Joint Entrance Examination (Main) - JEE(Main)

Paper Name	B.E/B.Tech.(Paper I)
Test Date	25-06-2022
Slot	SLOT - 2
Lang	English

Q:1
Topic Name: Mathematics-Section A

ItemCode:161

Question: 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

Question: 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

Question: 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

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

Question: The system of equations

$-kx + 3y - 14z = 25$

$-15x + 4y - kz = 3$

$-4x + y + 3z = 4$

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

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
Question: The area of the region enclosed between the parabolas $y^2 = 2x - 1$ and $y^2 = 4x - 3$ 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
Question: The coefficient of x^{101} in the expression $(5+x)^{500}+x(5+x)^{499}+x^2(5+x)^{498}+.....+x^{500}$, $x>0$, 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
Question: The sum $1+2\cdot 3+3\cdot 3^2+.....+10\cdot 3^9$ is equal to :

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

Question: Let P be the plane passing through the intersection of the planes $\vec{r}\cdot\left(\hat{i}+3\hat{j}-\hat{k}\right)=5$ and $\vec{r}\cdot\left(2\hat{i}-\hat{j}+\hat{k}\right)=3$, and the point (2, 1, –2). Let the position vectors of the points X and Y be $\hat{i}-2\hat{j}+4\hat{k}$ and $5\hat{i}-\hat{j}+2\hat{k}$ 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

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

Question: Water is being filled at the rate of 1 cm^3 / 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 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

Question: 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

A	$\frac{1}{3}$
B	$\frac{2}{3}$
C	$\frac{3}{2}$
D	3

Q:14
Topic Name: Mathematics-Section A

ItemCode:1614

Question: 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:

A	$6\left(3 + 2\sqrt{2}\right)$
B	$3\left(7 + 4\sqrt{3}\right)$
C	27
D	48

Q:15
Topic Name: Mathematics-Section A

ItemCode:1615

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

A	$\frac{\sqrt{5}\left(1-\sqrt{3}\right)}{4}$
B	$\frac{1-\sqrt{5}}{8}$
C	$\frac{\sqrt{3}\left(1-\sqrt{5}\right)}{2}$
D	$\frac{\sqrt{3}\left(1-\sqrt{5}\right)}{4}$

Q:16
Topic Name: Mathematics-Section A

ItemCode:1616

Question: 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 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

Question: The negation of the Boolean expression $((\sim q) \wedge p) \Rightarrow ((\sim p) \vee q)$ is logically 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

Question: If the line $y = 4 + kx$, $k > 0$, is the tangent to the parabola $y = x - x^2$ at the point P 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

Question: 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 :

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

Question: 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 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

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

Q:22
Topic Name: Mathematics-Section B

ItemCode:1622

Question: Let $f(x)=\left[2x^2+1\right]$ 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 fog is discontinuous is equal to _____.

Q:23
Topic Name: Mathematics-Section B

ItemCode:1623

Question: 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 _____.

Q:24
Topic Name: Mathematics-Section B

ItemCode:1624

Question: 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 _____.

Q:25
Topic Name: Mathematics-Section B

ItemCode:1625

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

Q:26
Topic Name: Mathematics-Section B

ItemCode:1626

Question: 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 _____.

Q:27
Topic Name: Mathematics-Section B

ItemCode:1627

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

Q:28
Topic Name: Mathematics-Section B

ItemCode:1628

Question: 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 _____.

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 $R=4\sqrt{h_1h_2}$

Reason R: Product of said heights.
$h_1h_2=\left(\frac{u^2\sin^2\theta}{2g}\right)\cdot\left(\frac{u^2\cos^2\theta}{2g}\right)$

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 what time, both the buses have same velocity ?

Question:

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

Question:

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

Question: 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. (Given $\alpha = 5.0 \times 10^{-4}\ °C^{-1}$) .

A	$2.4 \times 10^6\ cm^3$
B	$1.2 \times 10^5\ cm^3$
C	$6.0 \times 10^4\ cm^3$
D	$4.8 \times 10^5\ cm^3$

Q:35
Topic Name: Physics-Section A

ItemCode:1635

Question: 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 $J\,g^{-1}\,°C^{-1}$ and latent heat of fusion of water : 335 $J\,g^{-1}$]

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

Question: The ratio of specific heats $\left(\frac{C_P}{C_V}\right)$ in terms of degree of freedom (f) is given by :

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

Question: 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) :

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

Question: 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?

A	2:1
B	1:2
C	1:4
D	4:1

Q:39
Topic Name: Physics-Section A

ItemCode:1639

Question: 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 :

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

Question: 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.
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

Question: 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

A	B
B	$2B$

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

Q:42
Topic Name: Physics-Section A

ItemCode:1642
Question: A sinusoidal voltage $V(t) = 210 \sin 3000\, t$ volt is applied to a series LCR circuit in which $L = 10\ mH$, $C = 25\ \mu F$ 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
Question: The electromagnetic waves travel in a medium at a speed of 2.0×10^8 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
Question: 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

Q:45
Topic Name: Physics-Section A

ItemCode:1645
Question: 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. 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

Question: A proton, a neutron, an electron and an α-particle have same energy. If λ_p, λ_n, λ_e and λ_α are the de Broglie's wavelengths of proton, neutron, electron and α particle respectively, then choose the correct relation from the following :

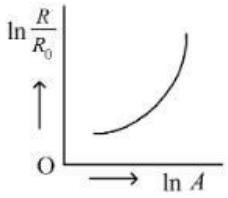
A	$\lambda_p = \lambda_n > \lambda_e > \lambda_\alpha$
B	$\lambda_\alpha < \lambda_n < \lambda_p < \lambda_e$
C	$\lambda_e < \lambda_p = \lambda_n > \lambda_\alpha$
D	$\lambda_e = \lambda_p = \lambda_n = \lambda_\alpha$

Q:47
Topic Name: Physics-Section A

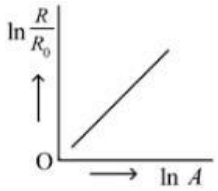
ItemCode:1647

Question: Which of the following figure represents the variation of $\ln\left(\frac{R}{R_0}\right)$ with $\ln A$ (if R = radius of a nucleus and A = its mass number)

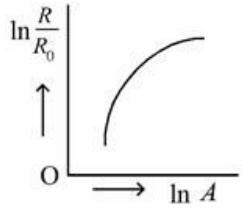
A



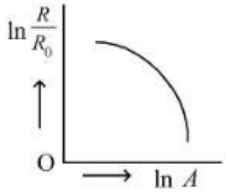
B



C



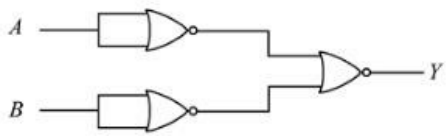
D



Q:48
Topic Name: Physics-Section A

ItemCode:1648

Question: Identify the logic operation performed by the given circuit :



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	List II
A. Facsimile	I. Static Document Image
B. Guided media Channel	II. Local Broadcast Radio
C. Frequency Modulation	III. Rectangular wave
D. Digital Signal	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

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

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

Q:51
Topic Name: Physics-Section B

ItemCode:1651

Question: For $z = a^2x^3y^{\frac{1}{2}}$, 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 _____%.

Q:52
Topic Name: Physics-Section B

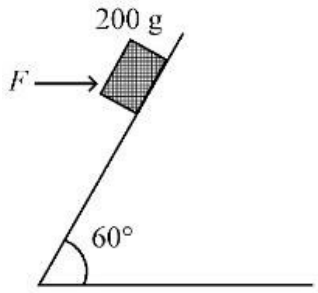
ItemCode:1652

Question: 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 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 $R_1 = 3200\ km$ and $R_2 = 800\ km$ 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

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

Q:57

Topic Name: Physics-Section B

ItemCode:1657

Question: 27 identical drops are charged at $22V$ each. They combine to form a bigger drop. The potential of the bigger drop will be _____ V.

Q:58

Topic Name: Physics-Section B

ItemCode:1658

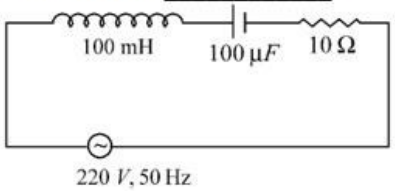
Question: The length of a given cylindrical wire is increased to double of its original length. The percentage increase in the resistance of the wire will be _____%.

Q:59

Topic Name: Physics-Section B

ItemCode:1659

Question: In a series LCR circuit, the inductance, capacitance and resistance are $L = 100$ mH, C= 100 μ F and $R=10$ Ω 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.

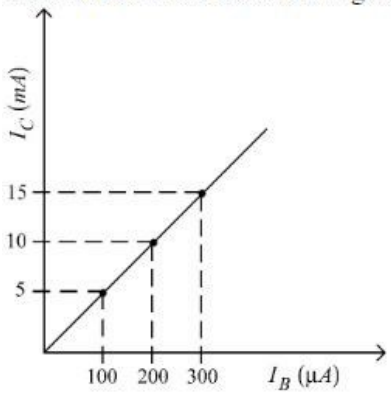


Q:60

Topic Name: Physics-Section B

ItemCode:1660

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

Q:61

Topic Name: Chemistry-Section A

ItemCode:1661

Question: 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 $1.3 \times 10^{15}\ s^{-1}$ and $h = 6.6 \times 10^{-34}$ J s.]

A	3.21×10^{-14} J
B	6.24×10^{-16} J
C	8.58×10^{-19} J
D	9.76×10^{-20} J

Q:62

Topic Name: Chemistry-Section A

ItemCode:1662

Question: At 25°C and 1 atm pressure, the enthalpy of combustion of benzene (l) and acetylene (g) are -3268 kJ mol^{-1} and -1300 kJ mol^{-1}, respectively. The change in enthalpy for the reaction $3\ C_2H_2(g) \rightarrow C_6H_6$ (l), is

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

Q:63

Topic Name: Chemistry-Section A

ItemCode:1663

Question: 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 1.86 K kg mol^{-1}.]

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

Q:64

Topic Name: Chemistry-Section A

ItemCode:1664

Question: The K_{sp} for bismuth sulphide (Bi_2S_3) is 1.08×10^{-73}. The solubility of Bi_2S_3 in 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

Question: 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

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.

Question: In the light of the above statements, 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: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.

Question: In the light of the 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	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	A > C > B > D > E
B	A > B > C > D > E
C	A > C > B > E > D
D	A > B > C > E > 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

$$Pb(NO_3)_2 \xrightarrow{673\ K} A + PbO + O_2$$

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 options given below.
Question:

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 napthalene. 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 options given below.
Question:

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

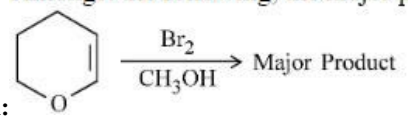
A	remove unreacted sodium
B	decompose cyanide or sulphide of sodium

C	extract halogen from organic compound
D	maintain the pH of extract.

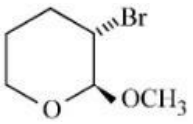
Q:75
Topic Name: Chemistry-Section A

ItemCode:1675

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



A



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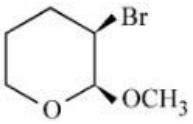

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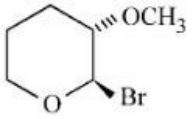

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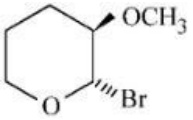
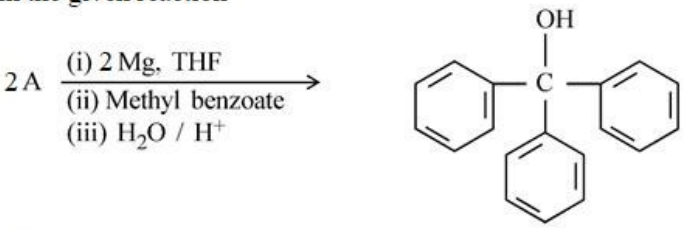


Q:76
Topic Name: Chemistry-Section A

ItemCode:1676

Question: In the given reaction



'A' can be

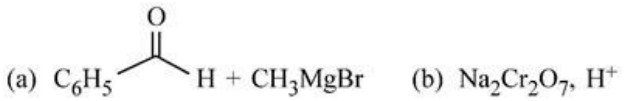
A	benzyl bromide
B	bromobenzene
C	cyclohexyl bromide
D	methyl bromide

Q:77
Topic Name: Chemistry-Section A

ItemCode:1677

Question: Which of the following conditions or reaction sequence will **NOT** give acetophenone as the major product ?

A



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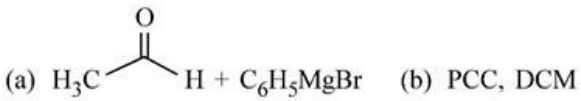

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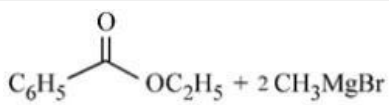
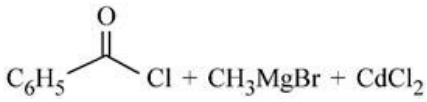
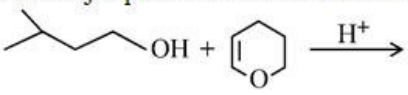


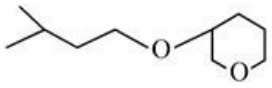
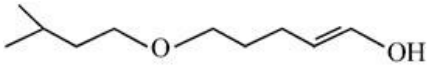
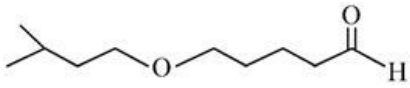
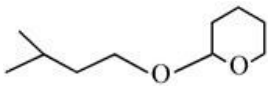
D	

Q:78
Topic Name: Chemistry-Section A

ItemCode:1678

Question: The major product formed in the following reaction, is

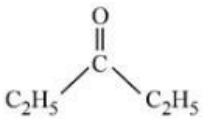
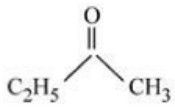
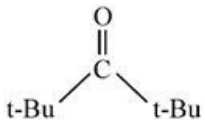


A	
B	
C	
D	

Q:79
Topic Name: Chemistry-Section A

ItemCode:1679

Question: Which of the following ketone will **NOT** give enamine on treatment with secondary amines? [where t-Bu is $-C(CH_3)_3$]

A	
B	
C	
D	

Q:80
Topic Name: Chemistry-Section A

ItemCode:1680

Question: An antiseptic dettol is a mixture of two compounds 'A' and 'B' where A has 6π electrons and B has 2π electrons. What is 'B'?

A	Bithionol
B	Terpineol
C	Chloroxylenol
D	Chloramphenicol

Q:81
Topic Name: Chemistry-Section B

ItemCode:1681

Question: A protein 'A' contains 0.30% of glycine (molecular weight 75). The minimum molar mass of the protein 'A' is _____ $\times 10^3$ g mol^{-1} [nearest integer]

Q:82

Topic Name: Chemistry-Section B

ItemCode: 1682

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

Q: 83

Topic Name: Chemistry-Section B

ItemCode: 1683

Question: Amongst BeF_2, BF_3, H_2O, NH_3, CCl_4 and HCl, the number of molecules with non-zero net dipole moment is _____.

Q: 84

Topic Name: Chemistry-Section B

ItemCode: 1684

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

Q: 85

Topic Name: Chemistry-Section B

ItemCode: 1685

Question: A solution of $Fe_2(SO_4)_3$ 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 F = 96500 C mol^{-1}

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

Q: 86

Topic Name: Chemistry-Section B

ItemCode: 1686

Question: Consider the following reactions :

$PCl_3 + H_2O \rightarrow A + HCl$

$A + H_2O \rightarrow B + HCl$

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

Q: 87

Topic Name: Chemistry-Section B

ItemCode: 1687

Question: Amongst $FeCl_3.3H_2O$, $K_3[Fe(CN)_6]$ and $[Co(NH_3)_6]Cl_3$, the spin-only magnetic moment value of the inner-orbital complex that absorbs light at shortest wavelength is _____ B.M. [nearest integer]

Q: 88

Topic Name: Chemistry-Section B

ItemCode: 1688

Question: The Novolac polymer has mass of 963 g. The number of monomer units present in it are

Q: 89

Topic Name: Chemistry-Section B

ItemCode: 1689

Question: How many of the given compounds will give a positive Biuret test _____ ?
Glycine, Glycylalanine, Tripeptide, Biuret

Q: 90

Topic Name: Chemistry-Section B

ItemCode: 1690

Question: 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 _____.
[M is a metal]