A Division of Aggarwal Educare
Aggarwal CLASSES™

JEE (MAIN)

TEST SERIES

SUBJECT : PHYSICS,CHEMISTRY, MATHEMATICS ***TEST CODE : TSJMT220***

QUESTION PAPER

TIME : 3 HRS ***MARKS : 300***

INSTRUCTIONS

GENERAL INSTRUCTIONS :

1. This test consists of 75 questions.
2. There are three parts in the question paper A, B, C consisting of Physics, Chemistry and Mathematics having 25 questions in each part.
3. 20 questions will be Multiple choice questions & 5 quetions will have answer to be filled as numerical value.
4. Marking scheme :

Type of Questions	Total Number of Questions	Correct Answer	Incorrect Answer	Unanswered
MCQ's	20	+4	Minus One Mark(-1)	No Mark (0)
Numerical Values	5	+4	No Mark (0)	No Mark (0)

5. There is only one correct responce for each question. Filling up more than one responce in each question will be treated as wrong response and marks for wrong response will be deducted accordingly as per instruction 4 above.

OPTICAL MARK RECOGNITION (OMR) :

6. The OMR will be provided to the students.
7. Darken the appropriate bubbles on the OMR sheet by applying sufficient pressure.
8. The OMR sheet will be collected by the invigilator at the end of the examination.
9. Do not tamper with or mutilate the OMR. Do not use the OMR for rough work.
10. Write your name, Batch name, name of the center, Test Code, roll number and signature with pen in the space provided for this purpose on the OMR. Do not write any of these details anywhere else on the OMR.

DARKENING THE BUBBLES ON THE OMR :

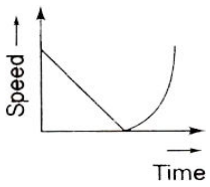
11. Use a BLACK BALL POINT PEN to darken the bubbles on the OMR.
12. Darken the bubble COMPLETELY.
13. Darken the bubbles ONLY IF you are sure of the answer. There is NO WAY to erase or "un- darken" a darkened bubble.

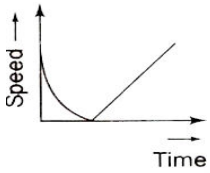
Part A - PHYSICS

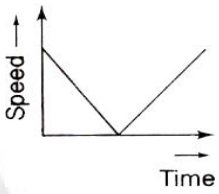
Q.1 The equation of state of some geses can be expressed as $\left(P + \frac{a}{V^2}\right) = \frac{R\theta}{V}$, where P is pressure, V volume, θ absolute temperature and a and b are constants. The dimensional formula of a is

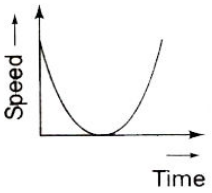
(a) $[ML^5T^{-2}]$ (b) $[M^{-1}L^5T^{-2}]$ (c) $[ML^{-1}\ T^{-2}]$ (d) $[ML^{-5}T^{-2}]$

Q.2 A ball is thrown vertically upwards. Which of the following plots represents the speed-time graph of the ball during its flight if the air resistance is not ignored ?

(a) 

(b) 

(c) 

(d) 

Q.3 The speed of a projectile at the highest point becomes $1/\sqrt{2}$ time its initial speed. The horizontal range of the projectile will be

(a) $\frac{u^2}{g}$ (b) $\frac{u^2}{2g}$ (c) $\frac{u^2}{3g}$ (d) $\frac{u^2}{4g}$

Q.4 A car A moves due north at a speed of 40 km/h. While another car B moves due east at a speed of 30 km/h Find the velocity of car B relative to car B (both in magnitude and direction)

(a) 40 km/h; at an angle $\tan^{-1}\left(\frac{3}{5}\right)$ east of south

(b) 50 km/h; at an angle $\tan^{-1}\left(\frac{3}{5}\right)$ east of south

(c) 40 km/h; at an angle $\tan^{-1}\left(\frac{3}{4}\right)$ east of south

(d) 50 km/h; at an angle $\tan^{-1}\left(\frac{3}{4}\right)$ east of south.

Q.5 When forces F_1, F_2, and F_3 are acting on a particle of mass m sucha that F_2 and F_3 are mutually perpendicular, then the particle remains stationary. If the force F_1 is now removed, then the acceleration of the particle is

(a) F_1/m (b) F_2F_3/mF_1 (c) $(F_2 - F_3)/m$ (d) F_2/m

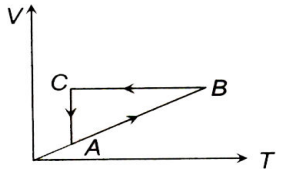
Q.6 A heavy uniform chain lies on a horizontal table top. If the coefficient of friction between the chain and the table surface is 0.25, then the maximum fraction of the length of the chain that can hang over on edge of the table is

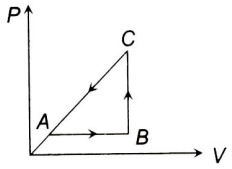
(a) 20% (b) 25% (c) 35% (d) 15%

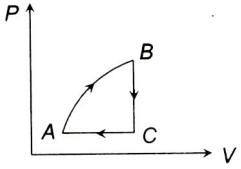
Q.7 The radii of two soap bubbles are R_1 and R_2. respectively. The ratio of masses of air in them will be

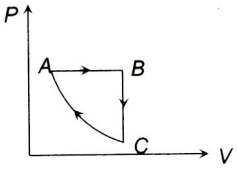
(a) $\frac{R_1^3}{R_2^3}$ (b) $\frac{R_2^3}{R_1^3}$ (c) $\left(\frac{P + \frac{4T}{R_1}}{P + \frac{4T}{R_2}}\right)\frac{R_1^3}{R_2^3}$ (d) $\left(\frac{P + \frac{4T}{R_2}}{P + \frac{4T}{R_1}}\right)\frac{R_2^3}{R_1^3}$

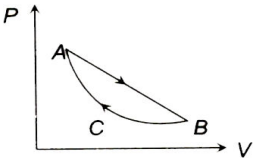
Q.8 A cycle process ABCA is shown in figure Process on the $P-V$ diagram is



(a) 

(b) 

(c) 

(d) 

Q.9 A thermally insulated vessel contains and ideal gas of molecular mass M and ratio of specific heats γ. It is moving with speed v and its suddenly brought to rest. Assuming no heat is lost to the surrounding, its temperature increases by

(a) $\frac{(\gamma-1)}{2(\gamma+1)R}Mv^2K$ (b) $\frac{(\gamma-1)}{2\gamma}Mv^2K$ (c) $\frac{\gamma Mv^2}{2R}K$ (d) $\frac{(\gamma-1)}{2R}Mv^2K$

Q.10 A point mass oscillates along the x-axis according to the law $x=x_0\cos\left(\omega t-\frac{\pi}{4}\right)$. If acceleration of the particle is written $a=A(\omega t+\delta)$, then

(a) $A=x_0\omega^2,\ \delta=\frac{\pi}{4}$ (b) $A=x_0\omega^2,\ \delta=-\frac{\pi}{4}$

(c) $A=x_0\omega^2,\ \delta=\frac{3\pi}{4}$ (d) $A=x_0\omega^2,\ \delta=-\frac{\pi}{4}$

Q.11 There is destructive interference between the two waves of wavelength λ coming from two different paths at a point. To get maximum sound or constructuve interference at that point, the path of one wave is to be increased by

(a) $\lambda/4$ (b) $\lambda/2$ (c) $3\lambda/4$ (d) λ

Q.12 Two point charges $-Q$ and $2Q$ are separated by a distance R. The neutral point will be obtained at,

(a) A distance of $\frac{R}{(\sqrt{2}-1)}$ from $-Q$ charge and lies between the charges.

(b) A distance of $\frac{R}{(\sqrt{2}-1)}$ from $-Q$ charge on the left side of it.

(c) A distance of $\frac{R}{(\sqrt{2}-1)}$ from $2Q$ charge on the right side of it

(d) A point on the line which passes perpendicularly through the centre of the line joining $-Q$ and $2Q$ charges.

Q.13 The potential at point x (measured in μm) due to some charges situated on the x-axis is given by $V(x)=200/(x^2-4)$ Volt. The electric field E at $x=4\,\mu m$ is given by

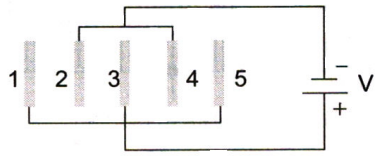
(a) $5/3\,V/\mu m$ and in the positive x-direction

(b) 10/9V/μm and in the negative x-direction

(c) 10/9V/μm and in the positive x-direction

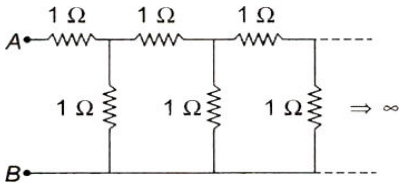
(d) $5/3\,V/\mu m$ and in the negative direction.

Q.14 Five similar condenser plates, each of area A are placed at equal distance d apart and are connected to a source of emf E as shown in figure. The charge on the plates 1 and 4 will be



(a) $\frac{\varepsilon_0 A}{d}, \frac{-2\varepsilon_0 A}{d}$ (b) $\frac{\varepsilon_0 AV}{d}, \frac{-2\varepsilon_0 AV}{d}$ (c) $\frac{\varepsilon_0 AV}{d}, \frac{-3\varepsilon_0 AV}{d}$ (d) $\frac{\varepsilon_0 AV}{d}, \frac{-4\varepsilon_0 AV}{d}$

Q.15 The equivalent resistance between points A and B of an infinite network of resistance, each of 1Ω connceted as shown in figure is



(a) Infinite (b) 2Ω (c) $\frac{1+\sqrt{5}}{2}\Omega$ (d) Zero

Q.16 A particle of charge q and mass m starts moving from the origin under the action of an electric field $\vec{E} = E_0 \hat{i}$ and $\vec{B} = B_0 \hat{i}$ with a velocity $\vec{v} = v_0 \hat{j}$. The speed of the particle will become $2v_0$ after a time

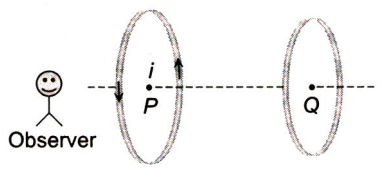
(a) $t = \frac{2mv_0}{qE}$ (b) $t = \frac{2Bq}{mv_0}$ (c) $t = \frac{\sqrt{3}Bq}{mv_0}$ (d) $t = \frac{\sqrt{3}mv_0}{qE}$

Q.17 The plane of dip circle is set in the geographic meridian and the apparent dip is θ_1. It is then set in a vartical plane perpendicular to the geographic meridian. Now the apparent dip is θ_2. The angle of declination α at that place is

(a) $\tan\alpha\sqrt{\tan\theta_1 \tan\theta_2}$ (b) $\tan\alpha = \sqrt{(\tan\theta_1)^2 + (\tan\theta_2)^2}$

(c) $\tan\alpha = \frac{\tan\theta_1}{\tan\theta_2}$ (d) $\tan\alpha = \frac{\tan\theta_2}{\tan\theta_1}$

Q.18 Two coils P and Q are lying a little distance apart coaxially. If an anticlockwise current i is suddenly set up in the coil P then the direction of current induced in coil Q will be



(a) Clockwise (b) Towards north (c) Towards south (d) Anticlockwise

Q.19 A transformer is used to light 140 W, 24 V lamp from 240 V ac mains. If the current in the mains is 0.7 A, then the efficiency of transformer is

(a) 63.8% (b) 84% (c) 83.3% (d) 48%

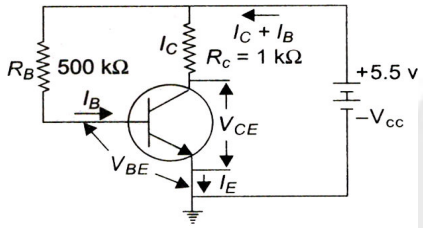
Q.20 A parallel plate capacitor consists of two circular plates each of radius 2 cm, separated by a distance of 0.1 mm. If voltage across the plates is varying at the rate of 5×10^{13} V/s, Then the value of displacement current is

(a) $5.50\,A$ (b) $5.56 \times 10^{2}\,A$ (c) $5.56 \times 10^{3}\,A$ (d) $2.28 \times 10^{4}\,A$

Q.21 A 2-V battery, a -15Ω resistor, and a potentiometer of 100 cm length, all are connected in series . If the resistance of potentiometer wire is $5\text{-}\Omega$, then the potential gradient of the potentiometer wire is_____?

Q.22 A double slit arrangement produces interference fringes for sodium light ($\lambda = 589$ nm) that have an angular separation of 3.50×10^{-3} radian, For what wavelength would the angular separation be 10% greater ?

Q.23 In the circuit shown in the figure, the base current IB is 10 μA and the collector is 5.2 mA. The value of V_{BE} is_____?



Q.24 An ice box used for keeping eatables has a total wall area of 1 m^2 and a wall thickness of 5.0 cm. The thermal conductivity of the ice box is $K = 0.01$ J/m°C. It is filled with ice at 0°C along with eatables on a day when the temperature is 30°C. The latent heat of fusion of ice is 334×10^{3} J/kg. The amount of ice melted on one day is _____?

(1 day = 86,400 s)

Q.25 A screw gauge gives the following reading when used to mesure the diameter of a wire. Main scale reading: 0 mm Circular scale reading: 52 divisions Given that 1 mm on main scale corresponds to 100 divisions of the circular scale , the diameter of wire from the above data is _____?

Part - B - CHEMISTRY

Q.26 The oxidation number of sulphur in Sg, S_2, F_2, H_2S respectively. are :

(a) 0, +1, and -2 (b) +2, +1, and -2 (c) 0, +1, and +2 (d) -2, +1 and -2

Q.27 Uncertainty in position is twice the uncertainty in momentum. Uncertainty in velocity is :

(a) $\sqrt{\frac{h}{\pi}}$ (b) $\frac{1}{2m}\sqrt{\frac{h}{\pi}}$ (c) $\frac{1}{2m}\sqrt{h}$ (d) $\frac{h}{4\pi}$

Q.28 The common features among the species CN^-, CO, and NO^+ are

(a) Bond order three and isoelectronic
(b) Bond order three and week field ligands
(c) Bond order two and π-acceptors
(d) Isoelectronic and week field ligands

Q.29 $N_2 + 3H_2 \longrightarrow 2NH_3$, 1 mol N_2 and 4 mol H_2 are taken in a 15-L flask at 27°C. After complete conversion of N_2 into NH_3, 5 L of H_2O is added. Pressure set up in the flask is :

(a) $\frac{3 \times 0.0821 \times 300}{15}$ atm (b) $\frac{2 \times 0.0821 \times 300}{10}$ atm

(c) $\frac{1 \times 0.0821 \times 300}{15}$ atm (d) $\frac{1 \times 0.0821 \times 300}{10}$ atm

Q.30 In harber's process of ammonia manufacture : $N_{2(g)} + 3H_{2(g)} \rightarrow 2NH_{3(g)}$; $H^0_{25^oC} = -92.2\ kJ$

Molecule	$N_{2(g)}$	$H_{2(g)}$	$NH_{3(g)}$
Cp (J/K mol)	29.1	28.8	35.1

In Cp is independent of temperature, then reaction at 100°C as compared to the of 25°C will be

(a) more endothermic (b) less endothermic

(c) more exothermic (d) less exothermic

Q.31 PCl_5 dissociation in a closed container is given as :

$$PCl_{5(g)} \rightleftharpoons PCl_{3(g)} + Cl_{2(g)}$$

If the total pressure at equilibrium of the reaction mixture is P and the degree of dissociation of PCl_5 is α, the partial pressure of PCl_3 will be :

(a) $P \times \left[\frac{\alpha}{\alpha+1}\right]$ (b) $P \times \left[\frac{2\alpha}{1-\alpha}\right]$ (c) $P \times \left[\frac{\alpha}{\alpha-1}\right]$ (d) $P \times \left[\frac{\alpha}{1-\alpha}\right]$

Q.32 For a sparingly souble salt $A_p B_q$, the relationship of its solubility product (L_s) with its solubility (S) is :

(a) $L_s = S^{p+q} \cdot p^p \cdot q^q$ (b) $L_s = S^{p+q} \cdot p^q \cdot q^p$ (c) $L_s = S^{pq} \cdot p^p \cdot q^q$ (d) $L_s = S^{pq} \cdot (p \cdot q)^{p+q}$

Q.33 A compound has the emprical formula $C_{10}H_8Fe$. A solution of 0.26 g of the compound in 11.2 g of benezene (C_6H_6) boils at 80.26°C. The boiling point of benzene is 80.10°C and K_b is 2.53°C/ molal. What is the molecular formula of the compound ?

(a) $C_{30}H_{24}Fe_3$ (b) $C_{10}H_8Fe$ (c) C_5H_4Fe (d) $C_{20}H_{16}Fe_2$

Q.34 For the cell $Ti|Ti||Cu^{2+}|Cu, E_{cell}$ at 25°C is 0.83 V. The EMF of the cell can be increasded by :

(a) increasing $[Cu^{2+}]$ (b) increasing $[Ti^+]$

(c) decreasing $[Cu^{2+}]$ (d) increasing temperature to 35°C

Q.35 Under the influence of an electric field, the particle in a sol migrate towards cathode. The coagulation of the same sol is studied using NaCl, Na_2SO_4 and Na_3SO_4 solution. Their coagulating values will be maximum for :

(a) NaCl (b) Na_2SO_4 (c) Na_3PO_4 (d) Same for all

Q.36 An organic compound (A) has the molecular formula C_3H_6O. It undergoes iodoform test. When saturated with dil. HCl, it gives (B) of molecular formula $C_9H_{14}O$. A and B respectively are :

(a) propanal and mesitylene

(b) propanone and mesityl oxide

(c) propanone and 2,6-dimethyl-2,5-hyptadien -4-one

(d) propanone and mesitylene oxide

Q.37 Among the following which one can have a meso form ?

(a) $CH_3 - CHOH - CH(Cl) - C_2H_5$

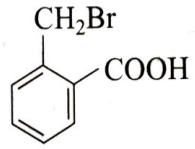
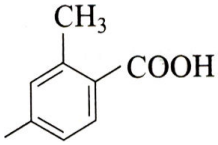
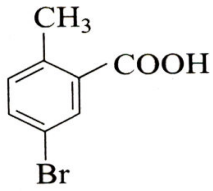
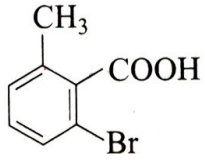
(b) $CH_3 - CHOH - CHOH - CH_3$

(c) $CH_3 - CH_2 - CHOH - CHOH - CH_3$

(d) $HOCH_2 - CHCl - CH_3$

Q.38 Propan-1 ol can be prepared from propane by alcohol :
(a) H_2O / H_2SO_4 (b) $Hg(OAc)_2/H_2O$ followed by $NaBH_4$
(c) B_2H_6 followed by B_2H_6 (d) CH_3CO_2/ H_2SO_4

Q.39 o-Touic acid on reaction with Br_2/Fe gives :

(a)  (b)  (c)  (d) 

Q.40 Empirical formula of a compound is CH_2O and its vapor density is 30. Molecular formula of the compound is :
(a) $C_3H_6O_3$ (b) $C_2H_4O_2$ (c) C_2H_4O (d) CH_2O

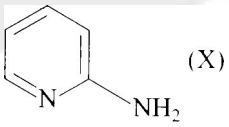
Q.41 A colorless water-soluble solid X on heating gives equimolar quantities of Y and Z. Y gives dense white fumes with HCl and Z does so with NH_3. Y gives brown precipitate with Nessler's reagent and Z gives white preecipitate with nitrates of Ag^+, Pb^{2+}, and Hg^+, X is
(a) NH_4Cl (b) NH_4NO_3 (c) NH_4NO_2 (d) $FeSO_4$

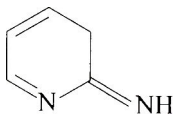
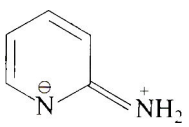
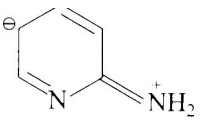
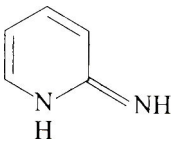
Q.42 Setting of plaster of Paris is :
(a) oxidation with atmospheric oxygen (b) combination with atmospheric CO_2
(c) dehydration (d) hydration to yield another hydrate

Q.43 The basic character of the transition metal monoxides follows the order :
(a) TiO > VO > CrO > FeO (b) VO > CrO > TiO > FeO
(c) CrO > VO > FeO > TiO (d) TiO > FeO > VO > CrO

Q.44 Formation of $Ni(CO_4)$ and its subsequent decomposition into Ni and CO (recycled) make basis of Mond's process : $Ni + 4CO \xrightarrow{T_1} Ni(CO_4) \xrightarrow{T_2} Ni + 4CO$
T_1 and T_2 are
(a) 100°C, 50°C (b) 50°C, 100°C (c) 50°C, 230°C (d) 230°C, 50°C

Q.45 The proper tautomeric structure for 2-aminopyridine (X) is :


(X)

(a)  (b)  (c)  (d) 

Q.46 $xA + yB \rightarrow zC$. If $-\frac{d[A]}{dt} = -\frac{d[B]}{dt} = 1.5\ \frac{d[C]}{dt}$, then x, y, and z are :

Q.47 The density of a pure substance "A" whose atoms pack in cubic close pack arrangement is 1 g/cc. If B atoms can occupy tetrahedral void and if all the tetrahedral voids are occupied by B atom, what is the density of resulting solid in g/cc.
[Atomic mass A = 30 g/mol and atomic mass (B)= 50 g/mol]

Q.48 What volume of liquid A has the same mass as 80.0 cm^3 of liquid B ?

Q.49 Oxidation states of vanadium in

$V \rightarrow V^{2+} + 2e$,

$V^{2+} \rightarrow V^{3+} + e$,

are 2 and 3 respectively. The oxidation states of vanadium in this following reaction

$V^{3+} + H_2O \rightarrow VO^{2+} + 2H^+ + e^-$?

Q.50 A 25.0 mL sample of 0.1050 M H_2SO_4 is titrated with NaOH solution of unknown concentration. The phenolphthalein indicator end point was reached when 17.23 mL of NaOH solution had been added. What is the concentration of the NaOH ?

Part - C - MATHEMATICS

Q.51 The 120 permutations of MAHES are arranged in dictionary order, as if each were an ordinary five-letter word. The last letter of the 86th word in the list is

(a) A (b) H (c) S (d) E

Q.52 $\log_7 \log_7 \sqrt{7\sqrt{(7\sqrt{7})}}$ is equal to

(a) $3 \log_2 7$ (b) $3 \log_7 2$ (c) $1 - 3\log_7 2$ (d) $1 - 3\log_7 7$

Q.53 The area of the quadrilateral $ABCD$ whose vertices are respectively $A(1, 1)$, $B(7, -3)$, $C(12, 2)$ and $(7, 21)$ is

(a) 100 sq. units (b) 125 sq. units (c) 132 sq. units (d) none of these

Q.54 If non-zero numbers a, b, c are in HP, then the straight line $\frac{x}{a} + \frac{y}{b} + \frac{1}{c} = 0$ always passes through a fixed point. The point is

(a) $(-1, -2)$ (b) $(-1, 2)$ (c) $\left(1, -\frac{1}{2}\right)$ (d) $(1, -2)$

Q.55 If a line is drawn through a fixed point $P(\alpha, \beta)$ to cut the circle $x^2 + y^2 = a^2$ at A and B, then $PA \cdot PB =$

(a) $\alpha^2 + \beta^2$ (b) $\alpha^2 + \beta^2 - a^2$ (c) a^2 (d) $\alpha^2 + \beta^2 + a^2$

Q.56 The curve described parametrically by $x = t^2 + r + 1$, $y = t^2 - t + 1$ represents

(a) a pair of straight lines (b) an ellipse
(c) a parabola (d) a hyperbola

Q.57 If any tangent to the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ intersept equal lenghts ℓ on the axes, then $\ell =$

(a) $a^2 + b^2$ (b) $\sqrt{a^2 + b^2}$ (c) $(a^2 + b^2)^2$ (d) none of these

Q.58 Two straight lines pass through the fixed points $(\pm a, 0)$ and have slopes whose products is $p > 0$. Then the locus of the points of intersection of the lines is

(a) ellipse (b) hyperbola (c) parabola (d) circle

Q.59 If $f(x + 2y, x - 2y) = xy$, then $f(x, y)$ equal

(a) $(x^2 - y^2)/8$ (b) $(x^2 - y^2)/4$ (c) $(x^2 + y^2)/4$ (d) $(x^2 - y^2)/2$

Q.60 The inverse of the function $f(x) = \dfrac{e^x - e^{-x}}{e^x + e^{-x}} + 2$ is given by

(a) $\log_e\left(\dfrac{x-2}{x-1}\right)^{\frac{1}{2}}$ (b) $\log_e\left(\dfrac{x-1}{3-x}\right)^{\frac{1}{2}}$ (c) $\log_e\left(\dfrac{x}{2-x}\right)^{\frac{1}{2}}$ (d) $\log_e\left(\dfrac{x-1}{x+1}\right)^{\frac{1}{2}}$

Q.61 If $f(x) = \begin{cases} \sin x, x \neq n\pi n \in Z \\ 0, \quad \text{otherwise} \end{cases}$ and $g(x) = \begin{cases} x^2 + 1, x \neq 0, 2 \\ 4, x = 0 \\ 5, x = 2 \end{cases}$ then $\lim\limits_{x \to 0} g\{f(x)\} =$

(a) 1 (b) 0 (c) $\dfrac{1}{2}$ (d) $\dfrac{1}{4}$

Q.62 The expression $y^2 \dfrac{d^2y}{dx^2}$ on the ellipse $3x^2 + 4y^2 = 12$ is equal to

(a) $\dfrac{9}{4}$ (b) $-\dfrac{9}{4}$ (c) $\dfrac{4}{9}$ (d) $-\dfrac{4}{9}$

Q.63 The lateral edge of a regular rectangular pyramid is "a" cm long. The lateral edge makes and angle α with the plane of the base. The value of of α for which the volume of the pyramid is greatest is

(a) $\dfrac{\pi}{4}$ (b) $\sin^{-1}\sqrt{\dfrac{2}{3}}$ (c) $\cot^{-1}\sqrt{2}$ (d) $\dfrac{\pi}{3}$

Q.64 $\displaystyle\int \frac{2x}{(1-x^2)\sqrt{x^4 - 1}}\,dx$ is equal to

(a) $\sqrt{\dfrac{x^2+1}{x^2-1}} + c$ (b) $\sqrt{\dfrac{x^2-1}{x^2+1}} + c$ (c) $\sqrt{x^4 - 1} + c$ (d) none of these

Q.65 The area of the closed figure bounded by $x = -1$ and $x = 2$ and $y = \begin{cases} -x^2 + 2, & x \leq 1 \\ 2x - 1, & x > 1 \end{cases}$ and the abscissa axis is

(a) $\dfrac{16}{3}$ sq units (b) $\dfrac{10}{3}$ sq units (c) $\dfrac{13}{3}$ sq units (d) $\dfrac{\mathbf{7}}{\mathbf{3}}$ sq units

Q.66 An object falling from rest in the air is subjects not only to the gravitational force but also to the air resistance. Assume that the air resistance is proportional to the velocity with constant of proportionality as k > 0. and acts in a direction opposite to motion $(g = 9.8\,\text{m/sec}^2)$. Then velocity cannot exceed

(a) 9.8/k m/sec (b) 9.8/k m/sec (c) $\dfrac{k}{9.8}$ m/sec (d) none of these

Q.67 The variable "x" satisfying the equation $|\sin x \times \cos x| + \sqrt{2 + \tan^2 x + \cot^2 x}\; x = \sqrt{3}$, belongs to the interval

(a) $\left[0, \frac{\pi}{3}\right]$ (b) $\left(\frac{\pi}{3}, \frac{\pi}{2}\right)$ (c) $\left[\frac{3\pi}{4}, \pi\right)$ (d) non-existant

Q.68 The equation $2\cos^2\frac{x}{2}\sin^2 x = x^2 + x^{-2};\ 0 < x \le \frac{\pi}{2} ss$ has

(a) no real solution (b) one real solution
(c) more then one solution (d) none of these

Q.69 Which of the following is the solution set of the equation $2\cos^{-1} x = \cot^{-1}\left(\frac{2x^2 - 1}{2x\sqrt{1 - x^2}}\right)$?

(a) (0, 1) (b) (-1, 1)-{0} (c) (-1, 0) (d) [-1, 1]

Q.70 If x, y, z are drawn perpendicular to a, b, and c, then the value of $\frac{bx}{c} + \frac{cy}{a} + \frac{az}{b}$ will be

(a) $\frac{a^2 + b^2 + c^2}{2R}$ (b) $\frac{a^2 + b^2 + c^2}{R}$ (c) $\frac{a^2 + b^2 + c^2}{4R}$ (d) $\frac{2(a^2 + b^2 + c^2)}{2R}$

Q.71 The coefficient of x^4 in the expansion of $(1 + x + x^2 + x^3)^{11}$ is _____?

Q.72 Solve : $\int_0^{\frac{\pi}{2}} \frac{dx}{1 + \cos x} =$

Q.73 If $\frac{dy}{dx} = y + 3 > 0$ and y (0) = 2, then y(In 2) is equal to ?

Q.74 If $A = \begin{vmatrix} 1 & -1 & 1 \\ 1 & 2 & 0 \\ 1 & 3 & 0 \end{vmatrix}$ then the value of $|\text{adj } A|$ is equal to ?

Q.75 The value of $\int_{-1}^{1} |x + 1|\, dx$ is _____?

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ROUGH WORK

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