MOCK TEST PAPER 6

General Instructions : *Same as Mock Test Paper 1.*

Physics

Section A

Q. 1. A displacement vector, at an angle of 30° with y-axis has an x-component of 10 units. Then the magnitude of the vector is :

(1) 5.0 **(2)** 10 (3) 11.5 **(4)** 20

Q. 2. The formula $S = ut - \frac{1}{3}at^2$ where S is the distance travelled, u is the initial velocity, a is the acceleration and t is the time is :

(1) only dimensionally correct

(2) dimensionally incorrect

(3) dimensionally and numerically correct

(4) dimensionally and numerically wrong

Q. 3. A stone is dropped from the top of the tower and travels 24.5 m in the last second of its journey. The height of the tower is : ($g = 9.8\ m/s^2$)

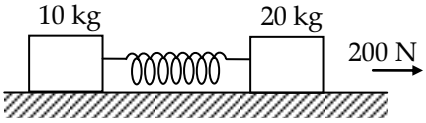
(1) 44.1 m **(2)** 49 m

(3) 78.4 m **(4)** 72 m

Q. 4. Two stones are projected with the same speed but making different angles with the horizontal. Their ranges are equal. If the angle of projection of one is $\frac{\pi}{3}$ and its maximum height is y_1 then the maximum height of the other will be :

(1) $3y_1$ **(2)** $2y_1$ (3) $\frac{y_1}{2}$ **(4)** $\frac{y_1}{3}$

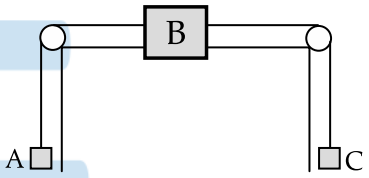
Q. 5. The masses of 10 kg and 20 kg, respectively, are connected by massless spring as shown in the figure. A force of 200 N acts on the 20 kg mass. At the instant shown, the 10 kg mass has acceleration of 12 m/s^2. What is the acceleration of 20 kg mass ? ($g = 10\ m/s^2$)



(1) 12 m/s^2 **(2)** 4 m/s^2

(3) 10 m/s^2 **(4)** zero

Q. 6. Block A has a mass of 2 kg and block B has 20 kg. If the coefficient of kinetic friction between block B and the horizontal surface is 0.1, and B is accelerating towards the right with a = 2 m/s^2, then the mass of the block C will be : ($g = 10\ m/s^2$)



(1) 15 kg **(2)** 12.5 kg

(3) 5.7 kg **(4)** 10.5 kg

Q. 7. The specific heat of a substance is given by $C = a + bT$, where a = 1.12 kJ kg^{-1}K^{-1} and b = 0.016 kJ–kg K^{-2}. The amount of heat required to raise the temperature of 1.2 kg of the material from 280 K to 312 K is :

(1) 205 kJ **(2)** 215 kJ

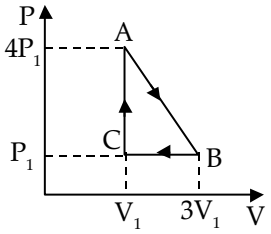
(3) 225 kJ **(4)** 235 kJ

Q. 8. In a cubical box of volume V, there are N molecules of a gas moving randomly. If m is mass of each molecule and v^2 is the mean square of x component of the velocity of molecules, then the pressure of the gas is :

(1) $P = \frac{1}{3}\frac{mNv^2}{V}$ **(2)** $P = \frac{mNv^2}{V}$

(3) $P = \frac{1}{3}mNv^2$ **(4)** $P = mNv^2$

Q. 9. An ideal gas is taken through series of changes ABCA. The amount of work involved in the cycle is :



(1) $12P_1V_1$ **(2)** $6P_1V_1$

(3) $3P_1V_1$ **(4)** P_1V_1

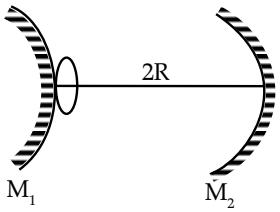
Q. 10. A thin square steel plate with each side equal to 10 cm is heated by a blacksmith. The rate of radiated energy by the heated plate is 1134 Watts. The temperature of the hot steel plate is :

(Stefan's constant $\sigma = 5.67 \times 10^{-8}$ watt $m^{-2}K^{-4}$ emissivity of the plate = 1)

(1) 570 K **(2)** 1189 K

(3) 2500 K **(4)** 750 K

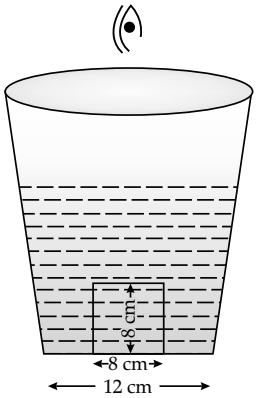
Q. 11. Two spherical mirrors, one convex and the other concave, each of same radius of curvature R are arranged coaxially at a distance of 2R from each other. A small circle of radius *a* is drawn on the convex mirror as shown in figure. What is the radii of first two images of the circle?



(1) $\frac{a}{3}, \frac{a}{11}$ **(2)** $\frac{a}{6}, \frac{a}{2}$

(3) $\frac{a}{3}, \frac{a}{4}$ **(4)** $\frac{a}{12}, \frac{a}{4}$

Q. 12. A cylindrical vessel of diameter 12 cm contains 800π cm^3 of water. A cylindrical glass piece of diameter 8.0 cm and height 8.0 cm is placed in the vessel. If the bottom of the vessel under the glass piece is seen by the paraxial rays (see figure), locate its image from bottom. The index of refraction of glass is 1.50 and that of water is 1.33.



(1) 2.1 cm **(2)** 7.1 cm

(3) 9.1 cm **(4)** 11.1 cm

Q. 13. A prism of refractive index $\sqrt{2}$ and refracting angle *A* produces minimum deviation δ_m of a ray on one face at an angle of incidence 45°, The values of *A* and δ_m are, respectively,

(1) 45°, 45° **(2)** 45°, 60°

(3) 60°, 30° **(4)** 60°, 45°

Q. 14. A converging lens of focal length *f* is placed at a distance 0.3 m from an object to produce an image on a screen 0.9 m from the lens. With the object and the screen in the same positions, an image of the object could also be produced on the screen by placing a converging lens of focal length

(1) *f* at a distance 0.1 m from the screen

(2) *f* at a distance 0.3 m from the screen

(3) 3 *f* at a distance 0.3 m from the screen

(4) 3 *f* at a distance 0.1 m from the screen

Q. 15. At 0K, which of the following properties of gas will be zero?

(1) Kinetic Energy

(2) Potential Energy

(3) Vibrational Energy

(4) Density

Q. 16. What is the electric potential needed to excite He^+ to its first excited state?

(1) 40.8 V **(2)** 20.4 V

(3) 10.2 V **(4)** 81.6 V

Q. 17. A square object is placed 15 cm from a convex mirror of radius of curvature 90 cm. Its areal magnification is—

(1) $\frac{2}{4}$ **(2)** $\frac{3}{4}$ (3) $\frac{9}{16}$ **(4)** $\frac{9}{18}$

Q. 18. When ultraviolet light of wavelength 100 nm is incident upon a sample of silver metal, a

potential difference of 7.7 volt is required to stop the photoelectrons from reaching the collector plate. The potential required to stop photo electrons when light of wavelength 200 nm is incident upon silver is :

(1) 1.5 V **(2)** 1.85 V

(3) 1.95 V **(4)** 2.37 V

Q. 19. The relation between the focal length of equiconvex lens and radius of curvature of either face when placed in air is given as—

(1) $f > R$ **(2)** $f < R$

(3) $f = R$ **(4)** $\frac{f}{R} = 2$

Q. 20. Calculate the average Kinetic Energy of translation of the molecule of an ideal gas at 0° C and 100° C.

[N = 6.02×10^{23}, K = 1.38×10^{-23} J/K]

(1) 5.56×10^{21} J/molecule, 7.12×10^{-21} J/molecule

(2) 6.56×10^{-21} J/molecule, 7.72×10^{-21} J/molecule

(3) 5.65×10^{21} J/molecule, 7.72×10^{-21} J/molecule

(4) 5.65×10^{21} J/molecule, 7.2×10^{-21} J/molecule

Section B

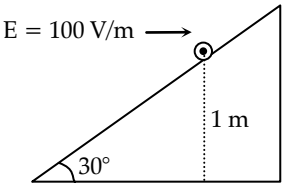
Q. 21. An engine is approaching a cliff at a constant speed. When it is at a distance of 0.9 km from cliff it sounds a whistle. The echo of the sound is heard by the driver after 5 seconds. Velocity of sound in air is equal to 330 ms^{-1}. The speed of the engine is ..... km/h

Q. 22. The greatest speed of transverse waves through a steel wire of radius 1 mm is ..... $\times 10^2$ m. The breaking stress of steel is 6.0×10^8 Nm^{-2}. Density of steel = 7800 kg m^{-3}.

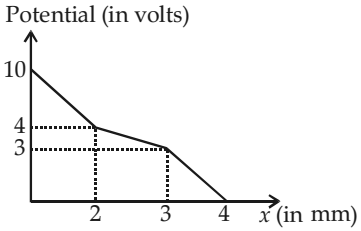
Q. 23. Length of steel rod so that it is 5 cm longer than the copper rod at all temperatures should be ..... cm.

(α for copper = 1.7×10^{-5}/°C and α for steel = 1.1×10^{-5}/°C)

Q. 24. An inclined plane makes an angle of 30° with the horizontal electric field E of 100 V/m. A particle of mass 1 kg and charge 0.01 C slides down from a height of 1 m. If the coefficient of friction is 0.2, the time taken for the particle to reach the bottom is ..... s.



Q. 25. A capacitor filled partially with dielectric material of dielectric constant 'k'. Its electric potential versus position graph is as shown. Distance between the two plates is 4 mm. The dielectric constant of medium is ..... .



Q. 26. One solenoid is centered inside another. The outer one has a length of 50.0 cm and contains 6750 coils, while the coaxial inner solenoid is 3.0 cm long and π cm^2 in area and contains 150 coils. The current in the outer solenoid is changing at 3000 A/s. The emf induced in the inner solenoid is ..... V. (Round off to two decimal places.)

Q. 27. Total momentum of electrons in a straight wire of length L carrying a current I is P, if mass of electron is doubled keeping its charge constant, and length of the wire is also doubled keeping current constant. the new value of momentum will be nP. so the value of n will be ..... .

Q. 28. A particle of mass 5×10^{-5} kg is placed at the lowest point of a smooth parabola having the equation $20\ x^2 = y$ (x, y in m). Here y is the vertical height. If it is displaced slightly and it is constrained to move along the parabola, the angular frequency (in rad/s) of small oscillations is ..... .

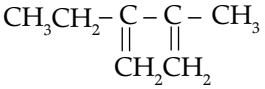
Q. 29. In the widest part of the horizontal pipe oil is flowing at a rate of 2 m/s. The speed (in m/s) of the flow of oil in the narrow part of the tube if the pressure difference in the broad and narrow parts of the pipe is 0.25 $\rho_{oil} g$, is ..... m/s.

Q. 30. A coil of effective area 4 m^2 is placed at right angles to the magnetic induction B. The e.m.f. of 0.32 V is induced in the coil. When the field is reduced to 20% of its initial value in 0.5 s. Find B (in Wb/m^2).

Chemistry

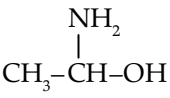
Section A

Q. 31. Write the IUPAC name of the compound



(1) 3-ethyl-2-methyl butadiene-1,3
(2) 2-ethyl-3-methyl butadiene-1,3
(3) 2-ethyl-4-methyl butadiene-1,2
(4) 2-ethyl-4-methyl butadiene-2,3

Q. 32. Acetamide is isomer of :

(1) 1-amino ethanol 

(2) Formamide 

(3) Ethyl amine $C_2H_5NH_2$
(4) Acetaldehyde oxime $CH_3–CH=N–OH$

Q. 33. Two statements are given below:

Statement I: The melting point of monocarboxylic acid with even number of carbon atoms is higher than that of with odd number of carbon atoms acid immediately below and above it in the series.

Statement II: The solubility of monocarboxylic acids in water decreases with increase in molar mass.

Choose the most appropriate option:

(1) Both Statement I and Statement II are correct.
(2) Both Statement I and Statement II are incorrect.
(3) Statement I is correct but Statement II is incorrect.
(4) Statement I is incorrect but Statement II is correct.

Q. 34. Incorrect statement for Tyndall effect is:

(1) The refractive indices of the dispersed phase and the dispersion medium differ greatly in magnitude.
(2) The diameter of the dispersed particles is much smaller than the wavelength of the light used.
(3) During projection of movies in the cinemas hall, tyndall effect is noticed.
(4) It is used to distinguish a true solution from a colloidal solution.

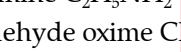
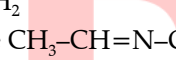
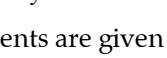
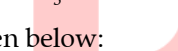
Q. 35. The number of bridged oxygen atoms present in compound B formed from the following reactions is

(1) 0 (2) –1 (3) 2 (4) 3

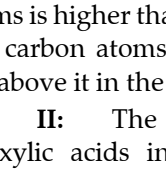
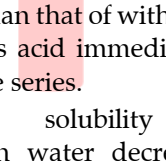
Q. 36. The reaction of H_2O_2 with potassium permanganate in acidic medium leads to the formation of mainly:

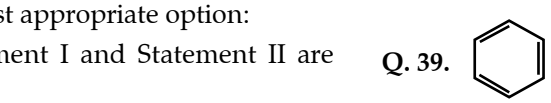
(1) Mn^{2+} **(2)** Mn^{4+} (3) Mn^{3+} **(4)** Mn^{6+}

Q. 37. The most stable free radical among the following is :

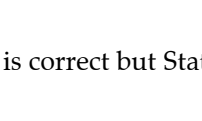
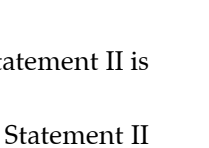
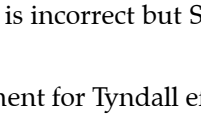
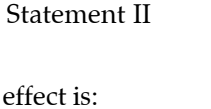
(1)  **(2)** 
(3)  **(4)** 

Q. 38. What would be the main product when propene reacts with HBr?

(1)  **(2)** 
(3) Both (1) and (2) **(4)** $Br–CH_2–CH=CH_2$

Q. 39. 

(excess)

(1)  **(2)** 
(3)  **(4)** 

Q. 40. What would be the product when neopentyl chloride reacts with sodium ethoxide?

(1) 2-Methyl-butan-2-ol
(2) Neo pentyl alcohol
(3) Both A and B
(4) 2-Methyl-but-2-ene

Q. 41. The missing structures A and B in the reaction sequence:

$R–CH_2–CH_2OH \xrightarrow[350^\circ C]{Al_2O_3} R–CH=CH_2$

$\xrightarrow[(ii)\ ZnH_3O^{\oplus}]{(i)\ O_3} RCHO + A;\ RCHO \xrightarrow{Reduce} B;$ are :

(1) CH_3OH, RCOOH
(2) Methanal, RCH_2OH
(3) Ethanal, RCOOH
(4) Methanal, RCHOHR

Q. 42. $CH_3–CH_2–CHO \xrightarrow[alkali]{Dil}$ Product. The product in the above reaction is :

(1) $CH_3–CH_2COOH$
(2) $CH_3–CH_2–CH_2OH$
(3) $CH_3–CH_2–\underset{\underset{OH}{|}}{CH}–CH_2–CHO$
(4) $CH_3–CH_2–\underset{\underset{OH}{|}}{CH}–\underset{\underset{CH_3}{|}}{CH}–CHO$

Q. 43. Identify the product A in the following reaction

$CH_2(COOH)_2 \xrightarrow{\Delta} CH_3COOH + A$

(1) CO_2 **(2)** CH_3CHO
(3) CH_3OH **(4)** None of the above

Q. 44. When propionamide reacts with Br_2 in the presence of alkali the product is :

(1) $CH_3CH_2CH_2NH_2$ **(2)** $CH_3CH_2NH_2$
(3) C_3H_7CN **(4)** C_2H_5CN

Q. 45. A pyranose ring consists of a skeleton of :

(1) 5 carbon atoms and one oxygen atom
(2) 6 carbon atoms
(3) 6 carbon atoms and one oxygen atom
(4) 4 carbon atoms and one oxygen atom

Q. 46. A mixture of benzene and chloroform is separated by :

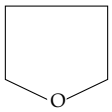
(1) Sublimation **(2)** Separating funnel
(3) Crystallisation **(4)** Distillation

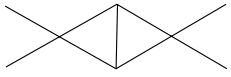
Q. 47. Which of the following is a double salt?

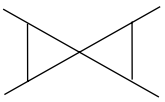
(1) Carnallite **(2)** Mohr's salt
(3) Alum **(4)** All of the above

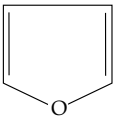
Q. 48. Match List – I with List – II.

List – I

(A) 

(B) 

(C) 

(D) 

List – II

(I) Spiro compound

(II) Aromatic compound

(III) Non–planar Heterocyclic compound

(IV) Bicyclo compound

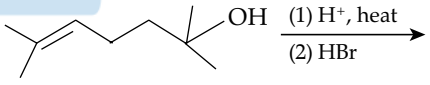
Choose the correct answer from the options given below:

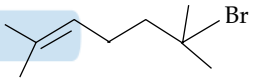
(1) (A) – (II), (B) – (I), (C) – (IV), (D) – (III)
(2) (A) – (IV), (B) – (III), (C) – (I), (D) – (II)
(3) (A) – (III), (B) – (IV), (C) – (I), (D) – (II)
(4) (A) – (IV), (B) – (III), (C) – (II), (D) – (I)

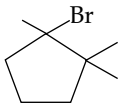
Q. 49. A reddish-pink substance on heating gives off a vapour which condenses on the sides of the test tube and the substance turns blue. If on cooling water is added to the residue it turns to original colour. The substance is :

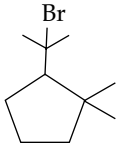
(1) Iodine crystals
(2) Copper sulphate crystals
(3) Cobalt chloride crystals
(4) ZnO

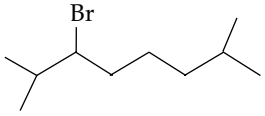
Q. 50. The major product in the given reaction is



(1) 

(2) 

(3) 

(4) 

Section B

Q. 51. The decomposition of N_2O into N_2 and O_2 in presence of gaseous argon follows second order kinetics, with

$k = (5.0 \times 10^{11}\ L\ mol^{-1}\ s^{-1})\ e^{-\frac{29000\ K}{T}}$. Arrhenius parameters are ..... kJ mol^{-1}.

Q. 52. A gaseous mixture of two substances A and B, under a total pressure of 0.8 atm is

in equilibrium with an ideal liquid solution. The mole fraction of substance A is 0.5 in the vapour phase and 0.2 in the liquid phase. The vapour pressure of pure liquid A is_____atm. (Nearest integer)

Q. 53. The solubility of $Co_2[Fe(CN)_6]$ in water at 25°C from the following data : Conductivity of saturated solution of $Co_2[Fe(CN)_6]$ = 2.06×10^{-6} ohm^{-1} cm^{-1} and that of water = 4.1×10^{-7} ohm^{-1} cm^{-1}. The ionic molar conductivities of Co^{2+} and $[Fe(CN)_6]^{4-}$ are 86 and 444 ohm^{-1} cm^2 mol^{-1} respectively, is ..... $\times 10^{-6}$ mol/L.

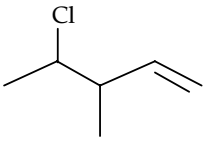
Q. 54. Total number of isomers (including stereoisomers) obtained on monochlorination of methyl cyclohexane is _____.

Q. 55. A storage battery contains a solution of H_2SO_4 38% by weight. At this concentration, vant Hoff factor is 2.50. At the battery content freeze temperature will be ..... K. K_f = 1.86 K kg mol^{-1}.

Q. 56. The number of sp^3 hybridised carbons in an acyclic neutral compound with molecular formula C_4H_5N is _____.

Q. 57. A given mixture consists only of pure substance X and pure substance Y. The total weight of the mixture is 3.72 g. The total number of moles is 0.06. If the weight of one mole Y is 48 g and if there is 0.02 mole X in the mixture, the weight of one mole of X is ..... g.

Q. 58.



Consider the above reaction. The number of π electrons present in the product 'P' is_____

Q. 59. Dipole moment of HX is 2.59 x 10^{-30} coulomb-metre. Bond length of HX is 1.39 Å. The ionic character of molecule is ..... %.

Q. 60. For the gaseous reaction,
$K(g) + F(g) \rightarrow K^+(g) + F^-(g)$, ΔH was calculated to be 19 kcal/mol under conditions where the cations and anions were prevented by electrostatic separation from combining with each other. The ionisation energy of K is 4.3 eV. The electron affinity of F is ..... . (in eV)

Mathematics

Section A

Q. 61. $\int \frac{3x+1}{2x^2-2x+3}\,dx$ equals :

(1) $\frac{1}{4}\log\left(2x^2-2x+3\right)-\frac{\sqrt{5}}{2}\tan^{-1}\left(\frac{2x-1}{\sqrt{5}}\right)+C$

(2) $\frac{3}{4}\log\left(2x^2-2x+3\right)+\frac{\sqrt{5}}{2}\tan^{-1}\left(\frac{2x-1}{\sqrt{5}}\right)+C$

(3) $\frac{3}{4}\log\left(2x^2-2x+3\right)+\frac{\sqrt{5}}{2}\tan^{-1}\left(\frac{4x-2}{\sqrt{5}}\right)+C$

(4) $\frac{1}{4}\log\left(2x^2-2x+3\right)-\frac{\sqrt{5}}{2}\tan^{-1}\left(\frac{4x-2}{\sqrt{5}}\right)+C$

Q. 62. $\int_0^{\pi} \frac{x\sin x}{1+\cos^2 x}\,dx$ equals :

(1) 0 **(2)** $\frac{\pi}{4}$ (3) $\frac{\pi^2}{4}$ **(4)** $\frac{\pi^2}{2}$

Q. 63. Area in first quadrant bounded by $y = 4x^2$, $x = 0$, $y = 1$ and y = 4 is :

(1) $\frac{3}{7}$ **(2)** $\frac{5}{7}$ (3) $\frac{7}{3}$ **(4)** $\frac{7}{5}$

Q. 64. If the curves $y^2 = 6x$, $9x^2 + by^2 = 16$, cut each other at right angles, then the value of b is :

(1) 2 **(2)** 4 (3) $\frac{9}{2}$ **(4)** 3

Q. 65. Let $f(x) = \tan^{-1}\phi(x)$, where $\phi(x)$ is monotonically increasing for $0 < x < \frac{\pi}{2}$. Then $f(x)$ is :

(1) increasing in $\left(0, \frac{\pi}{2}\right)$

(2) decreasing in $\left(0, \frac{\pi}{2}\right)$

(3) increasing in $\left(0, \frac{\pi}{4}\right)$ and decreasing in $\left(\frac{\pi}{4}, \frac{\pi}{2}\right)$

(4) decreasing in $\left(0, \frac{\pi}{4}\right)$ and increasing in $\left(\frac{\pi}{4}, \frac{\pi}{2}\right)$

Q. 66. The function $g(x)=\frac{f(x)}{x}$, $x \neq 0$ has an extreme value when :

(1) $g'(x) = f(x)$ **(2)** $f(x) = 0$

(3) $x\,g'(x) = f(x)$ **(4)** $g(x) = f'(x)$

Q. 67. The ratio $\frac{2^{\log_{2^{1/4}} a} - 3^{\log_{27}\left(a^2+1\right)^3} - 2a}{7^{4\log_{49} a} - a - 1}$ simplifies to

(1) $a^2 - a - 1$ **(2)** $a^2 + a - 1$

(3) $a^2 - a + 1$ **(4)** $a^2 + a + 1$

Q. 68. The number of real solutions of

$x - \frac{1}{x^2-4} = 2 - \frac{1}{x^2-4}$ is :

(1) 0 **(2)** 1 **(3)** 2 **(4)** infinite

Q. 69. A GP consists of an even number of terms. If the sum of all the terms is 5 times the sum of the terms occupying odd places, the common ratio will be equal to :

(1) 2 **(2)** 3 **(3)** 4 **(4)** 5

Q. 70. If sum of the coefficient of second and fourth terms in the expansion of $\left(2x - \frac{1}{3x^2}\right)^5$, in descending powers of x, is S, then the value $\left|\frac{81}{40}S\right|$ of is :

(1) 27 **(2)** 57 **(3)** 72 **(4)** 75

Q. 71. If the vertices of a triangle be (0, 0), (6, 0) and (6, 8), then its incentre will be :

(1) (2, 1) **(2)** (1, 2) **(3)** (4, 2) **(4)** (2, 4)

Q. 72. If the line $3x + 4y = m$ touches the circle $x^2 + y^2 = 10x$, then m is equal to :

(1) – 40, 10 **(2)** 40, – 10

(3) 40, 10 **(4)** –40, –10

Q. 73. Which of the following are not parametric coordinates of any point on the parabola $y^2 = 4ax$:

(1) $(at^2, 2at)$ **(2)** $\left(am^2, \frac{2a}{m}\right)$

(3) $(a/m^2, 2a/m)$ **(4)** $(am^2, -2am)$

Q. 74. Tangents are drawn from a point on the circle $x^2 + y^2 = 25$ to the ellipse $9x^2 + 16y^2 - 144 = 0$ then the angle between the tangents is :

(1) $\frac{\pi}{4}$ **(2)** $\frac{3\pi}{4}$ **(3)** $\frac{\pi}{2}$ **(4)** $\frac{2\pi}{3}$

Q. 75. Parametric form of the hyperbola $\frac{x^2}{4} - \frac{y^2}{9} = -1$ is :

(1) $(2\tan\theta, 3\sec\theta)$ **(2)** $(3\sec\theta, 2\tan\theta)$

(3) $(9\sec\theta, 4\tan\theta)$ **(4)** $(3\tan\theta, 2\sec\theta)$

Q. 76. Let $x = x(y)$ be the solution of the differential equation $2ye^{x/y^2}dx + \left(y^2 - 4xe^{x/y^2}\right)dy = 0$ such that $x(1) = 0$. Then, $x(e)$ is equal to:

(1) $e\log_e(2)$ **(2)** $-e\log_e(2)$

(3) $e^2\log_e(2)$ **(4)** $-e^2\log_e(2)$

Q. 77. 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

(1) $\arg z_2 = \frac{\pi}{4}$ **(2)** $\arg z_2 = -\frac{3\pi}{4}$

(3) $\arg z_1 = \frac{\pi}{4}$ **(4)** $\arg z_1 = -\frac{3\pi}{4}$

Q. 78. The d.c's of a line whose direction ratios are 2, 3, –6, are :

(1) $\frac{2}{7}, \frac{3}{7}, \frac{-6}{7}$ **(2)** $\frac{-2}{7}, \frac{3}{7}, \frac{-6}{7}$

(3) $\frac{2}{7}, \frac{-3}{7}, \frac{-6}{7}$ **(4)** $\frac{-2}{7}, \frac{-3}{7}, \frac{-6}{7}$

Q. 79. The shortest distance between the lines $\frac{x-3}{2} = \frac{y-2}{3} = \frac{z-1}{-1}$ and $\frac{x+3}{2} = \frac{y-6}{1} = \frac{z-5}{3}$ is

(1) $\frac{18}{\sqrt{5}}$ **(2)** $\frac{22}{3\sqrt{5}}$ **(3)** $\frac{46}{3\sqrt{5}}$ **(4)** $6\sqrt{3}$

Q. 80. The minimum number of zeroes in an upper triangular matrix of order $n \times n$ will be :

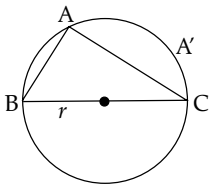
(1) $\frac{n(n-1)}{2}$ **(2)** $\frac{n(n+1)}{2}$

(3) $\frac{2n(n-1)}{2}$ **(4)** None of these

Section B

Q. 81. The Probability that A speaks truth is $\frac{3}{4}$ and that of B is $\frac{4}{5}$. The probability that they contradict each other in stating the same fact is p, then the value of 40p is :

Q. 82. Let right angled isosceles triangle ABC be inscribed in a circle according to adjacent diagram vertex A is moved along the circle to reach at A′ such that are $\overset{\frown}{AA'} = \frac{\pi r}{3}$, if $r = \sqrt{3}+1$ then $(A'C)^2$ is .....



Q. 83. Let $\lambda_1, \lambda_2 \in [0, \pi]$ are the solutions of the equation $\operatorname{cosec}\left(\frac{\pi}{4}+x\right)+\operatorname{cosec}\left(\frac{\pi}{4}-x\right)=2\sqrt{2}$, then $8(\sin^2\lambda_1 + \sin^2\lambda_2)$ is equal to .....

Q. 84 Let $x = \sin^{-1}(\sin 8) + \cos^{-1}(\cos 11) + \tan^{-1}(\tan 7)$, and $x = k(\pi - 2.4)$ for an integer k, then the value of k is.....

Q. 85. If in a frequency distribution, the mean and madian are 21 and 22 respectively, then its mode is approximately .....

Q. 86. Number of selections of at least one letter from the letters of MATHEMATICS, is .....

Q. 87. Let (p_1, q_1, r_1) & (p_2, q_2, r_2) are satisfying $\begin{vmatrix} 1 & p & p^2 \\ 1 & q & q^2 \\ 1 & r & r^2 \end{vmatrix} = 6$ (where $p_i, q_i, r_i \in N$ and $p_i < q_i < r_i$ and $i = 1, 2$) and point (p_1, q_1, r_1) lies on the plane $2x + 3y + 6z = k_1$ and point (p_2, q_2, r_2) lies on the plane $2x+3y + 6z = k_2$ (where $p_1 = p_2 = 1$). If distance between these planes is 'd', then value of $(210d)$ is ..... .

Q. 88. Let $f : R - \left\{\frac{1}{2}\right\} \to R - \left\{\frac{1}{2}\right\}$, $f(x) = \frac{x-2}{2x-1}$ **be a** function such that $x = m$ is the solution of $f(x) + 2f^{-1}(x) + 2 = f(f(x))$, then m is equal to ..... .

Q. 89. The value of $\lim\limits_{x\to 0}\frac{(\sin(\ell n e^x))^2}{(e^{\tan^2 x}-1)}$ is ..... .

Q. 90. If functions g & h are defined as

$$g(x) = \begin{cases} x^2+1 & x \in Q \\ px^2 & x \notin Q \end{cases}$$

and $h(x) = \begin{cases} px & x \in Q \\ 2x+q & x \notin Q \end{cases}$

If $(g + h)(x)$ is continuous at $x = 1$ and $x = 3$, then $3p + q$ is ..... .