

Q:1
Topic Name:Mathematics-Section A

ItemCode:161	
Let $A = \{x \in \mathbb{R} : x + 1 < 2\}$ and $B = \{x \in \mathbb{R} : x - 1 \geq 2\}$. Then which one of the following statements is NOT true ?	
A	$A - B = (-1, 1)$
B	$B - A = \mathbb{R} - (-3, 1)$
C	$A \cap B = (-3, -1]$
D	$A \cup B = \mathbb{R} - [1, 3)$

Q:2
Topic Name:Mathematics-Section A

ItemCode:162	
Let $a, b \in \mathbb{R}$ be such that the equation $ax^2 - 2bx + 15 = 0$ has a repeated root α . If α and β are the roots of the equation $x^2 - 2bx + 21 = 0$, then $\alpha^2 + \beta^2$ is equal to:	
A	37
B	58
C	68
D	92

Q:3
Topic Name:Mathematics-Section A

ItemCode:163	
Let z_1 and z_2 be two complex numbers such that $\bar{z}_1 = i\bar{z}_2$ and $\arg\left(\frac{z_1}{\bar{z}_2}\right) = \pi$. Then	
Question:	
A	$\arg z_2 = \frac{\pi}{4}$
B	$\arg z_2 = -\frac{3\pi}{4}$
C	$\arg z_1 = \frac{\pi}{4}$
D	$\arg z_1 = -\frac{3\pi}{4}$

Q:4
Topic Name:Mathematics-Section A

ItemCode:164	
The system of equations	
$-kx + 3y - 14z = 25$	
$-15x + 4y - kz = 3$	
$-4x + y + 3z = 4$	
Question:is consistent for all k in the set	
A	$\mathbb{R}$
B	$\mathbb{R} - \{-11, 13\}$
C	$\mathbb{R} - \{13\}$
D	$\mathbb{R} - \{-11, 11\}$

Q:5
Topic Name:Mathematics-Section A

ItemCode:165

$$\lim_{x \rightarrow \frac{\pi}{2}} \left(\tan^2 x \left(\left(2 \sin^2 x + 3 \sin x + 4 \right)^{\frac{1}{2}} - \left(\sin^2 x + 6 \sin x + 2 \right)^{\frac{1}{2}} \right) \right)$$
 is equal to

Question:

A $\frac{1}{12}$

B $-\frac{1}{18}$

C $-\frac{1}{12}$

D $\frac{1}{6}$

Q:6
Topic Name:Mathematics-Section A

ItemCode:166

The area of the region enclosed between the parabolas $y^2 = 2x - 1$ and $y^2 = 4x - 3$

Question:is

A $\frac{1}{3}$

B $\frac{1}{6}$

C $\frac{2}{3}$

D $\frac{3}{4}$

Q:7
Topic Name:Mathematics-Section A

ItemCode:167

The coefficient of x^{101} in the expression

Question: $(5+x)^{500} + x(5+x)^{499} + x^2(5+x)^{498} + + x^{500}, x > 0$, is

A $^{501}C_{101} (5)^{399}$

B $^{501}C_{101} (5)^{400}$

C $^{501}C_{100} (5)^{400}$

D $^{500}C_{101} (5)^{399}$

Q:8
Topic Name:Mathematics-Section A

ItemCode:168

The sum $1 + 2 \cdot 3 + 3 \cdot 3^2 + + 10 \cdot 3^9$ is equal to :

Question:

A $\frac{2 \cdot 3^{12} + 10}{4}$

B $\frac{19 \cdot 3^{10} + 1}{4}$

C $5 \cdot 3^{10} - 2$

D $\frac{9 \cdot 3^{10} + 1}{2}$

Q:9
Topic Name:Mathematics-Section A

ItemCode:169

Let P be the plane passing through the intersection of the planes

$$\vec{r} \cdot (\hat{i} + 3\hat{j} - \hat{k}) = 5 \text{ and } \vec{r} \cdot (2\hat{i} - \hat{j} + \hat{k}) = 3, \text{ and the point } (2, 1, -2). \text{ Let the}$$

position vectors of the points X and Y be $\hat{i} - 2\hat{j} + 4\hat{k}$ and $5\hat{i} - \hat{j} + 2\hat{k}$

Question: respectively. Then the points

- A X and $X + Y$ are on the same side of P
- B Y and $Y - X$ are on the opposite sides of P
- C X and Y are on the opposite sides of P
- D $X + Y$ and $X - Y$ are on the same side of P

Q:10

Topic Name:Mathematics-Section A

ItemCode:1610

A circle touches both the y -axis and the line $x + y = 0$. Then the locus of its center

Question: is:

- A $y = \sqrt{2}x$
- B $x = \sqrt{2}y$
- C $y^2 - x^2 = 2xy$
- D $x^2 - y^2 = 2xy$

Q:11

Topic Name:Mathematics-Section A

ItemCode:1611

Water is being filled at the rate of $1 \text{ cm}^3 / \text{sec}$ in a right circular conical vessel (vertex downwards) of height 35 cm and diameter 14 cm. When the height of the water level is 10 cm, the rate (in cm^2 / sec) at which the wet conical surface

Question: area of the vessel increases is

- A 5
- B $\frac{\sqrt{21}}{5}$
- C $\frac{\sqrt{26}}{5}$
- D $\frac{\sqrt{26}}{10}$

Q:12

Topic Name:Mathematics-Section A

ItemCode:1612

Question: If $b_n = \int_0^{\frac{\pi}{2}} \frac{\cos^2 nx}{\sin x} dx, n \in \mathbb{N}$, then

- A $b_3 - b_2, b_4 - b_3, b_5 - b_4$ are in an A.P. with common difference -2
- B $\frac{1}{b_3 - b_2}, \frac{1}{b_4 - b_3}, \frac{1}{b_5 - b_4}$ are in an A.P. with common difference 2
- C $b_3 - b_2, b_4 - b_3, b_5 - b_4$ are in a G.P.
- D $\frac{1}{b_3 - b_2}, \frac{1}{b_4 - b_3}, \frac{1}{b_5 - b_4}$ are in an A.P. with common difference -2

Q:13

Topic Name:Mathematics-Section A

ItemCode:1613

If $y = y(x)$ is the solution of the differential equation $2x^2 \frac{dy}{dx} - 2xy + 3y^2 = 0$ such

that $y(e) = \frac{e}{3}$, then $y(1)$ is equal to

Question:

A $\frac{1}{3}$

B $\frac{2}{3}$

C $\frac{3}{2}$

D 3

Q:14

Topic Name:Mathematics-Section A

ItemCode:1614

If the angle made by the tangent at the point (x_0, y_0) on the curve

$$x = 12(t + \sin t \cos t),$$

$y = 12(1 + \sin t)^2$, $0 < t < \frac{\pi}{2}$, with the positive x -axis is $\frac{\pi}{3}$, then y_0 is equal to:

Question:

A $6(3 + 2\sqrt{2})$

B $3(7 + 4\sqrt{3})$

C 27

D 48

Q:15

Topic Name:Mathematics-Section A

ItemCode:1615

Question: The value of $2\sin(12^\circ) - \sin(72^\circ)$ is :

A $\frac{\sqrt{5}(1 - \sqrt{3})}{4}$

B $\frac{1 - \sqrt{5}}{8}$

C $\frac{\sqrt{3}(1 - \sqrt{5})}{2}$

D $\frac{\sqrt{3}(1 - \sqrt{5})}{4}$

Q:16

Topic Name:Mathematics-Section A

ItemCode:1616

A biased die is marked with numbers 2, 4, 8, 16, 32, 32 on its faces and the

probability of getting a face with mark n is $\frac{1}{n}$. If the die is thrown thrice, then the

Question: probability, that the sum of the numbers obtained is 48, is :

A $\frac{7}{2^{11}}$

B $\frac{7}{2^{12}}$

C $\frac{3}{2^{10}}$

D $\frac{13}{2^{12}}$

Q:17
Topic Name:Mathematics-Section A

ItemCode:1617	
The negation of the Boolean expression $((\sim q) \wedge p) \Rightarrow ((\sim p) \vee q)$ is logically	
Question:equivalent to :	
A	$p \Rightarrow q$
B	$q \Rightarrow p$
C	$\sim(p \Rightarrow q)$
D	$\sim(q \Rightarrow p)$

Q:18
Topic Name:Mathematics-Section A

ItemCode:1618	
If the line $y = 4 + kx$, $k > 0$, is the tangent to the parabola $y = x^2 - x^2$ at the point P	
Question:and V is the vertex of the parabola, then the slope of the line through P and V is:	
A	$\frac{3}{2}$
B	$\frac{26}{9}$
C	$\frac{5}{2}$
D	$\frac{23}{6}$

Q:19
Topic Name:Mathematics-Section A

ItemCode:1619	
The value of $\tan^{-1} \left(\frac{\cos\left(\frac{15\pi}{4}\right) - 1}{\sin\left(\frac{\pi}{4}\right)} \right)$ is equal to :	
Question:	
A	$-\frac{\pi}{4}$
B	$-\frac{\pi}{8}$
C	$-\frac{5\pi}{12}$
D	$-\frac{4\pi}{9}$

Q:20
Topic Name:Mathematics-Section A

ItemCode:1620	
The line $y = x + 1$ meets the ellipse $\frac{x^2}{4} + \frac{y^2}{2} = 1$ at two points P and Q . If r is the	
Question:radius of the circle with PQ as diameter then $(3r)^2$ is equal to :	
A	20
B	12
C	11
D	8

Q:21
Topic Name:Mathematics-Section B

ItemCode:1621

Let $A = \begin{pmatrix} 2 & -2 \\ 1 & -1 \end{pmatrix}$ and $B = \begin{pmatrix} -1 & 2 \\ -1 & 2 \end{pmatrix}$. Then the number of elements in the

Question: set $\{(n, m) : n, m \in \{1, 2, \dots, 10\} \text{ and } nA^n + mB^m = I\}$ is _____.

Q:22

Topic Name:Mathematics-Section B

ItemCode:1622

Let $f(x) = [2x^2 + 1]$ and $g(x) = \begin{cases} 2x - 3, & x < 0 \\ 2x + 3, & x \geq 0 \end{cases}$, where $[t]$ is the greatest integer $\leq t$. Then, in the open interval $(-1, 1)$, the number of points where $f \circ g$ is

Question: discontinuous is equal to _____.

Q:23

Topic Name:Mathematics-Section B

ItemCode:1623

The value of $b > 3$ for which $12 \int_3^b \frac{1}{(x^2 - 1)(x^2 - 4)} dx = \log_e \left(\frac{49}{40} \right)$, is equal to

Question: _____.

Q:24

Topic Name:Mathematics-Section B

ItemCode:1624

If the sum of the co-efficients of all the positive even powers of x in the binomial expansion of $\left(2x^3 + \frac{3}{x}\right)^{10}$ is $5^{10} - \beta \cdot 3^9$, then β is equal to _____.

Question:

Q:25

Topic Name:Mathematics-Section B

ItemCode:1625

If the mean deviation about the mean of the numbers $1, 2, 3, \dots, n$, where n is odd, is $\frac{5(n+1)}{n}$, then n is equal to _____.

Question:

Q:26

Topic Name:Mathematics-Section B

ItemCode:1626

Let $\vec{b} = \hat{i} + \hat{j} + \lambda \hat{k}$, $\lambda \in \mathbb{R}$. If $\vec{a}$ is a vector such that $\vec{a} \times \vec{b} = 13\hat{i} - \hat{j} - 4\hat{k}$ and $\vec{a} \cdot \vec{b} + 21 = 0$, then $\left(\vec{b} - \vec{a}\right) \cdot \left(\hat{k} - \hat{j}\right) + \left(\vec{b} + \vec{a}\right) \cdot \left(\hat{i} - \hat{k}\right)$ is equal to

Question: _____.

Q:27

Topic Name:Mathematics-Section B

ItemCode:1627

The total number of three-digit numbers, with one digit repeated exactly two times, is _____.

Question:

Q:28

Topic Name:Mathematics-Section B

ItemCode:1628

Let $f(x) = |(x-1)(x^2 - 2x - 3)| + x - 3$, $x \in \mathbb{R}$. If m and M are respectively the number of points of local minimum and local maximum of f in the interval $(0, 4)$, then $m + M$ is equal to _____.

Question:

Q:29

Topic Name:Mathematics-Section B

ItemCode:1629

Let the eccentricity of the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ be $\frac{5}{4}$. If the equation of the

normal at the point $\left(\frac{8}{\sqrt{5}}, \frac{12}{5}\right)$ on the hyperbola is $8\sqrt{5}x + \beta y = \lambda$, then $\lambda - \beta$ is

Question: equal to _____.

Q:30

Topic Name:Mathematics-Section B

ItemCode:1630

Let l_1 be the line in xy -plane with x and y intercepts $\frac{1}{8}$ and $\frac{1}{4\sqrt{2}}$ respectively, and

l_2 be the line in zx -plane with x and z intercepts $-\frac{1}{8}$ and $-\frac{1}{6\sqrt{3}}$ respectively. If d is

the shortest distance between the line l_1 and l_2 , then d^{-2} is equal to

Question: _____.

Q:31

Topic Name:Physics-Section A

ItemCode:1631

Given below are two statements. One is labelled as **Assertion A** and the other is labelled as **Reason R**.

Assertion A: Two identical balls A and B thrown with same velocity ' u ' at two different angles with horizontal attained the same range R . If A and B reached the maximum height h_1 and h_2 respectively, then $R = 4\sqrt{h_1 h_2}$

Reason R: Product of said heights.

$$h_1 h_2 = \left(\frac{u^2 \sin^2 \theta}{2g} \right) \cdot \left(\frac{u^2 \cos^2 \theta}{2g} \right)$$

Question: Choose the correct answer :

- | | |
|---|---|
| A | Both A and R are true and R is the correct explanation of A . |
| B | Both A and R are true but R is NOT the correct explanation of A . |
| C | A is true but R is false. |
| D | A is false but R is true. |

Q:32

Topic Name:Physics-Section A

ItemCode:1632

Two buses P and Q start from a point at the same time and move in a straight line and their positions are represented by $X_P(t) = \alpha t + \beta t^2$ and $X_Q(t) = ft - t^2$. At

Question: what time, both the buses have same velocity ?

- | | |
|---|-----------------------------------|
| A | $\frac{\alpha - f}{1 + \beta}$ |
| B | $\frac{\alpha + f}{2(\beta - 1)}$ |
| C | $\frac{\alpha + f}{2(1 + \beta)}$ |
| D | $\frac{f - \alpha}{2(1 + \beta)}$ |

Q:33

Topic Name:Physics-Section A

ItemCode:1633

A disc with a flat small bottom beaker placed on it at a distance R from its center is revolving about an axis passing through the center and perpendicular to its plane with an angular velocity ω . The coefficient of static friction between the bottom of

Question: the beaker and the surface of the disc is μ . The beaker will revolve with the disc if :

A	$R \leq \frac{\mu g}{2\omega^2}$
B	$R \leq \frac{\mu g}{\omega^2}$
C	$R \geq \frac{\mu g}{2\omega^2}$
D	$R \geq \frac{\mu g}{\omega^2}$

Q:34

Topic Name:Physics-Section A

ItemCode:1634	A solid metallic cube having total surface area 24 m^2 is uniformly heated. If its temperature is increased by 10°C , calculate the increase in volume of the cube. Question: (Given $\alpha = 5.0 \times 10^{-4} \text{ }^\circ\text{C}^{-1}$).
A	$2.4 \times 10^6 \text{ cm}^3$
B	$1.2 \times 10^5 \text{ cm}^3$
C	$6.0 \times 10^4 \text{ cm}^3$
D	$4.8 \times 10^5 \text{ cm}^3$

Q:35

Topic Name:Physics-Section A

ItemCode:1635	A copper block of mass 5.0 kg is heated to a temperature of 500°C and is placed on a large ice block. What is the maximum amount of ice that can melt? [Specific heat of copper : $0.39 \text{ J g}^{-1} \text{ }^\circ\text{C}^{-1}$ and latent heat of fusion of water : 335 J g^{-1}] Question:
A	1.5 kg
B	5.8 kg
C	2.9 kg
D	3.8 kg

Q:36

Topic Name:Physics-Section A

ItemCode:1636	The ratio of specific heats $\left(\frac{C_P}{C_V}\right)$ in terms of degree of freedom (f) is given by : Question:
A	$\left(1 + \frac{f}{3}\right)$
B	$\left(1 + \frac{2}{f}\right)$
C	$\left(1 + \frac{f}{2}\right)$
D	$\left(1 + \frac{1}{f}\right)$

Q:37

Topic Name:Physics-Section A

ItemCode:1637	For a particle in uniform circular motion, the acceleration $\vec{a}$ at any point $P(R,\theta)$ on the circular path of radius R is (when θ is measured from the positive x-axis and v is uniform speed) : Question:
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A	$-\frac{v^2}{R} \sin \theta \hat{i} + \frac{v^2}{R} \cos \theta \hat{j}$
B	$-\frac{v^2}{R} \cos \theta \hat{i} + \frac{v^2}{R} \sin \theta \hat{j}$
C	$-\frac{v^2}{R} \cos \theta \hat{i} - \frac{v^2}{R} \sin \theta \hat{j}$
D	$-\frac{v^2}{R} \hat{i} + \frac{v^2}{R} \hat{j}$

Q:38

Topic Name:Physics-Section A

ItemCode:1638	Two metallic plates form a parallel plate capacitor. The distance between the plates is 'd'. A metal sheet of thickness $\frac{d}{2}$ and of area equal to area of each plate is introduced between the plates. What will be the ratio of the new capacitance to the original capacitance of the capacitor?
Question:	
A	2:1
B	1:2
C	1:4
D	4:1

Q:39

Topic Name:Physics-Section A

ItemCode:1639	Two cells of same emf but different internal resistances r_1 and r_2 are connected in series with a resistance R . The value of resistance R , for which the potential difference across second cell is zero, is :
Question:	
A	$r_2 - r_1$
B	$r_1 - r_2$
C	r_1
D	r_2

Q:40

Topic Name:Physics-Section A

ItemCode:1640	Given below are two statements : Statement – I : Susceptibilities of paramagnetic and ferromagnetic substances increase with decrease in temperature. Statement – II : Diamagnetism is a result of orbital motions of electrons developing magnetic moments opposite to the applied magnetic field.
Question:	Choose the correct answer from the options 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 but Statement – II is true.

Q:41

Topic Name:Physics-Section A

ItemCode:1641	A long solenoid carrying a current produces a magnetic field B along its axis. If the current is doubled and the number of turns per cm is halved, the new value of magnetic field will be equal to
Question:	
A	B
B	$2B$

C	$4B$
D	$\frac{B}{2}$

Q:42

Topic Name:Physics-Section A

ItemCode:1642 A sinusoidal voltage $V(t) = 210 \sin 3000 t$ volt is applied to a series LCR circuit in which $L = 10 \text{ mH}$, $C = 25 \mu\text{F}$ and $R = 100 \Omega$. The phase difference (Φ) between the applied voltage and resultant current will be :	
A	$\tan^{-1}(0.17)$
B	$\tan^{-1}(9.46)$
C	$\tan^{-1}(0.30)$
D	$\tan^{-1}(13.33)$

Q:43

Topic Name:Physics-Section A

ItemCode:1643 The electromagnetic waves travel in a medium at a speed of $2.0 \times 10^8 \text{ m/s}$. The relative permeability of the medium is 1.0. The relative permittivity of the medium will be :	
A	2.25
B	4.25
C	6.25
D	8.25

Q:44

Topic Name:Physics-Section A

ItemCode:1644 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 :	
Question:	
A	3
B	4
C	2
D	1

Q:45

Topic Name:Physics-Section A

ItemCode:1645 A light whose electric field vectors are completely removed by using a good polaroid, allowed to incident on the surface of the prism at Brewster's angle.	
Question: Choose the most suitable option for the phenomenon related to the prism.	
A	Reflected and refracted rays will be perpendicular to each other.
B	Wave will propagate along the surface of prism.
C	No refraction, and there will be total reflection of light.
D	No reflection. and there will be total transmission of light.

Q:46

Topic Name:Physics-Section A

ItemCode:1646

A proton, a neutron, an electron and an α -particle have same energy. If $\lambda_p, \lambda_n, \lambda_e$ and λ_α are the de Broglie's wavelengths of proton, neutron, electron and α particle

Question: respectively, then choose the correct relation from the following :

- A $\lambda_p = \lambda_n > \lambda_e > \lambda_\alpha$
- B $\lambda_\alpha < \lambda_n < \lambda_p < \lambda_e$
- C $\lambda_e < \lambda_p = \lambda_n > \lambda_\alpha$
- D $\lambda_e = \lambda_p = \lambda_n = \lambda_\alpha$

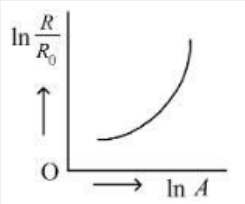
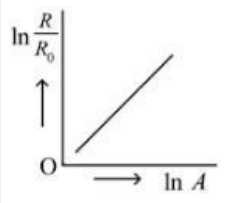
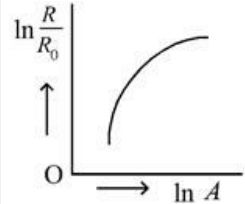
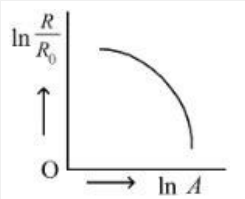
Q:47

Topic Name:Physics-Section A

ItemCode:1647

Which of the following figure represents the variation of $\ln\left(\frac{R}{R_0}\right)$ with $\ln A$ (if $R =$

Question: radius of a nucleus and $A =$ its mass number)

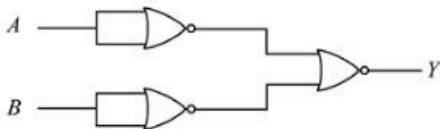
- A 
- B 
- C 
- D 

Q:48

Topic Name:Physics-Section A

ItemCode:1648

Identify the logic operation performed by the given circuit :



Question:

- A AND gate
- B OR gate
- C NOR gate
- D NAND gate

Q:49

Topic Name:Physics-Section A

ItemCode:1649

Match List I with List II

List I

- A. Facsimile
- B. Guided media Channel
- C. Frequency Modulation
- D. Digital Signal

List II

- I. Static Document Image
- II. Local Broadcast Radio
- III. Rectangular wave
- IV. Optical Fiber

Question: 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

Q:50

Topic Name:Physics-Section A

ItemCode:1650

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

Question: merit is K will be :

- A $\frac{KS}{(S+G)}$
- B $\frac{(G+S)}{nKS}$
- C $\frac{nKS}{(G+S)}$
- D $\frac{nK(G+S)}{S}$

Q:51

Topic Name:Physics-Section B

ItemCode:1651

For $z = a^2 x^3 y^{\frac{1}{2}}$, where ' a ' is a constant. If percentage error in measurement of ' x ' and ' y ' are 4% and 12%, respectively, then the percentage error for ' z ' will be

Question: _____ %.

Q:52

Topic Name:Physics-Section B

ItemCode:1652

A curved in a level road has a radius 75 m. The maximum speed of a car turning this curved road can be 30 m/s without skidding. If radius of curved road is changed to 48 m and the coefficient of friction between the tyres and the road

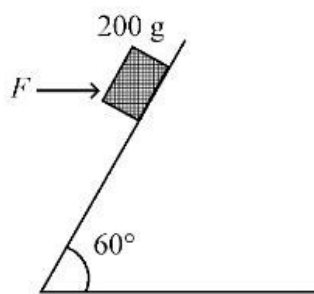
Question: remains same, then maximum allowed speed would be _____ m/s.

Q:53

Topic Name:Physics-Section B

ItemCode:1653

A block of mass 200 g is kept stationary on a smooth inclined plane by applying a minimum horizontal force $F = \sqrt{x}N$ as shown in figure.



Question: The value of $x =$ _____.

Q:54

Topic Name:Physics-Section B

ItemCode:1654

Moment of Inertia (M.I.) of four bodies having same mass ' M ' and radius ' $2R$ ' are as follows :

I_1 = M.I. of solid sphere about its diameter

I_2 = M.I. of solid cylinder about its axis

I_3 = M.I. of solid circular disc about its diameter

I_4 = M.I. of thin circular ring about its diameter

Question: If $2(I_2 + I_3) + I_4 = x \cdot I_1$ then the value of x will be _____.

Q:55

Topic Name:Physics-Section B

ItemCode:1655

Two satellites S_1 and S_2 are revolving in circular orbits around a planet with radius $R_1 = 3200 \text{ km}$ and $R_2 = 800 \text{ km}$ respectively. The ratio of speed of satellite

S_1 to the speed of satellite S_2 in their respective orbits would be $\frac{1}{x}$ where $x =$

Question: _____.

Q:56

Topic Name:Physics-Section B

ItemCode:1656

When a gas filled in a closed vessel is heated by raising the temperature by 1°C , its

Question: pressure increases by 0.4%. The initial temperature of the gas is _____ K.

Q:57

Topic Name:Physics-Section B

ItemCode:1657

27 identical drops are charged at $22V$ each. They combine to form a bigger drop.

Question: The potential of the bigger drop will be _____ V.

Q:58

Topic Name:Physics-Section B

ItemCode:1658

The length of a given cylindrical wire is increased to double of its original length.

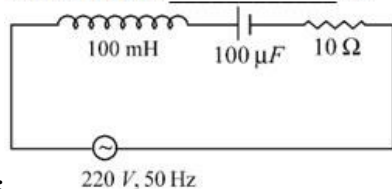
Question: The percentage increase in the resistance of the wire will be _____ %.

Q:59

Topic Name:Physics-Section B

ItemCode:1659

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



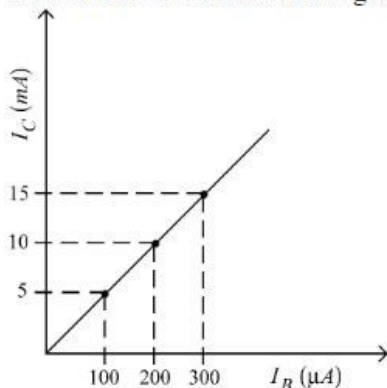
Question:

Q:60

Topic Name:Physics-Section B

ItemCode:1660

In an experiment of CE configuration of n-p-n transistor, the transfer characteristics are observed as given in figure.



If the input resistance is 200Ω and output resistance is 60Ω , the voltage gain in this experiment will be _____.

Question:

Q:61

Topic Name:Chemistry-Section A

ItemCode:1661

The minimum energy that must be possessed by photons in order to produce the photoelectric effect with platinum metal is:

[Given: The threshold frequency of platinum is $1.3 \times 10^{15} \text{ s}^{-1}$ and

Question: $h = 6.6 \times 10^{-34} \text{ J s}$.]

- A $3.21 \times 10^{-14} \text{ J}$
- B $6.24 \times 10^{-16} \text{ J}$
- C $8.58 \times 10^{-19} \text{ J}$
- D $9.76 \times 10^{-20} \text{ J}$

Q:62

Topic Name:Chemistry-Section A

ItemCode:1662

At 25°C and 1 atm pressure, the enthalpy of combustion of benzene (l) and acetylene (g) are $-3268 \text{ kJ mol}^{-1}$ and $-1300 \text{ kJ mol}^{-1}$, respectively. The change in enthalpy for the reaction $3 \text{ C}_2\text{H}_2(\text{g}) \rightarrow \text{C}_6\text{H}_6(\text{l})$, is

Question:

- A $+324 \text{ kJ mol}^{-1}$
- B $+632 \text{ kJ mol}^{-1}$
- C -632 kJ mol^{-1}
- D -732 kJ mol^{-1}

Q:63

Topic Name:Chemistry-Section A

ItemCode:1663

Solute A associates in water. When 0.7 g of solute A is dissolved in 42.0 g of water, it depresses the freezing point by 0.2 °C. The percentage association of solute A in water, is :

[Given: Molar mass of A = 93 g mol⁻¹. Molal depression constant of water is

Question: 1.86 K kg mol⁻¹.]

- A 50%
- B 60%
- C 70%
- D 80%

Q:64

Topic Name:Chemistry-Section A

ItemCode:1664

The K_{sp} for bismuth sulphide (Bi₂S₃) is 1.08×10^{-73} . The solubility of Bi₂S₃ in

Question: mol L⁻¹ at 298 K is

- A 1.0×10^{-15}
- B 2.7×10^{-12}
- C 3.2×10^{-10}
- D 4.2×10^{-8}

Q:65

Topic Name:Chemistry-Section A

ItemCode:1665

Match List I with List II.

List I	List II
A. Zymase	I. Stomach
B. Diastase	II. Yeast
C. Urease	III. Malt
D. Pepsin	IV. Soyabean

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

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

Q:66

Topic Name:Chemistry-Section A

ItemCode:1666

Question: The correct order of electron gain enthalpies of Cl, F, Te and Po is

- A $F < Cl < Te < Po$
- B $Po < Te < F < Cl$
- C $Te < Po < Cl < F$
- D $Cl < F < Te < Po$

Q:67

Topic Name:Chemistry-Section A

ItemCode:1667

Given below are two statements.

Statement I: During electrolytic refining, blister copper deposits precious metals.

Statement II: In the process of obtaining pure copper by electrolysis method, copper blister is used to make the anode.

In the light of the above statements, choose the *correct* answer from the options

Question: 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** but Statement II is **true**.

Q:68

Topic Name:Chemistry-Section A

ItemCode:1668

Given below are two statements one is labelled as **Assertion A** and the other is labelled as **Reason R** :

Assertion A : The amphoteric nature of water is explained by using Lewis acid/base concept.

Reason R : Water acts as an acid with NH_3 and as a base with H_2S .

In the light of the above statements choose the *correct* answer from the options

Question: given below :

- A Both **A** and **R** are true and **R** is the correct explanation of **A**.
- B Both **A** and **R** are true but **R** is **NOT** the correct explanation of **A**.
- C **A** is true but **R** is false.
- D **A** is false but **R** is true.

Q:69

Topic Name:Chemistry-Section A

ItemCode:1669

The correct order of reduction potentials of the following pairs is

- A. Cl_2/Cl^-
- B. I_2/I^-
- C. Ag^+/Ag
- D. Na^+/Na
- E. Li^+/Li

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

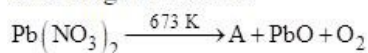
- A $\text{A} > \text{C} > \text{B} > \text{D} > \text{E}$
- B $\text{A} > \text{B} > \text{C} > \text{D} > \text{E}$
- C $\text{A} > \text{C} > \text{B} > \text{E} > \text{D}$
- D $\text{A} > \text{B} > \text{C} > \text{E} > \text{D}$

Q:70

Topic Name:Chemistry-Section A

ItemCode:1670

The number of bridged oxygen atoms present in compound B formed from the following reactions is



Question: A $\xrightarrow{\text{Dimerise}}$ B

- A 0

B	1
C	2
D	3

Q:71

Topic Name:Chemistry-Section A

ItemCode:1671

Question: The metal ion (in gaseous state) with lowest spin-only magnetic moment value is

- A V^{2+}
- B Ni^{2+}
- C Cr^{2+}
- D Fe^{2+}

Q:72

Topic Name:Chemistry-Section A

ItemCode:1672

Given below are two statements: one is labelled as **Assertion A** and the other is labelled as **Reason R**.

Assertion A: Polluted water may have a value of BOD of the order of 17 ppm.

Reason R: BOD is a measure of oxygen required to oxidise both the bio-degradable and non-biodegradable organic material in water.

In the light of the above statements, choose the *most appropriate* answer from the

Question: options given below.

- A Both **A** and **R** are correct and **R** is the correct explanation of **A**.
- B Both **A** and **R** are correct but **R** is NOT the correct explanation of **A**.
- C **A** is correct but **R** is not correct.
- D **A** is not correct but **R** is correct.

Q:73

Topic Name:Chemistry-Section A

ItemCode:1673

Given below are two statements: one is labelled as **Assertion A** and the other is labelled as **Reason R**.

Assertion A: A mixture contains benzoic acid and naphthalene. The pure benzoic acid can be separated out by the use of benzene.

Reason R: Benzoic acid is soluble in hot water.

In the light of the above statements, choose the *most appropriate* answer from the

Question: options given below.

- A Both **A** and **R** are true and **R** is the correct explanation of **A**.
- B Both **A** and **R** are true but **R** is NOT the correct explanation of **A**.
- C **A** is true but **R** is false.
- D **A** is false but **R** is true.

Q:74

Topic Name:Chemistry-Section A

ItemCode:1674

Question: During halogen test, sodium fusion extract is boiled with concentrated HNO_3 to

- A remove unreacted sodium
- B decompose cyanide or sulphide of sodium

C extract halogen from organic compound

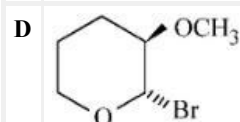
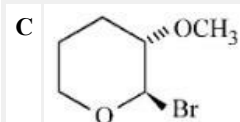
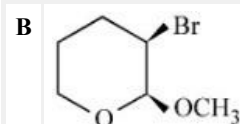
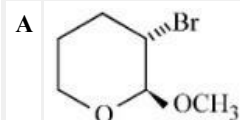
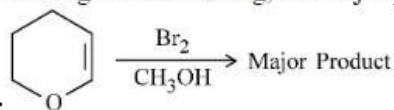
D maintain the pH of extract.

Q:75

Topic Name: Chemistry-Section A

ItemCode:1675

Amongst the following, the major product of the given chemical reaction is

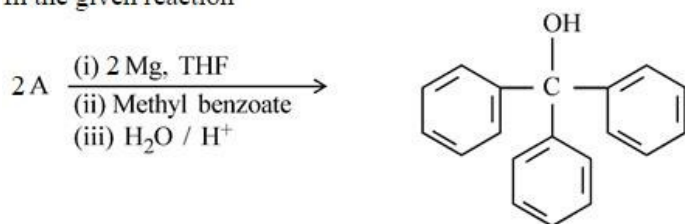


Q:76

Topic Name: Chemistry-Section A

ItemCode:1676

In the given reaction



Question: 'A' can be

A benzyl bromide

B bromobenzene

C cyclohexyl bromide

D methyl bromide

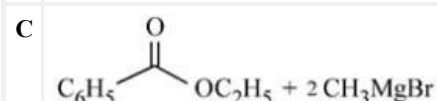
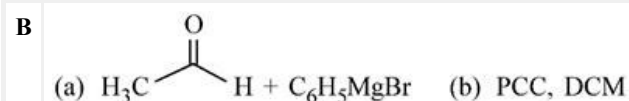
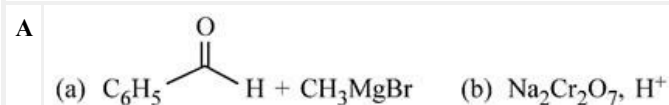
Q:77

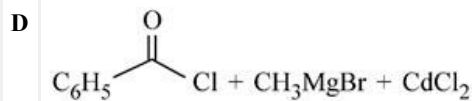
Topic Name: Chemistry-Section A

ItemCode:1677

Which of the following conditions or reaction sequence will **NOT** give

Question: acetophenone as the major product ?



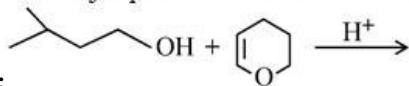


Q:78

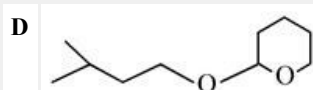
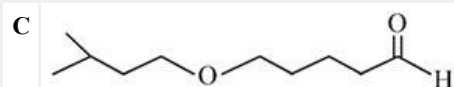
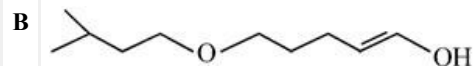
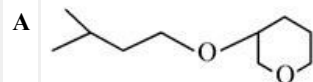
Topic Name: Chemistry-Section A

ItemCode:1678

The major product formed in the following reaction, is



Question:



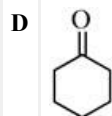
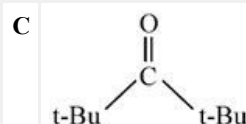
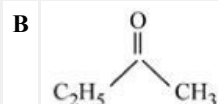
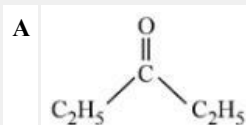
Q:79

Topic Name: Chemistry-Section A

ItemCode:1679

Which of the following ketone will NOT give enamine on treatment with

Question: secondary amines? [where t-Bu is $-\text{C}(\text{CH}_3)_3$]



Q:80

Topic Name: Chemistry-Section A

ItemCode:1680

An antiseptic dettol is a mixture of two compounds 'A' and 'B' where A has 6π

Question: electrons and B has 2π electrons. What is 'B'?

A Bithionol

B Terpeneol

C Chloroxylenol

D Chloramphenicol

Q:81

Topic Name: Chemistry-Section B

ItemCode:1681

A protein 'A' contains 0.30% of glycine (molecular weight 75). The minimum

Question: molar mass of the protein 'A' is _____ $\times 10^3 \text{ g mol}^{-1}$ [nearest integer]

Q:82

Topic Name: Chemistry-Section B

ItemCode:1682

A rigid nitrogen tank stored inside a laboratory has a pressure of 30 atm at 06:00 am when the temperature is 27 °C. At 03:00 pm, when the temperature is 45°C, the

Question: pressure in the tank will be _____ atm. [nearest integer]

Q:83

Topic Name: Chemistry-Section B

ItemCode:1683

Amongst BeF_2 , BF_3 , H_2O , NH_3 , CCl_4 and HCl , the number of molecules with

Question: non-zero net dipole moment is _____.

Q:84

Topic Name: Chemistry-Section B

ItemCode:1684

At 345 K, the half life for the decomposition of a sample of a gaseous compound initially at 55.5 kPa was 340 s. When the pressure was 27.8 kPa, the half life was

Question: found to be 170 s. The order of the reaction is _____. [integer answer]

Q:85

Topic Name: Chemistry-Section B

ItemCode:1685

A solution of $\text{Fe}_2(\text{SO}_4)_3$ is electrolyzed for 'x' min with a current of 1.5 A to deposit 0.3482 g of Fe. The value of x is _____. [nearest integer]

Given : $1 \text{ F} = 96500 \text{ C mol}^{-1}$

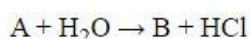
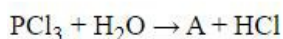
Question: Atomic mass of Fe = 56 g mol^{-1}

Q:86

Topic Name: Chemistry-Section B

ItemCode:1686

Consider the following reactions :



Question: The number of ionisable protons present in the product B is _____.

Q:87

Topic Name: Chemistry-Section B

ItemCode:1687

Amongst $\text{FeCl}_3 \cdot 3\text{H}_2\text{O}$, $\text{K}_3[\text{Fe}(\text{CN})_6]$ and $[\text{Co}(\text{NH}_3)_6]\text{Cl}_3$, the spin-only magnetic moment value of the inner-orbital complex that absorbs light at shortest

Question: wavelength is _____ B.M. [nearest integer]

Q:88

Topic Name: Chemistry-Section B

ItemCode:1688

The Novolac polymer has mass of 963 g. The number of monomer units present in

Question: it are

Q:89

Topic Name: Chemistry-Section B

ItemCode:1689

How many of the given compounds will give a positive Biuret test _____ ?

Question: Glycine, Glycylalanine, Tripeptide, Biuret

Q:90

Topic Name: Chemistry-Section B

ItemCode:1690

The neutralization occurs when 10 mL of 0.1M acid 'A' is allowed to react with 30 mL of 0.05 M base $M(OH)_2$. The basicity of the acid 'A' is _____.

Question: [M is a metal]