A Division of Aggarwal Educare
Aggarwal CLASSES™

JEE (MAIN)

TEST PAPER

SUBJECT : PHYSICS,CHEMISTRY, MATHEMATICS ***TEST CODE : TEST PAPER-4***

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 From the equation $\tan\theta = rg / v^2$, one can obtain the angle of banking θ for a cyclist taking a curve (the symbol have their usual meanings). Then say, it is
(a) Both dimensionally and numerically correct
(b) Neither numerically nor dimensionally correct
(c) Dimensionally correct only
(d) Numerically correct only

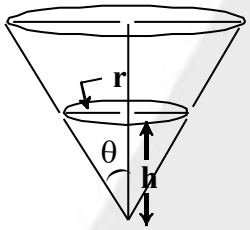
Q.2 A stone dropped from a building of height h and it reaches after t second on earth. From the same building if two stones are thrown (one upwards and other downwards) with the same velocity u and they reach the earth surface after t_1 and t_2 seconds, respectively, then

(a) $t = t_1 - t_2$ (b) $t = \frac{t_1 + t_2}{2}$ (c) $t = \sqrt{t_1 t_2}$ (d) $t = t_1^2 t_2^2$

Q.3 Pankaj and Sudhir are playing with two different balls of masses m and 2m, respectively. If Pankaj throws his ball vertically up and Sudhir at an angle θ, both of them stay in our view for the same period. The height attained by the two balls are in the ratio
(a) 2 : 1 (b) 1 : 1 (c) 1 : $\cos\theta$ (d) 1 : sec θ

Q.4 A rocket has a mass of 100 kg. 90% of this is fuel. It ejects fuel vapors at the rate of 1 kg/s with a velocity of 500 m/s relative to the rocket. It is supposed that the rocket is outside the gravitational field. The initial upthrust on the rocket when it just starts moving upwards is
(a) Zero (b) 500 N (c) 1000 N (d) 2000 N

Q.5 A particle describe a horizontal circle at the mouth of funnel type vessel as shown in fig . The surface of the funnel is frctionless . The velocity v of the particle in terms of r and θ will be

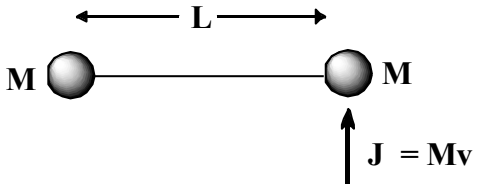


(a) $v = \sqrt{rg / \tan\theta}$ (b) $v = \sqrt{rg \tan\theta}$

(c) $v = \sqrt{rg \cot\theta}$ (d) $v = \sqrt{rg / \cot\theta}$

Q.6 The ratio of masses of two balls is 2 : 1 and before collision the ratio of their velocities is 1 : 2 in mutually opposite direction. After collision each ball moves in an opposite direction to its initial direction. If e = (5/6), the ratio of speed of each ball before and after collision would be
(a) (5/6) times
(b) Equal
(c) Not related
(d) Double for the first ball and half for the second ball

Q.7 Consider a body, shown in fig, consisting of two identical balls, each of mass M connected by a light rigid rod. If an impulse J = Mv is imparted to the body at one of its ends, what would be its angular velocity ?



(a) v / L (b) $2v$ / L (c) v / 3L (d) v / 4L

Q.8 The length of an elastic string is a meters when the longitudinal tension is 4 N and b meters when the logitudinal tension is 5 N. The length of the string in meters when the longitudinal tension is 9 N is

(a) $a-b$ (b) $5b-4a$ (c) $2b-\frac{1}{4}a$ (d) $4a-3b$

Q.9 Two capillary tubes of same diameter are kept vertically one each in two liquids whose relative densities are 0.8 and 0.6 and surface tensions are 60 and 50 dyne/cm. respectively, Ratio of heights of liquids in the two tubes h_1/h_2 is

(a) $\frac{10}{9}$ (b) $\frac{3}{10}$ (c) $\frac{10}{3}$ (d) $\frac{9}{10}$

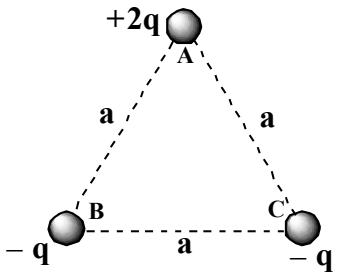
Q.10 Two samples A and B of a gas initially at the same pressure and temperature are compressed from volume V to V/2 (A isothermally and B adiabatically). The final pressure of A is
(a) Greater than the final pressure of B.
(b) Equal to the final pressure of B.
(c) Less than the final pressure of B.
(d) Twice the final pressure of B.

Q.11 The energy of all molecules of a monoatomic gas having a volume V and pressure P is 3PV/2. The total translational kinetic energy of all molecules of a diatomic gas as the same volume and pressure is

(a) $\frac{1}{2}$PV (b) $\frac{3}{2}$PV (c) $\frac{5}{2}$PV (d) 3PV

Q.12 A man is watching two trains, one leaving and the other coming in with equal speed of 4 m/s. If they sound their whistles, each of frequency 240 Hz, the number of beats heard by the man (velocity of sound in air = 320 m/s) will be equal to
(a) 6 (b) 3 (c) 0 (d) 12

Q.13 Three charges of (+2q), (-q) and (-q) are placed at the corners A, B and C of an equilateral triangle of side a as shown in fig, Then the dipole moment of this combination is



(a) qa (b) Zero (c) $qa\sqrt{3}$ (d) $\frac{2}{\sqrt{3}}qa$

Q.14 There is an electric field E in x-direction. If the work done in moving a charge 0.2 C through a distance of 2 m along a line making an angle 60^0 with the x-axis is 4 J, what is the value of E ?

(a) 4 N/C (b) 8 N/C (c) $\sqrt{3}$ N / C (d) 20 N/C

Q.15 Condenser A has a capacity of 15μF when it is filled with a medium of dielectric constant 15. Another condenser B has a capacity 1μF with air between the plates. Both are charged separately by a battery of 100 V. After charging, both are connected in parallel without the battery and the dielectric material being removed. The common potential now is

(a) 400 V (b) 800 V (c) 1200 V (d) 1600 V

Q.16 At a specific instant, emission of radioactive compound is deflected in magnetic field. The compound can emit

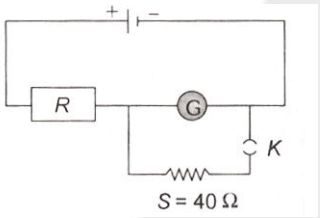
(a) Electron (b) Protons (c) He^{2+} (d) Neutrons

Q.17 The rest mass of the deuteron is equivalent to an energy of 1876 MeV; the rest mass of proton is equivalent to 939 MeV and that of a neutron to 40 MeV.
A deuteron may disintegrate to a proton and a neutron if it.
(a) emits a X-ray photon of energy 2 Me V.
(b) captures a X-rays photon of energy 2 MeV.
(c) emits a X-ray photon of energy 3 Me V.
(d) capture a X-ray photon of energy 3 Me V.

Q.18 In an experiment the angles are required to be measured using an instrument. 29 divisions of the main scale exactly coincide with the 30 divisions of the Vernier scale. If the smallest division of the main scale is half -a-degree (= 0.5^0), then the least count of the instrument is

(a) One minute (b) Half minute (c) One degree (d) Half degree

Q.19 In the ciruit shown in fig, if key K is pressed, then the galvanometer reading becomes half. The resistance of galvanometer is



(a) 20 Ω (b) 30 Ω (c) 40 Ω (d) 50 Ω

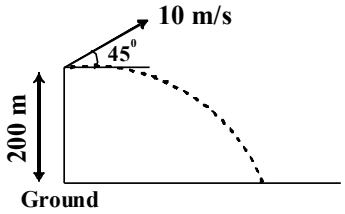
Q.20 A bomb of mass 16 kg at rest explodes into two pieces of masses 4 kg and 12 kg. The velocity of the 12 kg mass is 4 ms^{-1}. The kinetic energy of the other mass is

(a) 192 J (b) 96 J (c) 144 J (d) 288 J

Q.21 A room is maintained at 20^0C by a heater of resistance 20 Ω connected to 200 V mains. The temperature is uniform through out the room and heat is transmitted through a glass window of area 1 m^2 and thickness 0.2 cm. What will be the temperature outside ? Given that thermal conductivity K for glass is 0.2 cal/m^0Cs and J = 4.2 J/cal.

Q.22 A short bar magnet of magnetic moment 255 J/T is placed with its axis perpendicular to Earth's field direction. At what distance from the centre of the magnet, the resultant field is inclined at 45^0 with Earth's field, H = 0.4×10^{-4} T.

Q.23 A particle has been projected from the top of tower as shown in figure. Find the time taken by the particle to reach the ground. (Take g = 10 m/s^2)



Q.24 A uniform rectangular marble slab is 3.4 m long and 2.0 m wide. It has a mass of 180 kg. If it is originally lying on the flat ground, how much work is needed to stand it on an end ?

Q.25 A hemispherical bowl just floats without sinking in a liquid of density 1.2×10^3 kg/m^3. If outer diameter and the density of the bowl are 1 m and 2×10^4 kg/m^3 respectively, then the inner diameter of the bowl will be?

Part - B - CHEMISTRY

Q.26 Nodal planes of $\pi-$bond (s) in $CH_2 == C == C == CH_2$ are located in :
(a) All are in molecular plane
(b) Two in molecular plane and one in a plane perpendicular to the molecular plane which contains $C-C$ $\sigma-$bond.
(c) One in molecular plane and two in plane perpendicular to molecular plane which contains $C-C$ $\sigma-$bonds
(d) Two in molecular plane and one in a plane perpendicular to molecular plane which bisects $C-C$ $\sigma-$bonds at right angle

Q.27 For an f - orbital, the values of m are :
(a) $-2,-1,0,+1,+2$ (b) $-3,-2,-1,0,+1,+2,+3$
(c) $-1,0,+1$ (d) $0,+1,+2,+3$

Q.28 At what temperature in the Celsius scale V (volume) of a certain mass of gas at 27^{0}C will be doubled keeping the pressure constant ?
(a) 54^{0}C (b) 327^{0}C (c) 427^{0}C (d) 527^{0}C

Q.29 One mole of an ideal monoatomic gas at temperature T and volume 1 L expands to 2 L against a constant external pressure of 1 atm under adiabatic conditions, then the final temperature of gas will be :
(a) $T+\frac{2}{3\times0.0821}$ (b) $T-\frac{2}{3\times0.0821}$
(c) $\frac{T}{2^{5/3-1}}$ (d) $\frac{T}{2^{5/3+1}}$

Q.30 Which may be added to 1 L of water to act as a buffer ?
(a) One mole of $HC_2H_3O_2$ and 0.5 mole of NaOH
(b) One mole of NH_4Cl and 1 mole of HCl
(c) One mole of NH_4OH and 1 mole of NaOH
(d) One mole of $HC_2H_3O_2$ and 1 mole of HCl

Q.31 Salts of A (atomic weight : 7), B (atomic weight : 27), and C (atomic weight: 48) were electrolyzed under identical condition using the same quantity of electricity. It was found

that when 2.1 g of A was deposited, the weights of B and C deposited were 2.7 and 7.2 g, respectively. The valencies of A, B and C, respectively are :
(a) 3, 1, and 2 (b) 1, 3, and 2 (c) 3, 1, and 3 (d) 2, 3, and 2

Q.32 A radioactive substance (parent) decays to its daughter element. The age of radioactive substance (t) is related to the daughter (d) / parent (p) ratio by the equation :

(a) $t = \frac{1}{\lambda}\ln\left(1+\frac{p}{d}\right)$ (b) $t = \frac{1}{\lambda}\ln\left(1+\frac{d}{p}\right)$

(c) $t = \frac{1}{\lambda}\ln\left(\frac{d}{p}\right)$ (d) $t = \frac{1}{\lambda}\ln\left(\frac{p}{d}\right)$

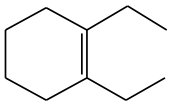
Q.33 What will be the effect of increase in temperature on physical adsorption ?
(a) It will decrease (b) It will increasese
(c) First increases then decreases (d) None of these

Q.34 The correct order of decreasing stability of the carbanions is

$\underset{(1)}{(CH_3)_3\overset{\ominus}{C}}, \underset{(2)}{(CH_3)_2\overset{\ominus}{C}H}, \underset{(3)}{CH_3\overset{\ominus}{C}H_2}, \underset{(4)}{C_6H_5\overset{\ominus}{C}H_2}$

(a) 1 > 2 > 3 > 4 (b) 4 > 3 > 2 > 1 (c) 4 < 1 > 2 > 3 (d) 1 > 2 > 4 > 3

Q.35 Which of these cycloalkenes will exhibit geometrical isomerism ?



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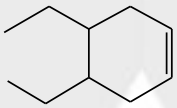


II III

(a) I (b) II (c) III (d) All of these

Q.36 $Me_2CH\text{-}\underset{\underset{OH}{|}}{C}H\text{-}Me \xrightarrow[350^\circ C]{Al_2O_3} (A) \xrightarrow[(ii)\,AgOH]{(i)\,HI} (B)$. Product (B) of the given reaction is :

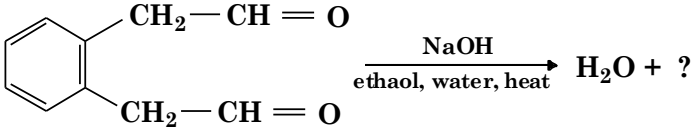
(a) $Me_2C(OH)CH_2Me$ (b) $Me_2CH-\underset{\underset{OH}{|}}{C}H-Me$

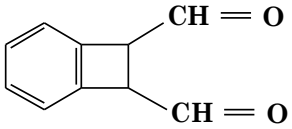
(c) $Me-\underset{\underset{OH}{|}}{C}H-CMe_3$ (d) $HO-CH_2-(CH_2)Me$

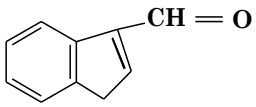
Q.37 If a mixture of two alkyl chlorides on treatment with sodium metal in ether solution gives isobutane as one of the product, then the reactants are :
(a) Methyl chloride and propyl chloride
(b) Methyl chloride and ethyl chloride

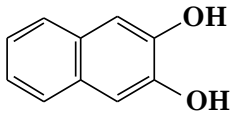
Q.38 Phenol $\xrightarrow{NaNO_2/H_2SO_4} B \xrightarrow{H_2O} C \xrightarrow{NaOH} D$ Name of the above reaction is :
(a) Liebermann's reaction (b) Phthalein fusion test
(c) Reimer - Tiemann reaction (d) Schotten - Baumann reation

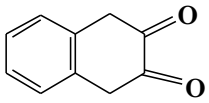
Q.39 What is the principal product of the following reaction ?



(a) 

(b) 

(c) 

(d) 

Q.40 Alkyl isocyanides undergo addition reaction on heating with HgO or S. This is due to
(a) electron-deficient nature of carbon atom
(b) electron-rich nature of carbon atom
(c) carbon has strong affinity for O and sulphur
(d) multiple bonding between N and C atom.

Q.41 In the estimation of sulphur, organic compound on treating with conc. HNO_3 is converted into :
(a) SO_2 (b) H_2S (c) H_2SO_4 (d) SO_3

Q.42 If a native protein is subjected to physical or chemical treatment which may disrupt its higher structure without affecting primary structure, then this process is called :
(a) inversion of protein (b) denaturation of protein
(c) renaturation of protein (d) fermentation

Q.43 PHBV is a biodegradable polymer of :
(a) 3-hydroxybutanoic acid and 2-hydroxypentanoic acid
(b) 3-hydroxybutanoic acid and 3-hydroxypentanoic acid
(c) 2-hydroxybutanoic acid and 2-hydroxypentanoic acid
(d) 2-hydroxybutanoic acid and 3-hydroxypentanoic acid

Q.44 A red solid is insoluble in water. However, it becomes soluble if some KI is added to water. Heating the red solid in a test tube results in liberation of some violet colored fumes and droplets of a metal appear on the cooler part of the test tube.
The red solid is :
(a) Pb_3O_4 (b) HgI_2 (c) HgO (d) $(NH_4)_2Cr_2O_7$

Q.45 Which of the following ions forms most stable complex compound ?
(a) Cu^{2+} (b) Ni^{2+} (c) Fe^{2+} (d) Mn^{2+}

Q.46 Two solution of a substance (nonelectrolyte) are mixed in the following manner ; 480 mL of 1.5 M first solution + 520 mL of 1.2 M second solution. What is the molarity of the final mixture ?

Q.47 Consider the reaction : $A_{(g)} + B_{(g)} \rightleftharpoons C_{(g)} + D_{(g)}$, which occurs in one step. The specific rate constant are 0.25 and 5000 for the forward and reverse reactions, repectively. The equilibrium constant is ___?

Q.48 An atomic solid crystallizes in a body centre cubic lattice and the inner surface of the atoms at the adjacent corner are separated by 60.3 pm. If the atomic weight of A is 48, then the density of the solid is nearly :

Q.49 K_f of 1,4-dioxane is 4.9 mol^{-1} for 1000 g. The depression in freezing point for a 0.001 m solution in dioxane is___?

Q.50 3.7 g of an oxide of a metal was heated with charcoal. The liberated CO_2 was absorbed in caustic soda solution and weighed 1.0 g. If the specific gravity of the metal is 0.095, the exact atomic weight of the metal is___?

Part - C - MATHEMATICS

Q.51 Let two number have arithmetic mean 9 and geometric mean 4. Then these numbers are the roots of the equation

(a) $x^2+18x+16=0$ (b) $x^2-18x+16=0$

(c) $x^2+18x-16=0$ (d) $x^2-18x-16=0$

Q.52 All the values of m for which both the roots of the equation $x^2-2mx+m^2-1=0$ are greater than -2 but less than 4 lie in the interval

(a) $-2 < m < 0$ (b) $1 < m < -3$ (c) $-1 < m < 3$ (d) $1 < m < 4$

Q.53 The points representing the complex number z for which $|z+5|^2-|z-5|^2=10$ lie on

(a) a straight line
(b) a circle
(c) a parabola
(d) the bisector of the line joining (5, 0) and (-5, 0)

Q.54 If $A=\begin{bmatrix}1&0&0\\0&1&0\\0&0&1\end{bmatrix}$, then A^2+2A equals

(a) A (b) 2 A (c) 3 A (d) 4 A

Q.55 In the which expansion of $\left(x^2+1+\frac{1}{x^2}\right)^n$, $n\in N$, which is not true

(a) number of terms is $2n+1$
(b) coefficient of constant term is 2^{n-1}
(c) coefficient of x^{2n-2} is n
(d) none of these

Q.56 For $x>0$, sum of the series $\frac{x-1}{x+1}+\frac{1}{2}\frac{x^2-1}{(x+1)^2}+\frac{1}{3}\frac{x^3-1}{(x+1)^3}+\frac{1}{4}\frac{x^4-1}{(x+1)^4}+\ldots.$ is

(a) $\log_e(x-1)$ (b) $\log_e x$ (c) $\log_e(x+1)$ (d) none of these

Q.57 If for a variable line $\frac{x}{a}+\frac{y}{b}=1$, the condition $\frac{1}{a^2}+\frac{1}{b^2}=\frac{1}{c^2}$ (c is a constant) is satisfied, then locus of foot of perpendicular drawn from origin to the line is

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

Q.58 The equation of the circle which is touched by $y=x$ has its centre on the positive direction of the x-axis and cuts off a chord of length 2 units along the line $\sqrt{3}\,y-x=0$ is

(a) $x^2+y^2-4x+2=0$ (b) $x^2+y^2-4x+1=0$

(c) $x^2+y^2-8x+8=0$ (d) $x^2+y^2-4y+2=0$

Q.59 A set of parallel chords of the parabola $y^2 = 4ax$ have their midpoint on
(a) any straight line through the vertex
(b) any straight line through the focus
(c) a straight line parallel to the axis
(d) another parabola

Q.60 Let R be a relation on a set A such that R = R^{-1}, then R is
(a) reflexive (b) symmetric (c) transitive (d) none of these

Q.61 If $\sqrt{(1-x^6)} + \sqrt{(1-y^6)} = a(x^3 - y^3)$ and $\frac{dy}{dx} = f(x,y)\sqrt{\left(\frac{1-y^6}{1-x^6}\right)}$ then

(a) $f(x,y) = y / x$ (b) $f(x,y) = y^2 / x^2$
(c) $f(x,y) = 2y^2 / x^2$ (d) $f(x,y) = x^2 / y^2$

Q.62 The function $f(x) = \tan^{-1}\left(\frac{1-x^2}{1+x^2}\right)$ is

(a) increasing in its domain
(b) decreasing in its domain
(c) decreasing in $(-\infty, 0)$ and increasing in $(0, \infty)$
(d) Increasing in $(-\infty, 0)$ and decreasing in $(0, \infty)$

Q.63 $\int \tan^{-1}\sqrt{x}\ dx$ equals

(a) $x\ \tan^{-1} x - \frac{1}{2}\log(1+x^2) + c$ (b) $x\ \tan^{-1}\sqrt{x} - \frac{1}{2}\log(1+x^2) + c$
(c) $x\ \tan^{-1}\sqrt{x} - \sqrt{x} + \log(1+x) + c$ (d) $(x+1)\tan^{-1}\sqrt{x} - \sqrt{x} + c$

Q.64 The equation of a curve passing through (2, 7/2) and having gradient $1 - \frac{1}{x^2}$ at (x, y) is

(a) $y = x^2 + x + 1$ (b) $xy = x^2 + x + 1$ (c) $xy = x + 1$ (d) none of these

Q.65 If $\frac{1+\sin 2x}{1-\sin 2x} = \cot^2(a+x)\ \forall\ x \in R \sim \left(n\pi + \frac{\pi}{4}\right)$, $n \in N$. Then "a" is equal to

(a) $\frac{\pi}{4}$ (b) $\frac{\pi}{2}$ (c) $\frac{3\pi}{4}$ (d) none of these

Q.66 Let $\vec{a} = 2\hat{i} + \hat{j} + \hat{k}$, $\vec{b} = \hat{i} + 2\hat{j} - \hat{k}$, and a unit vector $\vec{c}$ be coplanar. If $\vec{c}$ is perpendicular to $\vec{a}$ then $\vec{c}$ =

(a) $\frac{1}{\sqrt{2}}(-\hat{j} + \hat{k})$ (b) $\frac{1}{\sqrt{3}}(-\hat{i} - \hat{j} - \hat{k},)$ (c) $\frac{1}{\sqrt{5}}(\hat{i} - 2\hat{j})$ (d) $\frac{1}{\sqrt{3}}(\hat{i} - \hat{j} - \hat{k},)$

Q.67 Which of the following is logically equivalent to $\sim(\sim p \Rightarrow q)$?
(a) $p \wedge q$ (b) $p \wedge \sim q$ (c) $\sim p \wedge q$ (d) $\sim p \wedge \sim q$

Q.68 A and B are two events such that $P(A) > 0$, $P(B) \neq 1$, then, $P(\overline{A} / \overline{B})$ is equal to

(a) $1 - P(A / B)$ (b) $1 - P(\overline{A} / \overline{B})$ (c) $\frac{1 - P(A \cup B)}{P(\overline{B})}$ (d) $\frac{P(\overline{A})}{P(\overline{B})}$

Q.69 In the three dimensional xyz space the equation $x^2 - 5x + 6 = 0$ represents

(a) points (b) planes
(c) curves (d) pair of straight lines

Q.70 The mean income of a group of workers is $\overline{X}$ and that of another group is $\overline{Y}$. If the number of worker in the second group is 10 times the number of workers in the first group, then the mean income of the combined group is

(a) $(\overline{X} + 10\overline{Y}) / 3$ (b) $(\overline{X} + 10\overline{Y}) / 11$ (c) $(10\overline{X} + \overline{Y})$ (d) $(\overline{X} + 10\overline{Y}) / 9$

Q.71 A function $y = f(x)$ has a second -order derivative $f''(x) = 6(x - 1)$. If its graph passes through the point (2, 1) and at that point tangent to the graph is $y = 3x - 5$, then $f(2)$ is___?

Q.72 Let $f : R \to R$ be a differentiable function having $f(2) = 6$, $f'(2) = \frac{1}{48}$. Then

$\lim\limits_{x \to 2} \int_6^{f(x)} \frac{4t^3}{x - 2} dt$ equals ?

Q.73 Consider the five points comprising the vertices of a square and the intersection point of its diagonals. How many triangles can be formed using these points ?

Q.74 The remainder when $1! + 2! + 3! + ...+ n!$ is divided by 5 is $n \geq 4$?

Q.75 Let $\vec{u} = \hat{i} + \hat{j}, \vec{v} = \hat{i} - \hat{j}$ and $\vec{w} = \hat{i} + \hat{2j} + \hat{3k}$. If $\hat{n}$ is a unit vector such that $\vec{u}.\hat{n} = 0$ and $\vec{v}.\hat{n} = 0$. $\left|\vec{w}\hat{n}\right|$ is equal to ?

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