Competishun

52/6, Opposite Metro Mas Hospital, Shipra Path, Mansarovar

Date: 14/10/2024

Time: 3 hours **Max. Marks:** 300

PRATHAM-1 (24-25)-MPT-4

Physics

Single Choice Question

Q1 Calculate the value of mean free path (λ) for oxygen molecules at temperature 27°C and pressure 1.01×10^5 Pa. Assume the molecular diameter 0.3 nm and the gas is ideal. ($k = 1.38 \times 10^{-23}$ JK^{-1})

a) 58 nm **b)** 32 nm **c)** 86 nm **d)** 102 nm

Q2 An ideal gas in a closed container is slowly heated. As its temperature increases, which of the following statements are true?
(A) the mean free path of the molecules decreases.
(B) the mean collision time between the molecules decreases.
(C) the mean free path remains unchanged.
(D) the mean collision time remains unchanged

a) (C) and (D) **b)** (A) and (D) **c)** (B) and (C) **d)** (A) and (B)

Q3 The root mean square velocity of molecules of gas is

a) Proportional to square of temperature (T^2).

b) Inversely proportional to square root of temperature $\sqrt{\frac{1}{T}}$

c) Proportional to square root of temperature $\sqrt{T}$

d) Proportional to temperature (T).

Q4 What will be the effect on the root mean square velocity of oxygen molecules if the temperature is doubled and oxygen molecule dissociates into atomic oxygen?

a) The velocity of atomic oxygen remains same

b) The velocity of atomic oxygen doubles

c) The velocity of atomic oxygen becomes half

d) The velocity of atomic oxygen becomes four times

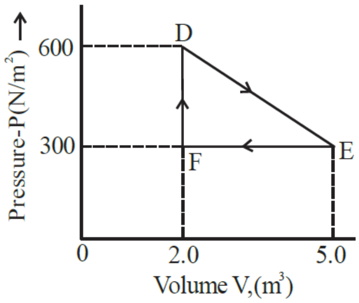
Q5 The root mean square speed of smoke particles of mass 5×10^{-17} kg their Brownian motion in air at NTP is approximately. [Given $k = 1.38 \times 10^{-23}$ JK^{-1}]

a) 60 mm s^{-1} **b)** 12 mm s^{-1} **c)** 15 mm s^{-1} **d)** 36 mm s^{-1}

Q6 The temperature at which the kinetic energy of oxygen molecules becomes double than its value at 27°C is

a) 1227°C **b)** 927°C **c)** 327°C **d)** 627°C

Q7 A thermodynamic system is taken from an original state D to an intermediate state E by the linear process shown in the figure. Its volume is then reduced to the original volume from E to F by an isobaric process. The total work done by the gas from D to E to F will be



a) –450 J **b)** 450 J **c)** 900 J **d)** 1350 J

Q8 A diatomic gas with rigid molecules does 10 J of work when expanded at constant pressure. What would be the heat energy absorbed by the gas, in this process?

a) 30 J **b)** 35 J **c)** 25 J **d)** 40 J

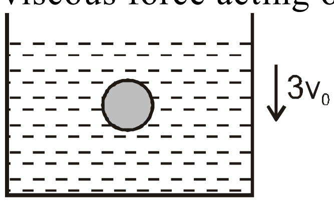
Q9 A capillary tube of radius 0.20 mm is dipped vertically in water. The height of the water column raised in the tube, will be (surface tension of water = 0.075 N/m and density of water = 1000 kg/m^3. Take g = 10 m/s^2 and contact angle 0°).

a) 7.5 cm **b)** 6 cm **c)** 5 cm **d)** 3 cm

Q10 When M_1 gram of ice at –10°C (specific heat = 0.5 cal g^{-1}°C^{-1}) is added to M_2 gram of water at 50°C, finally no ice is left and the water is at 0°C. The value of latent heat of ice, in cal g^{-1} is :

a) $\frac{50M_2}{M_1}-5$ **b)** $\frac{5M_1}{M_2}-50$ **c)** $\frac{50M_2}{M_2}$ **d)** $\frac{5M_2}{M_1}-5$

Q11 A container filled with viscous liquid is moving vertically downwards with constant speed $3v_0$. At the instant shown, a sphere of radius r is moving vertically downwards (in liquid) has speed v_0. The coefficient of viscosity is η. There is no relative motion between the liquid and the container. Then at the shown instant, the magnitude of viscous force acting on sphere is



a) $6\pi\eta r v_0$ **b)** $12\pi\eta r v_0$ **c)** $18\pi\eta r v_0$ **d)** $24\pi\eta r v_0$

Q12 Two different wires having lengths L_1 and L_2, and respective temperature coefficient of linear expansion α_1 and α_2, are joined end-to-end. Then the effective temperature coefficient of linear expansion is

a) $\sqrt[2]{\alpha_1\alpha_2}$ **b)** $4\frac{\alpha_1\alpha_2}{\alpha_1+\alpha_2}\frac{L_2L_1}{(L_2+L_1)^2}$ **c)** $\frac{\alpha_1+\alpha_2}{2}$ **d)** $\frac{\alpha_1L_1+\alpha_2L_2}{L_1+L_2}$

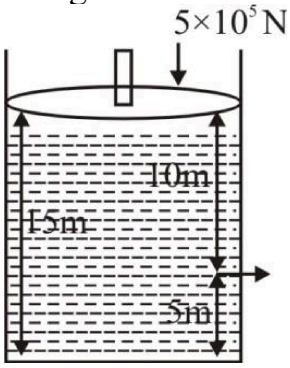
Q13 Two rods A and B of identical dimensions are at temperature 30°C. If A is heated upto 180°C and B upto T°C, then the new lengths are the same. If the ratio of the coefficients of linear expansion of A and B is 4 : 3, then the value of T is:

a) 270°C **b)** 230°C **c)** 250°C **d)** 200°C

Q14 A submarine experiences a pressure of 5.05×10^6 Pa at a depth of d_1 in a sea. When it goes further to a depth of d_2, it experiences a pressure of 8.08×10^6 Pa. Then $d_2 - d_1$ is approximately (density of water = 10^3 kg/m^3 and acceleration due to gravity = 10 ms^{-2}) :

a) 600 m **b)** 500 m **c)** 300 m **d)** 400 m

Q15 Consider a cylindrical tank of radius 1 m is filled with water. The top surface of water is at 15 m from the bottom of the cylinder. There is a hole on the wall of cylinder at a height of 5m from the bottom. A force of 5×10^5 N is applied an the top surface of water using a piston. The speed of efflux from the hole will be :
(given atmospheric pressure $P_A = 1.01 \times 10^5$ Pa, density of water $\rho_w = 1000$ kg/m^3 and gravitational acceleration g = 10 m/s^2)



a) 11.6 m/s **b)** 10.8 m/s **c)** 17.8 m/s **d)** 14.4 m/s

Q16 The force required to stretch a wire of cross-section 1 cm^2 to double its length will be :
(Given Youg's modulus of the wire = 2×10^{11} N/m^2)

a) 1×10^7 N **b)** 1.5×10^7 N **c)** 2×10^7 N **d)** 2.5×10^7 N

Q17 If speed V, area A and force F are chosen as fundamental units, then the dimension of Young's modulus will be

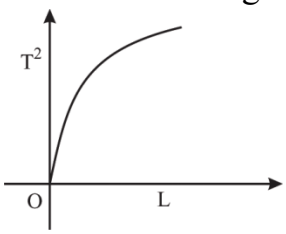
a) $FA^{-1}V^0$ **b)** FA^2V^{-1} **c)** FA^2V^{-2} **d)** FA^2V^{-3}

Q18 The normal density of a material is ρ and its bulk modulus of elasticity is K. The magnitude of increase in density of material, when a pressure P is applied uniformly on all sides, will be :

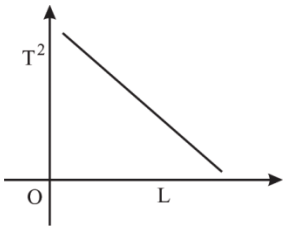
a) $\frac{\rho K}{P}$ **b)** $\frac{\rho P}{K}$ **c)** $\frac{K}{\rho P}$ **d)** $\frac{PK}{\rho}$

Q19 Choose the correct length (L) versus square of time period (T^2) graph for a simple pendulum executing simple harmonic motion.

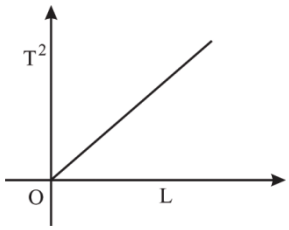
a)



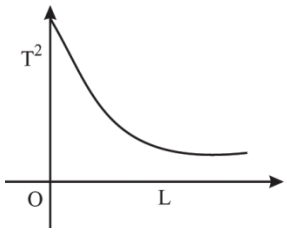
b)



c)



d)



Q20 For what value of displacement the kinetic energy and potential energy of a simple harmonic oscillation become equal ?

a) $x = 0$ **b)** $x = \pm A$ **c)** $x = \pm\frac{A}{\sqrt{2}}$ **d)** $x = \frac{A}{2}$

Numerical

Q21 In a certain thermodynamical process, the pressure of a gas depends on its volume as kV^3. The work done when the temperature changes from 100°C to 300°C will be ___ nR, where n denotes number of moles of a gas.

Q22 A sample of gas with $\gamma = 1.5$ is taken through an adiabatic process in which the volume is compressed from 1200 cm^3 to 300 cm^3. If the initial pressure is 200 kPa. The absolute value of the workdone by the gas in the process =_____J.

Q23 One mole of a monoatomic gas is mixed with three moles of a diatomic gas. The molecular specific heat of mixture at constant volume is $\frac{\alpha^2}{4}R$ J/mol K; then the value of α will be _____. (Assume that the given diatomic gas has no vibrational mode.)

Q24 When a gas filled in a closed vessel is heated by raising the temperature by 1°C, its pressure increase by 0.4%. The initial temperature of the gas is_____ K.

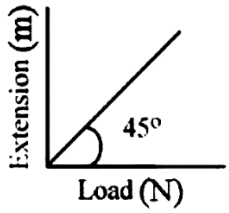
Q25 A steam engine intakes 50g of steam at 100°C per minute and cools it down to 20°C. If latent heat of vaporization of steam is 540 cal g^{-1}, then the heat rejected by the steam engine per minute is _____ × 10^3 cal.

Q26 M grams of steam at 100°C is mixed with 200 g of ice at its melting point in a thermally insulated container. If it produces liquid water at 40°C [heat of vaporization of water is 540 cal/g and heat of fusion of ice is 80 cal/g], the value of M is _____.

Q27 A hole is drilled in a metal sheet. At 27°C, the diameter of hole is 5 cm. When the sheet is heated to 177°C, the change in the diameter of hole is d × 10^{-3} cm. The value of d will be ____ if coefficient of linear expansion of the metal is 1.6 × 10^{-5} /°C.

Q28 The area of cross-section of a large tank is 0.5 m^2 It has a narrow opening near the bottom having area of cross-section 1 cm^2. A load of 25 kg is applied on the water at the top in the tank. Neglecting the speed of water in the tank, the velocity of the water, coming out of the opening at the time when the height of water level in the tank is 40 cm above the bottom, will be _____ cms^{-1}. [Take g = 10 ms^{-2}]

Q29 As shown in the figure, in an experiment to determine Young's modulus of a wire, the extension-load curve is plotted. The curve is a straight line passing through the origin and makes an angle of 45° with the load axis. The length of wire is 62.8 cm and its diameter is 4 mm. The Young's modulus is found to be x × 10^4 Nm^{-2}. The value of x is .



Q30 Two simple harmonic motion, are represented by the equations $y_1 = 10\sin\left(3\pi t + \frac{\pi}{3}\right)$

$y_2 = 5(\sin 3\pi t + \sqrt{3}\cos 3\pi t)$

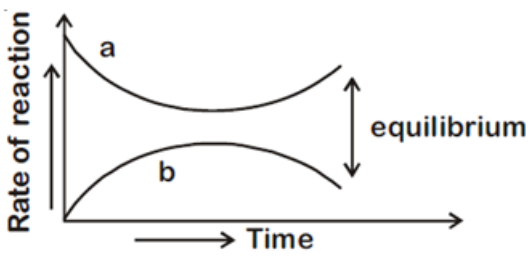
Ratio of amplitude of y_1 to y_2 = x : 1. The value of x is .....

Chemistry

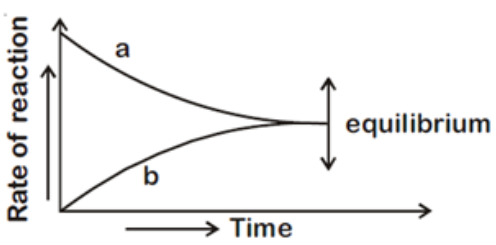
Single Choice Question

Q31 For the equilibrium $A \rightleftharpoons B$, the variation of the rate of the forward (a) and reverse (b) reaction with time is given by

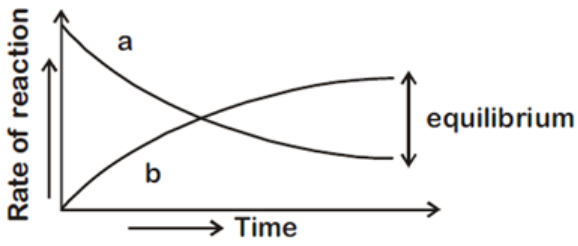
a)



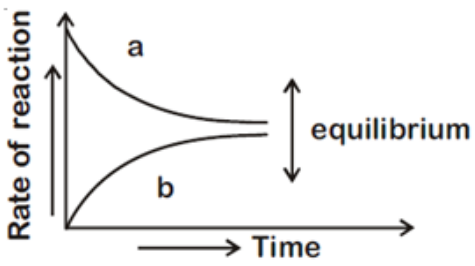
b)



c)



d)



Q32 For a reversible reaction A + B $\rightleftharpoons$ C, if the concentrations of the reactants are doubled at a definite temperature, then equilibrium constant will

a) be doubled **b)** be halved **c)** be one fourth **d)** remain same

Q33 The equilibrium constant for the reaction $N_2(g) + O_2(g) \rightleftharpoons 2NO(g)$ is K_1 and the equilibrium constant for the reaction $NO(g) \rightleftharpoons \frac{1}{2}N_2(g) + \frac{1}{2}O_2(g)$ is K_2 both at the same temperature. The value of K_1 and K_2 are related as

a) $K_1 = \left(\frac{1}{K_2}\right)^2$ **b)** $K_1 = K_2^2$ **c)** $K_2 = \left(\frac{1}{K_1}\right)^2$ **d)** $K_2 = K_1^2$

Q34 K_p of N_2O_4 and NO_2 at 1 atm and 384 K is 0.5 atm. Density of equilibrium mixture of the following reaction is :
$N_2O_4 \rightleftharpoons 2NO_2$

a) 2.54 g/dm^3 **b)** 2.18 g/dm^3 **c)** 3.87 g/dm^3 **d)** 6.5 g/dm^3

Q35 The decrease of pressure on ice $\rightleftharpoons$ water system at constant temperature will lead to :

a) a decrease in the entropy of the system

b) an increase in the Gibbs energy of the system **c)** no effect on the equilibrium

d) a shift of the equilibrium in the backward direction

Q36 Which of the following group shows more polarization in sigma bond

a) CH_3 –CN **b)** H_3C – OH **c)** H_3C – SH **d)** H_3C – Br

Q37 In which C – C bond of $H_3\overset{1}{C} - \overset{2}{C}H_2 - \overset{3}{C}H_2 - \overset{4}{C}H_2 - Br$ the inductive effect is expected to be least?

a) $C_3 - C_4$ **b)** $C_2 - C_3$ **c)** $C_1 - C_2$ **d)** same in all bonds

Q38 Which statement is incorrect from the following ?

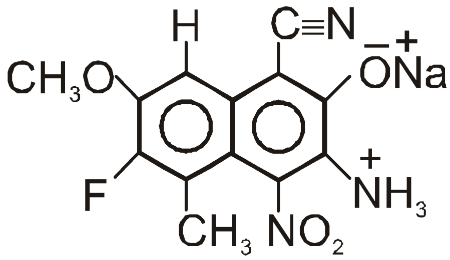
a) In Resonance only parallel p–orbital electron are shifted

b) As Resonance energy increases stability of molecule increases

c) Resonance hybrid is real structure

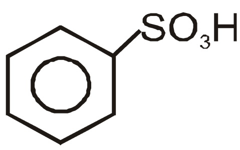
d) In Resonance atoms does not changes its position.

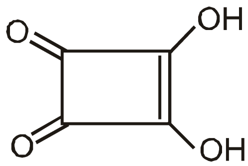
Q39 Few groups are attached with naphthalene out of the following how many groups exerts –I effect.

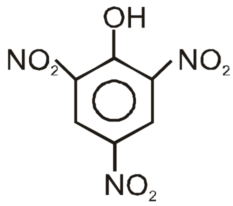


a) 3 **b)** 4 **c)** 5 **d)** 6

Q40 Which of the following would produce effervesence with sodium bicarbonate ?

a) 

b) 

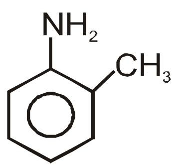
c) 

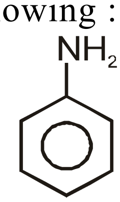
d) All of these

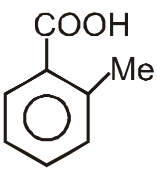
Q41 Which of the following reagent is used to distinguish phenol and benzoic acid ?

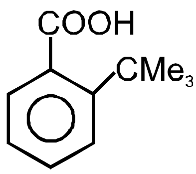
a) Aqueous NaOH **b)** Tollen's reagent **c)** Molisch reagent **d)** Neutral $FeCl_3$

Q42 Select correct statement from the following :

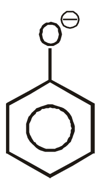
a) 

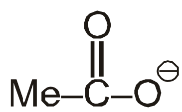
is more basic than 

b) 

is more acidic than 

c) HC≡CH is more acidic than NH_3

d) 

is more stable than 

Q43 Acetaldehyde and benzaldehyde can be differentiated by :
(a) Fehling test (b) Iodoform test (c) Tollen's reagent (d) 2,4-DNP test

a) a& b **b)** a & c **c)** b & c **d)** c & d

Q44 Which statement is **incorrect** about pyrosilicate ion.

a) sp^3 hybridisation **b)** One oxygen atom is shared between two tetrahydron
c) there are eight Si–O bond **d)** There is one Si-Si bond

Q45 For a reaction at equilibrium

$$A(g) \rightleftharpoons B(g) + \frac{1}{2}C(g)$$

The relation between dissociation constant (K), degree of dissociation (α) and equilibrium pressure (p) is given by :

a) $K = \dfrac{\alpha^{\frac{1}{2}} p^{\frac{3}{2}}}{\left(1+\frac{3}{2}\alpha\right)^{\frac{1}{2}}(1-\alpha)}$

b) $K = \dfrac{\alpha^{\frac{3}{2}} p^{\frac{1}{2}}}{(2+\alpha)^{\frac{1}{2}}(1-\alpha)}$

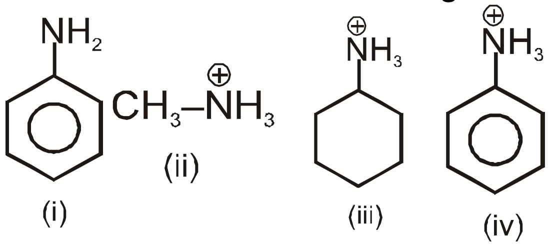
c) $K = \dfrac{(\alpha p)^{\frac{3}{2}}}{\left(1+\frac{3}{2}\alpha\right)^{\frac{1}{2}}(1-\alpha)}$

d) $K = \dfrac{(\alpha p)^{\frac{3}{2}}}{(1+\alpha)(1-\alpha)^{\frac{1}{2}}}$

Q46 4.0 moles of argon and 5.0 moles of PCl_5 are introduced into an evacuated flask of 100 litre capacity at 610 K. The system is allowed to equilibrate. At equilibrium, the total pressure of mixture was found to be 6.0 atm. The Kp for the reaction is [Given : R = 0.082L atm K^{-1} mol^{-1}]

a) 2.25 **b)** 6.24 **c)** 12.13 **d)** 15.24

Q47 Correct order of acidic strength :



a) (iv) > (i) > (ii) > (iii) **b)** (iv) > (iii) > (ii) > (i) **c)** (iv) > (ii) > (iii) > (i)
d) (ii) > (iv) > (i) > (iii)

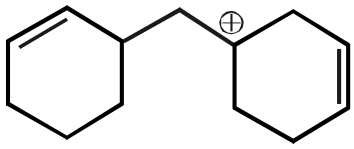
Q48 An ideal gas is allowed to expand from 1 L to 10 L against a constant external pressure of 1 bar. The work done in kJ is :

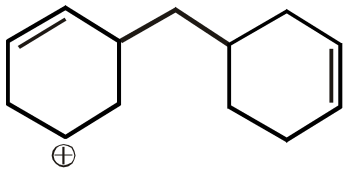
a) –9.0 **b)** –0.9 **c)** –2.0 **d)** +10.0

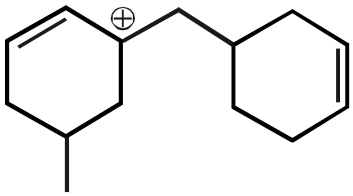
Q49 The difference between ΔH and ΔU (ΔH – ΔU), when the combustion of one mole of heptane(l) is carried out at a temperature T, is equal to :

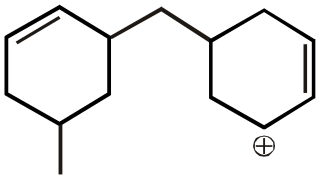
a) –3RT **b)** 4RT **c)** 3RT **d)** –4RT

Q50 Which of the following is the most stablized carbocation ?

a) 

b) 

c) 

d) 

Numerical

Q51 A mixture of 1 mole of H_2O and 1 mole of CO is taken in a 10 litre container and heated to 725 K. At equilibrium 40% of water by mass reacts with carbon monoxide according to the equation

$CO(g) + H_2O(g) \rightleftharpoons CO_2(g) + H_2(g)$

The equilibrium constant $K_C \times 10^2$ for the reaction is ____. (Nearest integer)

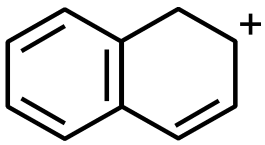
Q52 For the reaction

A + B 2C

the value of equilibrium constant is 100 at 298 K. If the initial concentration of all the three species is 1 M each, then the equilibrium concentration of C is x × 10^{-1} M. The value of x is _____ .

(Nearest integer)

Q53 Number of resonating structure possible for given compound is



Q54 $\Delta_{vap} H^{\ominus}$ for water is $+40.49\ kJ\ mol^{-1}$ at 1 bar and $100^{\circ}C$. Change in internal energy for this vapourisation under same condition is_____kJ mol^{-1}. (Integer answer)

(Given $R = 8.3JK^{-1}\ mol^{-1}$)

Q55 For a certain thermochemical reaction $M \rightarrow N$ at $T = 400\ K, \Delta H^{\ominus} = 77.2\ kJ\ mol^{-1}, \Delta S = 122JK^{-1}$, log equilibrium constant $(\log K)$ is $\times 10^{-1}$.

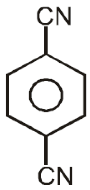
Q56 The minimum mass (in g) of $CaCO_3$ required to establish the equilibrium:

$CaCO_3(s) \rightleftharpoons CaO(s) + CO_2(g)$, $K_C = 0.05$ M

at a certain temperature in a 1.0 L container is

Q57 A bond X–Y has a dipole moment of 1.8×10^{-29} Cm and a bond length 150 pm. What will be the percentage of ionic character is given bond.

Q58 Number of non-polar molecule among the following is X and number of planar molecule is Y. Give X×Y.

BF_3, CO_2, SO_2, PCl_5, ClF_3, NH_3, SF_4, 

Q59 One mole of an ideal gas at 350K is in a 2.0 L vessel of thermally conducting walls, which are in contact with the surroundings. It undergoes isothermal reversible expansion from 2.0L to 3.0L against a constant pressure of 4 atm. The change in entropy of the surroundings (ΔS) is ____ $J\,K^{-1}$ (Nearest integer) Given : R = 8.314 $JK^{-1}\,mol^{-1}$.

Q60 At 25ºC, 560 g of deuterium oxide, D_2O (d = 1.10 g/ml) and 504 g H_2O (d = 0.997 g/ml) are mixed. The volumes are additive. Fifty percent of the H_2O reacts to form HDO. The value of K_C at 25ºC for the reaction $H_2O + D_2O \rightleftharpoons 2HDO$ is

Mathematics

Single Choice Question

Q61 The focus of parabola $x^2 - 4x + 2y + 8 = 0$ is

a) (3/2, –2) **b)** (5/2, –2) **c)** (2, –3/2) **d)** (2, –5/2)

Q62 With the usual notation, in ΔABC, if $\angle A + \angle B = 120°$, $a = \sqrt{3} + 1$ and $b = \sqrt{3} - 1$, then the ratio $\angle A : \angle B$, is:

a) 7 : 1 **b)** 3 : 1 **c)** 9 : 7 **d)** 5 : 3

Q63 Given $\frac{b+c}{11} = \frac{c+a}{12} = \frac{a+b}{13}$ for ΔABC with usual natation. If $\frac{\cos A}{\alpha} = \frac{\cos B}{\beta} = \frac{\cos C}{\gamma}$, then the ordered triplet (α, β, γ) has a value :

a) (3, 4, 5) **b)** (7, 19, 25) **c)** (19, 7, 25) **d)** (5, 12, 13)

Q64 If five parallel lines in a plane are intersected by a family of six parallel lines, then the number of parallelograms thus formed is

a) 30 **b)** 20 **c)** 150 **d)** 80

Q65 If all the letters of the word "QUEUE" are arranged in all possible manner as they are in a dictionary, then the rank of the word QUEUE is

a) 15^{th} **b)** 16^{th} **c)** 17^{th} **d)** 18^{th}

Q66 If a, b, c be three natural numbers in A.P. and a + b + c = 21, then the possible number of values of a , b, c is

a) 15 **b)** 14 **c)** 13 **d)** 16

Q67 A pole stands vertically inside a triangular park ABC. Let the angle of elevation of the top of the pole from each corner of the park be $\frac{\pi}{3}$. If the radius of the circumcircle of ΔABC is 2, then the height of the pole is equal to :

a) $\frac{2\sqrt{3}}{3}$ **b)** $2\sqrt{3}$ **c)** $\sqrt{3}$ **d)** $\frac{1}{\sqrt{3}}$

Q68 Equation of straight line ax + by + c = 0, where 3a + 4b + c = 0, which is at maximum distance from (1, – 2) is

a) 3x + y – 17 = 0 **b)** 4x + 3y – 24 = 0 **c)** 3x + 4y – 25 = 0 **d)** x + 3y – 15 = 0

Q69 A straight line L with negative slope passes through the points (8, 2) and cuts the positive coordinate axes at points P and Q. As L varies the absolute minimum value of OP + OQ is (O is origin) –

a) 28 **b)** 15 **c)** 18 **d)** 10

Q70 The point $(a^2, a + 1)$ lies in the angle between the line 3x – y + 1= 0 and x + 2y – 5 = 0 containing the origin if

a) $a \in (-3, 0) \cap \left(\frac{1}{3}, 1\right)$ **b)** $a \in (-\infty, -3) \cup \left(\frac{1}{3}, 1\right)$ **c)** $a \in \left(-3, \frac{1}{3}\right)$

d) $a \in \left(\frac{1}{3}, \infty\right)$

Q71 If the coefficients of x^7 in $\left(ax^2 + \frac{1}{2bx}\right)^{11}$ and x^{-7} in $\left(ax - \frac{1}{3bx^2}\right)^{11}$ are equal, then ______.

a) $64ab = 243$ b) $729ab = 32$ c) $243ab = 64$ d) $32ab = 729$

Q72 Let R be the focus of the parabola $y^2 = 20x$ and the line $y = mx + c$ intersect the parabola at two points P and Q. Let the point G(10, 10) be the centroid of the triangle PQR. If c–m = 6, then $(PQ)^2$ is –

a) 325 b) 317 c) 296 d) 346

Q73 For the circle $x^2 + y^2 - 2x - 6y + 1 = 0$ the chord of minimum length and passing through (1, 2) is of length

a) $2\sqrt{2}$ b) $4\sqrt{2}$ c) $6\sqrt{2}$ d) $8\sqrt{2}$

Q74 In centre of the triangle formed by common tangents of the circles $x^2 + y^2 - 6x = 0$ and $x^2 + y^2 + 2x = 0$ is

a) (3, 0) b) (– 1, 0) c) (– 1/2, 0) d) (–5/2, 0)

Q75 Three equal circles each of radius r touch one another. The radius of the circle touching all the three given circles internally is -

a) $(2 + \sqrt{3})\, r$ b) $\frac{(2+\sqrt{3})}{\sqrt{3}} r$ c) $\frac{(2-\sqrt{3})}{\sqrt{3}} r$ d) $(2 - \sqrt{3})\, r$

Q76 The set of points P(x, y) such that their distance from (3, 0) is $\sqrt{2}$ times their distance from (0, 2) form a circle

a) whose radius is greater than 5 units b) whose radius is equal to 5 units
c) whose radius is less than 5 units d) None of these

Q77 Equation of tangents to the $x^2 + y^2 - 2x - 4y + 1 = 0$ which are parallel to the x–axis are

a) y = 0 ; y = 2 b) y = 0 ; y = 4 c) y = 2 ; y = 4 d) y = 2 ; y = –2

Q78 Three circles of radii a, b, c (a < b < c) touch each other externally. If they have x-axis as a common tangent, then

a) a, b, c are in A.P. b) $\frac{1}{\sqrt{a}} = \frac{1}{\sqrt{b}} + \frac{1}{\sqrt{c}}$ c) $\sqrt{a}, \sqrt{b}, \sqrt{c}$ anr in A.P d) $\frac{1}{\sqrt{b}} = \frac{1}{\sqrt{a}} + \frac{1}{\sqrt{c}}$

Q79 In a triangle ABC, $\tan \frac{A}{2} = \frac{5}{6}$, $\tan \frac{C}{2} = \frac{2}{5}$, then –

a) a, c, b are in A.P. b) a, b, c are in A.P. c) b, a, c are in A.P.
d) a, b, c are in G.P.

Q80 If in a triangle ABC sines of angles A and B satisfy the equation $4x^2 - 2\sqrt{6}x + 1 = 0$, then cos (A – B) is equal to -

a) 0 b) 1/2 c) $1/\sqrt{2}$ d) $\sqrt{3}/2$

Numerical

Q81 Let a circle C of radius 5 lie below the x-axis. The line $L_1 = 4x + 3y - 2$ passes through the centre P of the circle C and intersects the line $L_2 : 3x-4y-11 = 0$ at Q. The line L_2 touches C at the point Q. Then the distance of P from the line $5x - 12y + 51 = 0$ is

Q82 If one of the diameters of the circle $x^2 + y^2 - 2\sqrt{2}x - 6\sqrt{2}y + 14 = 0$ is a chord of the circle $\left(x-2\sqrt{2}\right)^2 + \left(y-2\sqrt{2}\right)^2 = r^2$, then the value of r^2 is equal to

Q83 If $(\sin\theta, \cos\theta)$, $\theta \in [0, 2\pi]$ & (1, 4) lie on same side of line $\sqrt{3}x - y + 1 = 0$, then no. of integral value of $\sin\theta$ is:

Q84 Let $H_n = \frac{x^2}{1+n} - \frac{y^2}{3+n} = 1, n \in N$. Let k be the smallest even value of n such that the eccentricity of H_k is a rational number. If l is length of the latus return of H_k, then $21l$ is equal to _____.

Q85 Total number of ways in which the letter of the word SUCCESS be arranged so that all s are never together

Q86 If $\frac{1}{n+1}{}^nC_n + \frac{1}{n}{}^nC_{n-1} + \ldots\ldots + \frac{1}{2}{}^nC_1 + {}^nC_0 = \frac{1023}{10}$ then n is equal to-

Q87 Sum of all the divisors of the 6!

Q88 Total number of positive integral solutions for (x, y, z) such that xyz = 24, is:

Q89 If the coefficients of x and x^2 in $(1 + x)^p (1 - x)^q$ are 4 and -5 respectively, then 2p + 3q is equal to___.

Q90 The coefficient of x^{18} in the expansion of $\left(x^4 - \frac{1}{x^3}\right)^{15}$ is _____

Answer Key

Que.	1	2	3	4	5	6	7	8	9	10
Ans.	**D**	**C**	**C**	**B**	**C**	**C**	**B**	**B**	**A**	**A**
Que.	11	12	13	14	15	16	17	18	19	20
Ans.	**B**	**D**	**B**	**C**	**C**	**C**	**A**	**B**	**C**	**C**
Que.	21	22	23	24	25	26	27	28	29	30
Ans.	**50**	**480**	**3**	**250**	**31**	**40**	**12**	**300**	**5**	**1**
Que.	31	32	33	34	35	36	37	38	39	40
Ans.	**B**	**D**	**A**	**B**	**D**	**A**	**C**	**A**	**C**	**D**
Que.	41	42	43	44	45	46	47	48	49	50
Ans.	**D**	**C**	**A**	**D**	**B**	**A**	**C**	**B**	**D**	**C**
Que.	51	52	53	54	55	56	57	58	59	60
Ans.	**44**	**25**	**7**	**38**	**37**	**5**	**75**	**20**	**3**	**4**
Que.	61	62	63	64	65	66	67	68	69	70
Ans.	**D**	**A**	**B**	**C**	**C**	**C**	**B**	**D**	**C**	**A**
Que.	71	72	73	74	75	76	77	78	79	80
Ans.	**B**	**A**	**B**	**B**	**B**	**A**	**B**	**B**	**B**	**B**
Que.	81	82	83	84	85	86	87	88	89	90
Ans.	**11**	**10**	**1**	**306**	**360**	**9**	**2418**	**30**	**63**	**5005**