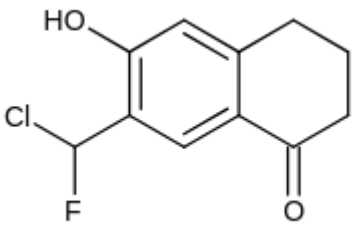
B.



C.

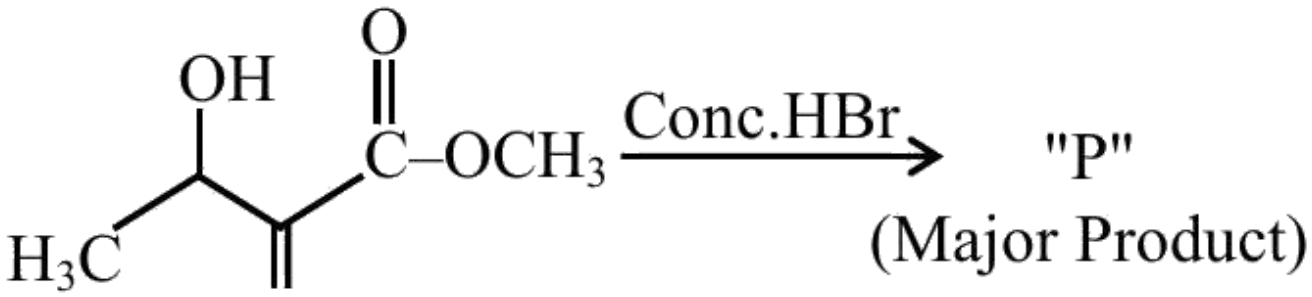


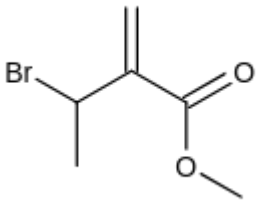
D.



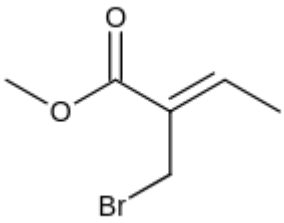
Question 166 View solution online

Consider the above reaction, the major product "P" formed is :-

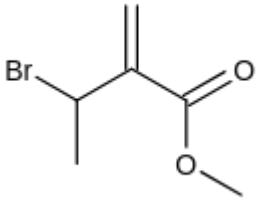




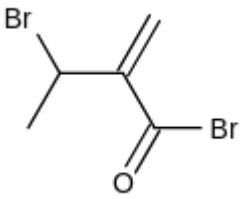
A.



B.



C.

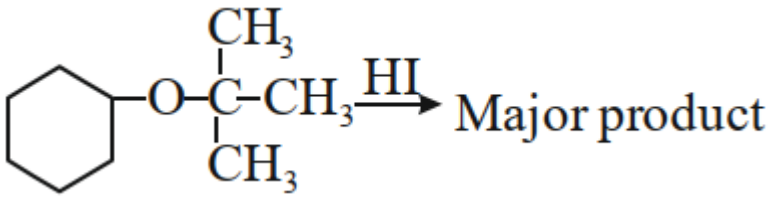


D.

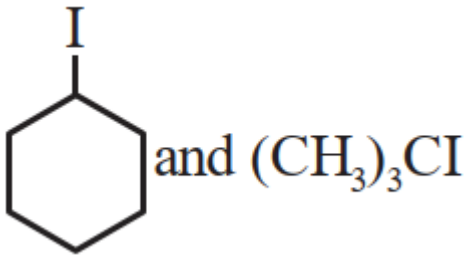
Question 167

View solution online

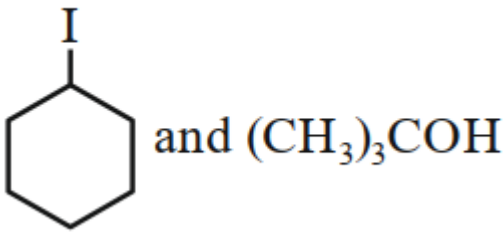
Major product formed in the following reaction is a mixture of:



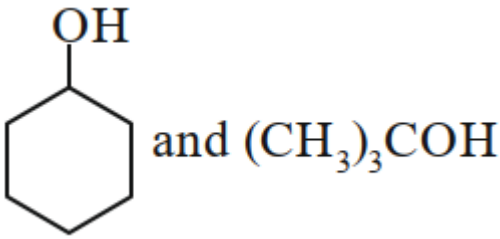
A.



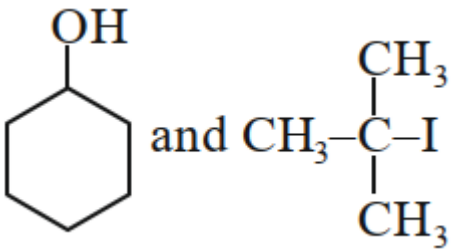
B.



C.



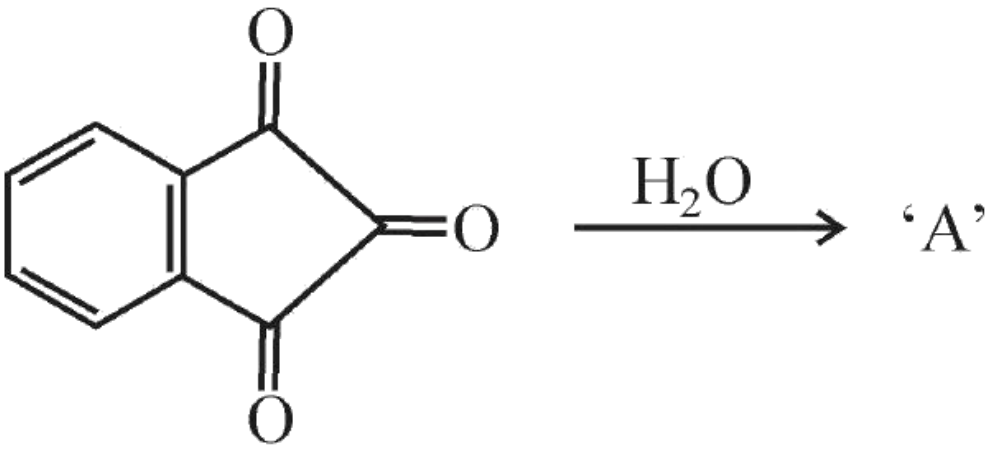
D.

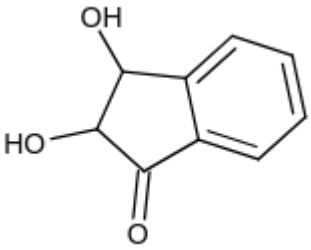


Question 168

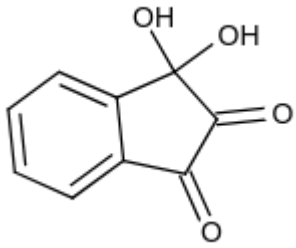
View solution online

major product ' A ' formed in the above reaction is

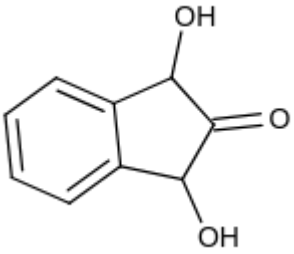




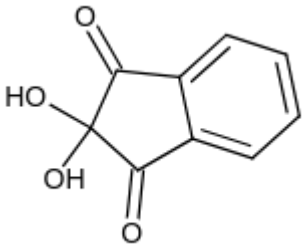
A.



B.



C.

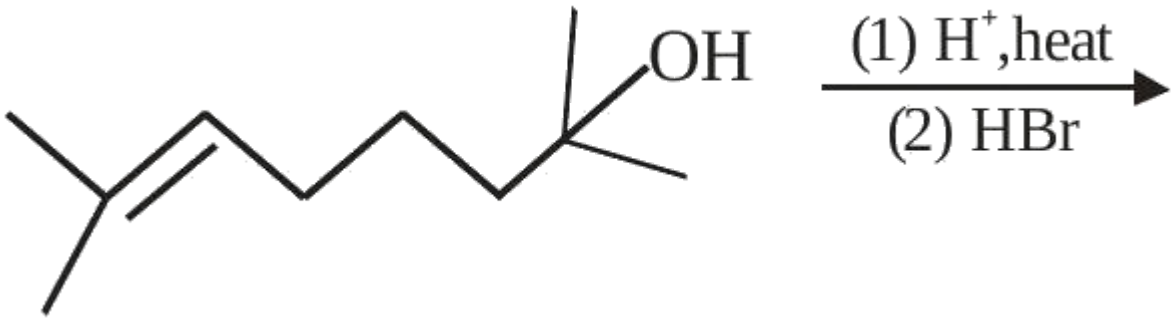


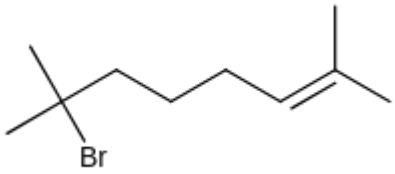
D.

Question 169

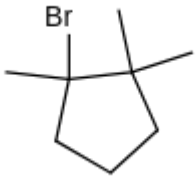
View solution online

The major product in the given reaction is

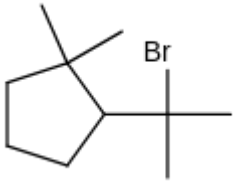




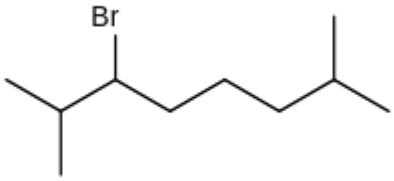
A.



B.



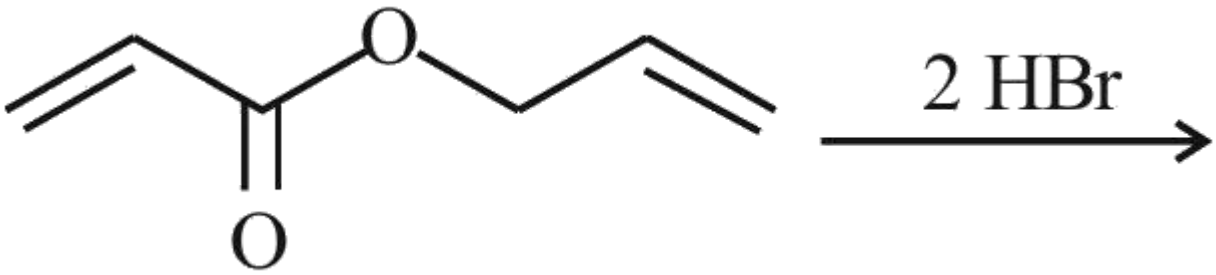
C.



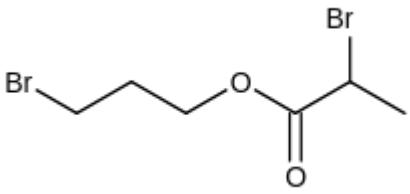
D.

Question 170 View solution online

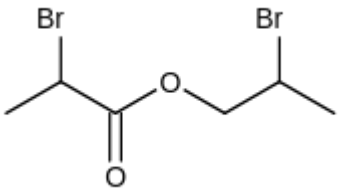
Major product of the following reaction is



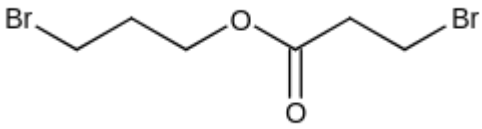
A.



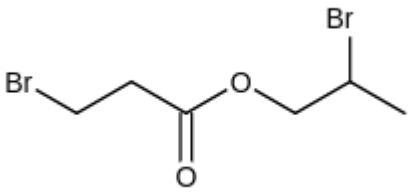
B.



C.

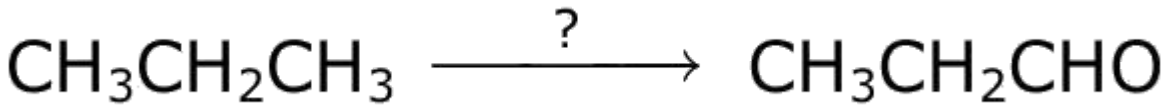


D.



Question 171 View solution online

Which of the following reagent is used for the following reaction?



A. Potassium permanganate

B. Molybdenum oxide

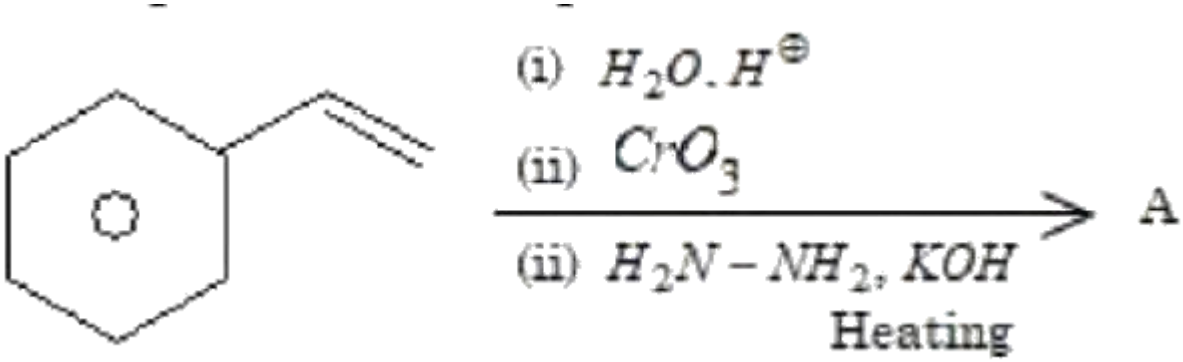
C. Copper at high temperature and pressure

D. Manganese acetate

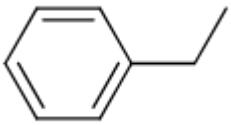
Question 172

View solution online

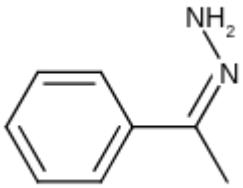
The final product A formed in the following multistep reaction sequence is



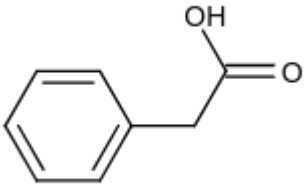
A.



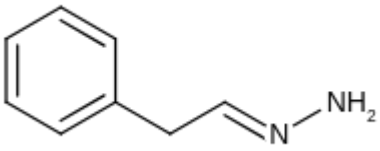
B.



C.

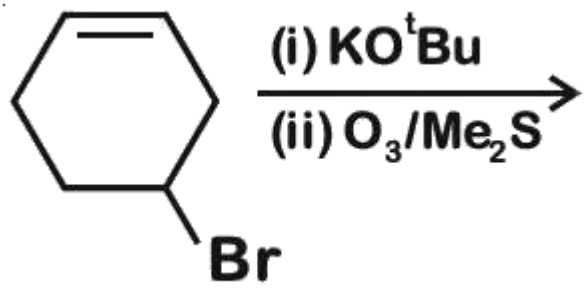


D.

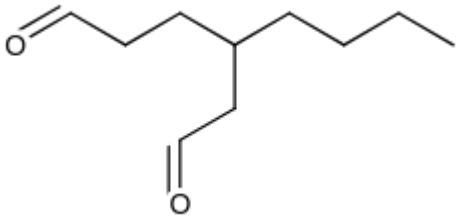


Question 173 View solution online

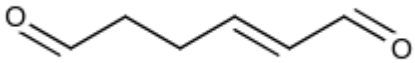
The major product(s) obtained in the following reaction is/are



A. 

B. 

C. 

D. 

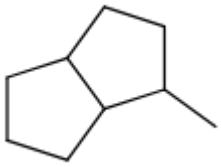
Question 174

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)

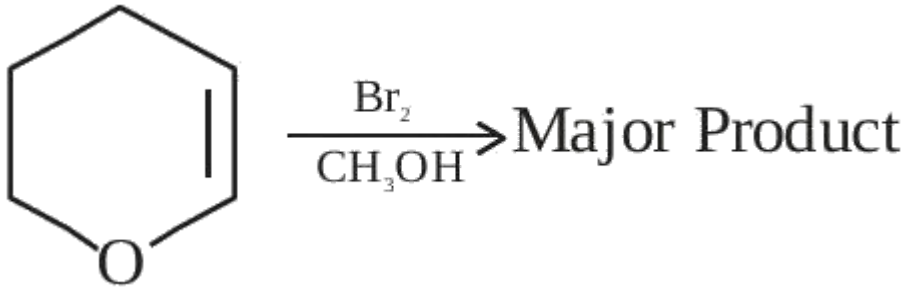
C. (A)-(III), (B)-(II), (C)-(I), (D)-(IV)

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

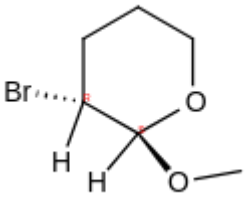
Question 175

View solution online

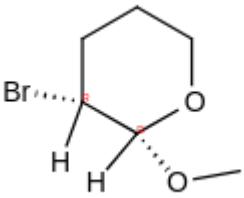
Amongst the following, the major product of the given chemical reaction is



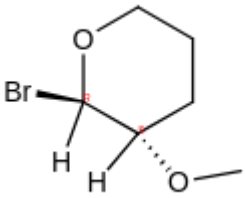
A.



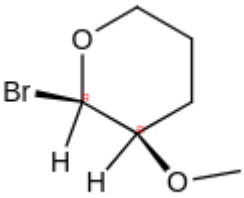
B.



C.



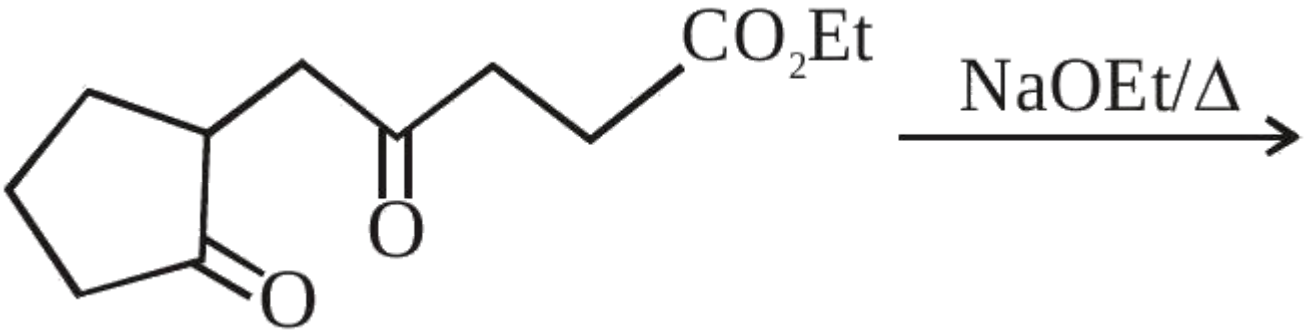
D.



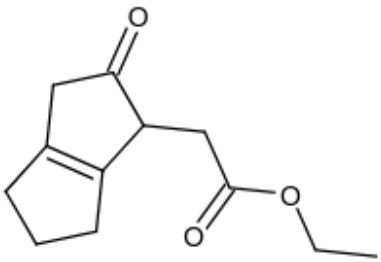
Question 176

View solution online

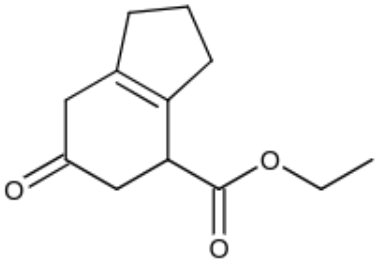
The major product obtained in the following reaction is :



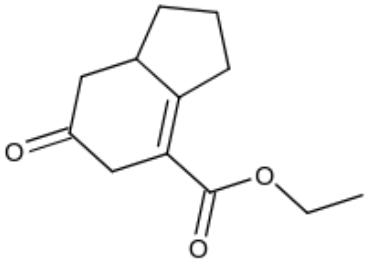
A.



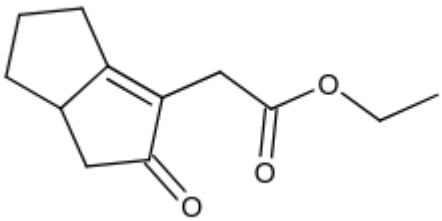
B.



C.

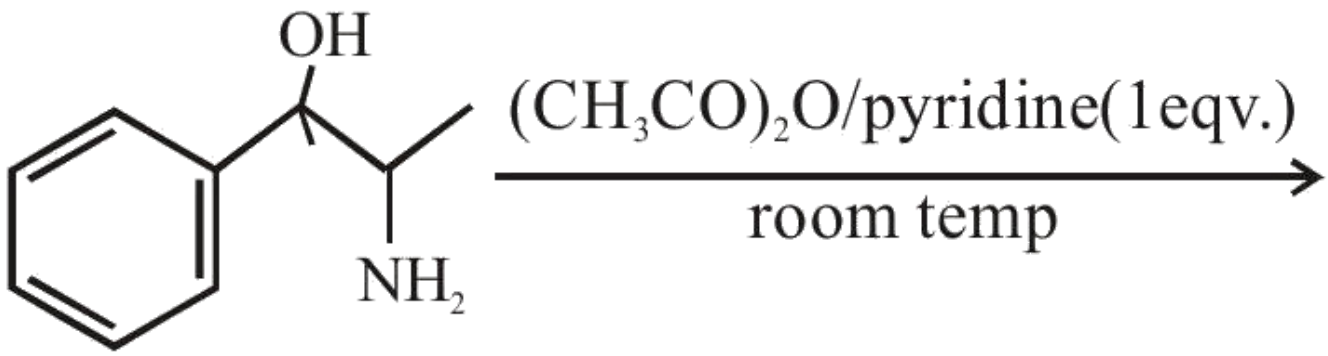


D.

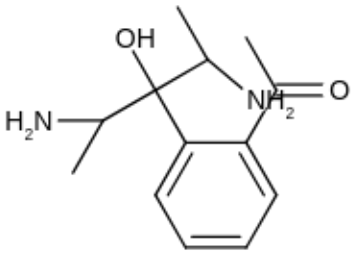


Question 177 View solution online

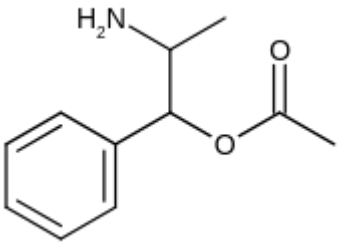
The major product obtained in the following reaction is :



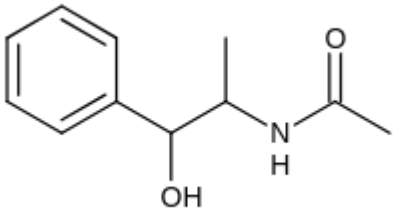
A.



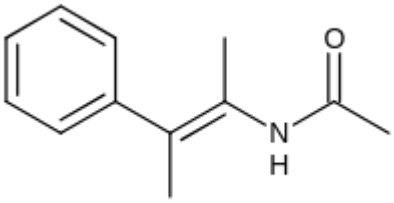
B.



C.

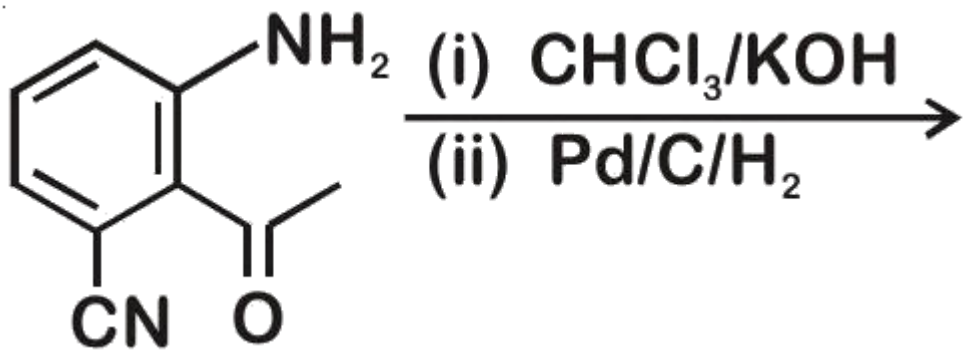


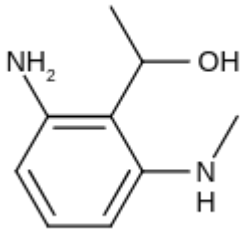
D.



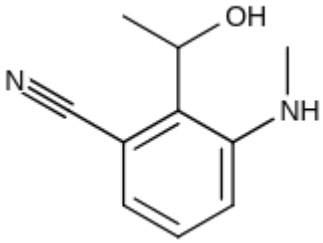
Question 178 View solution online

The major product obtained in the following reaction is:

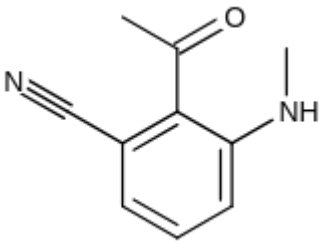




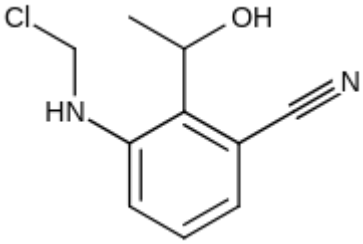
A.



B.



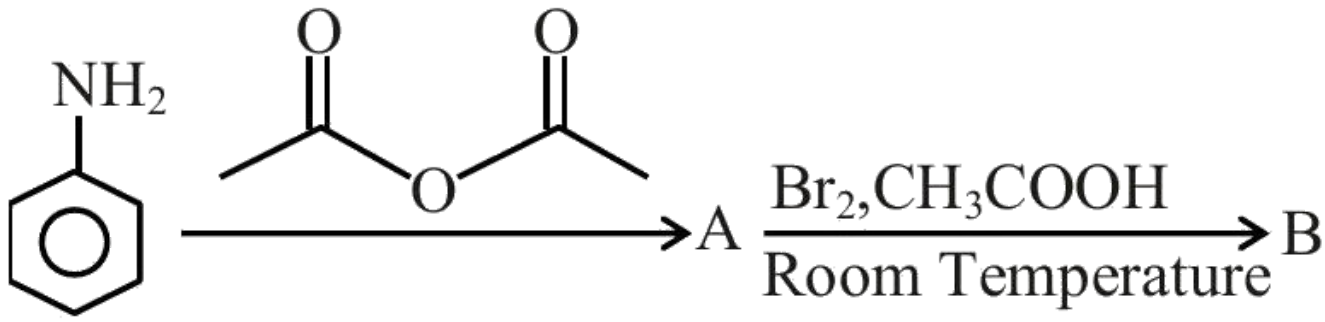
C.



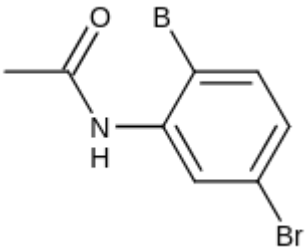
D.

Question 179 View solution online

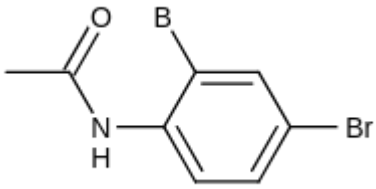
The major products A and B formed in the following reaction sequence are :



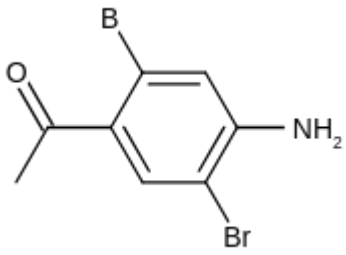
A.



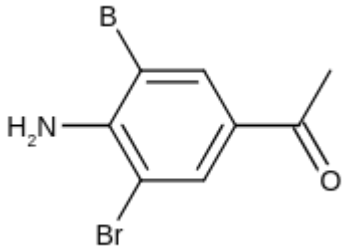
B.



C. ,

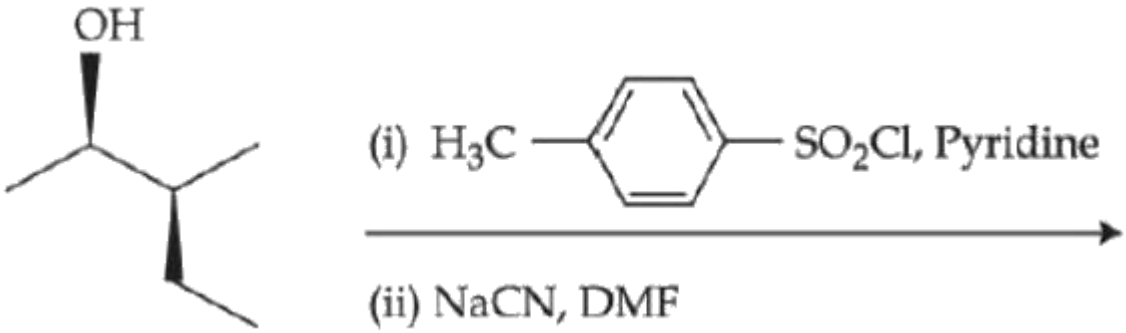


D.

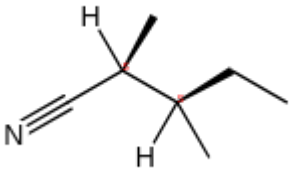


Question 180 View solution online

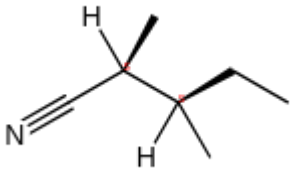
Most stable product of the following reaction is:



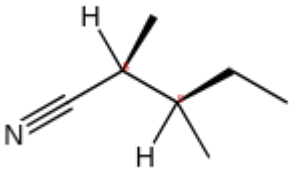
A.



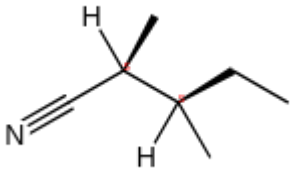
B.



C.

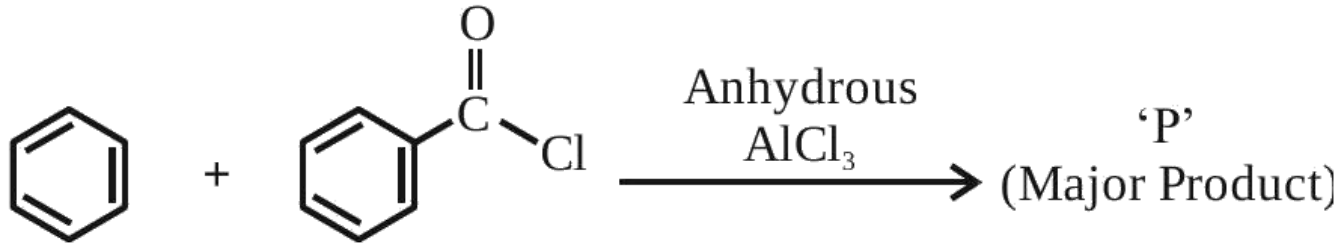


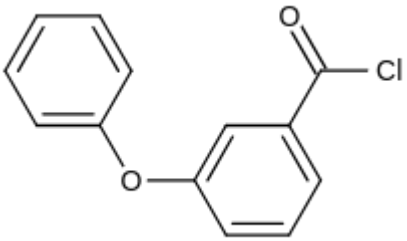
D.



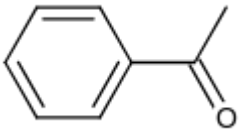
Question 181 View solution online

Identify major product ' P ' formed in the following reaction.

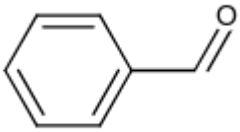




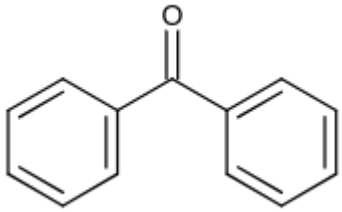
A.



B.



C.

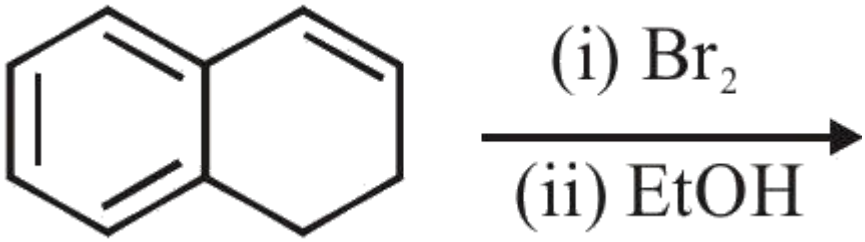


D.

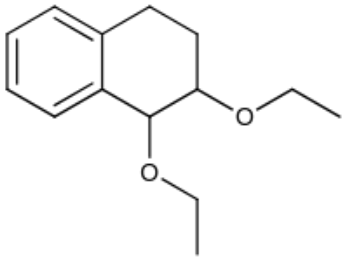
Question 182

View solution online

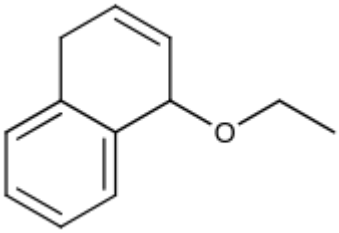
The major product the following reaction is :



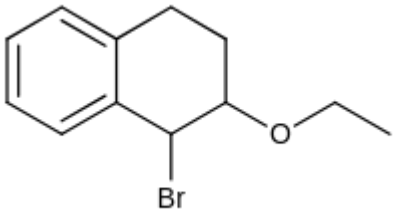
A.



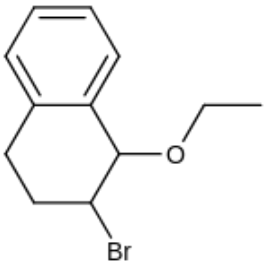
B.



C.

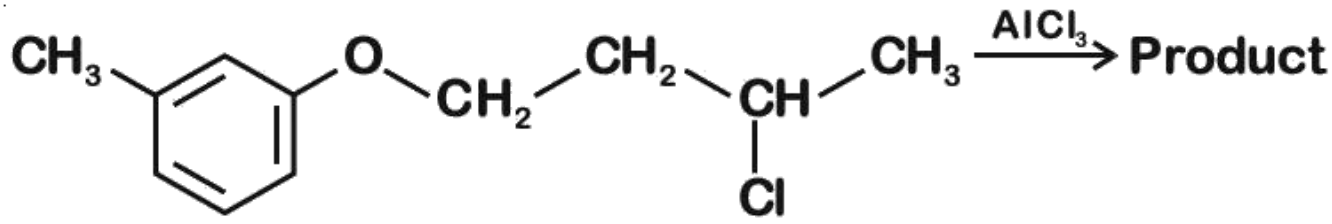


D.

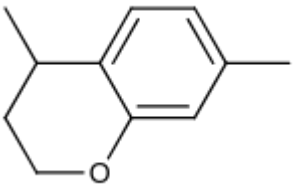


Question 183 View solution online

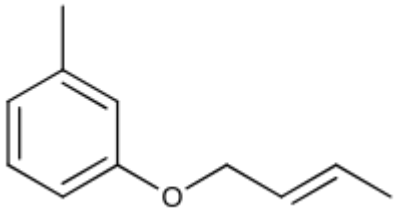
The major product obtained in the given reaction is :



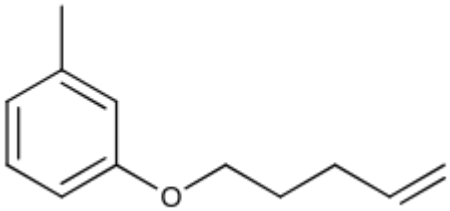
A.



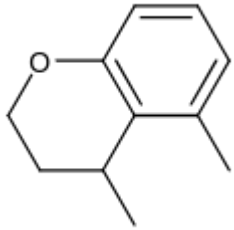
B.



C.



D.



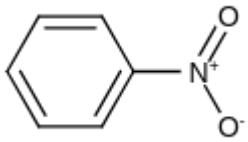
Question 184 View solution online

Match the Compounds (List-I) with the appropriate Catalyst/Reagents (List-II) for their reduction into corresponding amines.

List-I	List-II (Compounds)	(Catalyst/Reagents)

(A)
(I) $\mathbf{NaOH}$ (aqueous)
(B)
(II) $\mathbf{H_2/Ni}$
(C) $\mathbf{R-C\equiv N}$
(III) $\mathbf{LiAlH_4, H_2O}$
(D)
(IV) $\mathbf{Sn, HCl}$

Choose the correct answer from the options given below:



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

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

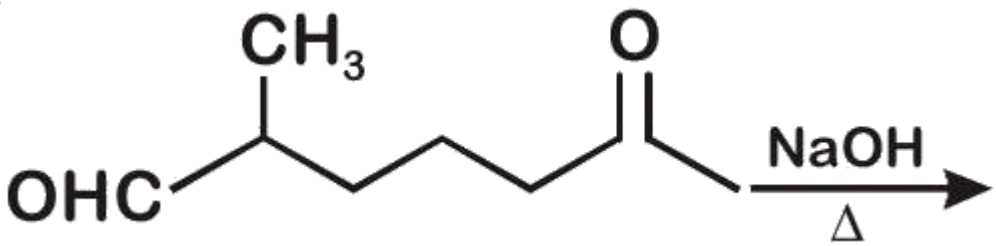
C. (A)-(II), (B)-(I), (C)-(III), (D)-(IV)

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

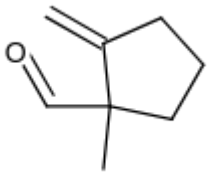
Question 185

View solution online

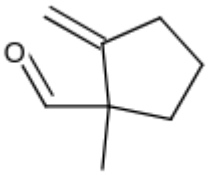
The major product obtained in the following reaction is



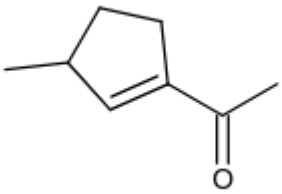
A.



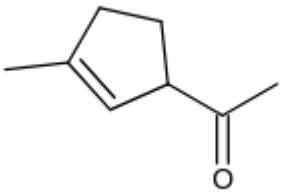
B.



C.

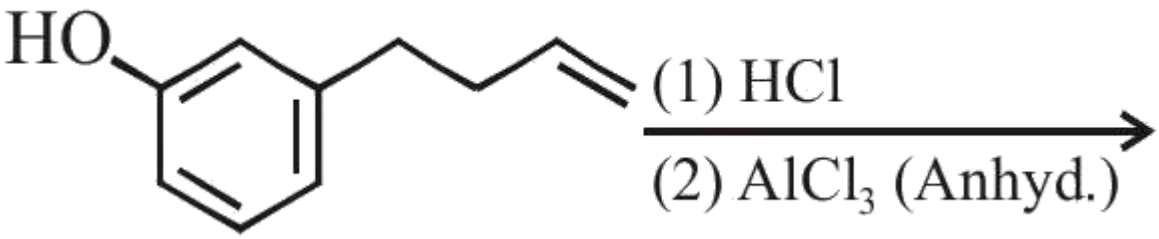


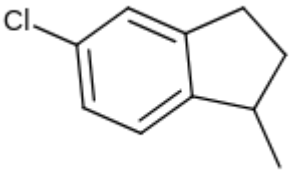
D.



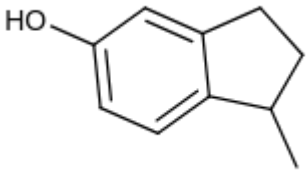
Question 186 View solution online

The major product of the following reaction is :-

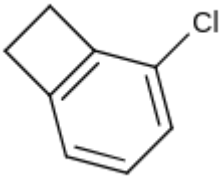




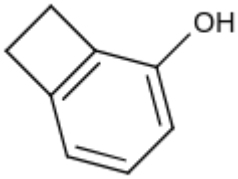
A.



B.



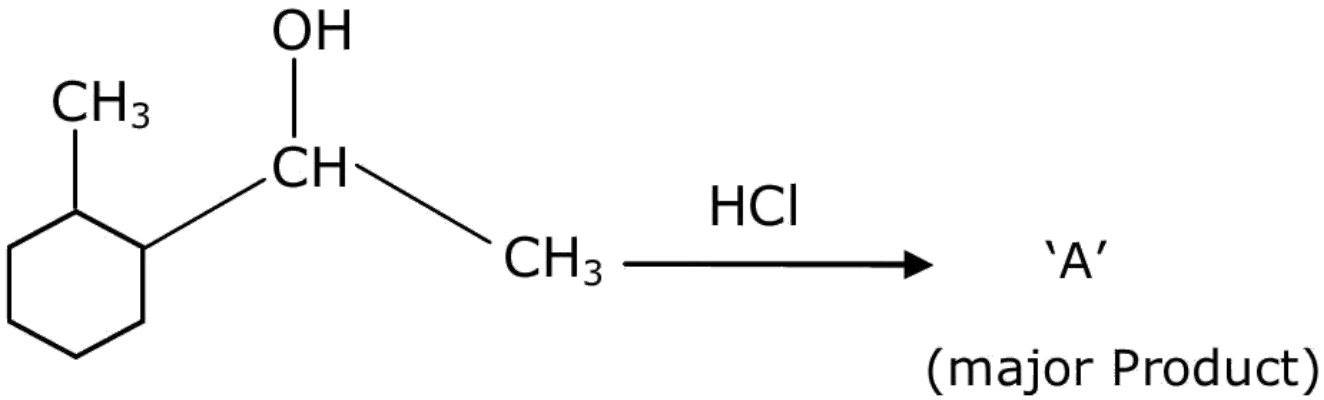
C.



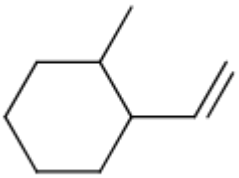
D.

Question 187 View solution online

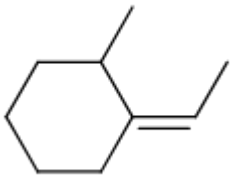
Which is the final product (major) ' A ' in the given reaction?



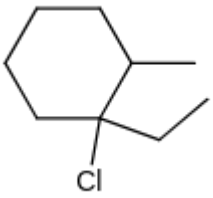
A.



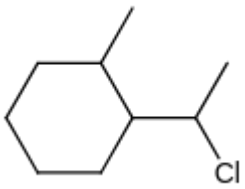
B.



C.



D.



Question 188 View solution online

Which among the following is incorrect statement?

A. Electromeric effect dominates over inductive effect

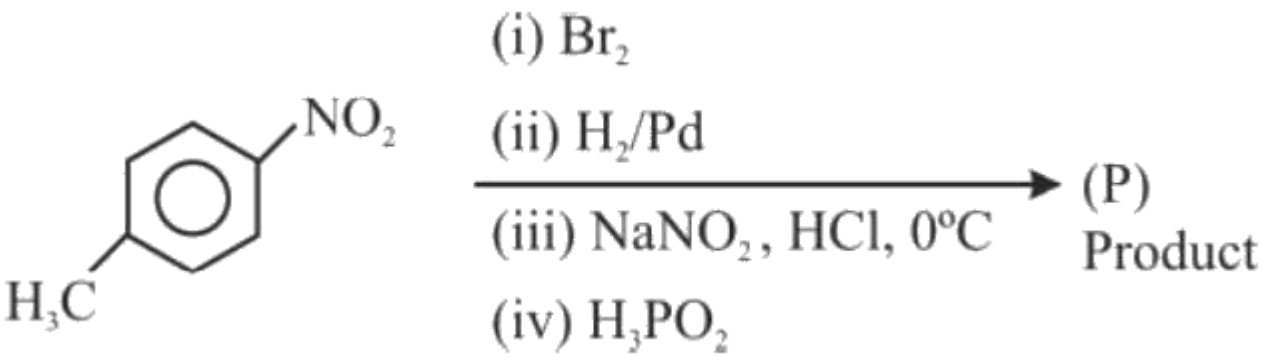
B. The electromeric effect is, temporary effect

C. The organic compound shows electromeric effect in the presence of the reagent only

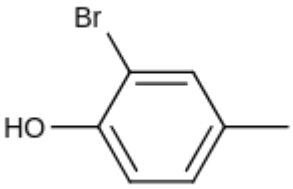
D. Hydrogen ion (H^+)shows negative electromeric effect

Question 189 View solution online

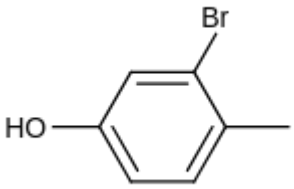
The product (P) formed from the following multistep reaction is :-



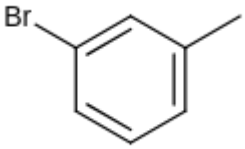
A.



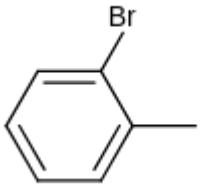
B.



C.



D.



CHAPTER 10 / CHEMISTRY

Solutions

Questions 190-194 / 5 selected / 1.7% practice weight / Consolidate

Topics to prioritise in this collection

- Boiling point elevation: 1 question / 20.0% of this chapter
- Concentration of solutions: 1 question / 20.0% of this chapter
- Freezing point depression: 1 question / 20.0% of this chapter
- Molar masses from elevation of boiling point: 1 question / 20.0% of this chapter
- Solution properties: 1 question / 20.0% of this chapter

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

Question 190

View solution online

Elements P and Q form two types of non-volatile, non-ionizable compounds PQ and $\mathbf{PQ_2}$. When 1 g of PQ is dissolved in 50 g of solvent ' A '. $\mathbf{\Delta T_b}$ was 1.176 K while when 1 g of $\mathbf{PQ_2}$ is dissolved in 50 g of solvent 'A', $\mathbf{\Delta T_b}$ was 0.689 K . ($\mathbf{K_b}$ of 'A' = 5 K $\mathbf{kgmol^{-1}}$). The molar masses of elements P and Q (in $\mathbf{gmol^{-1}}$) respectively, are :

A. 70, 110

B. 65, 145

C. 60, 25

D. 25, 60

Question 191 View solution online

At T(K), 100 g of 98% $\mathbf{H_2SO_4(w/w)}$ aqueous is mixed with 100 g of $\mathbf{49}$ aqueous solution. What is the mole fraction of $\mathbf{H_2SO_4}$ in the resultant solution?
(Given : Atomic mass $\mathbf{H = 1u; S = 32u; O = 16u}$)
(Assume that temperature after mixing remains constant)

A. 0.9

B. 0.1

C. 0.337

D. 0.663

Question 192 View solution online

A solution containing 10 g of an electrolyte $\mathbf{AB_2}$ in 100 g of water boils at $\mathbf{100.52^\circ C}$. The degree of ionization of the electrolyte ($\boldsymbol{\alpha}$) is $\times 10^{-1}$.
(nearest integer)
[Given : Molar mass of $\mathbf{AB_2 = 200\ g\ mol^{-1}}$. $\mathbf{K_b}$ (molal boiling point elevation const. of water) $\mathbf{= 0.52\ K\ kg\ mol^{-1}}$, boiling point of water $\mathbf{= 100^\circ C}$;
$\mathbf{AB_2}$ ionises as $\mathbf{AB_2 \rightarrow\ A^{2+} + 2\ B^-}$]

Numerical answer: _____

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

Question 193 View solution online

$\mathbf{20\%}$ 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 $\times 10^{-3}{}^\circ C$

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 $\mathbf{1.86\ K\ kg\ mol^{-1}}$ and $\mathbf{1\ g\ cm^{-3}}$ respectively.

Numerical answer: _____

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

Question 194 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 11 / CHEMISTRY

Electrochemistry

Questions 195-196 / 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

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

Question 195

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 196

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 12 / CHEMISTRY

Chemical Kinetics

Questions 197-198 / 2 selected / 0.7% practice weight / Consolidate

Topics to prioritise in this collection

- Initial-rate method: 1 question / 50.0% of this chapter
- Reaction stoichiometry from a concentration-time graph: 1 question / 50.0% of this chapter

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

Question 197

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]

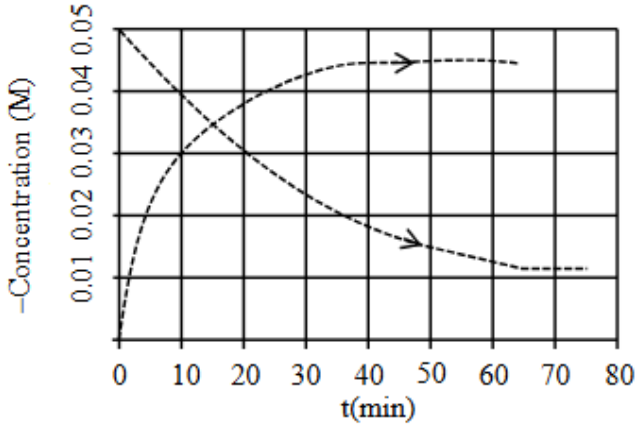
Numerical answer: _____

Enter the requested integer (0 decimal places).

Question 198

View solution online

Given above is the concentration vs time plot for a dissociation reaction : A → nB.
Based on the data of the initial phase of the reaction (initial 10 min), the value of n is _____.



A. 4

B. 3

C. 2

D. 5

CHAPTER 13 / CHEMISTRY

The p-Block Elements

Questions 199-204 / 6 selected / 2.0% practice weight / Next

Topics to prioritise in this collection

- Main group element chemistry: 4 questions / 66.7% of this chapter
- Acidic, basic and amphoteric oxides of group 14 elements: 1 question / 16.7% of this chapter
- Gas-evolution reactions: 1 question / 16.7% of this chapter

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

Question 199

View solution online

Given below are two statements :
Statement I : The number of pairs among [SiO_2, CO_2], [SnO, SnO_2], [PbO, PbO_2] and [GeO, GeO_2], which contain oxides that are both amphoteric is 2.
Statement II : BF_3 is an electron deficient molecule can act as a lewis acid, forms adduct with NH_3 and has a trigonal planar geometry.
In the light of the above statement, choose the correct answer from the option given below.

A. Both Statement I and Statement II are true.

B. Both Statement I and Statement II are false.

C. Statement I is true but Statement II is false.

D. Statement I is false Statement II is true.

Question 200

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 201 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 202 View solution online

Given below are two statements

Statement I: The N-N single bond is weaker and longer than that of $P-P$ single bond
Statement II : Compounds of group 15 elements in +3 oxidation states readily undergo disproportionation reactions.
In the light of above statements, choose the correct answer from the options given below

A. Statement I is true but statement II is false

B. Both statement I and statement II are false

C. Statement I is false but statement II is true

D. Both statement I and statement II are true

Question 203

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

Question 204 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

CHAPTER 14 / CHEMISTRY

The d- and f-Block Elements

Questions 205-214 / 10 selected / 3.3% practice weight / Next

Topics to prioritise in this collection

- The d- and f- Block Elements: 6 questions / 60.0% of this chapter
- Properties of transition elements: 3 questions / 30.0% of this chapter
- Magnetic properties of transition ions: 1 question / 10.0% of this chapter

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

Question 205

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 206 View solution online

Given below are two statements : One is labelled as Assertion $\mathbf{A}$ and the other is labelled as Reason $\mathbf{R}$
Assertion A :- Sodium is about 30 times as abundant as potassium in the oceans.
Reason $\mathbf{R}$:- Potassium is bigger in size than sodium.
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 true but R is false.

C. A is false but R is true

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

Question 207 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 208 View solution online

Which one of the following statements is incorrect ?

A. van Arkel method is used to purify tungsten.

B. The malleable iron is prepared from cast iron by oxidising impurities in a reverberatory furnace.

C. Cast iron is obtained by melting pig iron with scrap iron and coke using hot air blast.

D. Boron and Indium can be purified by zone refining method.

Question 209 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 210 View solution online

Which one of the following statements is incorrect?

A. Atomic hydrogen is produced when H_2 molecules at a high temperature are irradiated with UV radiation.

B. At around 2000 K , the dissociation of dihydrogen into its atoms is nearly 8.1%.

C. Bond dissociation enthalpy of H_2 is highest among diatomic gaseous molecules which contain a single bond .

D. Dihydrogen is produced on reacting zinc with HCl as well as $NaOH_{(aq)}$.

Question 211 View solution online

Which of the following statements are incorrect?

A. A, D

B. B, C

C. A, B

D. A, B, C, D

Question 212 View solution online

The incorrect statements among the following is

A. PH_3 shows lower proton affinity than NH_3.

B. PF_3 exists but NF_5 does not.

C. NO_2 can dimerise easily.

D. SO_2 can act as an oxidizing agent, but not as a reducing agent.

Question 213

View solution online

Match List I with List II

LIST - I (Complex ion)		LIST - II (Electronic Configuration	
A.	$[Cr(H_2O)_6]^{3+}$	I.	$t_{2g}^2e_g^0$
B.	$[Fe(H_2O)_6]^{3+}$	II.	$t_{2g}^3e_g^0$
C.	$[Ni(H_2O)_6]^{2+}$	III.	$t_{2g}^3e_g^2$
D.	$[V(H_2O)_6]^{3+}$	IV.	$t_{2g}^6e_g^2$

Choose the correct answer from the options given below:

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

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

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

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

Question 214 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)

CHAPTER 15 / CHEMISTRY

Coordination Compounds

Questions 215-229 / 15 selected / 5.0% practice weight / Focus first

Topics to prioritise in this collection

- Coordination chemistry: 9 questions / 60.0% of this chapter
- Coordination Compounds: 2 questions / 13.3% of this chapter
- Coordination number and geometry: 1 question / 6.7% of this chapter
- Crystal field splitting: 1 question / 6.7% of this chapter
- Hybridisation, geometry and spin-only magnetic moment: 1 question / 6.7% of this chapter
- Inner- and outer-orbital complexes and hybridisation: 1 question / 6.7% of this chapter

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

Question 215 View solution online

Match the metals (Column I) with the coordination compound(s) / enzyme(s) (Column II)

Column-I}
Metals}
(A) Co
(B) Zn
(C) Rh
(D) Mg

Column-II}
Coordination}
compound(s) / Enzyme(s)(i) Wilkinson catalyst
(ii) Chlorophyll
(iii) Vitamin $\mathbf{B_{12}}$
(iv) Carbonic anhydrase

A. A-ii ; B-i ; C-iv ; D-iii

B. A-iii ; B-iv ; C-i ; D-ii

C. A-iv ; B-iii ; C-i ; D-ii

D. A-i ; B-ii ; C-iii ; D-iv

Question 216 View solution online

The d-electron configuration of $[Ru(en)_3]Cl_2$ and $[Fe(H_2O)_6]Cl_2$, respectively are:

A. $t_{2g}^4 e_g^2$ and $t_{2g}^6 e_g^0$

B. $t_{2g}^6 e_g^0$ and $t_{2g}^6 e_g^0$

C. $t_{2g}^4 e_g^2$ and $t_{2g}^4 e_g^2$

D. $t_{2g}^6 e_g^0$ and $t_{2g}^4 e_g^2$

Question 217 View solution online

Identify the diamagnetic octahedral complex ions from below ;

A. $[Mn(CN)_6]^{3-}$

B. $[Co(NH_3)_6]^{3+}$

C. $[Fe(CN)_6]^4$

D. $[Co(H_2O)_3\ F_3]$

Choose the correct answer from the options given below:

A. B and D Only

B. A and D Only

C. A and C Only

D. B and C Only

Question 218 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 219 View solution online

Given following complexes:

I. $Na_4[Fe(CN)_6]$

II. $[Cr(H_2O)_6]Cl_2$

III. $(NEt_4)_2[CoCl_4]$

IV. $Na_3[Fe(C_2O_4)_3]\ (\Delta_0 > P)$

The correct order of spin only magnetic moment for the above complexes

A. (II) > (II) > (IV) > (I)

B. (II) > (IV) > (III) > (I)

C. (I) > (III) > (III) > (II)

D. (II) > (I) > (IV) > (III)

Question 220 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 221 View solution online

Given below are two statements :

Statement I : $[Mn(CN)_6]^{3-}$, $[Fe(CN)_6]^{3-}$ and $[Co(C_2O_4)_3]^{3-}$ are d^2sp^3 hybridised.
Statement II : $[MnCl_6]^{3-}$ and $[FeF_6]^{3-}$ 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 222

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

Question 223

View solution online

Identify the CORRECT set of details from the following :

A. $[Co(NH_3)_6]^{3+}$: Inner orbital complex ; d^2sp^3 hybridized

B. $[MnCl_6]^{3-}$ Outer orbital complex; $sp^3\ d^2$ hybridized

C. $[CoF_6]^3$: Outer orbital complex ; d^2sp^3 hybridized

D. $[FeF_6]^{3-}$: Outer orbital complex: $sp^3\ d^2$ hybridized

E. $[Ni(CN)]^{2-}$: Inner orbital complex ; sp^3 hybridized

Choose the correct answer from the options given below:

A. C & D only

B. A, B & D only

C. A, C & E only

D. A, B, C, D & E

Question 224 View solution online

List I (Complex)	List II (Hybridisation)
$(A)\ [CoF_6]^{3-}$	$(I)\ d^2sp^3$
$(B)\ [NiCl_4]^{2-}$	$(II)\ sp^3$
$(C)\ [Co(NH_3)_6]^{3+}$	$(III)\ sp^3d^2$
$(D)\ [Ni(CN)_4]^{2-}$	$(IV)\ dsp^2$

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

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

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

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

Question 225 View solution online

Given below are two statements:

Statement I: The hybridisation, shape and spin-only magnetic moment of $K_3[Co(CO_3)_3]$ are sp^3d^2, octahedral and $4.9\ BM$, respectively.

Statement II: The geometry, hybridisation and spin-only magnetic moment (BM) of the ions $[Ni(CN)_4]^{2-}$, $[MnBr_4]^{2-}$ and $[CoF_6]^{3-}$ are square planar, tetrahedral and octahedral; dsp^2, sp^3 and sp^3d^2; and 0, 5.9 and 4.9, respectively.

In the light of the above statements, choose the correct answer from the options given below.

A. Both statement-I and statement-II are false

B. Statement I is false but statement-II is true

C. Both statement-I and statement-II are true

D. Statement-I is true but statement-II is false

Question 226

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 227

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 228

View solution online

Match List-I with List-II.

List-I (Complex)

(A) $[CoF_6]^{3-}$
(B) $[NiCl_4]^{2-}$
(C) $[Co(NH_3)_6]^{3+}$
(D) $[Ni(CN)_4]^{2-}$

List-II
(Hybridisation of central metal ion)
(I) d^2sp^3
(II) sp^3
(III) $sp^3\ d^2$
(IV) dsp^2

Choose the correct answer from the options given below:

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

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

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

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

Question 229 View solution online

Match List - I with List - II

List - I (Complex)	**List - II** (Hybridization)
(A) $Ni(CO)_4$	(I) sp^3
(B) $[Ni(CN)_4]^{2-}$	(II) sp^3d^2
(C) $[Co(CN)_6]^{3-}$	(III) d^2sp^3
(D) $[CoF_6]^{3-}$	(IV) dsp^2

Choose the correct answer from the options given below.

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

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

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

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

CHAPTER 16 / CHEMISTRY

Haloalkanes and Haloarenes

Questions 230-242 / 13 selected / 4.3% practice weight / Focus first

Topics to prioritise in this collection

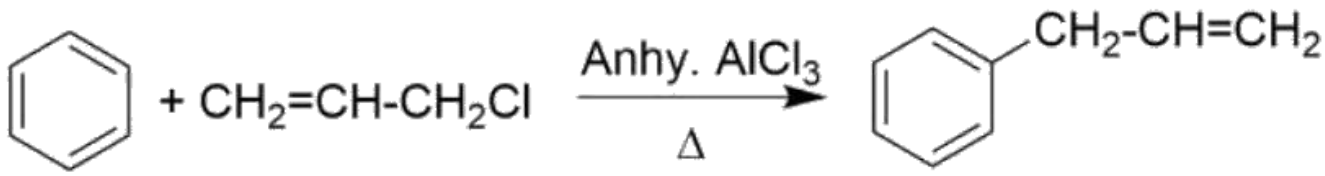
- Nucleophilic substitution: 10 questions / 76.9% of this chapter
- Haloalkanes and Haloarenes: 1 question / 7.7% of this chapter
- Reactivity of aryl halides: 1 question / 7.7% of this chapter
- SN2 mechanism: 1 question / 7.7% of this chapter

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

Question 230

View solution online

Which of the following reactions are possible?



A. A, B, C

B. **B, D**

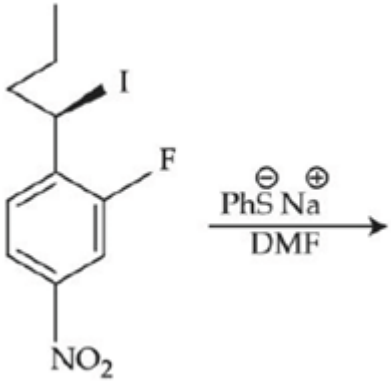
C. A, C, D

D. **A, C**

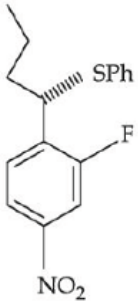
Question 231

View solution online

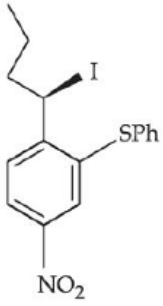
The major product of the following reaction is:



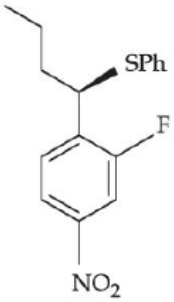
A.



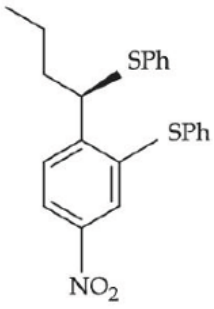
B.



C.



D.



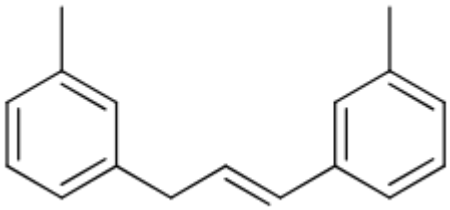
Question 232

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)

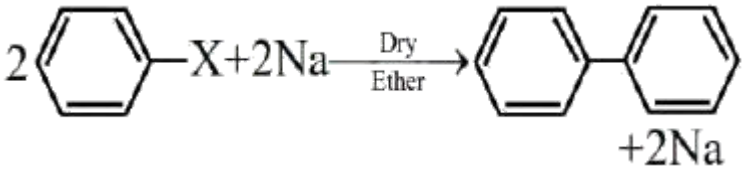
D. (A)-(IV), (B)-(III), (C)-(I), (D)-(II)

Question 233 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)

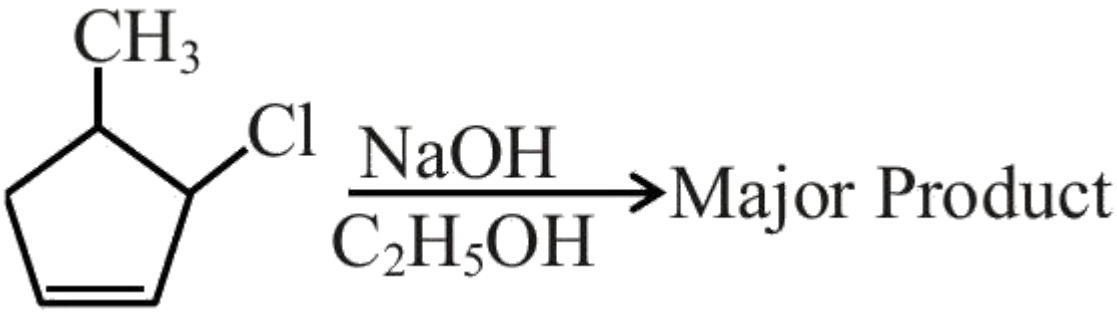
B. (A)-(III), (B)-(IV), (C)-(II), (D)-(I)

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

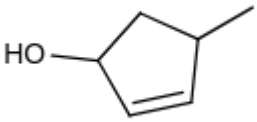
D. (A)-(IV), (B)-(I), (C)-(II), (D)-(III)

Question 234 View solution online

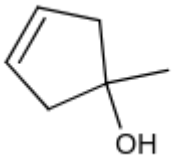
The major product of the following reaction is :



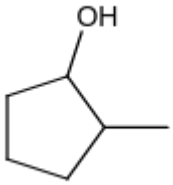
A.



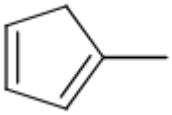
B.



C.



D.

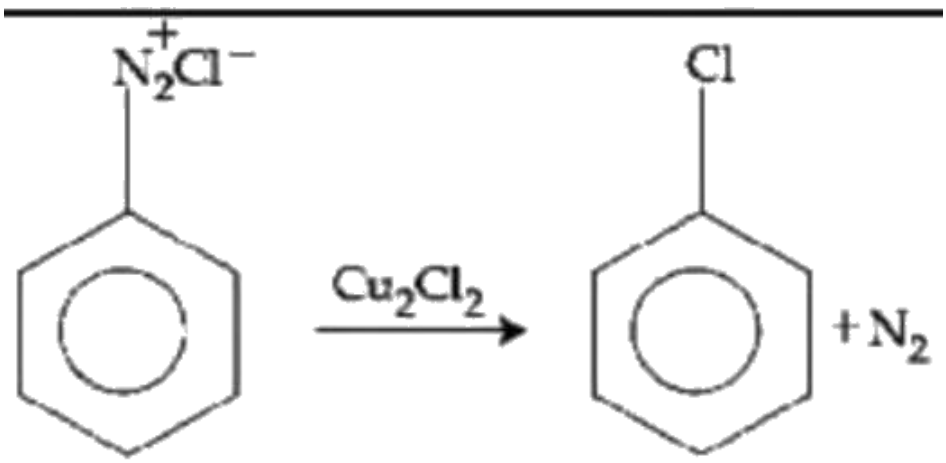


Question 235 View solution online

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 236 View solution online

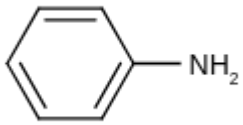
The increasing order of reactivity of the following compounds towards reaction with alkyl halides directly is :

(A)

(B)

(C)

(D)



A. $(B) < (A) < (D) < (C)$

B. (B) < (A) < (C) < (D)

C. (A) < (C) < (D) < (B)

D. (A) < (B) < (C) < (D)

Question 237 View solution online

Identify the correct order of reactivity for the following pairs towards the respective mechanism

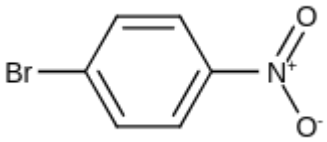
(A)

(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)

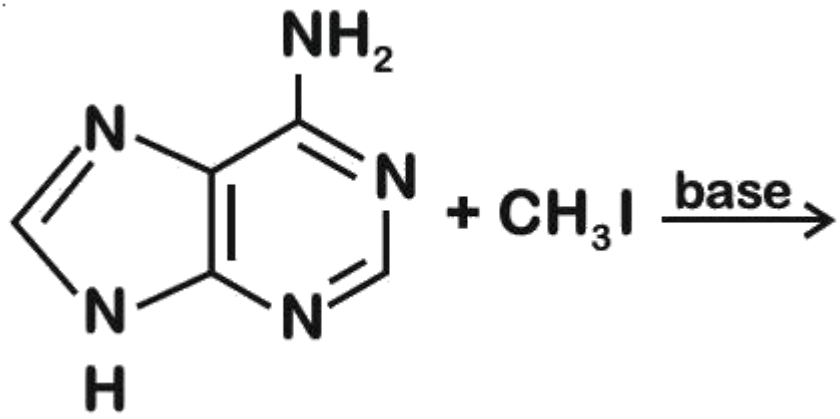
C. (A), (C) and (D) only

D. (B), (C) and (D) only

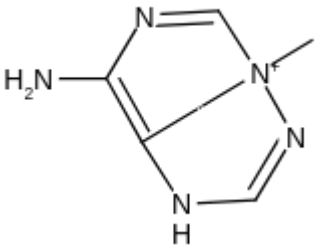
Question 238

View solution online

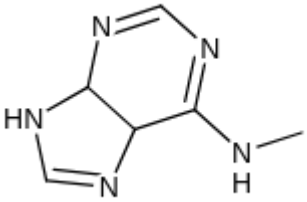
The major product in the following reaction is:



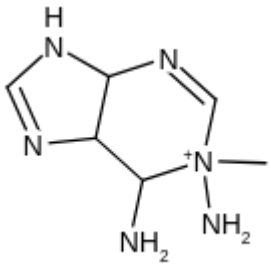
A.



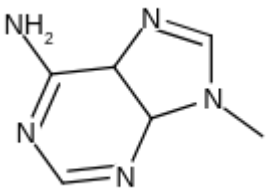
B.



C.



D.



Question 239

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 240

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 241

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

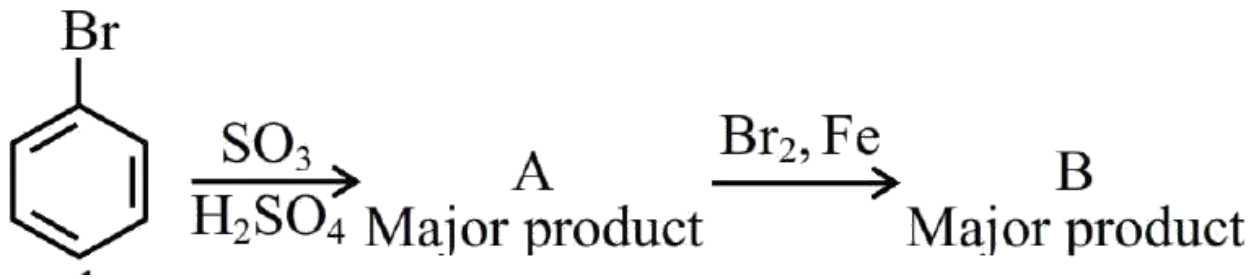
C. A-I, B-II, C-III, D-IV

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

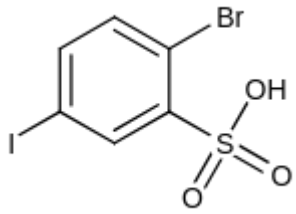
Question 242 View solution online

In the following series of reactions identify the major products A & B respectively.

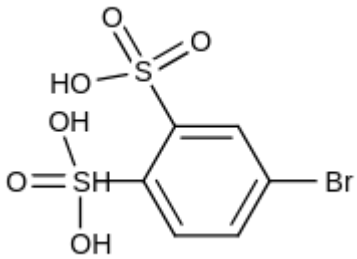
Bromobenzene



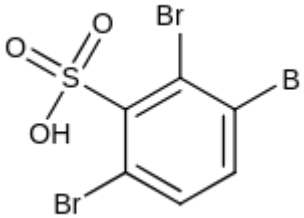
A.



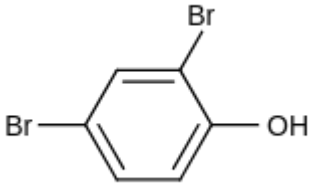
B.



C.



D.



CHAPTER 17 / CHEMISTRY

Alcohols, Phenols and Ethers

Questions 243-263 / 21 selected / 7.0% practice weight / Focus first

Topics to prioritise in this collection

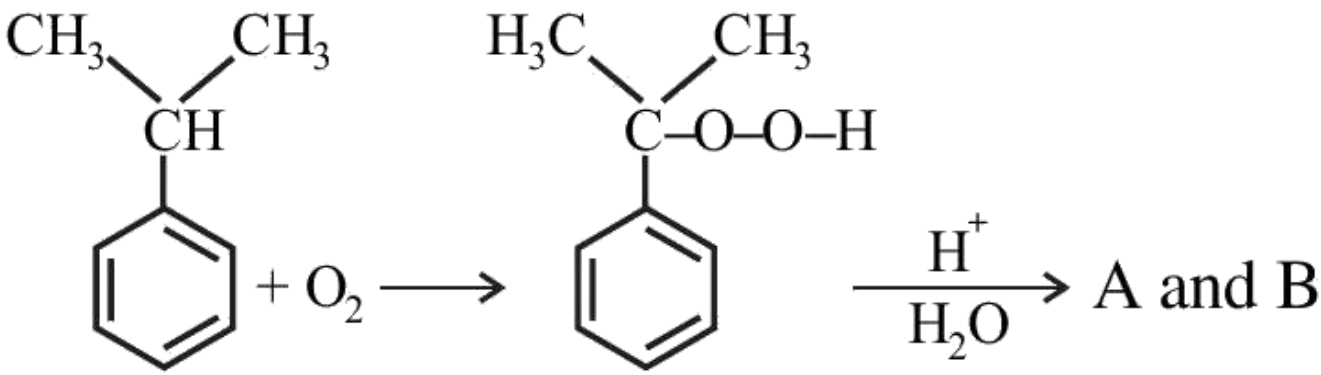
- Reactions of alcohols, phenols and ethers: 15 questions / 71.4% of this chapter
- Reactions of alcohols and phenols: 3 questions / 14.3% of this chapter
- Acid-catalysed dehydration: 2 questions / 9.5% of this chapter
- Alcohols, phenols and ethers: 1 question / 4.8% of this chapter

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

Question 243

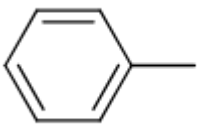
View solution online

In the following reaction:

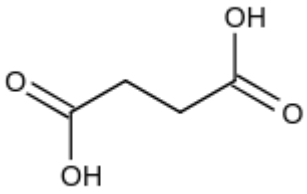


The compounds A and B respectively are :-

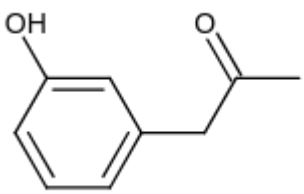
A.



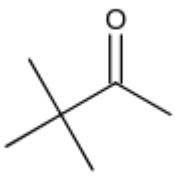
B.



C.

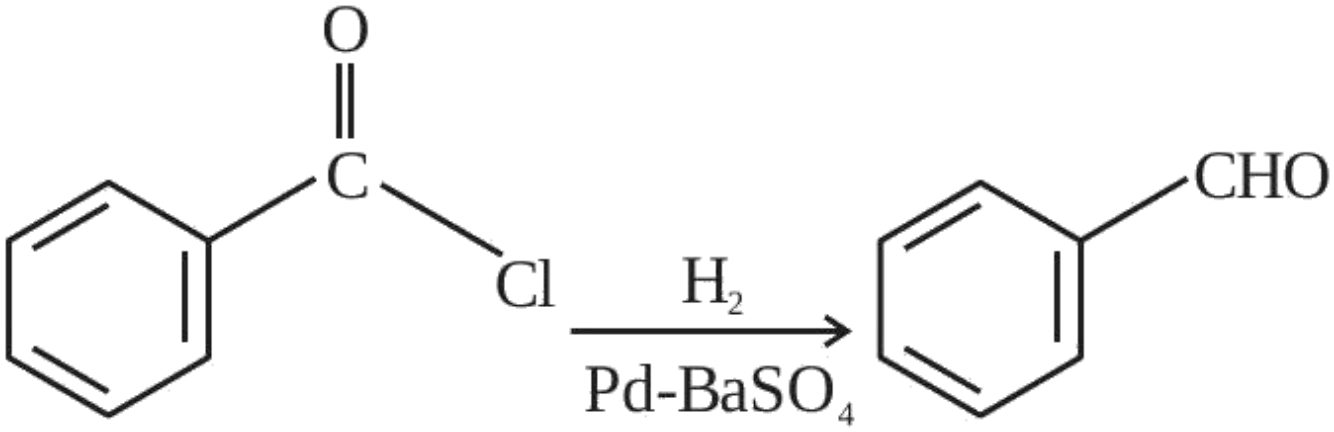


D.



Question 244 View solution online

This reduction reaction is known as:



A. Rosenmund reduction

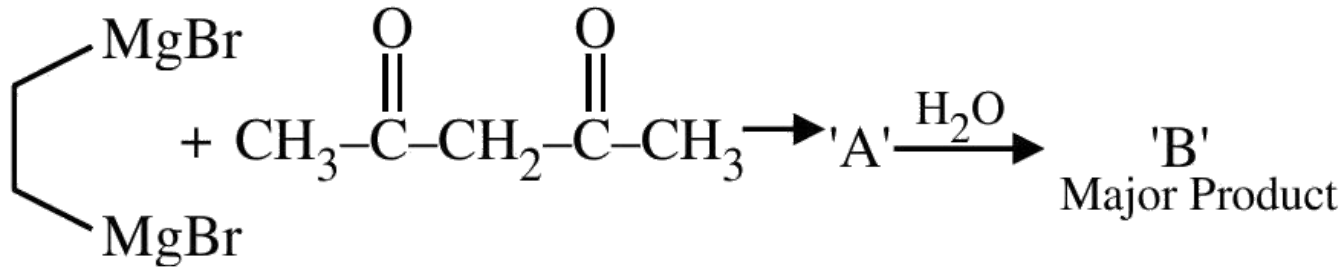
B. Wolff-Kishner reduction

C. Stephen reduction

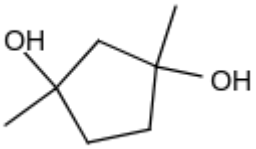
D. Etard reduction

Question 245 View solution online

Consider the above reaction sequence and identify the product B.



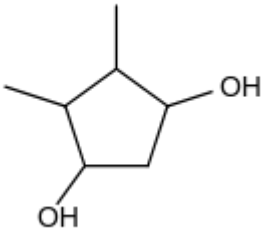
A.



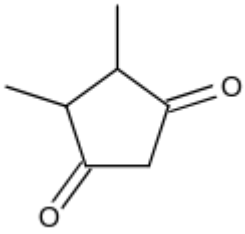
B.



C.

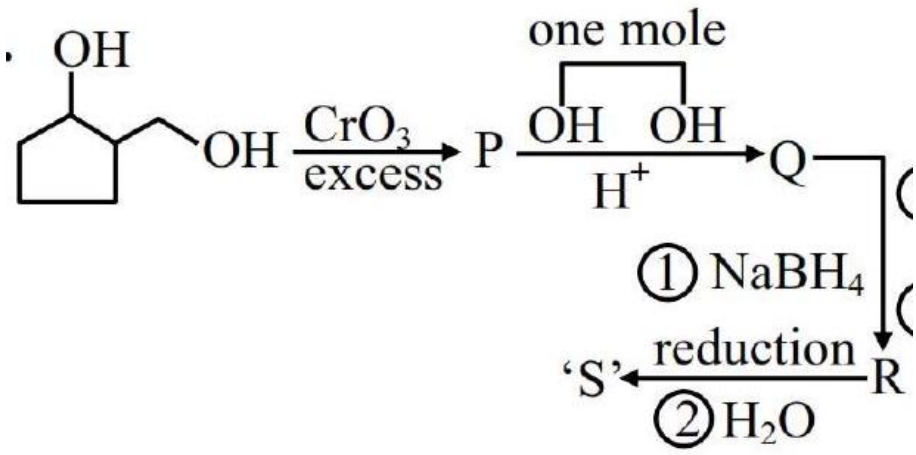


D.



Question 246

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 247

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

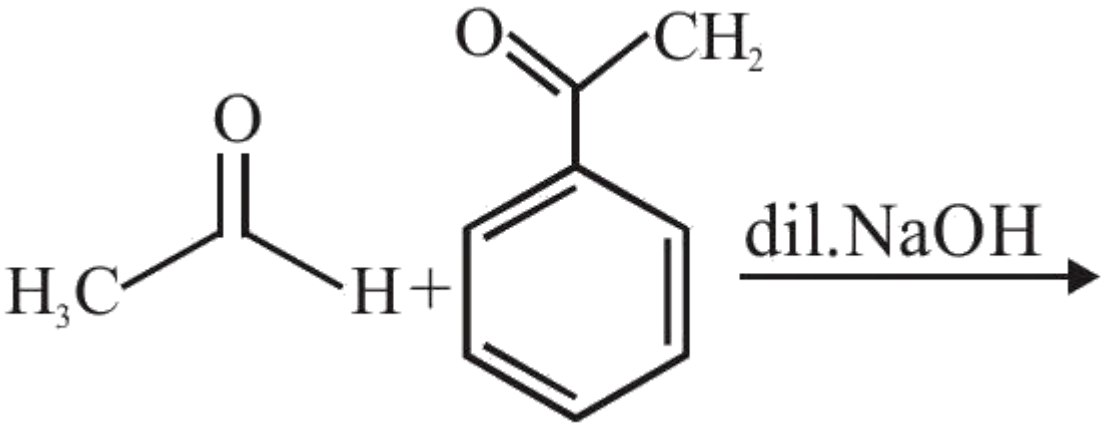
B. A-II, B-III, C-I, D-IV

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

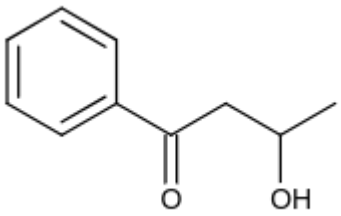
D. A-II, B-IV, C-III, D-I

Question 248 View solution online

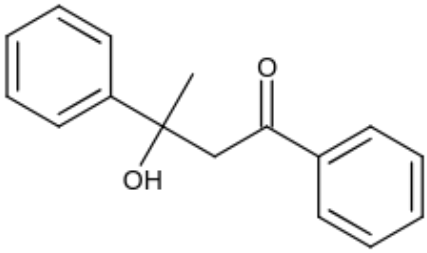
The major product formed in the following reaction is:



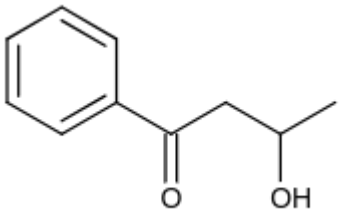
A.



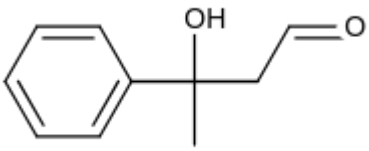
B.



C.



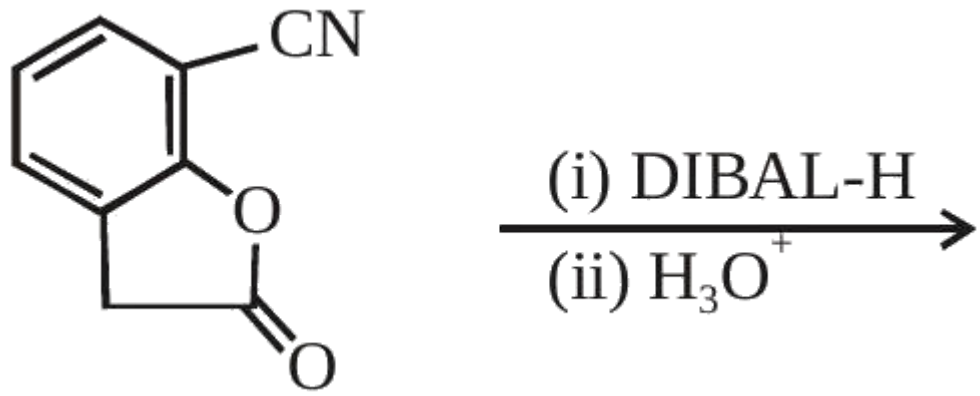
D.



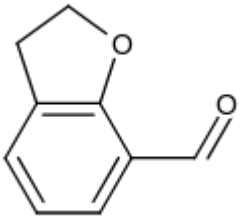
Question 249

View solution online

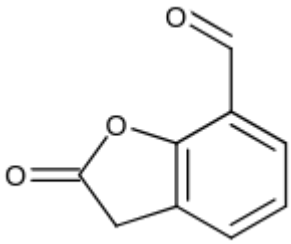
The major product of the following reaction is:



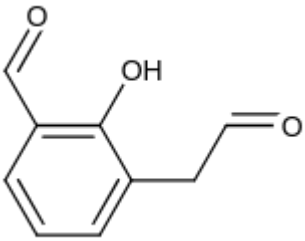
A.



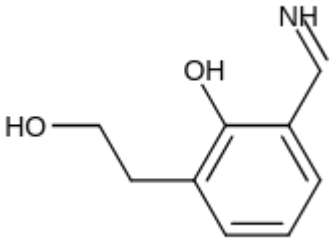
B.



C.



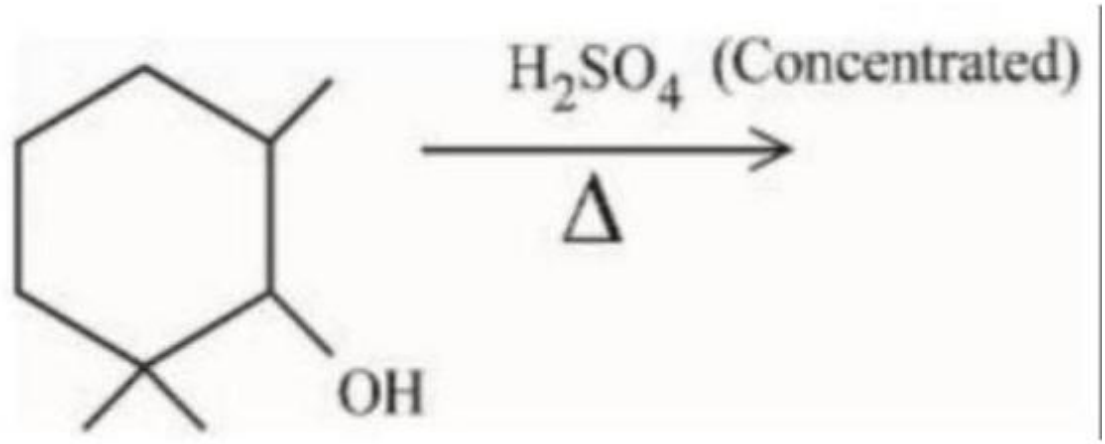
D.



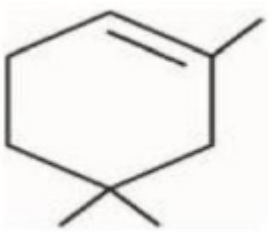
Question 250

View solution online

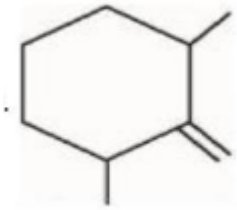
Find out the major product from the following reaction.



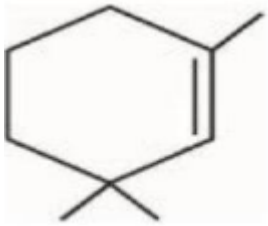
A.



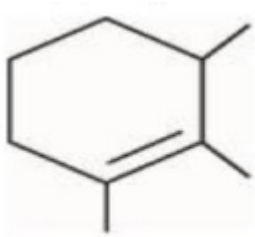
B.



C.



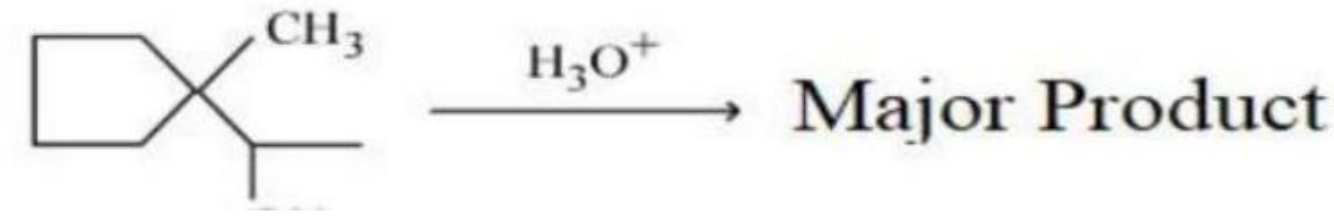
D.



Question 251

View solution online

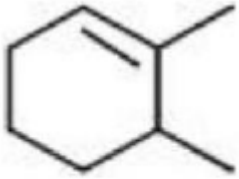
Find out the major product for the following reaction.



A.

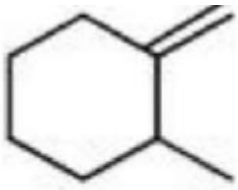


B.

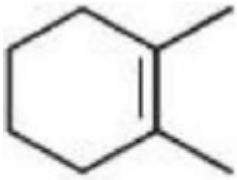


C.

3.



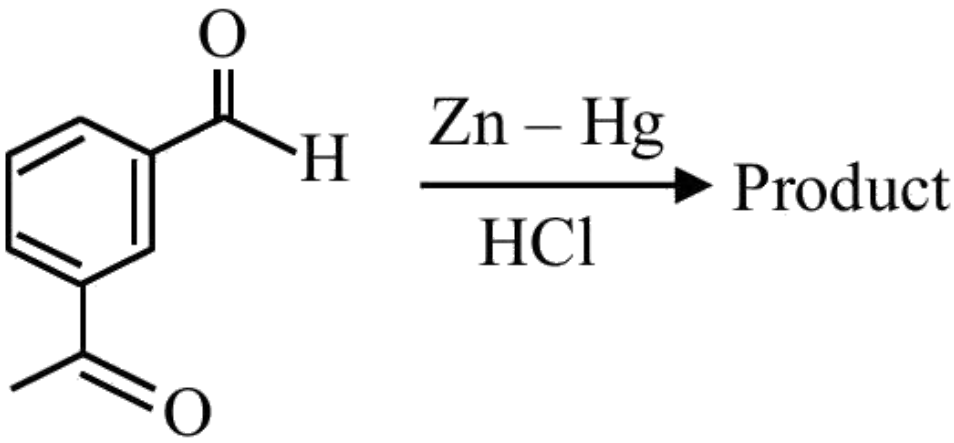
D.



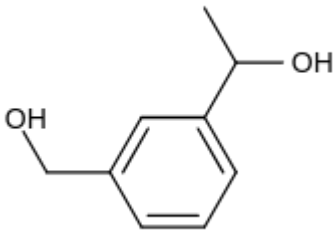
Question 252

View solution online

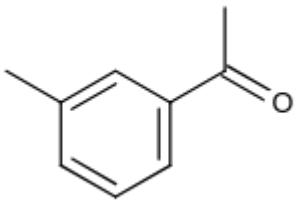
Identify the product in the following reaction :



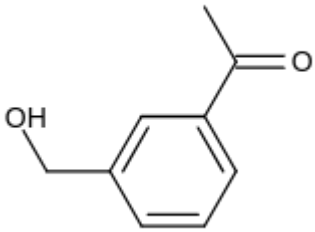
A.



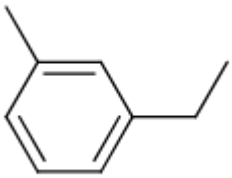
B.



C.

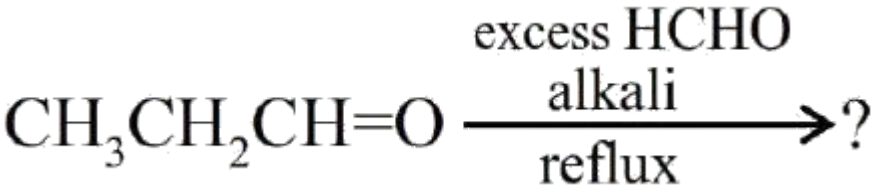


D.



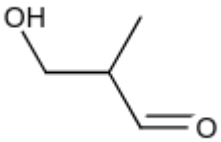
Question 253 View solution online

The major product of the following reaction is :

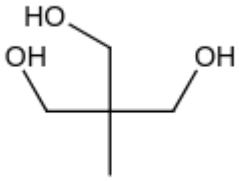


A. $CH_3 - CH_2 - CH_2 - OH$

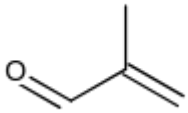
B.



C.

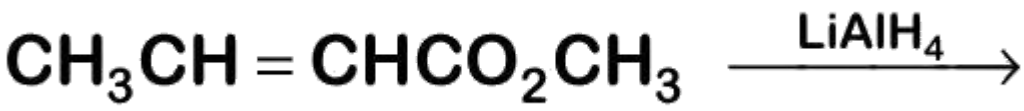


D.



Question 254 View solution online

The major product of the following reaction is



A. $CH_3CH_2CH_2CH_2OH$

B. $CH_3CH_2CH_2CHO$

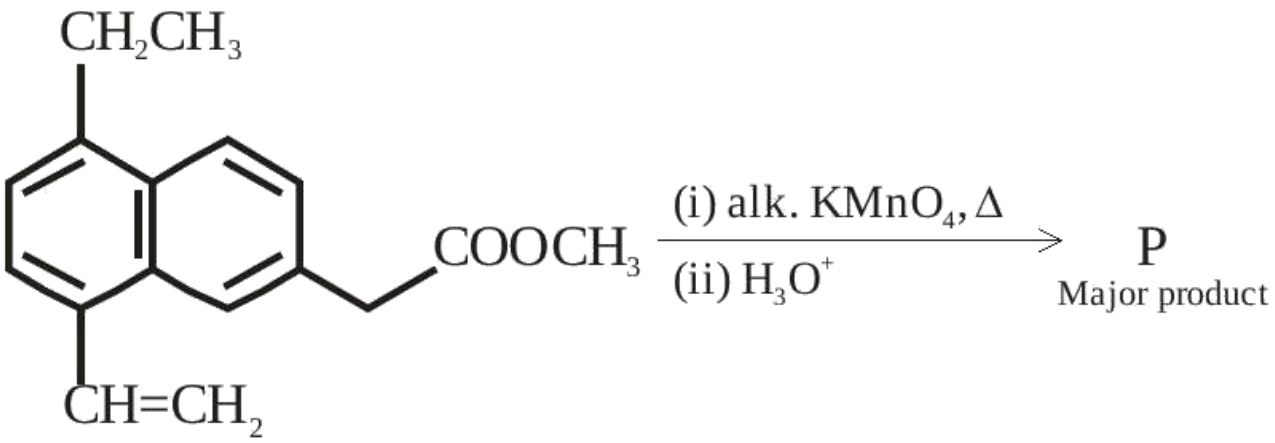
C. $CH_3CH_2CH_2CO_2CH_3$

D. $CH_3CH = CHCH_2OH$

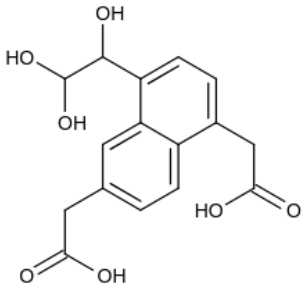
Question 255

View solution online

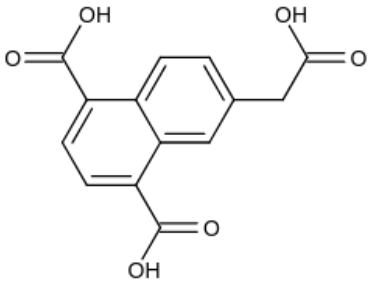
The major product ' P ' formed in the given reaction is



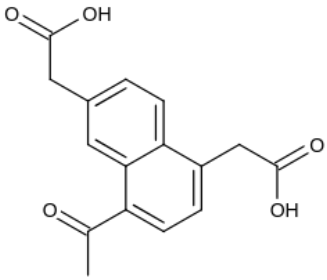
A.



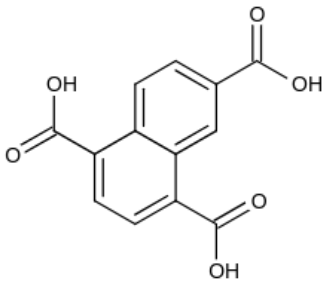
B.



C.



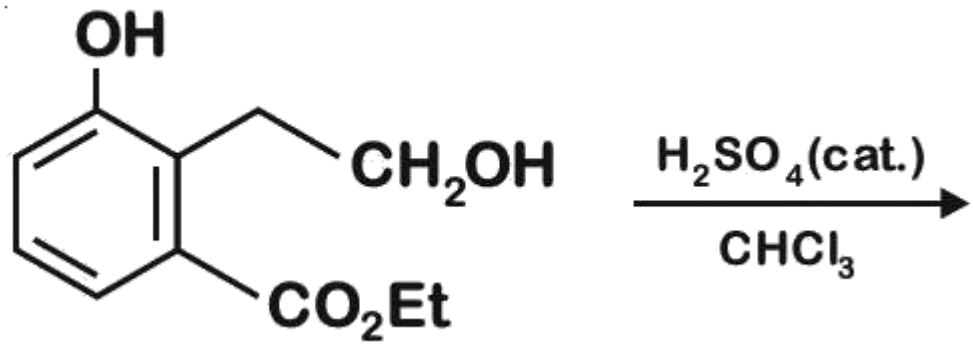
D.



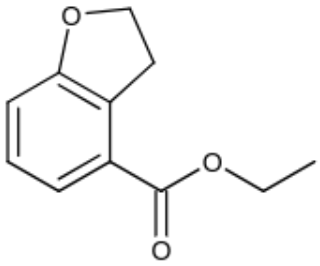
Question 256

View solution online

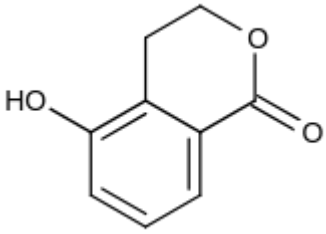
The major product of the following reaction is :



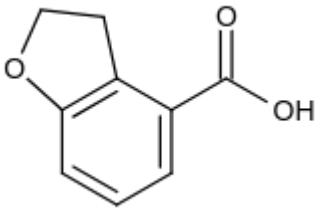
A.



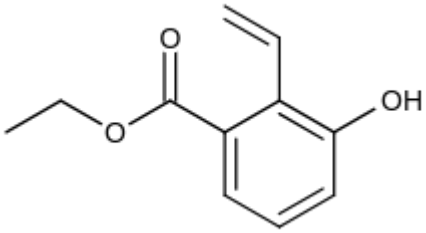
B.



C.



D.

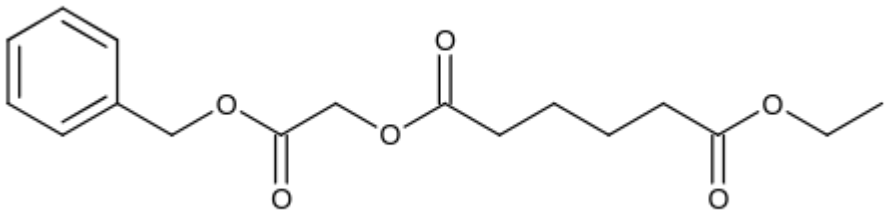


Question 257 View solution online

Match List - I with List -II.

List - I (Reactions)		List - II (Reagents)	
(B)	$C_6H_5COC_6H_5 \rightarrow C_6H_5CH_2C_6H_5$	(II)	$Zn(Hg)$ and conc. HCl
(C)	$C_6H_5CHO \rightarrow C_6H_5CH(OH)CH_3$	(III)	$NaBH_4, H^+$

Choose the correct answer from options given below:



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

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

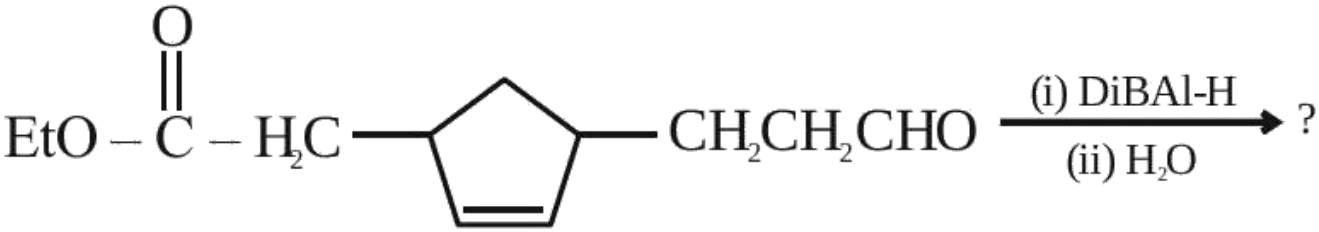
C. A-(IV), (B)-(II), (C)-(III), (D)-(I)

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

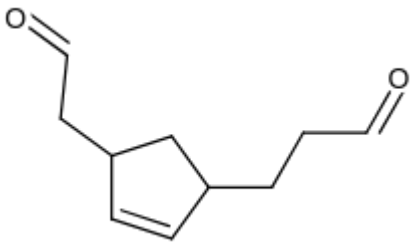
Question 258

View solution online

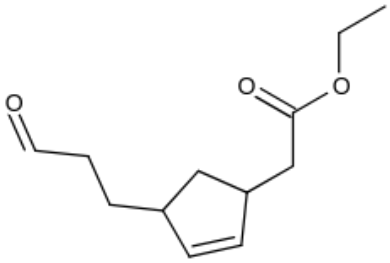
Consider the above reaction and predict the major product.



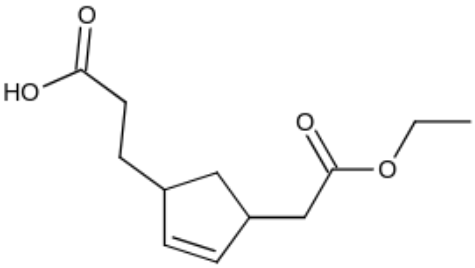
A.



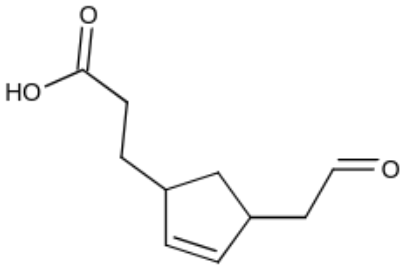
B.



C.



D.



Question 259

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 260

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

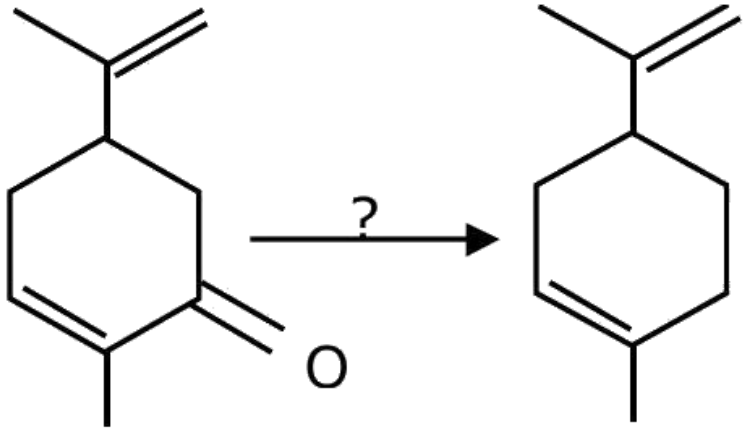
B. A-III, B-I, C-IV, D-II

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

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

Question 261 View solution online

Which of the following reagent is suitable for the preparation of the product in the above reaction.



A. Red $P + Cl_2$

B. $NH_2 - NH_2/C_2H_5 \overset{\ominus\oplus}{O} Na$

C. Ni/H_2

D. $NaBH_4$

Question 262 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

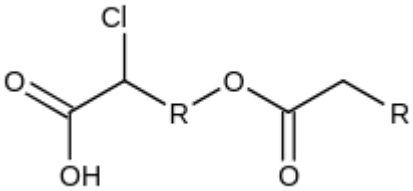
O

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)

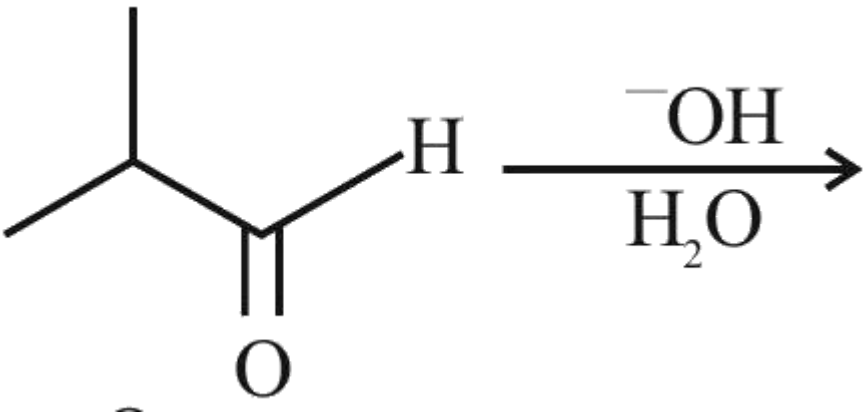
C. (a)-(iii), (b)-(i), (c)-(iv), (d)-(ii)

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

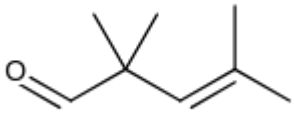
Question 263

View solution online

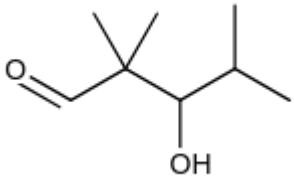
What is the major product of the following reaction?



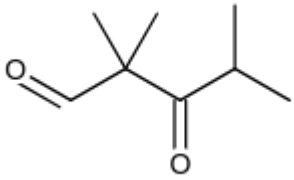
A.



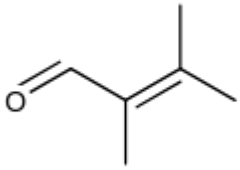
B.



C.



D.



CHAPTER 18 / CHEMISTRY

Aldehydes, Ketones and Carboxylic Acids

Questions 264-267 / 4 selected / 1.3% practice weight / Consolidate

Topics to prioritise in this collection

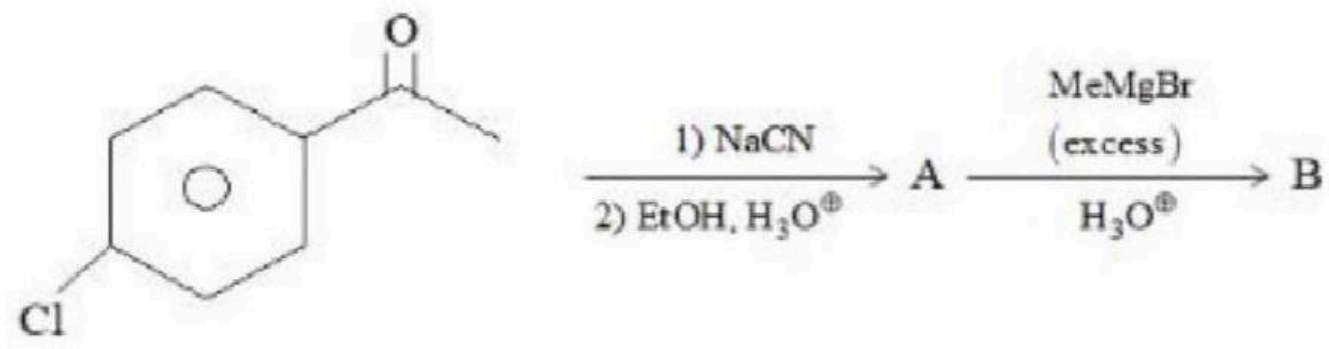
- Reactivity of the carbonyl group: 2 questions / 50.0% of this chapter
- Aldehydes, Ketones and Carboxylic Acids: 1 question / 25.0% of this chapter
- Cyanohydrin reaction sequence: 1 question / 25.0% of this chapter

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

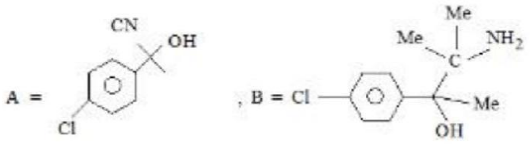
Question 264

View solution online

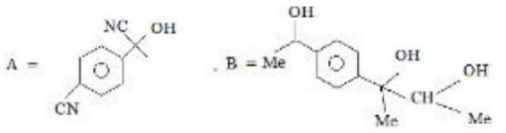
Find out the major products from the following reaction sequence.



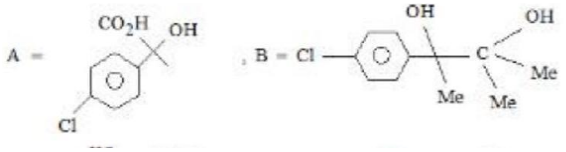
A.



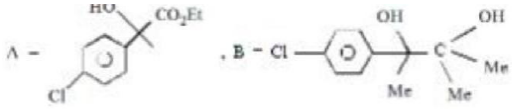
B.



C.



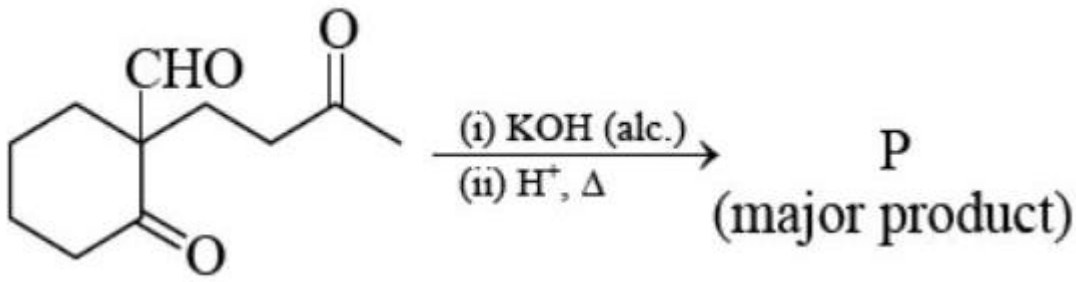
D.



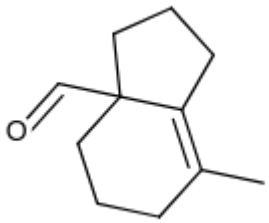
Question 265

View solution online

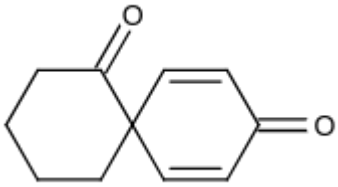
The major product (P) in the following reaction is



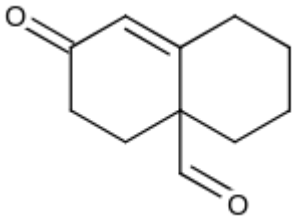
A.



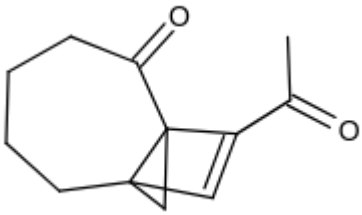
B.



C.



D.



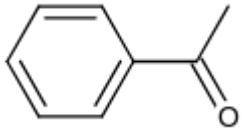
Question 266 View solution online

The increasing order of the reactivity of the following compounds towards electrophilic aromatic substitution reactions is :

(I)

(II)

(III)



A. I < III < II

B. III < II < I

C. II < I < III

D. III < I < II

Question 267 View solution online

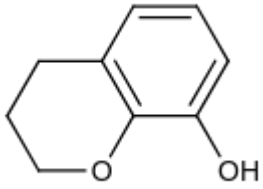
Arrange the following compounds in increasing order of rate of aromatic electrophilic substitution reaction

(a)

(b)

(c)

(d)



A. d, b, c, a

B. b, c, a, d

C. c, a, b, d

D. d, b, a, c

CHAPTER 19 / CHEMISTRY

Amines

Questions 268-274 / 7 selected / 2.3% practice weight / Next

Topics to prioritise in this collection

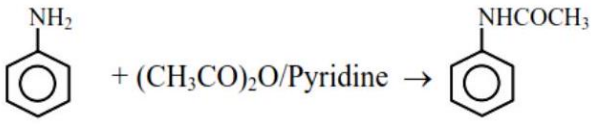
- Amines: 3 questions / 42.9% of this chapter
- Reactions of amines: 2 questions / 28.6% of this chapter
- Amines and diazonium salts: 1 question / 14.3% of this chapter
- Hofmann bromamide degradation: 1 question / 14.3% of this chapter

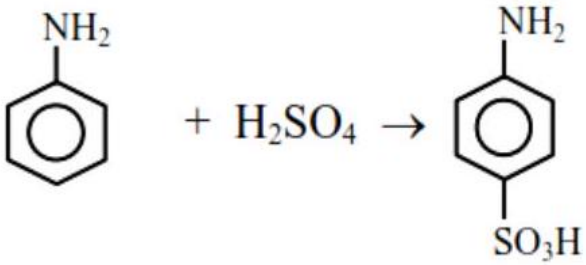
Open this chapter's solutions on mobile / Back to chapter guide

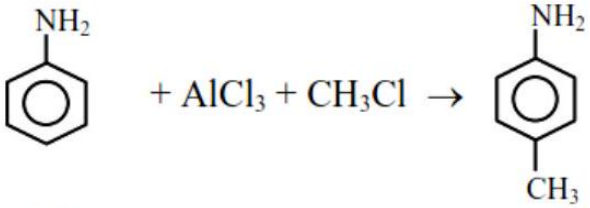
Question 268

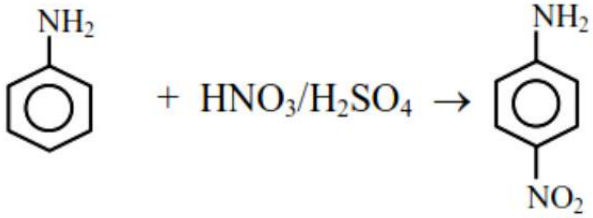
View solution online

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 (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:

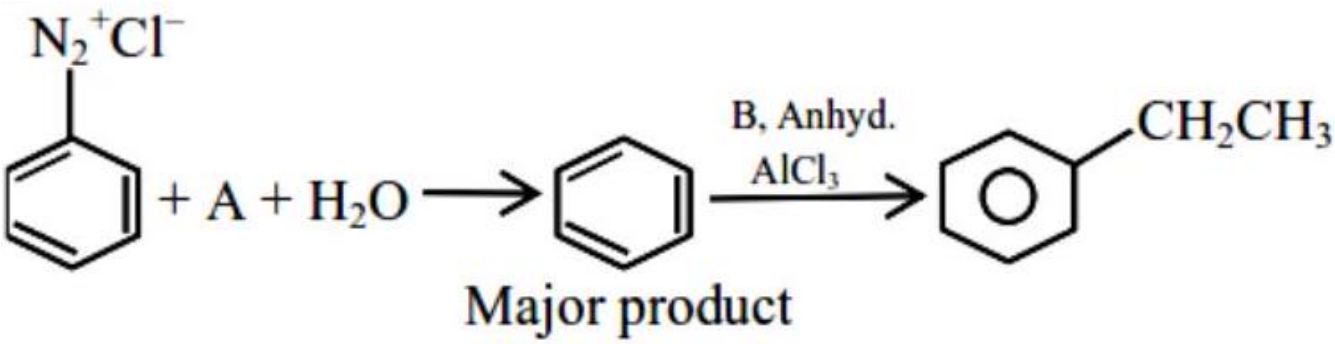
A. A-III, B-IV, C-II, D-I

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 270 View solution online



In the chemical reactions given above A and B respectively are :

A. H_3PO_2 and CH_3CH_2Cl

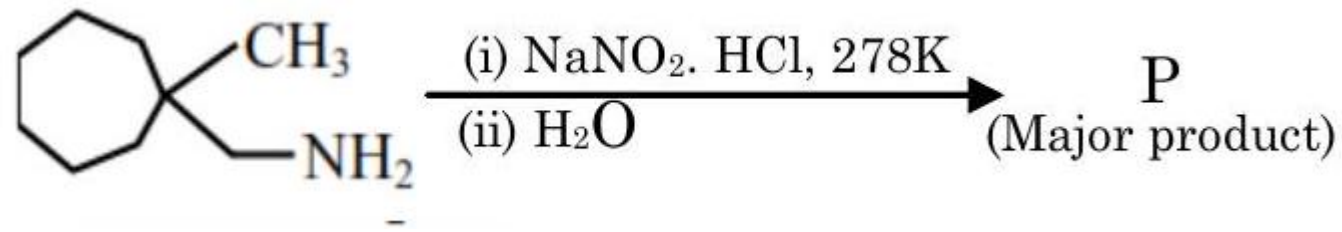
B. CH_3CH_2OH and H_3PO_2

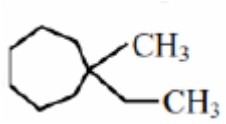
C. H_3PO_2 and $CH_3CH_2PO_2$

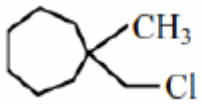
D. CH_3CH_2Cl and H_3PO_2

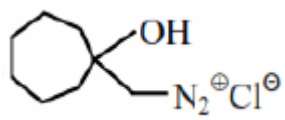
Question 271 View solution online

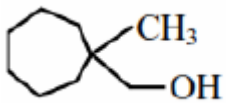
What is the major product "P" of the following reaction ?



A.


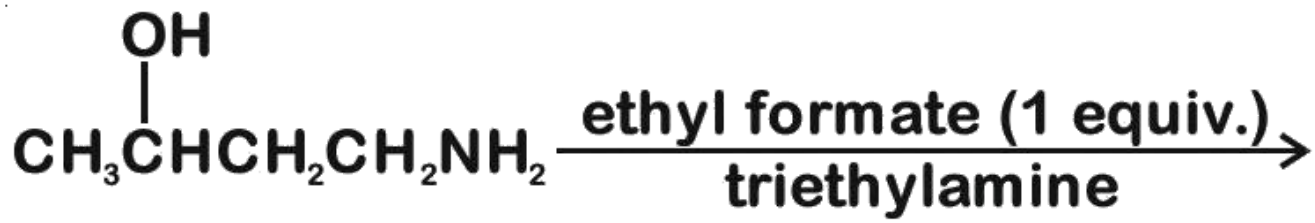
B.


C.


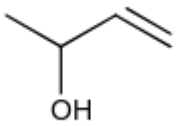
D.


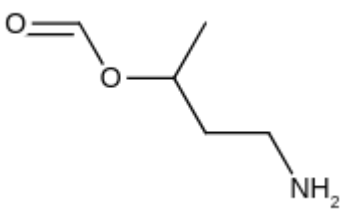
Question 272 View solution online

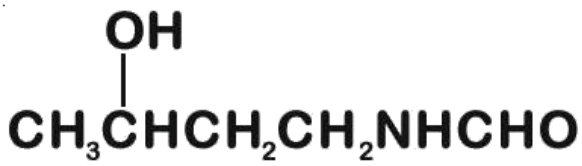
The major product of the following reaction is:



A. $CH_3CH = CH - CH_2NH_2$

B.


C.


D.


Question 273

View solution online

Match List - I with List - II

	List - I		List - II
(A)	Sphalerite	(I)	$FeCO_3$
(B)	Calamine	(II)	PbS
(C)	Galena	(III)	$ZnCO_3$
(D)	Siderite	(IV)	ZnS

Choose the most appropriate answer from the options given below:

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

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

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

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

Question 274

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

CHAPTER 20 / CHEMISTRY

Biomolecules

Questions 275-285 / 11 selected / 3.7% practice weight / Focus first

Topics to prioritise in this collection

- Carbohydrates: 6 questions / 54.5% of this chapter
- Biomolecules: 3 questions / 27.3% of this chapter
- Proteins and amino acids: 1 question / 9.1% of this chapter
- Reactions of alcohols and phenols: 1 question / 9.1% of this chapter

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

Question 275

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 276 View solution online

The correct match between item 'I' and item 'II' is :

Item 'I'	Item 'II' (compound)	(reagent)

(A) Lysine
(P) 1-naphthol
(B) Furfural
(Q) ninhydrin
(C) Benzyl alcohol
(R) $\mathbf{KMnO_4}$
(D) Styrene
(S) Ceric ammonium nitrate

A. $(A) \rightarrow (Q), (B) \rightarrow (P), (C) \rightarrow (S), (D) \rightarrow (R)$

B. $(A) \rightarrow (Q), (B) \rightarrow (R), (C) \rightarrow (S), (D) \rightarrow (P)$

C. $(A) \rightarrow (Q), (B) \rightarrow (P), (C) \rightarrow (R), (D) \rightarrow (S)$

D. $(A) \rightarrow (R), (B) \rightarrow (P), (C) \rightarrow (Q), (D) \rightarrow (S)$

Question 277

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 278

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 279

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 280

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 281 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 282 View solution online

Identify the correct statement among the following:

A. All naturally occurring amino acids except glycine contain one chiral centre.

B. All naturally occurring amino acids are optically active.

C. Glutamic acid is the only amino acid that contains a -COOH group at the side chain.

D. Amino acid, cysteine easily undergo dimerization due to the presence of free SH group.

Question 283 View solution online

The correct statement among the following is :

A. $(SiH_3)_3N$ is planar and less basic than $(CH_3)_3N$

B. $(SiH_3)_3N$ is pyramidal and more basic than $(CH_3)_3N$

C. $(SiH_3)_3N$ is pyramidal and less basic than $(CH_3)_3N$

D. $(SiH_3)_3N$ is planar and more basic than $(CH_3)_3N$

Question 284 View solution online

Identify the incorrect statement from the following

A. Amylose is a branched chain polymer of glucose

B. Starch is a polymer of $\alpha - D$ glucose

C. β-Glycosidic linkage makes cellulose polymer

D. Glycogen is called as animal starch

Question 285

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)

CHAPTER 21 / CHEMISTRY

Practical Chemistry (NCERT Laboratory Manual)

Questions 286-289 / 4 selected / 1.3% practice weight / Consolidate

Topics to prioritise in this collection

- Practical and qualitative chemistry: 3 questions / 75.0% of this chapter
- Qualitative chemical analysis: 1 question / 25.0% of this chapter

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

Question 286 View solution online

For reaction: $\mathrm{SO_2(g) + \frac{1}{2}O_2(g) \rightleftharpoons SO_3(g)}$
$\mathrm{K_p = 2 \times 10^{12}}$ at $\mathrm{27^\circ C}$ and 1 atm pressure. The $\mathrm{K_c}$ for the same reaction is $\times 10^{13}$. (Nearest integer) (Given $\mathrm{R = 0.082\ L\ atm\ K^{-1}\ mol^{-1}}$)

Numerical answer: _____

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

Question 287

View solution online

Match the List-I with List-II

List-I	List-II
Cations	Group reagents
$\mathbf{A} \rightarrow \mathbf{Pb^{2+}, Cu^{2+}}$	i) $\mathbf{H_2S}$ gas in presence of dilute HCl
$\mathbf{B} \rightarrow \mathbf{Al^{3+}, Fe^{3+}}$	ii) $\mathbf{(NH_4)_2CO_3}$ in presence of $\mathbf{NH_4OH}$
$\mathbf{C} \rightarrow \mathbf{Co^{2+}, Ni^{2+}}$	iii) $\mathbf{NH_4OH}$ in presence of $\mathbf{NH_4Cl}$
$\mathbf{D} \rightarrow \mathbf{Ba^{2+}, Ca^{2+}}$	iv) $\mathbf{H_2S}$ in presence of $\mathbf{NH_4OH}$

Correct match is -

A. A $\rightarrow$ iii, B $\rightarrow$ i, C $\rightarrow$ iv, D $\rightarrow$ ii

B. $\mathbf{A} \rightarrow$ i, $\mathbf{B} \rightarrow$ iii, $\mathbf{C} \rightarrow$ ii, $\mathbf{D} \rightarrow$ iv

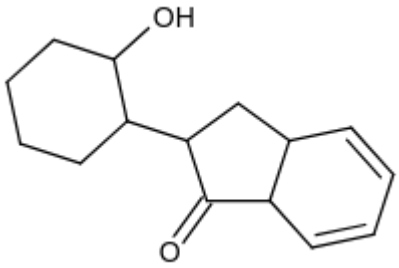
C. $\mathbf{A} \rightarrow$ iv, $\mathbf{B} \rightarrow$ ii, $\mathbf{C} \rightarrow$ iii, $\mathbf{D} \rightarrow$ i

D. A $\rightarrow$ i, B $\rightarrow$ iii, C $\rightarrow$ iv, D $\rightarrow$ ii

Question 288

View solution online

Match items of column I and II

Column I (Mixture of compounds)	Column II (Separation Technique)
A. H_2O/CH_2Cl_2	i. Crystallization
	ii. Differential solvent extraction
C. Kerosene /Naphthalene	iii. Column chromatography
D. $C_6H_{12}O_6/NaCl$	iv. Fractional Distillation

Correct match is

A. A-(ii), B-(iii), C-(iv), D-(i)

B. A-(i), B-(iii), C-(ii), D-(iv)

C. A -(ii), B -(iv), C -(i), D -(iii)

D. A-(iii), B-(iv), C-(ii), D-(i)

Question 289 View solution online

Match List I with List II:

List I (Mixture)		List II (Separation Technique)	
A.	$CHCl_3 + C_6H_5NH_2$	I.	Steam distillation
B.	$C_6H_{14} + C_5H_{12}$	II.	Differential extraction
C.	$C_6H_5NH_2 + H_2O$	III.	Distillation
D.	Organic compound in H_2O	IV.	Fractional distillation

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

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

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

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

CHAPTER 22 / CHEMISTRY / HISTORICAL APPENDIX

States of Matter

Questions 290-292 / 3 selected / 1.0% practice weight / Historical appendix

Topics to prioritise in this collection

- Gas laws: 2 questions / 66.7% of this chapter
- Omitted Chapter : States of Matter: 1 question / 33.3% of this chapter

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

Question 290 View solution online

Which of the following is a correct statement?

A. Brownian motion destabilises sols.

B. Any amount of dispersed phase can be added to emulsion without destabilising it.

C. Mixing two oppositely charged sols in equal amount neutralises charges and stabilises colloids.

D. Presence of equal and similar charges on colloidal particles provides stability to the colloidal solution.

Question 291 View solution online

Which statement is correct?

A. Buna-S is a synthetic and linear thermosetting polymer

B. Neoprene is addition copolymer used in plastic bucket manufacturing

C. Synthesis of Buna-S needs nascent oxygen

D. Buna-N is a natural polymer

Question 292 View solution online

Correct statement is:

A. An average human being consumes nearly 15 times more air than food

B. An average human being consumes 100 times more air than food

C. An average human being consumes equal amount of food and air

D. An average human being consumes more food than air

CHAPTER 23 / CHEMISTRY / HISTORICAL APPENDIX

Hydrogen

Questions 293-295 / 3 selected / 1.0% practice weight / Historical appendix

Topics to prioritise in this collection

- Hydrogen and its compounds: 2 questions / 66.7% of this chapter
- Hydrogen and water chemistry: 1 question / 33.3% of this chapter

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

Question 293

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 294

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

Question 295

View solution online

Match List I with List II

LIST I Type of Hydride				LIST II Example
A.	Electron deficient hydride	I.	MgH_2	
B.	Electron rich hydride	II.	HF	
C.	Electron precise hydride	III.	B_2H_6	
D.	Saline hydride	IV.	CH_4	

Choose the correct answer from the options given below :

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

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

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

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

CHAPTER 24 / CHEMISTRY / HISTORICAL APPENDIX

The s-Block Elements

Questions 296-296 / 1 selected / 0.3% practice weight / Historical appendix

Topics to prioritise in this collection

- s-Block Elements: 1 question / 100.0% of this chapter

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

Question 296

View solution online

Match List I with List II :

	List-I Elements		List-II Properties
(a)	Li	(i)	Poor water solubility of I salt
(b)	Na	(ii)	Most abundant element in cell fluid
(c)	K	(iii)	Bicarbonate salt used in fire extinguisher
(d)	Cs	(iv)	Carbonate salt decomposes easily on heating

Choose the correct answer from the options given below :

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

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

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

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

CHAPTER 25 / CHEMISTRY / HISTORICAL APPENDIX

Surface Chemistry

Questions 297-298 / 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

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

Question 297

View solution online

Which of the following represent the Freundlich adsorption isotherms?

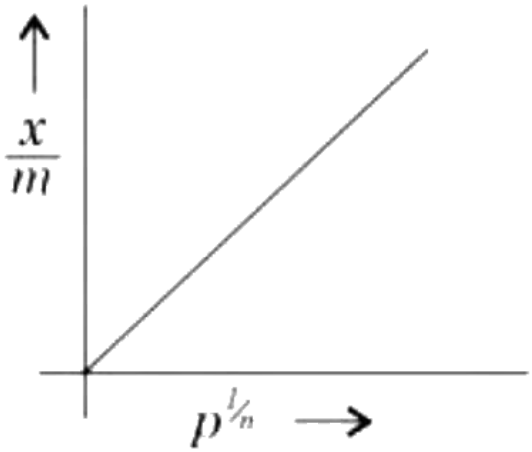
(A)

(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 298

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

CHAPTER 26 / CHEMISTRY / HISTORICAL APPENDIX

General Principles and Processes of Isolation of Elements

Questions 299-300 / 2 selected / 0.7% practice weight / Historical appendix

Topics to prioritise in this collection

- Extraction and purification of metals: 1 question / 50.0% of this chapter
- Metallurgy: 1 question / 50.0% of this chapter

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

Question 299

View solution online

Match List I with List II.

List I Ore	List II Composition
A. Siderite	I. Fe CO_3
B. Malachite	II. $CuCO_3 \cdot Cu(OH)_2$
C. Sphalerite	III. ZnS
D. Calamine	IV. $ZnCO_3$

Choose the correct answer from the options given below:

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

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

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

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

Question 300

View solution online

Match List I with List II

LIST I		LIST II	
A.	Reverberatory furnace	I.	Pig Iron
B.	Electrolytic cell	II.	Aluminum
C.	Blast furnace	III.	Silicon
D.	Zone Refining furnace	IV.	Copper

Choose the correct answer from the options given below:

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

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

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

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

QUICK CHECK

Answer key

For numerical questions the stored answer value is shown. Follow the question's precision and units.

1. A	**2.** 20	**3.** 1655	**4.** A	**5.** 100
6. D	**7.** B	**8.** D	**9.** D	**10.** B
11. B	**12.** A	**13.** A	**14.** A	**15.** A
16. C	**17.** A	**18.** A	**19.** A	**20.** B
21. A	**22.** C	**23.** B	**24.** 4	**25.** C
26. 5	**27.** 70	**28.** 10	**29.** B	**30.** 847
31. 173	**32.** C	**33.** B	**34.** A	**35.** B
36. A	**37.** D	**38.** 6	**39.** 33	**40.** D
41. 3	**42.** 48	**43.** 962	**44.** 1411	**45.** 1
46. 6	**47.** B	**48.** 5	**49.** B	**50.** D
51. 43	**52.** C	**53.** D	**54.** A	**55.** C
56. A	**57.** B	**58.** A	**59.** D	**60.** D
61. C	**62.** D	**63.** A	**64.** C	**65.** C
66. A	**67.** 5	**68.** A	**69.** A	**70.** D
71. D	**72.** A	**73.** A	**74.** C	**75.** C
76. C	**77.** C	**78.** A	**79.** D	**80.** D
81. C	**82.** B	**83.** C	**84.** A	**85.** B
86. A	**87.** C	**88.** B	**89.** A	**90.** A
91. A	**92.** C	**93.** C	**94.** B	**95.** C
96. D	**97.** B	**98.** B	**99.** A	**100.** D
101. A	**102.** C	**103.** A	**104.** C	**105.** C
106. C	**107.** C	**108.** B	**109.** C	**110.** D
111. C	**112.** B	**113.** C	**114.** A	**115.** C
116. B	**117.** C	**118.** A	**119.** A	**120.** B
121. B	**122.** D	**123.** B	**124.** B	**125.** B
126. C	**127.** D	**128.** A	**129.** A	**130.** A
131. B	**132.** B	**133.** D	**134.** B	**135.** C
136. B	**137.** D	**138.** A	**139.** C	**140.** B
141. C	**142.** D	**143.** B	**144.** D	**145.** A
146. B	**147.** B	**148.** C	**149.** B	**150.** D

151. B	**152.** C	**153.** C	**154.** C	**155.** D
156. D	**157.** D	**158.** B	**159.** D	**160.** 2
161. A	**162.** A	**163.** D	**164.** C	**165.** D
166. B	**167.** D	**168.** D	**169.** C	**170.** D
171. B	**172.** A	**173.** A	**174.** B	**175.** A
176. D	**177.** C	**178.** A	**179.** B	**180.** B
181. D	**182.** D	**183.** A	**184.** D	**185.** C
186. B	**187.** C	**188.** D	**189.** D	**190.** D
191. C	**192.** 5	**193.** 372	**194.** D	**195.** A
196. C	**197.** 1	**198.** B	**199.** A	**200.** C
201. D	**202.** B	**203.** A	**204.** D	**205.** B
206. A	**207.** A	**208.** A	**209.** C	**210.** B
211. A	**212.** D	**213.** D	**214.** B	**215.** B
216. D	**217.** D	**218.** C	**219.** A	**220.** B
221. D	**222.** D	**223.** B	**224.** B	**225.** C
226. D	**227.** C	**228.** B	**229.** B	**230.** B
231. A	**232.** C	**233.** B	**234.** C	**235.** A
236. B	**237.** B	**238.** D	**239.** C	**240.** A
241. D	**242.** B	**243.** C	**244.** A	**245.** A
246. 13	**247.** A	**248.** A	**249.** C	**250.** D
251. D	**252.** D	**253.** C	**254.** D	**255.** D
256. B	**257.** B	**258.** A	**259.** D	**260.** B
261. B	**262.** D	**263.** B	**264.** D	**265.** B
266. D	**267.** C	**268.** C	**269.** A	**270.** A
271. D	**272.** D	**273.** A	**274.** C	**275.** C
276. A	**277.** C	**278.** C	**279.** C	**280.** B
281. D	**282.** D	**283.** A	**284.** A	**285.** B
286. 1	**287.** D	**288.** A	**289.** B	**290.** D
291. C	**292.** A	**293.** D	**294.** B	**295.** A
296. A	**297.** B	**298.** A	**299.** A	**300.** A

LEARNE2I / PRIORITY PRACTICE

JEE Main 2026 Session 2

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-2/

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 2 collection, begin with **Three Dimensional Geometry; Conic Sections; Sequences and Series**. 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 Functions and relations: 6 (46.2%) / Properties of functions: 4 (30.8%) / Equivalence relations: 3 (23.1%)	Next	1-13 (13)	4.3%
Trigonometric Functions Trigonometric identities: 2 (50.0%) / Transformation and evaluation of trigonometric expressions: 1 (25.0%) / Trigonometric Functions: 1 (25.0%)	Consolidate	14-17 (4)	1.3%
Complex Numbers and Quadratic Equations Nature of roots: 1 (100.0%)	Consolidate	18-18 (1)	0.3%
Permutations and Combinations Counting arrangements and selections: 11 (50.0%) / Fundamental counting principle: 4 (18.2%) / Counting arrangements: 2 (9.1%) / More topics in chapter guide	Focus first	19-40 (22)	7.3%
Binomial Theorem Middle term of a binomial expansion: 1 (100.0%)	Consolidate	41-41 (1)	0.3%
Sequences and Series Sequences and finite sums: 15 (42.9%) / Arithmetic progression: 7 (20.0%) / Evaluation of a structured finite sequence or series: 5 (14.3%) / More topics in chapter guide	Focus first	42-76 (35)	11.7%
Straight Lines Equation of a straight line: 4 (80.0%) / Distance from a point to a line: 1 (20.0%)	Consolidate	77-81 (5)	1.7%
Conic Sections Parabola geometry: 13 (27.7%) / Ellipse geometry: 9 (19.1%) / Conic geometry: 8 (17.0%) / More topics in chapter guide	Focus first	82-128 (47)	15.7%
Limits and Derivatives Limits and Derivatives: 1 (50.0%) / Standard limits: 1 (50.0%)	Consolidate	129-130 (2)	0.7%
Statistics Variance and standard deviation: 11 (68.8%) / Measures of central tendency and dispersion: 5 (31.3%)	Next	131-146 (16)	5.3%
Probability Binomial distribution: 2 (100.0%)	Consolidate	147-148 (2)	0.7%

NCERT chapter / leading topics	Priority	Questions	Weight
Inverse Trigonometric Functions Inverse trigonometric identities: 1 (100.0%)	Consolidate	149-149 (1)	0.3%
Matrices Algebra of matrices: 1 (33.3%) / Linear systems: 1 (33.3%) / Matrix operations and properties: 1 (33.3%)	Consolidate	150-152 (3)	1.0%
Determinants Determinants: 3 (42.9%) / System of linear equations: 3 (42.9%) / Properties of determinants: 1 (14.3%)	Next	153-159 (7)	2.3%
Application of Derivatives Tangents and normals: 2 (40.0%) / Applications of derivatives: 1 (20.0%) / Derivative-based curve analysis: 1 (20.0%) / More topics in chapter guide	Consolidate	160-164 (5)	1.7%
Integrals Evaluation or use of an integral relation: 1 (100.0%)	Consolidate	165-165 (1)	0.3%
Application of Integrals Area under a curve: 5 (62.5%) / Area between curves: 2 (25.0%) / Standard equation and geometric properties of a parabola: 1 (12.5%)	Next	166-173 (8)	2.7%
Vector Algebra Algebra of vectors: 4 (33.3%) / Scalar product: 4 (33.3%) / Vector operations: 2 (16.7%) / More topics in chapter guide	Next	174-185 (12)	4.0%
Three Dimensional Geometry Coordinates in three dimensions: 28 (24.6%) / Shortest distance between lines: 21 (18.4%) / Lines and planes in space: 17 (14.9%) / More topics in chapter guide	Focus first	186-299 (114)	38.0%
Linear Programming Linear optimisation: 1 (100.0%)	Consolidate	300-300 (1)	0.3%

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 1-13 / 13 selected / 4.3% practice weight / Next

Topics to prioritise in this collection

- Functions and relations: 6 questions / 46.2% of this chapter
- Properties of functions: 4 questions / 30.8% of this chapter
- Equivalence relations: 3 questions / 23.1% 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 relations R_1 and R_2 on the set
$X = \{1, 2, 3, \ldots, 20\}$ be given by
$R_1 = \{(x, y) : 2x - 3y = 2\}$ and
$R_2 = \{(x, y) : -5x + 4y = 0\}$. If M and N be the minimum number of elements required to be added in R_1 and R_2, respectively, in order to make the relations symmetric, then $M + N$ equals

A. 8

B. 16

C. 12

D. 10

Question 4 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 5 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 6 View solution online

Let $\mathbf{A}=\{1,3,4,6,9\}$ and $\mathbf{B}=\{2,4,5,8,10\}$. Let R be a relation defined on $\mathbf{A}\times\mathbf{B}$ such that $\mathbf{R}=\{((\mathbf{a}_1,\ \mathbf{b}_1),(\mathbf{a}_2,\ \mathbf{b}_2)):\mathbf{a}_1\leq\mathbf{b}_2$ and $\mathbf{b}_1\leq\mathbf{a}_2\}$. Then the number of elements in the set R is

A. 26

B. 160

C. 180

D. 52

Question 7 View solution online

Let R be a relation defined on $\mathbb{N}$ as a R b if $\mathbf{2a+3\ b}$ is a multiple of $\mathbf{5},\mathbf{a},\mathbf{b}\in\mathbb{N}$.

Then R is

A. an equivalence relation

B. transitive but not symmetric

C. not reflexive

D. symmetric but not transitive

Question 8 View solution online

Let $\mathbf{A}=\{1,2,3,4\}$ and R be a relation on the set $A\times A$ defined by $R=\{((a,b),(c,d)):2a+3b=4c+5d\}$. Then the number of elements in R is:

Numerical answer: _____

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

Question 9 View solution online

Let $\mathbf{A}=\{2,3,4\}$ and $\mathbf{B}=\{8,9,12\}$. Then the number of elements in the relation $R=\{((a_1,b_1),(a_2,b_2))\in(A\times B,A\times B):a_1$ divides $\mathbf{b}_2$ and $\mathbf{a}_2$ divides $\mathbf{b}_1$ \} is :

A. 36

B. 12

C. 18

D. 24

Question 10 View solution online

Let $A = \{-4, -3, -2, 0, 1, 3, 4\}$ and $R = \{(a, b) \in A \times A : b = |a| \text{ or } b^2 = a + 1\}$ be a relation on A . Then the minimum number of elements, that must be added to the relation R so that it becomes reflexive and symmetric, is .

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

Let $A = \{1, 2, 3, 4, 5, 6, 7\}$.Then the relation $R = \{(x, y) \in A \times A : x + y = 7\}$ is

A. transitive but neither symmetric nor reflexive

B. reflexive but neither symmetric nor transitive

C. an equivalence relation

D. symmetric but neither reflexive nor transitive

Question 12 View solution online

The number of relations on the set $A = \{1, 2, 3\}$ containing at most 6 elements including (1,2), which are reflexive and transitive but not symmetric, is

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

The number of relations, on the set $\{1, 2, 3\}$ containing $(1, 2)$ and $(2, 3)$, which are reflexive and transitive but not symmetric, is

Numerical answer: _____

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

CHAPTER 02 / MATHEMATICS

Trigonometric Functions

Questions 14-17 / 4 selected / 1.3% practice weight / Consolidate

Topics to prioritise in this collection

- Trigonometric identities: 2 questions / 50.0% of this chapter
- Transformation and evaluation of trigonometric expressions: 1 question / 25.0% of this chapter
- Trigonometric Functions: 1 question / 25.0% of this chapter

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

---

Question 14 View solution online

Let $\cos(\alpha+\beta)=-\frac{1}{10}$ and $\sin(\alpha-\beta)=\frac{3}{8}$, where

$$0<\alpha<\frac{\pi}{3} \text{ and } 0<\beta<\frac{\pi}{4}.$$

If $\tan 2\alpha=\frac{3(1-r\sqrt{5})}{\sqrt{11}(s+\sqrt{5})}, r, s \in \mathbb{N}$, then r + s is equal to

_____

.

Numerical answer: _____

Enter an integer. Use the units and scaling requested in the question.

Question 15 View solution online

Let $S=\left\{\sin^2 2\theta : \left(\sin^4\theta+\cos^4\theta\right)x^2+(\sin 2\theta)x+\left(\sin^6\theta+\cos^6\theta\right)=0 \text{ has real roots }\right\}$. 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 16 View solution online

Question ID: 101787

Let $c, k \in R$. If $f(x) = (c+1)x^2 + \left(1-c^2\right)x + 2k$ 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 17 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.

CHAPTER 03 / MATHEMATICS

Complex Numbers and Quadratic Equations

Questions 18-18 / 1 selected / 0.3% practice weight / Consolidate

Topics to prioritise in this collection

- Nature of roots: 1 question / 100.0% of this chapter

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

Question 18 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

CHAPTER 04 / MATHEMATICS

Permutations and Combinations

Questions 19-40 / 22 selected / 7.3% practice weight / Focus first

Topics to prioritise in this collection

- Counting arrangements and selections: 11 questions / 50.0% of this chapter
- Fundamental counting principle: 4 questions / 18.2% of this chapter
- Counting arrangements: 2 questions / 9.1% of this chapter
- Permutations and Combinations: 2 questions / 9.1% of this chapter
- Permutations with restrictions: 2 questions / 9.1% of this chapter
- Systematic counting under stated restrictions: 1 question / 4.5% of this chapter

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

Question 19 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 20 View solution online

Total numbers of 3-digit numbers that are divisible by 6 and can be formed by using the digits $1, 2, 3$, 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 21 View solution online

The number of 4-letter words, with or without meaning, each consisting of 2 vowels and 2 consonants, which can be formed from the letters of the word UNIVERSE without repetition is

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

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 23 View solution online

The number of numbers greater than 5000, less than 9000 and divisible by 3, that can be formed using the digits 0, 1, 2, 5, 9, if the repetition of the digits is allowed, is

_____

Numerical answer: _____

Enter an integer. Use the units and scaling requested in the question.

Question 24 View solution online

The largest $n \in N$, for which 7^n divides 101!, is :

A. 16

B. 18

C. 15

D. 19

Question 25 View solution online

The number of numbers, strictly between 5000 and 10000 can be formed using the digits $1, 3, 5, 7, 9$ without repetition, is

A. 12

B. 120

C. 72

D. 6

Question 26 View solution online

The number of integers, greater than 7000 that can be formed, using the digits $3, 5, 6, 7, 8$ without repetition, is

A. 168

B. 220

C. 120

D. 48

Question 27 View solution online

The total number of six digit numbers, formed using the digits $4, 5, 9$ 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.

Question 28 View solution online

Let 5 digit numbers be constructed using the digits $0, 2, 3, 4, 7, 9$ with repetition allowed, and are arranged in ascending order with serial numbers. Then the serial number of the number 42923 is

Numerical answer: _____

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

Question 29 View solution online

Five digit numbers are formed using the digits $1, 2, 3, 5, 7$ with repetitions and are written in descending order with serial numbers. For example, the number 77777 has serial number 1 . Then the serial number of 35337 is

Numerical answer: _____

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

Question 30 View solution online

The number of 3 -digit numbers, that are divisible by either 2 or 3 but not divisible by 7 , is

Numerical answer: _____

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

Question 31 View solution online

Number of 4-digit numbers (the repeation of digits is allowed) which are made using the digits $1, 2, 3$ and 5 , and are divisible by 15 , is equal to

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

The number of 3 digit numbers, that are divisible by either 3 or 4 but not divisible by 48 , is

A. 507

B. 432

C. 472

D. 400

Question 33 View solution online

The number of 9 digit numbers, that can be formed using all the digits of the number 123412341 so that the even digits occupy only even places, is

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

The total number of 4 -digit numbers whose greatest common divisor with 54 is 2 , is

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

The number of seven digits odd numbers, that can be formed using all the seven digits $\mathbf{1, 2, 2, 2, 3, 3, 5}$ is

.

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

Number of 4-digit numbers that are less than or equal to 2800 and either divisible by 3 or by 11 , 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

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 38 View solution online

Let x and y be distinct integers where $1 \leq x \leq 25$ and $1 \leq y \leq 25$. Then, the number of ways of choosing x and y, such that $x + y$ is divisible by 5 , is

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

A boy needs to select five courses from 12 available courses, out of which 5 courses are language courses. If he can choose at most two language courses, then the number of ways he can choose five courses is

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

Suppose Anil's mother wants to give 5 whole fruits to Anil from a basket of 7 red apples, 5 white apples and 8 oranges. If in the selected 5 fruits, at least 2 oranges, at least one red apple and at least one white apple must be given, then the number of ways, Anil's mother can offer 5 fruits to Anil is

Numerical answer: _____

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

CHAPTER 05 / MATHEMATICS

Binomial Theorem

Questions 41-41 / 1 selected / 0.3% practice weight / Consolidate

Topics to prioritise in this collection

- Middle term of a binomial expansion: 1 question / 100.0% of this chapter

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

Question 41 View solution online

Let K be the sum of the coefficients of the odd powers of x in the expansion of $(1+x)^{99}$. Let 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 m and n are odd numbers, then the ordered pair (l, n) is equal to

A. $(50, 51)$

B. $(50, 101)$

C. $(51, 99)$

D. $(51, 101)$

CHAPTER 06 / MATHEMATICS

Sequences and Series

Questions 42-76 / 35 selected / 11.7% practice weight / Focus first

Topics to prioritise in this collection

- Sequences and finite sums: 15 questions / 42.9% of this chapter
- Arithmetic progression: 7 questions / 20.0% of this chapter
- Evaluation of a structured finite sequence or series: 5 questions / 14.3% of this chapter
- Geometric progression: 4 questions / 11.4% of this chapter
- Summation of series: 2 questions / 5.7% of this chapter
- Progressions: 1 question / 2.9% 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 42 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 43 View solution online

Let f be a function such that $3f(x) + 2f\left(\frac{m}{19x}\right) = 5x$, $x \neq 0$, where $m = \sum_{i=1}^{9}(i)^2$. Then $f(5) - f(2)$ is equal to

A. -9

B. 36

C. 18

D. 9

Question 44 View solution online

Points $\mathbf{P(-3,2), Q(9,10)}$ and $\mathbf{(a,4)}$ lie on a circle C with PR as its diameter, The tangents to C at the points Q and $\boldsymbol{R}$ intersect at the point $\boldsymbol{S}$. If $\boldsymbol{S}$ lies on the line $\boldsymbol{2x-ky=1}$, then $\boldsymbol{k}$ is equal to

Numerical answer: _____

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

Question 45 View solution online

Let $\mathbf{f: N \to R}$ be a function such that $\boldsymbol{f(x+y)=2f(x)f(y)}$ for natural numbers $\boldsymbol{x}$ and $\boldsymbol{y}$. If $\boldsymbol{f(1)=2}$, then the value of $\boldsymbol{\alpha}$ for which

$$\sum_{k=1}^{10} f(\alpha+k) = \frac{512}{3}\left(2^{20}-1\right)$$

holds, is

A. 2

B. 3

C. 4

D. 6

Question 46 View solution online

The point of intersection $\boldsymbol{C}$ of the plane $\boldsymbol{8x+y+2z=0}$ and the line joining the point $\boldsymbol{A(-3,-61)}$ and $\mathbf{B(2,-4,-3)}$ divides the line segment AB internally in the ratio k :. If $\mathbf{a, b, c(|a|, |b|, |c|)}$ 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 $|\mathbf{a+b+}$ 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 47 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 48 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 49 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 50 View solution online

The common difference of the A.P.: $\mathbf{a_1,a_2,\ldots,a_m}$ is 13 more than the common difference of the A.P.: $\mathbf{b_1,\ b_2,\ldots,\ b_n}$. If $\mathbf{b_{31}=-277,\ b_{43}=-385}$ and $\mathbf{a_{78}}=327$, then $\mathbf{a_1}$ is equal to

A. 21

B. 24

C. 19

D. 16

Question 51 View solution online

Let $a_1, \frac{a_2}{2}, \frac{a_3}{2^2}, \ldots, \frac{a_{10}}{2^9}$ be a G.P. of common ratio $\frac{1}{\sqrt{2}}$. If $a_1 + a_2 + \ldots + a_{10} = 62$, then a_1 is equal to :

A. $2(\sqrt{2}-1)$

B. $2-\sqrt{2}$

C. $\sqrt{2}-1$

D. $2(2-\sqrt{2})$

Question 52 View solution online

Let $a_1, a_2, a_3, \ldots$. be a G.P. of increasing positive terms such that $a_2 . a_3 . a_4 = 64$ and $a_1 + a_3 + a_5 = \frac{813}{7}$. Then $a_3 + a_5 + a_7$ is equal to :

A. 3256

B. 3252

C. 3244

D. 3248

Question 53 View solution online

Let $\alpha_1, \alpha_2, \alpha_3, \alpha_4$ be an A.P. of four terms such that each term of the A. P. and its common difference l are integers. If $\alpha_1 + \alpha_2 + \alpha_3 + \alpha_4 = 48$ and $\alpha_1, \alpha_2, \alpha_3, \alpha_4 + l^4 = 361$ then the largest term of the A.P. is equal to

A. 27

B. 24

C. 21

D. 23

Question 54 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 55 View solution online

Let $a_1, a_2, a_3 \ldots$. be a G.P. of increasing positive terms. If $a_1 a_5 = 28$ and $a_2 + a_4 = 29$, the a_6 is equal to

A. 628

B. 526

C. 784

D. 812

Question 56 View solution online

Let S_n be the sum to n-terms of an arithmetic progression 3, 7, 11, ...
If $40 < \left(\frac{6}{n(n+1)} \sum_{k=1}^{n} S_k\right) < 42$, then n equals .

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

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 58 View solution online

Suppose that the number of terms in an A.P. is 2 k , $k \in N$. If the sum of all odd terms of the A.P. is 40 , the sum of all even terms is 55 and the last term of the A.P. exceeds the first term by 27 , then k is equal to

A. 5

B. 8

C. 6

D. 4

Question 59 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 60 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 61 View solution online

Let $S_n = \frac{1}{2} + \frac{1}{6} + \frac{1}{12} + \frac{1}{20} + \ldots$ upto n terms. If the sum of the first six terms of an A.P. with first term -p and common difference p is $\sqrt{2026\,S_{2025}}$, then the absolute difference between 20th and 15th terms of the A.P. is

A. 25

B. 90

C. 20

D. 45

Question 62 View solution online

If in a G.P. of 64 terms, the sum of all the terms is 7 times the sum of the odd terms of the G.P, then the common ratio of the G.P. is equal to

A. 7

B. 4

C. 5

D. 6

Question 63 View solution online

Let $3, 7, 11, 15, \ldots, 403$ and $2, 5, 8, 11, \ldots, 404$ be two arithmetic progressions. Then the sum, of the common terms in them, is equal to .

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 S_n denote the sum of the first n terms of an arithmetic progression. If $S_{10} = 390$ and the ratio of the tenth and the fifth terms is $15 : 7$, then $S_{15} - S_5$ is equal to:

A. 800

B. 890

C. 790

D. 690

Question 65 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 66 View solution online

Let $\mathbf{A}:\{1,2,3,4,5,6,7\}$. Define $\mathbf{B}=\{\mathbf{T}\subseteq\mathbf{A}:$ either $\mathbf{1}\notin\ \mathbf{T}$ or $\mathbf{2}\in\ \mathbf{T}\}$ and $\mathbf{C}=\mathbf{T}\subseteq\mathbf{A}:\mathbf{T}$ the sum of all the elements of T is a prime number $\}$. Then the number of elements in the set $B\cup C$ 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

The sum of the common terms of the following three arithmetic progressions.

3, 7, 11, 15, ...,399
$\mathbf{2,5,8,11,.....,359}$ 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 68 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 $a_1a_9+a_2a_4a_9+a_5+a_7$ is equal to

Numerical answer: _____

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

Question 69 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 70 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 71 View solution online

Let $f(x)$ be a funciton such that $f(x+y) = f(x) \cdot f(y)$ for all $x, y \in N$. If $f(1) = 3$ and $\sum_{k=1}^{n} f(k) = 3279$, then the value of n is

A. 9

B. 6

C. 8

D. 7

Question 72 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 73 View solution online

For the two positive numbers $\mathbf{a}, \mathbf{b}$ is $\mathbf{a}, \mathbf{b}$ and $\frac{1}{18}$ are in a geometric progression, while $\frac{1}{\mathbf{a}}, 10$ and $\frac{1}{\mathbf{b}}$ are in an arithmetic progression, then $16\mathbf{a} + \mathbf{b}$ is equal to

Numerical answer: _____

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

Question 74 View solution online

Let $a_1 = b_1 = 1$ and $a_n = a_{n-1} + (n-1), b_n = b_{n-1} + a_{n-1}, \forall n \geq 2$. If $S = \sum_{n=1}^{10} \frac{b_n}{2^n}$ and $T = \sum_{n=1}^{8} \frac{n}{2^{n-1}}$, then $2^7(2S - T)$ is equal to

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 bag contains six balls of different colours. Two balls are drawn in succession with replacement. The probability that both the balls are of the same colour is p. Next four balls are drawn in succession with replacement and the probability that exactly three balls are of the same colour is q . If $\mathbf{p : q = m : n}$, where m and n are coprime, then $m + n$ is equal to .

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

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.

CHAPTER 07 / MATHEMATICS

Straight Lines

Questions 77-81 / 5 selected / 1.7% practice weight / Consolidate

Topics to prioritise in this collection

- Equation of a straight line: 4 questions / 80.0% of this chapter
- Distance from a point to a line: 1 question / 20.0% of this chapter

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

Question 77 View solution online

Let two straight lines drawn from the origin O intersect the line $3x + 4y = 12$ at the points P and Q such that $\triangle OPQ$ is an isosceles triangle and $\angle POQ = 90°$. If $l = OP^2 + PQ^2 + QO^2$, then the greatest integer less than or equal to l is :

A. 44

B. 48

C. 46

D. 42

Question 78 View solution online

Let the line $x + y = 1$ meet the axes of x and y at A and B , respectively. A right angled triangle AMN is inscribed in the triangle OAB , where O is the origin and the points M and N lie on the lines OB and AB , respectively. If the area of the triangle AMN is $\frac{4}{9}$ of the area of the triangle OAB and $AN : NB = \lambda : 1$, then the sum of all possible value(s) of is λ :

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

B. $\frac{13}{6}$

C. $\frac{5}{2}$

D. 2

Question 79 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 80 View solution online

A line passes through the origin and makes equal angles with the positive coordinate axes. It intersects the lines
$\mathbf{L_1 : 2x + y + 6 = 0}$ and $\mathbf{L_2 : 4x + 2y - p = 0, p > 0}$, at the points A and B , respectively. If $\mathbf{AB = \frac{9}{\sqrt{2}}}$ and the foot of the perpendicular from the point A on the line $\mathbf{L_2}$ is M , then $\frac{\mathbf{AM}}{\mathbf{BM}}$ is equal to

A. 5

B. 4

C. 2

D. 3

Question 81 View solution online

Let the point $\mathbf{P(\alpha, \beta)}$ be at a unit distance from each of the two lines $\mathbf{L_1 : 3x - 4y + 12 = 0}$, and $\mathbf{L_2 : 8x + 6y + 11 = 0}$. If P lies below $\mathbf{L_1}$ and above L_2, then $100(\alpha + \beta)$ is equal to

A. -14

B. 42

C. -22

D. 14

CHAPTER 08 / MATHEMATICS

Conic Sections

Questions 82-128 / 47 selected / 15.7% practice weight / Focus first

Topics to prioritise in this collection

- Parabola geometry: 13 questions / 27.7% of this chapter
- Ellipse geometry: 9 questions / 19.1% of this chapter
- Conic geometry: 8 questions / 17.0% of this chapter
- Circle geometry: 5 questions / 10.6% of this chapter
- Standard equation and geometric properties of an ellipse: 5 questions / 10.6% of this chapter
- Standard equation and geometric properties of a parabola: 2 questions / 4.3% of this chapter
- Ellipse and hyperbola: 1 question / 2.1% of this chapter
- Hyperbola geometry: 1 question / 2.1% of this chapter
- Hyperbola tangency: 1 question / 2.1% of this chapter
- Properties of conic sections: 1 question / 2.1% of this chapter
- Standard equation and geometric properties of a hyperbola: 1 question / 2.1% of this chapter

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

Question 82 View solution online

A square is inscribed in the circle $x^2 + y^2 - 10x - 6y + 30 = 0$. One side of this square is parallel to $y = x + 3$. If (x_i, y_i) are the vertices of the square, then $\sum (x_i^2 + y_i^2)$ is equal to:

A. 148

B. 156

C. 160

D. 152

Question 83 View solution online

Let one end of a focal chord of the parabola $\mathbf{y^2 = 16x}$ be (16, 16). If $\mathbf{P(\alpha, \beta)}$ divides this focal chord internally in the ratio 5 : 2, then the minimum value of $\alpha + \beta$ is equal to :

A. 22

B. 7

C. 5

D. 16

Question 84 View solution online

Let S and S' be the foci of the ellipse $\frac{x^2}{25} + \frac{y^2}{9} = 1$ and $\mathbf{P(\alpha, \beta)}$ be a point on the ellipse in the first quadrant. If $\mathbf{(SP)^2 + (S'P)^2 - SP \bullet S'P = 37}$, then $\alpha^2 + \beta^2$ is equal to :

A. 15

B. 11

C. 17

D. 13

Question 85 View solution online

The plane $\mathbf{2x - y + z = 4}$ intersects the line segment joining the points $A(a, -2, 4)$ and $B(2, b, -3)$ at the point C in the ratio $\mathbf{2 : 1}$ 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 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 $3\mathbf{x} - 25 = 0$ 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

Let a circle C of radius 5 lie below the x -axis. The line $\mathbf{L_1} = 4\mathbf{x} + 3\mathbf{y} - 2$ passes through the centre P of the circle C and intersects the line $\mathbf{L_2} : 3\mathbf{x} - 4\mathbf{y} - 11 = 0$ at Q . The line $\mathbf{L_2}$ touches C at the point Q . Then the distance of P from the line $5x - 12y + 51 = 0$ is

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

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 $6\mathbf{f_1 f_2} - \mathbf{r}$ is equal to

A. 74

B. 68

C. 70

D. 78

Question 89 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 90 View solution online

Let the length of the latus rectum of an ellipse with its major axis along x-axis and centre at the origin, be 8 . If the distance between the foci of this ellipse is equal to the length of its minor axis, then which one of the following points lies on it ?

A. $(4\sqrt{3}, 2\sqrt{3})$

B. $(4\sqrt{3}, 2\sqrt{2})$

C. $(4\sqrt{2}, 2\sqrt{2})$

D. $(4\sqrt{2}, 2\sqrt{3})$

Question 91 View solution online

Let the hyperbola $\mathrm{H}: \frac{\mathrm{x}^2}{\mathrm{a}^2}-\mathrm{y}^2=1$ and the ellipse $E: 3x^2+4y^2=12$ be such that the length of latus rectum of H is equal to the length of latus rectum of E . If $\mathrm{e_H}$ and $\mathrm{e_E}$ are the eccentricities of H and E respectively, then the value of $12\left(\mathrm{e_H^2}+\mathrm{e_E^2}\right)$ is equal to .

Numerical answer: _____

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

Question 92 View solution online

An ellipse has its center at (1,-2), one focus at (3,-2) and one vertex at (5, -2). Then the length of its latus rectum is :

A. 16

B. 6

C. $4\sqrt{3}$

D. $6\sqrt{3}$

Question 93 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 94 View solution online

Let e_1 be the eccentricity of the hyperbola $\frac{x^2}{16} - \frac{y^2}{9} = 1$ and e_2 be the eccentricity of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1, a > b$, which passes through the foci of the hyperbola. If $e_1 e_2 = 1$, then the length of the chord of the ellipse parallel to the x-axis and passing through $(0,2)$ is :

A. $4\sqrt{5}$

B. $\frac{8\sqrt{5}}{3}$

C. $\frac{10\sqrt{5}}{3}$

D. $3\sqrt{5}$

Question 95 View solution online

An ellipse, with foci at $(0, 2)$ and $(0, -2)$ and minor axis of length 4, passes through which of the following points?

A. $(\sqrt{2}, 2)$

B. $(2, 2\sqrt{2})$

C. $(1, 2\sqrt{2})$

D. $(2, \sqrt{2})$

Question 96 View solution online

If the distance between the foci of an ellipse is 6 and the distance between its directrices is 12 , then the length of its latus rectum is

A. 4

B. $3\sqrt{2}$

C. 9

D. $2\sqrt{2}$

Question 97 View solution online

An ellipse $E : x^2/a^2 + y^2/b^2 = 1$ passes through the vertices of the hyperbola $H : x^2/49 - y^2/64 = -1$. The major and minor axes of E coincide with the transverse and conjugate axes of H. Their eccentricities have product 1/2. If l is the latus rectum length of E, find 113l.

Numerical answer: _____

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

Question 98 View solution online

$3x + 4y = 12\sqrt{2}$ is a tangent to the ellipse $\frac{x^2}{a^2} + \frac{y^2}{9} = 1$, then the distance between foci of ellipse is

A. $2\sqrt{5}$

B. $2\sqrt{7}$

C. 4

D. $2\sqrt{3}$

Question 99 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 , $\mathbf{0}$). Let the line segment PQ be also a focal chord of the ellipse $\boldsymbol{E: \frac{x^2}{a^2} + \frac{y^2}{b^2} = 1, a^2 > b^2}$. If $\boldsymbol{e}$ 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 100 View solution online

Let an ellipse $\boldsymbol{E: \frac{x^2}{a^2} + \frac{y^2}{b^2} = 1a^2 > b^2}$, passes through $\left(\sqrt{\frac{3}{2}}, 1\right)$ and has eccentricity $\frac{1}{\sqrt{3}}$. If a circle, centered at focus $\mathbf{F(\alpha, 0), \alpha > 0}$, of E and radius $\frac{2}{\sqrt{3}}$, intersects E at two points P and Q , then $\mathbf{PQ^2}$ is equal to :

A. $\frac{8}{3}$

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

C. $\frac{16}{3}$

D. 3

Question 101 View solution online

The length of the latus-rectum of the ellipse, whose foci are $\mathbf{(2, 5)}$ and $\mathbf{(2, -3)}$ and eccentricity is $\frac{4}{5}$, is

A. $\frac{6}{5}$

B. $\frac{50}{3}$

C. $\frac{10}{3}$

D. $\frac{18}{5}$

Question 102 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 103 View solution online

Let the hyperbola $\mathbf{H}: \frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ pass through the point $(2\sqrt{2}, -2\sqrt{2})$. A parabola is drawn whose focus is same as the focus of H with positive abscissa and the directrix of the parabola passes through the other focus of H . If the length of the latus rectum of the parabola is e times the length of the latus rectum of H , where e is the eccentricity of H , then which of the following points lies on the parabola?

A. $(2\sqrt{3}, 3\sqrt{2})$

B. $(3\sqrt{3}, -6\sqrt{2})$

C. $(\sqrt{3}, -\sqrt{6})$

D. $(3\sqrt{6}, 6\sqrt{2})$

Question 104 View solution online

If the line $x - 2y = 12$ is tangent to the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ at the point $\left(3, \frac{-9}{2}\right)$, then the length of the latus rectum of the ellipse is :

A. 5

B. $8\sqrt{3}$

C. $12\sqrt{2}$

D. 9

Question 105 View solution online

Let $\mathbf{H}: \frac{-x^2}{a^2} + \frac{y^2}{b^2} = 1$ be the hyperbola, whose eccentricity is $\sqrt{3}$ and the length of the latus rectum is $4\sqrt{3}$. Suppose the point $(\alpha, 6), \alpha > 0$ lies on H . If β is the product of the focal distances of the point $(\alpha, 6)$, then $\alpha^2 + \beta$ is equal to :

A. 170

B. 171

C. 169

D. 172

Question 106 View solution online

In an ellipse, with centre at the origin, if the difference of the lengths of major axis and minor axis is 10 and one of the foci is at $(0, 5\sqrt{3})$, then the length of its latus rectum is :

A. 5

B. 6

C. 8

D. 10

Question 107 View solution online

If the length of the latus rectum of the ellipse $x^2 + 4y^2 + 2x + 8y - \lambda = 0$ is 4 , and l is the length of its major axis, then $\lambda + l$ is equal to .

Numerical answer: _____

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

Question 108 View solution online

Let $\mathrm{P}(10, 2\sqrt{15})$ be a point on the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$, whose foci are S and S'. If the length of its latus rectum is 8, then the square of the area of $\triangle \mathrm{PSS}'$ is equal to :

A. 4200

B. 900

C. 1462

D. 2700

Question 109 View solution online

Let one focus of the hyperbola $\mathrm{H}: \frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ be at $(\sqrt{10}, 0)$ and the corresponding directrix be $x = \frac{9}{\sqrt{10}}$. If e and l respectively are the eccentricity and the length of the latus rectum of H , then $9\left(e^2 + l\right)$ is equal to:

A. 14

B. 15

C. 16

D. 12

Question 110 View solution online

If S and S' are the foci of the ellipse $\frac{x^2}{18} + \frac{y^2}{9} = 1$ and P be a point on the ellipse, then $\min(\mathrm{SP}.\mathrm{S}'\mathrm{P}) + \max\left(\mathrm{SP}'\mathrm{S}'\mathrm{P}\right)$ is equal to :

A. $3(1+\sqrt{2})$

B. $3(6+\sqrt{2})$

C. 9

D. 27

Question 111 View solution online

Let P be a point on the ellipse $\frac{x^2}{9}+\frac{y^2}{4}=1$. Let the line passing through P and parallel to y -axis meet the circle $x^2+y^2=9$ at point Q such that P and Q are on the same side of the x -axis. Then, the eccentricity of the locus of the point R on PQ such that $\mathrm{PR}:\mathrm{RQ}=4:3$ as P moves on the ellipse, is :

A. $\frac{11}{19}$

B. $\frac{13}{21}$

C. $\frac{\sqrt{139}}{23}$

D. $\frac{\sqrt{13}}{7}$

Question 112 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 113 View solution online

Let the tangents at the points P and Q on the ellipse $\frac{x^2}{2}+\frac{y^2}{4}=1$ meet at the point $\mathrm{R}(\sqrt{2}, 2\sqrt{2}-2)$. If S is the focus of the ellipse on its negative major axis, then $\mathrm{SP}^2+\mathrm{SQ}^2$ is equal to

Numerical answer: _____

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

Question 114 View solution online

Let the eccentricity of the hyperbola $\mathbf{H}: \frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ be $\sqrt{\frac{5}{2}}$ and length of its latus rectum be $6\sqrt{2}$, If $y = 2x + c$ is a tangent to the hyperbola H , then the value of c^2 is equal to

A. 18

B. 20

C. 24

D. 32

Question 115 View solution online

Let (h, k) lie on the circle $C: x^2 + y^2 = 4$ and the point $(2h + 1, 3k + 2)$ lie on an ellipse with eccentricity e. Then the value of $\frac{5}{e^2}$ is equal to

_____

.

Numerical answer: _____

Enter an integer. Use the units and scaling requested in the question.

Question 116 View solution online

For the hyperbola $\mathbf{H}: x^2 - y^2 = 1$ and the ellipse $\mathbf{E}: \frac{x^2}{a^2} + \frac{y^2}{b^2} = 1, a > b > 0$, let the
(1) eccentricity of E be reciprocal of the eccentricity of H , and
(2) the line $y = \sqrt{\frac{5}{2}}x + K$ be a common tangent of E and H .

Then $4\left(a^2 + b^2\right)$ is equal to .

Numerical answer: _____

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

Question 117 View solution online

Let the product of the focal distances of the point $\left(\sqrt{3}, \frac{1}{2}\right)$ on the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1, (a > b)$, be $\frac{7}{4}$. Then the absolute difference of the eccentricities of two such ellipses is

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

B. $\frac{1-\sqrt{3}}{\sqrt{2}}$

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

D. $\frac{1-2\sqrt{2}}{\sqrt{3}}$

Question 118 View solution online

If the length of the minor axis of an ellipse is equal to one fourth of the distance between the foci, then the eccentricity of the ellipse is :

A. $\frac{4}{\sqrt{17}}$

B. $\frac{\sqrt{3}}{16}$

C. $\frac{3}{\sqrt{19}}$

D. $\frac{\sqrt{5}}{7}$

Question 119 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 120 View solution online

Let $\mathbf{P}\left(\frac{2\sqrt{3}}{\sqrt{7}}, \frac{6}{\sqrt{7}}\right), \mathbf{Q}, \mathbf{R}$ and S be four points on the ellipse $9x^2 + 4y^2 = 36$. Let PQ and RS be mutually perpendicular and pass through the origin. If $\frac{1}{(PQ)^2} + \frac{1}{(RS)^2} = \frac{p}{q}$, where p and q are coprime, then $\mathbf{p + q}$ is equal to

A. 143

B. 137

C. 157

D. 147

Question 121 View solution online

Let the ellipse $\mathbf{E}: \frac{x^2}{144}+\frac{y^2}{169}=1$ and the hyperbola $\mathbf{H}: \frac{x^2}{16}-\frac{y^2}{\lambda^2}=-1$ have the same foci. If e and L, respectively denote the eccentricity and the length of the latus rectum of H, then the value of $24(e+L)$ is :

A. 296

B. 126

C. 148

D. 67

Question 122 View solution online

Let an ellipse with centre $(1,0)$ and latus rectum of length $\frac{1}{2}$ have its major axis along x-axis. If its minor axis subtends an angle $60°$ at the foci, then the square of the sum of the lengths of its minor and major axes is equal to

Numerical answer: _____

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

Question 123 View solution online

For some $\theta \in \left(0, \frac{\pi}{2}\right)$, let the eccentricity and the length of the latus rectum of the hyperbola $x^2-y^2\sec^2\theta=8$ be e_1 and ℓ_1, respectively, and let the eccentricity and the length of the latus rectum of the ellipse $x^2\sec^2\theta+y^2=6$ be e_2 and ℓ_2, respectively. If $e_1^2=e_2^2\left(\sec^2\theta+1\right)$, then $\left(\frac{\ell_1\ell_2}{e_1e_2}\right)\tan^2\theta$ is equal to_____.

Numerical answer: _____

Enter an integer. Use the units and scaling requested in the question.

Question 124 View solution online

Let the foci of a hyperbola H coincide with the foci of the ellipse $E: \frac{(x-1)^2}{100}+\frac{(y-1)^2}{75}=1$ and the eccentricity of the hyperbola H be the reciprocal of the eccentricity of the ellipse E. If the length of the transverse axis of H is α and the length of its conjugate axis is β, then $3\alpha^2+2\beta^2$ is equal to :

A. 242

B. 225

C. 237

D. 205

Question 125 View solution online

For some $\theta \in \left(0, \frac{\pi}{2}\right)$, if the eccentricity of the hyperbola, $x^2-y^2\sec^2\theta=10$ is $\sqrt{5}$ times the eccentricity of the ellipse, $x^2\sec^2\theta+y^2=5$, then the length of the latus rectum of the ellipse, is:

A. $\frac{4\sqrt{5}}{3}$

B. $\frac{2\sqrt{5}}{3}$

C. $2\sqrt{6}$

D. $\sqrt{30}$

Question 126 View solution online

Let the foci of a hyperbola be $(1,14)$ and $(1,-12)$. If it passes through the point $(1,6)$, then the length of its latus-rectum is :

A. $\frac{25}{6}$

B. $\frac{24}{5}$

C. $\frac{288}{5}$

D. $\frac{144}{5}$

Question 127 View solution online

The length of the latus rectum of a parabola, whose vertex and focus are on the positive x -axis at a distance R and $S(>R)$ respectively from the origin, is :

A. $4(\mathrm{S}+\mathrm{R})$

B. $2(\mathrm{S}-\mathrm{R})$

C. $4(\mathrm{S}-\mathrm{R})$

D. $2(\mathrm{S}+\mathrm{R})$

Question 128 View solution online

Let A be the focus of the parabola $y^2 = 8x$. Let the line $y = mx + c$ intersect the parabola at two distinct points B and C. If the centroid of the triangle ABC is $\left(\frac{7}{3}, \frac{4}{3}\right)$, then $(BC)^2$ is equal to :

A. 41

B. 80

C. 89

D. 32

CHAPTER 09 / MATHEMATICS

Limits and Derivatives

Questions 129-130 / 2 selected / 0.7% practice weight / Consolidate

Topics to prioritise in this collection

- Limits and Derivatives: 1 question / 50.0% of this chapter
- Standard limits: 1 question / 50.0% of this chapter

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

Question 129 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 130 View solution online

Suppose f is a function satisfying $f(x + y) = f(x) + f(y)$ for all $x, y \in \mathbb{N}$ and $f(1) = \frac{1}{5}$. If $\sum_{n=1}^{m} \frac{f(n)}{n(n+1)(n+2)} = \frac{1}{12}$, then m is equal to

Numerical answer: _____

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

CHAPTER 10 / MATHEMATICS

Statistics

Questions 131-146 / 16 selected / 5.3% practice weight / Next

Topics to prioritise in this collection

- Variance and standard deviation: 11 questions / 68.8% of this chapter
- Measures of central tendency and dispersion: 5 questions / 31.3% of this chapter

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

---

Question 131 View solution online

The mean of 10 numbers
$7 \times 8, 10 \times 10, 13 \times 12, 16 \times 14, \ldots$. is .

Numerical answer: _____

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

Question 132 View solution online

The mean and standard deviation of the marks of 10 students were found to be 50 and 12 respectively. Later, it was observed that two marks 20 and 25 were wrongly read as 45 and 50 respectively. Then the correct variance is .

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

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 134 View solution online

From a lot of 10 items, which include 3 defective items, a sample of 5 items is drawn at random. Let the random variable X denote the number of defective items in the sample. If the variance of X is σ^2, then $96\sigma^2$ is equal to .

Numerical answer: _____

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

Question 135 View solution online

Let the mean of 6 observation $1, 2, 4, 5, x$ and y be 5 and their variance be 10 . Then their mean deviation about the mean is equal to

A. $\frac{10}{3}$

B. $\frac{7}{3}$

C. 3

D. $\frac{8}{3}$

Question 136 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 137 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 138 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 139 View solution online

The mean and variance of the marks obtained by the students in a test are 10 and 4 respectively. Later, the marks of one of the students is increased from 8 to 12 . If the new mean of the marks is 10.2, then their new variance is equal to :

A. 2,24

B. (1) 3.96

C. (2) 4.08

D. (3) 4.04

Question 140 View solution online

Let the mean and standard deviation of marks of class A of 100 students be respectively 40 and α (> 0), and the mean and standard deviation of marks of class B of n students be respectively 55 and 30 $-\alpha$. If the mean and variance of the marks of the combined class of $100+n$ studants are respectively 50 and 350 , then the sum of variances of classes A and B is :

A. 650

B. 450

C. 900

D. 500

Question 141 View solution online

Let $9=x_1<x_2<\ldots..<x_7\ldots\ldots,x_7$ 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 $\bar{x}$, then $\bar{x}+x_6$ 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 142 View solution online

Let $X=\{11,12,13,\ldots,40,41\}$ and $Y=\{61,62,63,\ldots,90,91\}$ be the two sets of observations. If $\bar{x}$ and $\bar{y}$ are their respective means and σ^2 is the variance of all the observations in $X \cup Y$, then $\left|\bar{x}+\bar{y}-\sigma^2\right|$ is equal to

Numerical answer: _____

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

Question 143 View solution online

The mean and variance of 5 observations are 5 and 8 respectively. If 3 observations are $\mathbf{1, 3, 5}$ then the sum of cubes of the remaining two observations is

A. 1216

B. 1072

C. 1456

D. 1792

Question 144 View solution online

If the variance of the frequency distribution

x_i	2	3	4	5	6	7	8
Frequency f_i	3	6	16	α	9	5	6

is 3 , 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 145 View solution online

For 20 observations mean and variance is given as 10 and 4 , later it was observed that by mistake 9 was taken in place of 11 , then the correct variance is

A. 3.98

B. 3.99

C. 4.01

D. 4.02

Question 146 View solution online

The mean of five observations is 5 and their variance is 9.20 . If three of the given five observations are 1,3 and 8 , then a ratio of other two observations is :

A. $4:9$

B. $6:7$

C. $5:8$

D. $10:3$

CHAPTER 11 / MATHEMATICS

Probability

Questions 147-148 / 2 selected / 0.7% practice weight / Consolidate

Topics to prioritise in this collection

- Binomial distribution: 2 questions / 100.0% of this chapter

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

Question 147 View solution online

Three rotten apples are mixed accidently with seven good apples and four apples are drawn one by one without replacement. Let the random variable X denote the number of rotten apples. If μ and σ^2 represent mean and variance of X, respectively, then $10\left(\mu^2+\sigma^2\right)$ is equal to

A. 250

B. 25

C. 30

D. 20

Question 148 View solution online

In a binomial distribution $\mathrm{B}(\mathrm{n}, \mathrm{p})$, the sum and the product of the mean and the variance are 5 and 6 respectively, then $6(n+p-q)$ is equal to

A. 52

B. 50

C. 51

D. 53

CHAPTER 12 / MATHEMATICS

Inverse Trigonometric Functions

Questions 149-149 / 1 selected / 0.3% practice weight / Consolidate

Topics to prioritise in this collection

- Inverse trigonometric identities: 1 question / 100.0% of this chapter

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

Question 149 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

CHAPTER 13 / MATHEMATICS

Matrices

Questions 150-152 / 3 selected / 1.0% practice weight / Consolidate

Topics to prioritise in this collection

- Algebra of matrices: 1 question / 33.3% of this chapter
- Linear systems: 1 question / 33.3% of this chapter
- Matrix operations and properties: 1 question / 33.3% of this chapter

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

Question 150 View solution online

Let A be a matrix of order 3×3 and $|\mathrm{A}| = 5$. If $|2\,\mathrm{adj}(3\,\mathrm{A}\,\mathrm{adj}(2\,\mathrm{A}))| = 2^{\alpha} \cdot 3^{\beta} \cdot 5^{\gamma} \alpha, \beta, \gamma \in \mathbf{N}$ then $\alpha + \beta + \gamma$ is equal to

A. 25

B. 26

C. 27

D. 28

Question 151 View solution online

If system of equations $x + y + z = 6, x + 2y + 3z = 10, 3x + 2y + \lambda z = \mu$ has more than 2 solutions, then $(\mu - \lambda^2)$ is .

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

Let $|\mathbf{A}| = \mathbf{6}$, where A is a $\mathbf{3} \times \mathbf{3}$ matrix. If $\left|\mathbf{adj}\left(\mathbf{3}\,\mathbf{adj}\left(\mathbf{A}^{\mathbf{2}}.\,\mathbf{adj}(\mathbf{2}\,\mathbf{A})\right)\right)\right| = \mathbf{2^m.3^n}, \mathbf{m}, \mathbf{n} \in \mathbf{N}$, then m + n is equal to

_____

.

Numerical answer: _____

Enter an integer. Use the units and scaling requested in the question.

CHAPTER 14 / MATHEMATICS

Determinants

Questions 153-159 / 7 selected / 2.3% practice weight / Next

Topics to prioritise in this collection

- Determinants: 3 questions / 42.9% of this chapter
- System of linear equations: 3 questions / 42.9% of this chapter
- Properties of determinants: 1 question / 14.3% of this chapter

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

Question 153 View solution online

Let $\lambda, \mu \in \mathbf{R}$. If the system of equations

$3x + 5y + \lambda z = 3$

$7x + 11y - 9z = 2$

$97x + 155y - 189z = \mu$

has infinitely many solutions, then $\mu + 2\lambda$ is equal to :

A. 25

B. 24

C. 27

D. 22

Question 154 View solution online

If the system of equations

$2x + 7y + \lambda z = 3$

$3x + 2y + 5z = 4$

$x + \mu y + 32z = -1$

has infinitely many solutions, then $(\lambda - \mu)$ is equal to :

Numerical answer: _____

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

Question 155 View solution online

The values of $\mathbf{m, n}$, for which the system of equations
$\mathbf{x + y + z = 4}$,
$2x + 5y + 5z = 17$,
$\mathbf{x + 2y + mz = n}$
has infinitely many solutions, satisfy the equation :

A. $m^2 + n^2 - m - n = 46$

B. $m^2 + n^2 + m + n = 64$

C. $m^2 + n^2 + mn = 68$

D. $m^2 + n^2 - mn = 39$

Question 156 View solution online

If the system of equations
$\mathbf{11x + y + \lambda z = -5}$
$2x + 3y + 5z = 3$
$8x - 19y - 39z = \mu$
has infinitely many solutions, then $\lambda^4 - \mu$ is equal to :

A. 49

B. 45

C. 47

D. 51

Question 157 View solution online

Let A be a non-singular matrix of order 3. If $\det(3\,\mathrm{adj}(2\,\mathrm{adj}((\det\ \mathrm{A})\mathrm{A}))) = 3^{-13} \cdot 2^{-10}$ and $\det(3\,\mathrm{adj}(2A)) = 2^m \cdot 3^n$, then $|3m + 2n|$ is equal to

.

Numerical answer: _____

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

Question 158 View solution online

If A is a square matrix of order 3 such that $\det(A) = 3$ and $\det\left(\text{adj}\left(-4\,\text{adj}\left(-3\,\text{adj}\left(3\,\text{adj}\left((2\,A)^{-1}\right)\right)\right)\right)\right) = 2^m 3^n$, then $m+ \mid 2n$ is equal to:

A. 3

B. 2

C. 4

D. 6

Question 159 View solution online

Let the determinant of a square matrix A of order m be $m - n$, where m and n satisfy $4m + n = 22$ and $17m + 4n = 93$. If $\det\left(n\,\text{adj}(\text{adj}(mA))\right) = 3^a 5^b 6^c$. then $a + b + c$ is equal to:

A. 96

B. 101

C. 109

D. 84

CHAPTER 15 / MATHEMATICS

Application of Derivatives

Questions 160-164 / 5 selected / 1.7% practice weight / Consolidate

Topics to prioritise in this collection

- Tangents and normals: 2 questions / 40.0% of this chapter
- Applications of derivatives: 1 question / 20.0% of this chapter
- Derivative-based curve analysis: 1 question / 20.0% of this chapter
- Maxima and minima: 1 question / 20.0% of this chapter

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

Question 160 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 161 View solution online

Let the area of a $\triangle \mathbf{PQR}$ with vertices $\mathbf{P(5, 4), Q(-2, 4)}$ and $\mathbf{R(a, b)}$ be 35 square units. If its orthocenter and centroid are $\mathbf{O\left(2, \frac{14}{5}\right)}$ and $\mathbf{C(c, d)}$ respectively, then $\mathbf{c + 2\,d}$ is equal to

A. $\frac{7}{3}$

B. 3

C. 2

D. $\frac{8}{3}$

Question 162 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 x_1 and x_2 respectively such that $x_1x_2 = 54$, then $a + x_1 + x_2$ is equal to :-

A. 15

B. 18

C. 24

D. 13

Question 163 View solution online

A person forgets his 4-digit ATM pin code. But he remembers that in the code all the digits are different, the greatest digit is 7 and the sum of the first two digits is equal to the sum of the last two digits. Then the maximum number of trials necessary to obtain the correct code is

Numerical answer: _____

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

Question 164 View solution online

Let E be an ellipse whose axes are parallel to the co-ordinates axes, having its center at $(3, -4)$, one focus at $(4, -4)$ and one vertex at $(5, -4)$. If $mx - y = 4,\ m > 0$ is a tangent to the ellipse E, then the value of $5\ m^2$ is equal to .

Numerical answer: _____

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

CHAPTER 16 / MATHEMATICS

Integrals

Questions 165-165 / 1 selected / 0.3% practice weight / Consolidate

Topics to prioritise in this collection

- Evaluation or use of an integral relation: 1 question / 100.0% of this chapter

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

Question 165

View solution online

Let $\mathbf{I(x)} = \int \frac{3dx}{(4x+6)\left(\sqrt{4x^2+8x+3}\right)}$ and $\mathbf{I(0)} = \frac{\sqrt{3}}{4} + \mathbf{20}$. If $\mathbf{I}\left(\frac{1}{2}\right) = \frac{a\sqrt{2}}{b} + \mathbf{c}$, where a, b, c $\in \mathbf{N}, \mathbf{gcd(a, b)} = \mathbf{1}$, then $\mathbf{a + b + c}$ is equal to :

A. 29

B. 28

C. 31

D. 30

CHAPTER 17 / MATHEMATICS

Application of Integrals

Questions 166-173 / 8 selected / 2.7% practice weight / Next

Topics to prioritise in this collection

- Area under a curve: 5 questions / 62.5% of this chapter
- Area between curves: 2 questions / 25.0% of this chapter
- Standard equation and geometric properties of a parabola: 1 question / 12.5% of this chapter

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

---

Question 166 View solution online

Let $P_1 : y = 4x^2$ and $P_2 : y = x^2 + 27$ be two parabolas. If the area of the bounded region enclosed between $\mathbf{P_1}$ and $\mathbf{P_2}$ is six times the area of the bounded region enclosed between the line $\mathbf{y = \alpha x, \alpha > 0}$ and $\mathbf{P_1}$, then α is equal to :

A. 8

B. 15

C. 12

D. 6

Question 167 View solution online

Let the area of the region $\{(x, y) : 2y \leq x^2 + 3, \mathbf{y} + |\mathbf{x}| \leq 3, \mathbf{y} \geq |\mathbf{x} - 1|\}$ be A . Then 6 A is equal to:

A. 16

B. 12

C. 18

D. 14

Question 168 View solution online

The centre of a circle C is at the centre of the ellipse $\mathbf{E}: \frac{x^2}{a^2}+\frac{y^2}{b^2}=1, \mathbf{a}>\mathbf{b}$. Let C pass through the foci $\mathbf{F_1}$ and $\mathbf{F_2}$ of E such that the circle C and the ellipse E intersect at four points. Let P be one of these four points. If the area of the triangle $\mathbf{PF_1\ F_2}$ is 30 and the length of the major axis of E is 17 , then the distance between the foci of E is :

A. 26

B. 13

C. 12

D. $\frac{13}{2}$

Question 169 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 170 View solution online

Let the ellipse $E: x^2+9y^2=9$ intersect the positive x - and y -axes at the points A and B respectively Let the major axis of E be a diameter of the circle C. Let the line passing through A and B meet the circle C at the point P . If the area of the triangle which vertices $\mathbf{A, P}$ and the origin O is $\frac{m}{n}$, where m and n are coprime, then $\mathbf{m-n}$ is equal to

A. 18

B. 16

C. 17

D. 15

Question 171 View solution online

Let the ellipse, $E_1 : \frac{x^2}{a^2} + \frac{y^2}{b^2} = 1, a > b$ and $\mathbf{E_2 : \frac{x^2}{A^2} + \frac{y^2}{B^2} = 1,\ A < B}$ have same eccentricity $\frac{1}{\sqrt{3}}$. Let the product of their lengths of latus rectums be $\frac{32}{\sqrt{3}}$, and the distance between the foci of $\mathbf{E_1}$ be 4. If $\mathbf{E_1}$ and $\mathbf{E_2}$ meet at $\mathbf{A, B, C}$ and D , then the area of the quadrilateral ABCD equals:

A. $6\sqrt{6}$

B. $\frac{18\sqrt{6}}{5}$

C. $\frac{12\sqrt{6}}{5}$

D. $\frac{24\sqrt{6}}{5}$

Question 172 View solution online

Let for two distinct values of p the lines $y = x + p$ touch the ellipse $\mathbf{E : \frac{x^2}{4^2} + \frac{y^2}{3^2} = 1}$ at the points A and B . Let the line $\mathbf{y = x}$ intersect E at the points C and D . Then the area of the quadrilateral ABCD is equal to

A. 36

B. 24

C. 48

D. 20

Question 173 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 $\mathbf{R\,(x_1, y_1), x_1 > 0}$. If F is a focus of H which is nearer to the point P , then the area of $\mathbf{\triangle QFR}$ is equal to

A. $4\sqrt{6}$

B. $\sqrt{6} - 1$

C. $\frac{7}{\sqrt{6}} - 2$

D. $4\sqrt{6} - 1$

CHAPTER 18 / MATHEMATICS

Vector Algebra

Questions 174-185 / 12 selected / 4.0% practice weight / Next

Topics to prioritise in this collection

- Algebra of vectors: 4 questions / 33.3% of this chapter
- Scalar product: 4 questions / 33.3% of this chapter
- Vector operations: 2 questions / 16.7% of this chapter
- Vector operations and geometric interpretation: 2 questions / 16.7% of this chapter

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

Question 174 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 175 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 $\left(2,3,\frac{1}{2}\right)$, then the value of $\frac{|13\vec{a}|^2}{d^2}$ is equal to

A. 90

B. 93

C. 95

D. 97

Question 176 View solution online

Let $\vec{a} = 2\hat{i} + 7\hat{j} - \hat{k}, \vec{b} = 3\hat{i} + 5\hat{k}$ and $\vec{c} = \hat{i} - \hat{j} + 2\hat{k}$. Let $\overrightarrow{\mathbf{d}}$ be a vector which is perpendicular to both $\vec{a}$ and $\vec{b}$, and $\vec{c} \cdot \vec{d} = 12$. Then $(-\hat{i} + \hat{j} - \hat{k}) \cdot (\vec{c} \times \vec{d})$ is equal to

A. 48

B. 42

C. 44

D. 24

Question 177 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 $6\left(|\overrightarrow{\mathrm{AG}}|^2 + |\overrightarrow{\mathrm{BG}}|^2 + |\overrightarrow{\mathrm{CG}}|^2\right)$ is equal to

Numerical answer: _____

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

Question 178 View solution online

Let $\vec{a} = 2\hat{i} + 3\hat{j} + 4\hat{k}, \vec{b} = 2\hat{i} - 2\hat{j} - 2\hat{k}$ and $\vec{c} = -\hat{i} + 4\hat{j} + 3\hat{k}$. If $\vec{d}$ is a vector perpendicular to both $\overrightarrow{\mathbf{b}}$ and $\overrightarrow{\mathbf{c}}$ and $\overrightarrow{\mathbf{a}} \cdot \overrightarrow{\mathbf{d}} = 18$, Then $|\overrightarrow{\mathbf{a}} \times \overrightarrow{\mathbf{d}}|^2$ is equal to

A. 640

B. 760

C. 680

D. 720

Question 179 View solution online

Let $\vec{a} = \hat{i} - 2\hat{j} + 3\hat{k}, \vec{b} = 2\hat{i} + \hat{j} - \hat{k}, \vec{c} = \lambda\hat{i} + \hat{j} + \hat{k}$ and $\vec{v} = \vec{a} \times \vec{b}$. If $\vec{v} . \vec{c} = 11$ and the length of the projection of $\vec{b}$ on $\vec{c}$ is p, then $9p^2$ is equal to :

A. 9

B. 6

C. 4

D. 12

Question 180 View solution online

Let $\vec{\alpha} = 3\hat{i} + \hat{j}$ and $\vec{\beta} = 2\hat{i} - \hat{j} + 3\hat{k}$. If $\vec{\beta} = \vec{\beta}_1 - \vec{\beta}_2$, where $\vec{\beta}_1$ is parallel to $\vec{\alpha}$ and $\vec{\beta}_2$ is perpendicular to $\vec{\alpha}$, then $\vec{\beta}_1 \times \vec{\beta}_2$ is equal to:

A. $\frac{1}{2}(3\hat{i} - 9\hat{j} + 5\hat{k})$

B. $\frac{1}{2}(-3\hat{i} + 9\hat{j} + 5\hat{k})$

C. $-3\hat{i} + 9\hat{j} + 5\hat{k}$

D. $3\hat{i} - 9\hat{j} - 5\hat{k}$

Question 181 View solution online

Let $\vec{a} = \hat{i} + \hat{j} + \hat{k}, \vec{b} = 3\hat{i} + 2\hat{j} - \hat{k}, \vec{c} = \lambda\hat{j} + \mu\hat{k}$ and $\hat{d}$ be a unit vector such that $\vec{a} \times \hat{d} = \vec{b} \times \hat{d}$ and $\vec{c} . \hat{d} = 1$, If $\vec{c}$ is perpendicular to $\vec{a}$, then $|3\lambda\hat{d} + \mu\vec{c}|^2$ is equal to .

Numerical answer: _____

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

Question 182 View solution online

Let $\vec{a} = \hat{i} + 2\hat{j} + 3\hat{k}$, $\vec{b} = 2\hat{i} + 3\hat{j} - 5\hat{k}$ and $\vec{c} = 3\hat{i} - \hat{j} + \lambda\hat{k}$ be three vectors. Let $\vec{r}$ be a unit vector along $\vec{b} + \vec{c}$. If $\vec{r} . \vec{a} = 3$, then 3λ is equal to :

A. 27

B. 25

C. 25

D. 21

Question 183 View solution online

Let $\vec{a} = \hat{i} + 4\hat{j} + 2\hat{k}, \vec{b} = 3\hat{i} - 2\hat{j} + 7\hat{k}$ and $\vec{c} = 2\hat{i} - \hat{j} + 4\hat{k}$. If a vector $\vec{d}$ satisfies $\vec{d} \times \vec{b} = \vec{c} \times \vec{b}$ and $\vec{d}.\vec{a} = 24$, then $|\vec{d}|^2$ is equal to

A. 413

B. 423

C. 323

D. 313

Question 184 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 185 View solution online

Let $\vec{a} = -\hat{i} + \hat{j} + 2\hat{k}, \vec{b} = \hat{i} - \hat{j} - 3\hat{k}, \vec{c} = \vec{a} \times \vec{b}$ and $\vec{d} = \vec{c} \times \vec{a}$. Then $(\vec{a} - \vec{b}) \cdot \vec{d}$ is equal to :

A. 4

B. -4

C. -2

D. 2

CHAPTER 19 / MATHEMATICS

Three Dimensional Geometry

Questions 186-299 / 114 selected / 38.0% practice weight / Focus first

Topics to prioritise in this collection

- Coordinates in three dimensions: 28 questions / 24.6% of this chapter
- Shortest distance between lines: 21 questions / 18.4% of this chapter
- Lines and planes in space: 17 questions / 14.9% of this chapter
- Equation of a plane: 16 questions / 14.0% of this chapter
- Introduction to 3D Geometry: 15 questions / 13.2% of this chapter
- Equation of a line in space: 4 questions / 3.5% of this chapter
- Coordinate-geometric properties of lines: 3 questions / 2.6% of this chapter
- Three Dimensional Geometry: 3 questions / 2.6% of this chapter
- Distance from a point to a three-dimensional line along specified directions: 1 question / 0.9% of this chapter
- Distances and point coordinates along lines in three dimensions: 1 question / 0.9% of this chapter
- Equations and relative geometry of lines in three dimensions: 1 question / 0.9% of this chapter
- Intersecting spatial lines: 1 question / 0.9% of this chapter
- Plane containing lines: 1 question / 0.9% of this chapter
- Section formula in three dimensions: 1 question / 0.9% of this chapter
- Three-dimensional line coordinates and area of a triangle: 1 question / 0.9% of this chapter

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

---

Question 186 View solution online

Let the line $\ell : x = \frac{1-y}{-2} = \frac{z-3}{\lambda}, \lambda \in \mathbb{R}$ meet the plane $\mathrm{P} : \mathrm{x} + 2\mathrm{y} + 3\mathrm{z} = 4$ 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 187 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 188 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 189 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 190 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 $+b + c$ is equal to

A. 14

B. 12

C. 13

D. 15

Question 191 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 192 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 193 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 194 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 195 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 196 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 197 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 198 View solution online

Let (α, β, γ) be the image of the point $P(2, 3, 5)$ in the plane $2x + y - 3z = 6$. Then $\alpha + \beta + \gamma$ is equal to

A. 10

B. 5

C. 12

D. 9

Question 199 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 200 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 201 View solution online

Let the line passing through the points, $P(2, -1, 2)$ and $Q(5, 3, 4)$ meet the plane $x - y + z = 4$ 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 202 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 203 View solution online

A circle with centre $(2, 3)$ and radius 4 intersects the line $x + y = 3$ at the points P and Q. If the tangents at P and Q intersect at the point $S(\alpha, \beta)$, then $4\alpha - 7\beta$ is equal to

Numerical answer: _____

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

Question 204 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 205 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 206 View solution online

Let d be the distance of the point of intersection of the lines $\frac{x+6}{3} = \frac{y}{2} = \frac{z+1}{1}$ and $\frac{x-7}{4} = \frac{y-9}{3} = \frac{z-4}{2}$ from the point $(7, 8, 9)$. Then $d^2 + 6$ is equal to :

A. 72

B. 69

C. 75

D. 78

Question 207 View solution online

For real numbers α and $\beta \neq 0$, if the point of intersection of the straight lines $\frac{x-\alpha}{1} = \frac{y-1}{2} = \frac{z-1}{3}$ and $\frac{x-4}{\beta} = \frac{y-6}{3} = \frac{z-7}{3}$, lies on the plane $x + 2y - z = 8$, then $\alpha - \beta$ is equal to :

A. 5

B. 9

C. 3

D. 7

Question 208 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 209 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 210 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 211 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 212 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 213 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 214 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 215 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 216 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 217 View solution online

Let the mirror image of the point ($\mathbf{a, b, c}$) with respect to the plane $3x - 4y + 12z + 19 = 0$ be ($\mathbf{a - 6}, \beta, \gamma$). If $\mathbf{a + b + c = 5}$, 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 218 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 219 View solution online

Let a line having direction ratio $1, -4, 2$ intersect the lines $\frac{x-7}{3} = \frac{y-1}{-1} = \frac{z+2}{1}$ and $\frac{x}{2} = \frac{y-7}{3} = \frac{z}{1}$ at the point A and B . Then $(AB)^2$ is equal to .

Numerical answer: _____

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

Question 220 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 221 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 $\mathbf{a}, \mathbf{b}, (\mathbf{a} < \mathbf{b})$. 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 222 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 $\mathbf{a}, \mathbf{b}, (\mathbf{a} < \mathbf{b})$. 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 223 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 224 View solution online

Let A and B be two distinct points on the line $\mathbf{L}:\frac{x-6}{3}=\frac{y-7}{2}=\frac{z-7}{-2}$. Both A and B are at a distance $2\sqrt{17}$ from the foot of perpendicular drawn from the point $(1,2,3)$ on the line L . If O is the origin, then $\overrightarrow{OA}\cdot\overrightarrow{OB}$ is equal to:

A. 49

B. 47

C. 21

D. 62

Question 225 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 226 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 227 View solution online

If the length of the perpendicular drawn from the point $\mathbf{P(a,4,2), a > 0}$ on the line $\frac{x+1}{2} = \frac{y-3}{3} = \frac{z-1}{-1}$ is $2\sqrt{6}$ units and $\mathbf{Q}\left(\alpha_1, \alpha_2, \alpha_3\right)$ is the image of the point P in this line, then $\mathbf{a} + \sum_{i=1}^{3} \alpha_i$ is equal to :

A. 7

B. 8

C. 12

D. 14

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

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 230 View solution online

Let the line $\frac{x-3}{7} = \frac{y-2}{-1} = \frac{z-3}{-4}$ intersect the plane containing the lines $\frac{x-4}{1} = \frac{y+1}{-2} = \frac{z}{1}$ and $4ax - y + 5z - 7a = 0 = 2x - 5y - z - 3, a \in \mathbb{R}$ at the point $P(\alpha, \beta, \gamma)$. Then the value of $\alpha + \beta + \gamma$ equals .

Numerical answer: _____

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

Question 231 View solution online

Let a line with direction ratios $a, -4a, -7$ be perpendicular to the lines with direction ratios 3 , $-1, 2b$ and $b, a, -2$. If the point of intersection of the line $\frac{x+1}{a^2+b^2} = \frac{y-2}{a^2-b^2} = \frac{z}{1}$ and the plane $x - y + z = 0$ 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 232 View solution online

Let the mirror image of the point $(1, 3, a)$ with respect to the plane $\vec{r} \cdot (2\hat{i} - \hat{j} + \hat{k}) - b = 0$ be $(-3, 5, 2)$. Then the value of $|a + b|$ is equal to

.

Numerical answer: _____

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

Question 233 View solution online

Let the lines $\frac{x-1}{\lambda} = \frac{y-2}{1} = \frac{z-3}{2}$ and $\frac{x+26}{-2} = \frac{y+18}{3} = \frac{z+28}{\lambda}$ be coplanar and P be the plane containing these two lines. Then which of the following points does NOT lies on P?

A. $(0, -2, -2)$

B. $(-5, 0, -1)$

C. $(3, -1, 0)$

D. $(0, 4, 5)$

Question 234 View solution online

Let $\mathbf{P}(\alpha, \beta, \gamma)$ be the point on the line

$$\frac{x-1}{2} = \frac{y+1}{-3} = z \text{ at a distance } 4\sqrt{14} \text{ from the}$$

point (1, -1, 0) and nearer to the origin. Then the shortest distance, between the lines $\frac{x-\alpha}{1} = \frac{y-\beta}{2} = \frac{z-\gamma}{3}$ and $\frac{x+5}{2} = \frac{y-10}{1} = \frac{z-3}{1}$, is equal to

A. $7\sqrt{\frac{5}{4}}$

B. $4\sqrt{\frac{7}{5}}$

C. $4\sqrt{\frac{5}{7}}$

D. $2\sqrt{\frac{7}{4}}$

Question 235 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 236 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 237 View solution online

The line of shortest distance between the lines $\frac{x-2}{0} = \frac{y-1}{1} = \frac{z}{1}$ and $\frac{x-3}{2} = \frac{y-5}{2} = \frac{z-1}{1}$ makes an angle of $\cos^{-1}\left(\sqrt{\frac{2}{27}}\right)$ with the plane $P : ax - y - z = 0, (a > 0)$. If the image of the point $(1, 1, -5)$ in the plane P 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 238 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 239 View solution online

The equation of the line passing through $(-4, 3, 1)$, parallel to the plane $\mathbf{x + 2y - z - 5 = 0}$ 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 240 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, $\mathbf{x + y + z = 2}$?

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 241 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 242 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 243 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 244 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 245 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 246 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 247 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 248 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 249 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 250 View solution online

Two lines $\frac{x-3}{1} = \frac{y+1}{3} = \frac{z-6}{-1}$ and $\frac{x+5}{7} = \frac{y-2}{-6} = \frac{z-3}{4}$ intersect at the point R. The reflection of R in the xy-plane has coordinates :-

A. $(2, 4, 7)$

B. $(-2, 4, 7)$

C. $(2, -4, -7)$

D. $(2, -4, 7)$

Question 251 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 252 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 253 View solution online

Two lines

$$\frac{x-3}{1}=\frac{y+1}{3}=\frac{z-6}{-1}$$

and

$$\frac{x+5}{7}=\frac{y-2}{-6}=\frac{z-3}{4}$$

intersect at the point R. The reflection of R in the xy-plane has coordinates :-

A. $(2,4,7)$

B. $(-2,4,7)$

C. $(2,-4,-7)$

D. $(2,-4,7)$

Question 254 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 $\mathbf{A}(-4,4,3) \cdot \mathbf{B}(-1,6,3)$ 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 255 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 256 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 $\mathbf{L_2}$ is :

A. $\frac{23}{\sqrt{38}}$

B. $\frac{21}{\sqrt{57}}$

C. $\frac{23}{\sqrt{57}}$

D. $\frac{21}{\sqrt{38}}$

Question 257 View solution online

The shortest distance between the line $\frac{x-3}{4} = \frac{y+7}{-11} = \frac{z-1}{5}$ and $\frac{x-5}{3} = \frac{y-9}{-6} = \frac{z+2}{1}$ is :

A. $\frac{187}{\sqrt{563}}$

B. $\frac{178}{\sqrt{563}}$

C. $\frac{185}{\sqrt{563}}$

D. $\frac{179}{\sqrt{563}}$

Question 258 View solution online

The line $\mathbf{l_1}$ passes through the point $(2, 6, 2)$ and is perpendicular to the plane $\mathbf{2x + y - 2z = 10}$. Then the shortest distance between the line l_1 and the line $\frac{x+1}{2} = \frac{y+4}{-3} = \frac{z}{2}$ is :

A. $\frac{13}{3}$

B. $\frac{19}{3}$

C. 7

D. 9

Question 259 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 260 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 $4x = 2y = z$ 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 261 View solution online

The line L_1 is parallel to the vector $\vec{a} = -3\hat{i} + 2\hat{j} + 4\hat{k}$ 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

Let $\mathbf{Q(a,b,c)}$ be the image of the point $\mathbf{P(3,2,1)}$ in the line $\frac{x-1}{1}=\frac{y}{2}=\frac{z-1}{1}$. Then the distance of Q from the line $\frac{x-9}{3}=\frac{y-9}{2}=\frac{z-5}{-2}$ is

A. 6

B. 8

C. 7

D. 5

Question 263 View solution online

Let L be the line $\frac{x+1}{2}=\frac{y+1}{3}=\frac{z+3}{6}$ and let S be the set of all points (a, b, c) on L, whose distance from the line $\frac{x+1}{2}=\frac{y+1}{3}=\frac{z-9}{0}$ along the line L is 7. Then $\sum_{(a,b,c)\in S}(a+b+c)$ is equal to :

A. 34

B. 28

C. 40

D. 6

Question 264 View solution online

If the foot of the perpendicular from point $(4,3,8)$ on the line $L_1:\frac{x-a}{l}=\frac{y-2}{3}=\frac{z-b}{4}, l\neq 0$ is $(3,5,7)$, then the shortest distance between the line L_1 and line $L_2:\frac{x-2}{3}=\frac{y-4}{4}=\frac{z-5}{5}$ is equal to :

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

B. $\frac{1}{\sqrt{6}}$

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

D. $\frac{1}{\sqrt{3}}$

Official Answer by NTA (2)}

Question 265 View solution online

Let d be the distance of the point of intersection of the lines

$$\frac{x+6}{3} = \frac{y}{2} = \frac{z+1}{1}$$

and

$$\frac{x-7}{4} = \frac{y-9}{3} = \frac{z-4}{2}$$

from the point $(7, 8, 9)$. Then $d^2 + 6$ is equal to :

A. (4) 78

B. (3) 75

C. (2) 69

D. (1) 72

Question 266 View solution online

The shortest distance between the line

$$\frac{x-3}{4}=\frac{y+7}{-11}=\frac{z-1}{5}$$

and

$$\frac{x-5}{3}=\frac{y-9}{-6}=\frac{z+2}{1}$$

is :

A. $\frac{187}{\sqrt{563}}$

B. $\frac{178}{\sqrt{563}}$

C. $\frac{185}{\sqrt{563}}$

D. $\frac{179}{\sqrt{563}}$

Question 267 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 268 View solution online

The shortest distance between the lines $\frac{x-1}{2}=\frac{y-2}{1}=\frac{z-6}{-3}$ and $\frac{x-1}{2}=\frac{y+8}{-7}=\frac{z-4}{5}$

A. $5\sqrt{3}$

B. $2\sqrt{3}$

C. $3\sqrt{3}$

D. $4\sqrt{3}$

Question 269 View solution online

Shortest distance between the lines $\frac{x-3}{1}=\frac{y-8}{4}=\frac{z-3}{22}, \frac{x+3}{1}=\frac{y+7}{1}=\frac{z-6}{7}$ is

A. $3\sqrt{30}$

B. $\sqrt{30}$

C. $2\sqrt{30}$

D. $4\sqrt{30}$

Question 270 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 271 View solution online

If the image of the point $\mathbf{P(1,2,a)}$ in the line $\frac{x-6}{3}=\frac{y-7}{2}=\frac{7-z}{2}$ is $\mathbf{Q(5,\ b,c)}$, then $\mathbf{a^2+b^2+c^2}$ is equal to

A. 293

B. 264

C. 298

D. 283

Question 272 View solution online

The shortest distance between the lines $\frac{x-3}{2}=\frac{y+15}{-7}=\frac{z-9}{5}$ and $\frac{x+1}{2}=\frac{y-1}{1}=\frac{z-9}{-3}$ is

A. $6\sqrt{3}$

B. $4\sqrt{3}$

C. $5\sqrt{3}$

D. $8\sqrt{3}$

Question 273 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 274 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 275 View solution online

The distance of line $3\mathrm{y}-2\mathrm{z}-1=0=3\mathrm{x}-\mathrm{z}+4$ from the point (2, -1, 6) is :

A. $\sqrt{26}$

B. $2\sqrt{5}$

C. $2\sqrt{6}$

D. $4\sqrt{2}$

Question 276 View solution online

The distance of the point $(7, 10, 11)$ from the line

$$\frac{x-4}{1} = \frac{y-4}{0} = \frac{z-2}{3}$$

along the line

$$\frac{x-9}{2} = \frac{y-13}{3} = \frac{z-17}{6}$$

is

A. 18

B. 14

C. 12

D. 16

Question 277 View solution online

The vertices B and C of a triangle ABC lie on the line $\frac{x}{1} = \frac{1-y}{-2} = \frac{z-2}{3}$. The coordinates of A and B are $(1, 6, 3)$ and $(4, 9, \alpha)$ respectively and C is at a distance of 10 units from B . The area (in sq. units) of $\triangle ABC$ is:

A. $5\sqrt{13}$

B. $15\sqrt{13}$

C. $20\sqrt{13}$

D. $10\sqrt{13}$

Question 278 View solution online

Let a line pass through two distinct points $\mathbf{P}(-2,-1,3)$ and $\mathbf{Q}$, and be parallel to the vector $3\hat{\mathbf{i}}+2\hat{\mathbf{j}}+2\hat{\mathbf{k}}$. If the distance of the point $\mathbf{Q}$ from the point $\mathbf{R}(1,3,3)$ is 5, then the square of the area of $\triangle \mathbf{PQR}$ is equal to:

A. 136

B. 140

C. 144

D. 148

Question 279 View solution online

The shortest distance between the lines $\frac{x+7}{-6}=\frac{y-6}{7}=z$ and $\frac{7-x}{2}=y-2=z-6$ is

A. $2\sqrt{29}$

B. 1

C. $\sqrt{\frac{37}{29}}$

D. $\frac{\sqrt{29}}{2}$

Question 280 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 $\mathbf{P}(1,-9,2)$ from the line L is

A. 9

B. $\sqrt{54}$

C. $\sqrt{69}$

D. $\sqrt{74}$

Question 281 View solution online

Line L_1 passes through the point $(1,2,3)$ and is parallel to z -axis. Line $\mathbf{L_2}$ passes through the point $(\lambda,5,6)$ and is parallel to y-axis. Let for $\lambda=\lambda_1,\lambda_2,\lambda_2<\lambda_1$, the shortest distance between the two lines be 3 . Then the square of the distance of the point ($\lambda_1,\lambda_2,7$) from the line $\mathbf{L_1}$ is

A. 40

B. 32

C. 25

D. 37

Question 282 View solution online

The shortest distance between the lines

$$\frac{x-3}{2}=\frac{y+15}{-7}=\frac{z-9}{5}$$

and

$$\frac{x+1}{2}=\frac{y-1}{1}=\frac{z-9}{-3}$$

is

A. $6\sqrt{3}$

B. $4\sqrt{3}$

C. $5\sqrt{3}$

D. $8\sqrt{3}$

Question 283 View solution online

Let the line $\mathbf{L_1}$ be parallel to the vector $-3\hat{\mathbf{i}}+2\hat{\mathbf{j}}+4\hat{\mathbf{k}}$ and pass through the point ($\mathbf{2, 6, 7}$) and the line $\mathbf{L_2}$ be parallel to the vector $2\hat{\mathbf{i}}+\hat{\mathbf{j}}+3\hat{\mathbf{k}}$ and pass through the point (4, 3, 5). If the line $\mathbf{L_3}$ is parallel to the vector $-3\hat{\mathbf{i}}+5\hat{\mathbf{j}}+16\hat{\mathbf{k}}$ and intersects the lines $\mathbf{L_1}$ and $\mathbf{L_2}$ at the points C and D , respectively, then $|\overrightarrow{\mathbf{CD}}|^2$ is equal to :

A. 171

B. 290

C. 312

D. 89

Question 284 View solution online

If $A(1,1), B(6,5), C\left(\frac{3}{2}, 2\right)$ are the vertices of $\triangle ABC$. A point P is such that area of $\triangle PAB, \triangle PAC$ and $\triangle PBC$ are equal, then find the length of the line the segment PQ, where Q is the point $\left(-\frac{7}{6}, -\frac{1}{3}\right)$

A. 2

B. 3

C. 4

D. 5

Question 285 View solution online

Let the line $\frac{x}{1} = \frac{6-y}{2} = \frac{z+8}{5}$ intersect the lines $\frac{x-5}{4} = \frac{y-7}{3} = \frac{z+2}{1}$ and $\frac{x+3}{6} = \frac{3-y}{3} = \frac{z-6}{1}$ at the points A and B respectively. Then the distance of the mid-point of the line segment AB from the plane $2x - 2y + z = 14$ is

A. 4

B. $\frac{10}{3}$

C. 3

D. $\frac{11}{3}$

Question 286 View solution online

Let PQR be a triangle with $R(-1,4,2)$. Suppose $\mathbf{M(2,1,2)}$ is the mid point of PQ . The distance of the centroid of $\triangle \mathbf{PQR}$ 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 287 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 $\triangle \mathbf{PQR}$ is

Numerical answer: _____

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

Question 288 View solution online

The distance of the point having position vector $-\hat{i}+2\hat{j}+6\hat{k}$ from the straight line passing through the point $(2,3,-4)$ and parallel to the vector $6\hat{i}+3\hat{j}-4\hat{k}$ is :

A. 7

B. $4\sqrt{3}$

C. 6

D. $2\sqrt{13}$

Question 289 View solution online

If the lines $\vec{r}=(\hat{i}-\hat{j}+\hat{k})+\lambda(3\hat{j}-\hat{k})$ and $\vec{r}=(\alpha\hat{i}-\hat{j})+\mu(2\hat{i}-3\hat{k})$ are co-planar, then distance of the plane containing these two lines from the point $(\cdot,0,0)$ is :

A. $\frac{2}{9}$

B. $\frac{2}{11}$

C. $\frac{4}{11}$

D. 2

Question 290 View solution online

The shortest distance between the lines $\frac{x+2}{1}=\frac{y}{-2}=\frac{z-5}{2}$ and $\frac{x-4}{1}=\frac{y-1}{2}=\frac{z+3}{0}$ is

A. 6

B. 9

C. 7

D. 8

Question 291 View solution online

If the distances of the point (1, 2, a) from the line
$\frac{x-1}{1} = \frac{y}{2} = \frac{z-1}{1}$ along the lines
$L_1 : \frac{x-1}{3} = \frac{y-2}{4} = \frac{z-a}{b}$ and
$L_2 : \frac{x-1}{1} = \frac{y-2}{4} = \frac{z-a}{c}$ are equal,
then $a + b + c$ is equal to

A. 7

B. 5

C. 6

D. 4

Question 292 View solution online

If $A(3, 1, -1), B\left(\frac{5}{3}, \frac{7}{3}, \frac{1}{3}\right), C(2, 2, 1)$ and $D\left(\frac{10}{3}, \frac{2}{3}, \frac{-1}{3}\right)$ are the vertices of a quadrilateral ABCD, then its area is

A. $\frac{4\sqrt{2}}{3}$

B. $\frac{5\sqrt{2}}{3}$

C. $2\sqrt{2}$

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

Question 293 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 $x - 2y - z = 3$. If d is the distance of the point $(0, 0, 6)$ from L , then 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 294 View solution online

The shortest distance between the lines $x+1=2y=-12z$ and $x=y+2=6z-6$ is

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

B. 2

C. $\frac{5}{2}$

D. 3

Question 295 View solution online

Let the values of λ for which the shortest distance between the lines $\frac{x-1}{2}=\frac{y-2}{3}=\frac{z-3}{4}$ and $\frac{x-\lambda}{3}=\frac{y-4}{4}=\frac{z-5}{5}$ is $\frac{1}{\sqrt{6}}$ be λ_1 and λ_2. Then the radius of the circle passing through the points $(0,0),(\lambda_1,\lambda_2)$ and (λ_2,λ_1) is

A. $\frac{5\sqrt{2}}{3}$

B. 4

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

D. 3

Question 296 View solution online

The shortest distance between the lines $x+1=2y=-12z$ and $x=y+2=6z-6$ is

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

B. 2

C. $\frac{5}{2}$

D. 3

Question 297

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 298 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 $Q(4, -5, 1)$ is :

A. 5

B. 10

C. $5\sqrt{6}$

D. $5\sqrt{5}$

Question 299 View solution online

The distance, of the point ($7, -2, 11$) from the line $\frac{x-6}{1} = \frac{y-4}{0} = \frac{z-8}{3}$ along the line $\frac{x-5}{2} = \frac{y-1}{-3} = \frac{z-5}{6}$, is :

A. 12

B. 14

C. 18

D. 21

CHAPTER 20 / MATHEMATICS

Linear Programming

Questions 300-300 / 1 selected / 0.3% practice weight / Consolidate

Topics to prioritise in this collection

- Linear optimisation: 1 question / 100.0% of this chapter

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

Question 300 View solution online

Let the points $\left(\frac{11}{2}, \alpha\right)$ lie on or inside the triangle with sides $x + y = 11, x + 2y = 16$ and $2x + 3y = 29$. Then the product of the smallest and the largest values of α is equal to :

A. 22

B. 44

C. 33

D. 55

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.** D	**4.** 19	**5.** 18
6. B	**7.** A	**8.** 6	**9.** A	**10.** 7
11. D	**12.** 5	**13.** 4	**14.** 20	**15.** 4
16. 3395	**17.** 14	**18.** B	**19.** A	**20.** 16
21. 432	**22.** A	**23.** 42	**24.** A	**25.** C
26. A	**27.** 81	**28.** 2997	**29.** 1436	**30.** 514
31. 21	**32.** B	**33.** 60	**34.** 3000	**35.** 240
36. 710	**37.** 32	**38.** 120	**39.** 546	**40.** 6860
41. B	**42.** C	**43.** C	**44.** 3	**45.** C
46. 10	**47.** 22	**48.** 125	**49.** 31	**50.** C
51. A	**52.** B	**53.** A	**54.** C	**55.** C
56. 9	**57.** B	**58.** A	**59.** C	**60.** B
61. A	**62.** D	**63.** 6699	**64.** C	**65.** C
66. 107	**67.** 321	**68.** 60	**69.** 754	**70.** 8
71. D	**72.** B	**73.** 3	**74.** 461	**75.** 14
76. 40	**77.** C	**78.** D	**79.** D	**80.** D
81. D	**82.** D	**83.** B	**84.** D	**85.** B
86. D	**87.** 11	**88.** C	**89.** D	**90.** B
91. 42	**92.** B	**93.** C	**94.** C	**95.** A
96. B	**97.** 1552	**98.** B	**99.** B	**100.** C
101. D	**102.** 61	**103.** B	**104.** D	**105.** B
106. A	**107.** 75	**108.** D	**109.** C	**110.** D
111. D	**112.** A	**113.** 13	**114.** B	**115.** 9
116. 3	**117.** C	**118.** A	**119.** 120	**120.** C
121. A	**122.** 9	**123.** 8	**124.** B	**125.** A
126. C	**127.** C	**128.** B	**129.** B	**130.** 10
131. 398	**132.** 269	**133.** D	**134.** 56	**135.** D
136. C	**137.** B	**138.** A	**139.** C	**140.** D
141. D	**142.** 603	**143.** B	**144.** 5	**145.** B
146. A	**147.** D	**148.** A	**149.** A	**150.** C
151. 13	**152.** 62	**153.** A	**154.** 38	**155.** D

156. C **157.** 14 **158.** C **159.** A **160.** B

161. B **162.** B **163.** 72 **164.** 3 **165.** C

166. C **167.** D **168.** B **169.** A **170.** C

171. D **172.** B **173.** C **174.** C **175.** B

176. C **177.** 164 **178.** D **179.** D **180.** B

181. 5 **182.** B **183.** A **184.** A **185.** C

186. 11 **187.** 15 **188.** C **189.** C **190.** A

191. C **192.** C **193.** C **194.** A **195.** 26

196. B **197.** A **198.** A **199.** D **200.** C

201. D **202.** A **203.** 11 **204.** A **205.** B

206. C **207.** D **208.** 11 **209.** D **210.** D

211. D **212.** A **213.** 108 **214.** A **215.** D

216. B **217.** 137 **218.** 180 **219.** 84 **220.** 158

221. B **222.** C **223.** C **224.** B **225.** 8

226. C **227.** B **228.** C **229.** 38 **230.** 12

231. 10 **232.** 1 **233.** D **234.** B **235.** B

236. D **237.** 3 **238.** C **239.** B **240.** C

241. B **242.** D **243.** B **244.** A **245.** A

246. C **247.** A **248.** D **249.** C **250.** C

251. C **252.** A **253.** C **254.** C **255.** A

256. A **257.** A **258.** A **259.** A **260.** C

261. A **262.** C **263.** A **264.** B **265.** A

266. A **267.** 14 **268.** B **269.** A **270.** 18

271. C **272.** B **273.** C **274.** D **275.** C

276. D **277.** A **278.** A **279.** A **280.** D

281. C **282.** B **283.** B **284.** D **285.** A

286. C **287.** 957 **288.** A **289.** B **290.** B

291. A **292.** A **293.** 26 **294.** B **295.** A

296. B **297.** B **298.** D **299.** B **300.** C