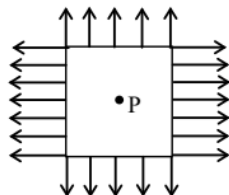


SAMPLE PAPER - 12

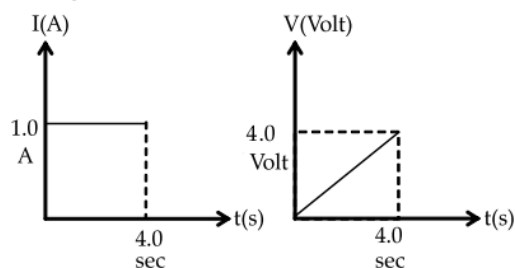
Physics

Section A

- Q. 1.** Electric lines of force are as shown in the figure. Then potential at point P :



- (1) is zero (2) is not zero
 (3) may be zero also (4) is not defined
- Q. 2.** Current versus time and voltage versus time graphs of a circuit element are shown in figure.



The type of the circuit element is :

- (1) capacitance of 2 F
 (2) resistance of 2 Ω
 (3) capacitance of 1 F
 (4) a voltage source of e.m.f 1 V

- Q. 3.** When a galvanometer is shunted with a 4 Ω resistance, the deflection is reduced to one-fifth. If the galvanometer is further shunted with a 2 Ω wire. The further reduction (find the ratio of decrease in current to the previous current) in the deflection will be (the main current remains the same)

- (1) $\left(\frac{8}{13}\right)$ of the deflection when shunted with 4 Ω only
 (2) $\left(\frac{5}{13}\right)$ of the deflection when shunted with 4 Ω only
 (3) $\left(\frac{3}{4}\right)$ of the deflection when shunted with 4 Ω only
 (4) $\left(\frac{3}{13}\right)$ of the deflection when shunted with 4 Ω only

- Q. 4.** An α particle is moving along a circle of radius R with a constant angular velocity ω . Point A lies in the same plane at a distance 2R from the centre. Point A records magnetic field produced by α particle, if the minimum time interval between two successive times at which A records zero magnetic field is 't' the angular speed ω , in terms of t is

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

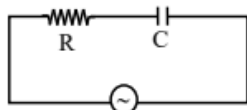
Q. 5. A short magnet produces a deflection of 30° when placed at certain distance in tanA position of magnetometer. If another short magnet of double the length and thrice the pole strength is placed at the same distance in tanB position of the magnetometer, the deflection produced will be :

- (1) 60° (2) 30°
 (3) 45° (4) None of these

Q. 6. A current $I = 10 \sin(100\pi t)$ A. is passed in first coil, which induces a maximum e.m.f of 5π volt in second coil. The mutual inductance between the coils is

- (1) 10 mH (2) 15 mH
 (3) 25 mH (4) 5 mH

Q. 7. A 50 Hz AC source of 20 volts is connected across R and C as shown in figure. The voltage across R is 12 volt. The voltage across C is :



- (1) 8 V
 (2) 16 V
 (3) 10 V
 (4) Not possible to determine unless values of R and C are given

Q. 8. The region between two concentric spheres of radii $a < b$ contain volume charge density $\rho(r) = \frac{c}{r}$, where c is constant and r is radial-distance from centre no figure needed. A point charge q is placed at the origin, $r = 0$. Value of c is in such a way for which the electric field in the region between the spheres is constant (i.e. independent of r). Find the value of c :

- (1) $\frac{q}{2\pi a^2}$ (2) $\frac{q}{4\pi a^2}$
 (3) $\frac{q}{\pi a^2}$ (4) $\frac{q}{a^2}$

Q. 9. Which of the following physical quantities has neither dimensions nor unit ?

- (1) angle
 (2) luminous intensity
 (3) coefficient of friction
 (4) current

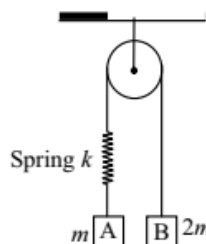
Q. 10. Boat travels upstream in a river and at $t = 0$ a wooden cork is thrown over the side with zero initial velocity. After 7.5 minutes the boat turns and starts moving downstream catches the cork when it has drifted 1 km downstream. Then the velocity of water current is :

- (1) 2 km/h (2) 4 km/h
 (3) 6 km/h (4) 8 km/h

Q. 11. A circular disc of radius $r = 5$ m is rotating in horizontal plane about y -axis. Y -axis is vertical axis passing through the centre of disc and x - z is the horizontal plane at ground. The height of disc above ground is $h = 5$ m. Small particles are ejecting from disc in horizontal direction with speed 12 m/s from the circumference of disc then the distance of these particles from origin when they hits the x - z plane is :

- (1) 12 m (2) 13 m
 (3) 5 m (4) None of these

Q. 12. Two blocks A and B of masses m and $2m$, respectively, are held at rest such that the spring is in natural length. Find out the accelerations of both the blocks just after release.



- (1) $g \downarrow, g \downarrow$ (2) $\frac{g}{3} \downarrow, \frac{g}{3} \uparrow$
 (3) 0, 0 (4) $g \downarrow, 0$

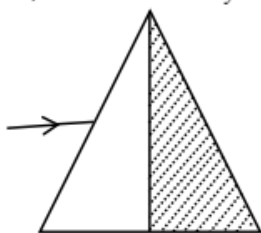
Q. 13. A block of mass $m = 1$ kg moving on horizontal surface with speed $u = 2$ m/s enters a rough horizontal patch ranging from $x = 0.10$ m to $x = 2.00$ m. If the retarding force f_r on the block in this range is inversely proportional to x over this range i.e.

$$f_r = \frac{-k}{x} \quad 0.10 < x < 2.00$$

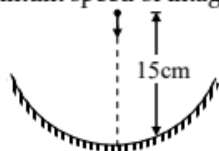
$$= 0 \quad \text{for } x < 0.10 \text{ and } x > 2.00$$

If $k = 0.5$ J then the speed of this block as it crosses the patch is (use $\ln 20 = 3$)

- (1) 2.65 m/s (2) 1 m/s
(3) 1.5 m/s (4) 2 m/s
- Q. 14. A triatomic molecule can be modelled as three rigid sphere joined by three rigid rods forming an triangle. Consider a triatomic gas consisting such molecule. If gas performs 30 J work when it expands under constant pressure the heat given to gas is :
- (1) 60 J (2) 30 J
(3) 45 J (4) 120 J
- Q. 15. Wein's constant is 2892×10^{-6} SI unit and the value of λ_m for moon is 14.46 micron. The surface temperature of moon is :
- (1) 100 K (2) 300 K
(3) 400 K (4) 200 K
- Q. 16. A wave of frequency $\nu = 1000$ Hz, propagates at a velocity $v = 700$ m/sec along x -axis. Phase difference at a given point x during a time interval $\Delta t = 0.5 \times 10^{-3}$ sec is :
- (1) $-\pi$ (2) $\pi/2$
(3) $3\pi/2$ (4) 2π
- Q. 17. A ray of light when incident upon a thin prism suffers a minimum deviation of 39° . If the shaded half portion of the prism is removed, then the same ray will :

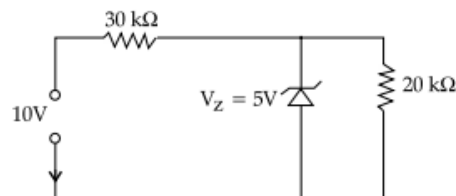


- (1) suffer a deviation of 19.5°
(2) suffer a deviation of 39°
(3) not suffer any deviation
(4) will be totally internally reflected
- Q. 18. A particle is dropped along the axis from a height 15 cm on a concave mirror of focal length 30 cm as shown in figure. The acceleration due to gravity is 10 m/s^2 . Find the maximum speed of image in m/s :



- (1) 1.2 m/s (2) 3.5 m/s
(3) 2.25 m/s (4) 5.5 m/s

- Q. 19. A Daniel cell is balanced on 125 cm lengths of a potentiometer wire. Now the cell is short circuited by a resistance 2Ω and the balance is obtained at 100 cm. The internal resistance of the Daniel cell is
- (1) 0.5Ω (2) 1.5Ω
(3) 1.25Ω (4) $4/5 \Omega$
- Q. 20. Consider the following circuit :

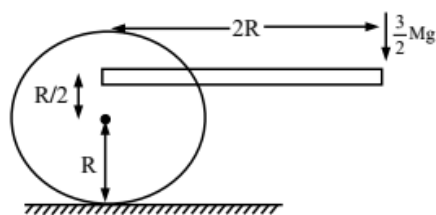


The potential drop across the $20 \text{ k}\Omega$ resistor would be :

- (1) 4V (2) 3V
(3) 5V (4) 2V

Section B

- Q. 21. A particle moves in a straight line with its retardation proportional to its displacement ' x '. Change in kinetic energy is proportional to n^{th} power of x , where n is
- Q. 22. The minimum radius of a circle along which a cyclist can ride with a velocity 18 km/hr if the coefficient of friction between the tyres and the road is $\mu = 0.5$, is (Take $g = 10 \text{ m/s}^2$)
- Q. 23. Machine gun mounted on car is firing 30 bullets per minute onto the truck moving with speed 90 km/hr . The car is chasing truck with speed 180 km/hr . Numbers of bullet hitting the truck per min is (Speed f bullet with respect to ground = 300 m/s)
- Q. 24. A disc of mass M and radius R is placed a rough horizontal surface with its axis horizontal. A light rod of length ' $2R$ ' is fixed to the disc at point ' A ' as shown in figure and a force $\frac{3}{2}Mg$ is applied at the other end. If disc starts to roll without slipping the value of " $10 \times \mu_{\text{min}}$ " where μ_{min} is minimum coefficient of friction between disc and horizontal surface required for pure rolling is

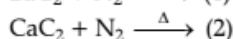
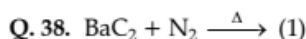


- Q. 25. A ball is immersed in water kept in container and released. At the same time container is accelerated in horizontal direction with acceleration, $\sqrt{44} \text{ m/s}^2$. Acceleration of ball w.r.t. container is m/s^2 (specific gravity of ball = $12/17$, $g = 10 \text{ m/s}^2$):
- Q. 26. A glass capillary sealed at the upper end is of length 0.11 m and internal diameter $2 \times 10^{-5} \text{ m}$. This tube is immersed vertically into a liquid of surface tension $5.06 \times 10^{-2} \text{ N/m}$. When the length $x \times 10^{-2} \text{ m}$ of the tube is immersed in liquid then the liquid level inside and outside the capillary tube becomes the same, then the value of x is m . (Assume atmospheric pressure is $1.01 \times 10^5 \frac{\text{N}}{\text{m}^2}$)
- Q. 27. The shortest wavelength of the Brackett series of a hydrogen like atom of atomic number Z is same as the shortest wavelength of the Balmer series of hydrogen atom, then the value of Z is
- Q. 28. In U^{238} ore containing Uranium the ratio of U^{234} to Pb^{206} nuclei is 3. Assuming that all the lead present in the ore is final stable product of U^{238} . Half life of U^{238} to be 4.5×10^9 years and the age of ore is $\times 10^9$ years. (in 10^9 years)
- Q. 29. The De-Broglie wavelength of electron in the third Bohr orbit of hydrogen is $\times 10^{-11} \text{ m}$ (given radius of first Bohr orbit is $5.3 \times 10^{-11} \text{ m}$):
- Q. 30. The wavelength of light incident on a metal surface is reduced from 300 nm to 200 nm (both are less than threshold wavelength). What is the change in the stopping potential for photoelectrons emitted from the surface will be V . (Take $h = 6.6 \times 10^{-34} \text{ J-s}$)

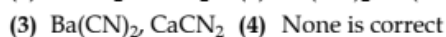
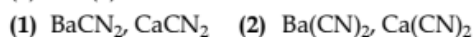
Chemistry

Section A

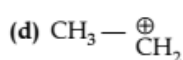
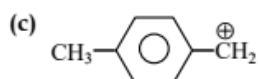
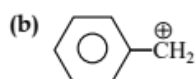
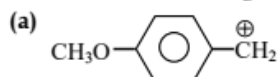
- Q. 31. NH_3 and BF_3 combine readily because of the formation of :
- (1) a covalent bond
 - (2) a hydrogen bond
 - (3) a co-ordinate bond
 - (4) an ionic bond
- Q. 32. If there were 10 periods in periodic table then maximum number of elements it can have is :
- (1) 290
 - (2) 770
 - (3) 204
 - (4) None of these
- Q. 33. In the trivial system which prefix will be used for the following compound ?
- $$\begin{array}{c} \text{CH}_3 \\ | \\ \text{CH}_3 - \text{C} - \\ | \\ \text{CH}_3 \end{array}$$
- (1) Neo
 - (2) Tertiary
 - (3) Secondary
 - (4) Iso
- Q. 34. Which one of the following pairs are called position isomers :
- (1) $\text{CH}_2(\text{OH})\text{CH}_2\text{COOH}$ and $\text{CH}_3-\text{CH}(\text{OH})\text{COOH}$
 - (2) $\text{C}_2\text{H}_5\text{OH}$ and CH_3OH
 - (3) $(\text{C}_4\text{H}_9)_2\text{CO}$ and $\text{CH}_3\text{COOCH}_2\text{CH}_2\text{CH}_3$
 - (4) All of the above
- Q. 35. The volume of '10 Vol' of H_2O_2 required to liberate 500 mL O_2 at NTP is :
- (1) 50 mL
 - (2) 25 mL
 - (3) 100 mL
 - (4) 125 mL
- Q. 36. On the addition of mineral acid to an aqueous solution of borax, the compound formed is :
- (1) Orthoboric acid
 - (2) Boron hydride
 - (3) Metaboric acid
 - (4) Pyroboric acid
- Q. 37. On heating graphite with conc. HNO_3 repeatedly, a yellow mass is obtained which is called :
- (1) Graphitic oxide
 - (2) Graphitic peroxide
 - (3) Benzene hexacarboxylic acid
 - (4) Graphitic nitrate



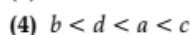
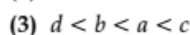
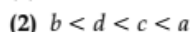
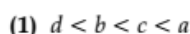
(1) and (2) are :



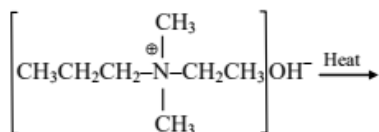
Q. 39. Consider the following carbocations



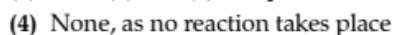
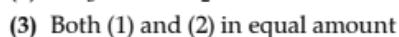
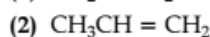
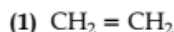
The relative stabilities of these carbocations are such that :



Q. 40. Consider the reaction



Which of the following is formed in major amount ?



Q. 41. Consider the following statements about benzene:

I : Heats of hydrogenation of benzene and 1, 3, 5-cyclohexatriene are identical

II : Benzene is much more stable than expected for 1, 3, 5-cyclohexatriene

III : All carbon-carbon bonds (single and double) have equal length

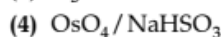
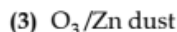
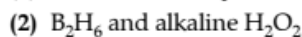
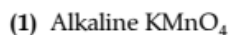
Select correct statements :



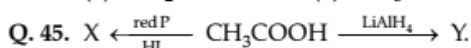
The above reaction is called :



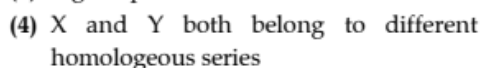
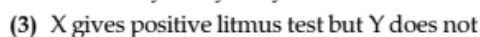
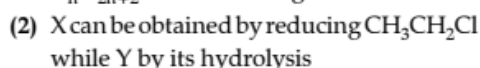
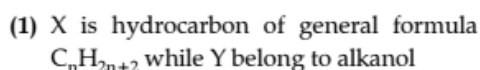
Q. 43. Propene, $\text{CH}_3 - \text{CH} = \text{CH}_2$ can be converted to 1-propanol by oxidation. Which set of reagents among the following is ideal to effect the conversion :



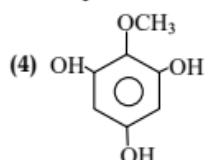
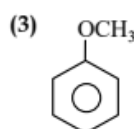
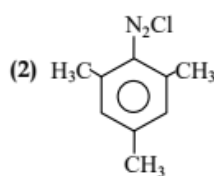
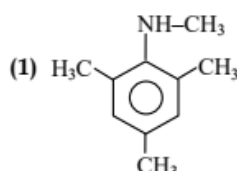
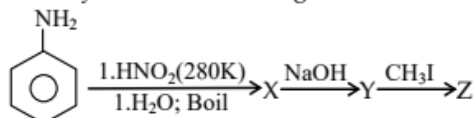
Q. 44. For distinction between CH_3CHO and $\text{C}_6\text{H}_5\text{CHO}$ the reagent used is :



What does NOT true for X and Y :



Q. 46. Identify 'Z' in the reaction given below :



- Q. 47. Lassaigne's test for the detection of nitrogen fails in :
- (1) $\text{NH}_2\text{CONHNH}_2 \cdot \text{HCl}$
 - (2) $\text{NH}_2\text{NH}_2 \cdot \text{HCl}$
 - (3) NH_2CONH_2
 - (4) $\text{C}_6\text{H}_5\text{NHNH}_2 \cdot \text{HCl}$
- Q. 48. Among the following ions, which one has the highest paramagnetism ?
- (1) $[\text{Cr}(\text{H}_2\text{O})_6]^{3+}$
 - (2) $[\text{Fe}(\text{H}_2\text{O})_6]^{2+}$
 - (3) $[\text{Cu}(\text{H}_2\text{O})_6]^{2+}$
 - (4) $[\text{Zn}(\text{H}_2\text{O})_6]^{2+}$
- Q. 49. In blast furnace, the hearth is lined with
- (1) Dolomite refractories
 - (2) Alumina refractories
 - (3) Chromite refractories
 - (4) Carbon refractories
- Q. 50. Ca, Ba and Sr ions are precipitated in fifth group as their :
- (1) Oxides
 - (2) Sulphates
 - (3) Carbonates
 - (4) Sulphides

Section B

- Q. 51. For a chemical reaction starting with some initial concentration of reactant A_t as a function of time (t) is given by the equation,
- $$\frac{1}{A_t^4} = 2 + 1.5 \times 10^{-3} t$$
- The rate of disappearance of $[A]$ is $\times 10^{-2} \text{ M/sec}$ when $[A] = 2 \text{ M}$.
 [Given : $[A_t]$ in M and t in sec.]
 [Express your answer in terms of 10^{-2} M/s]
 [Round off your answer if required]
- Q. 52. For adsorption of gas over solid surface following data is obtained at 300 K.
- | | | |
|------------------------------------|------|--------|
| Pressure of gas (mm of Hg) | 100 | 25 |
| Amount adsorbed per kg of charcoal | 3 gm | 1.5 gm |
- The slope of the graph between $\log P$ vs $\log x/m$ will be
 [x/m and P are in same units as given in question.]
- Q. 53. A strong current of trivalent gaseous boron passed through a silicon crystal decreases the density of the crystal due to part replacement of silicon by boron and due to interstitial vacancies created by missing Si atoms. In one such experiment, one gram of silicon is taken and the boron atoms are found to be 1000 ppm by weight, when the density of the Si crystal decreases by 12%. The percentage of missing vacancies due to silicon, which are filled up by boron atoms will be g. [Given : Atomic wt. Si = 30, B = 11]
- Q. 54. A solution is prepared by mixing 250 ml toluene (C_7H_8) and 8.4 g thiophene ($\text{C}_4\text{H}_4\text{S}$). Then molality of thiophene in the solution is [Given : Density of toluene = 0.8 g/ml, Density of thiophene = 1.2 g/ml]
 [Multiply your answer by 10]
- Q. 55. If the value of K_{sp} for Hg_2Cl_2 (s) is X then the value of X will be where $pX = -\log X$. Given :
- $$\text{Hg}_2\text{Cl}_2 (\text{s}) + 2e^- \rightarrow 2\text{Hg} (\text{l}) + 2\text{Cl}^- \quad E^\circ = 0.27 \text{ V}$$
- $$\text{Hg}^{+2} + 2e^- \rightarrow 2\text{Hg} (\text{l}) \quad E^\circ = 0.81 \text{ V}$$
- Q. 56. Consider an isothermal cylinder and massless piston assembly in which ideal gas is filled. Cross sectional area of the cylinder = 1 m^2 . Three masses m_1 , m_2 and m_3 are kept on the piston. When m_1 is removed, piston moves upto point A. When m_1 and m_2 both are removed piston moves upto point B and when m_1 , m_2 and m_3 all the three are removed, piston moves upto point C. The work done by the gas is J, when piston moves from point B to point C.
 [Given : $m_1 = 2 \times 10^4 \text{ kg}$, $m_2 = 3 \times 10^4 \text{ kg}$, $g = 10 \text{ m/s}^2$]
-
- Q. 57. It is found that in 11.2L at 0°C and 1 atm, of any gaseous compound of 'X', there is never less than 15.5 gm of 'X'. It is also found that 11.2 L of vapours of 'X' at 0°C and 1 atm, weighs 62 gm. The atomicity of 'X' is

- Q. 58. The de Broglie's wavelength of electron emitted by a metal will be Å whose threshold frequency is 2.25×10^{14} Hz when exposed to visible radiation of wavelength 500 nm.
- Q. 59. A 50 L gas stream was passed through a solution containing Cd^{2+} where H_2S (in gas stream) was retained as CdS. The mixture was acidified and treated with 50 ml of 0.004 M I_2 . After the reaction $\text{S}^{2-} + \text{I}_2 \rightarrow \text{S}(s) + 2\text{I}^-$ was complete, the excess iodine was treated with 15 ml of 0.01 M thiosulphate. The concentration of H_2S in ppm will be Use density of gas stream = 1.7 gm/L.
- [Divide your answer by 10]
- Q. 60. Enthalpy for the reaction $\text{Ag}^+(aq) + \text{Br}^-(aq) \rightarrow \text{AgBr}(s)$ is : 90 kJ. Magnitude of enthalpy of formation of $\text{Ag}^+(aq)$ and $\text{Br}^-(aq)$ are in the ratio 5 : 6. Formation of $\text{Ag}^+(aq)$ is an endothermic process whereas formation of Br^- is an exothermic process. Enthalpy of formation of AgBr is - 110 kJ/mol. The enthalpy of formation of $\text{Ag}^+(aq)$ will be kJ/mol.

Mathematics

Section A

- Q. 61. The statement $p \rightarrow (q \rightarrow p)$ is equivalent to :
- (1) $p \rightarrow q$ (2) $p \rightarrow (p \vee q)$
 (3) $p \rightarrow (p \rightarrow q)$ (4) $p \rightarrow (p \wedge q)$
- Q. 62. Set of values of x satisfying the inequality $\frac{(x-3)^2(2x+5)(x-7)}{(x^2+x+1)(3x-6)^2} \leq 0$ is $[a, b) \cup (b, c]$ then $2a + b + c$ is equal to
- (1) 0 (2) 4
 (3) 5 (4) 7
- Q. 63. The roots of the equation $(b+c)x^2 - (a+b+c)x + a = 0$ ($a, b, c \in \mathbb{Q}, b+c \neq a$) are :
- (1) irrational and different
 (2) rational and different
 (3) imaginary and different
 (4) real and equal
- Q. 64. If in a geometric progression $\{a_n\}$, $a_1 = 3$, $a_n = 96$ and $S_n = 189$, then the value of n is :
- (1) 5 (2) 6
 (3) 7 (4) 8
- Q. 65. If the coefficients of $(2r+4)^{\text{th}}$, $(r-2)^{\text{th}}$ terms in the expansion of $(1+x)^{18}$ are equal, then r is :
- (1) 4 (2) 6
 (3) 8 (4) 3
- Q. 66. There are 12 balls numbered from 1 to 12. The number of ways in which they can be used to fill 8 places in a row so that the balls are with numbers in ascending or descending order is equal to :
- (1) ${}^{12}\text{C}_8$ (2) ${}^{12}\text{P}_8$
 (3) $2 \times {}^{12}\text{P}_8$ (4) $2 \times {}^{12}\text{C}_8$
- Q. 67. If the angle between the tangent t The circle $x^2 + 4y^2 + 2x + 4y - 11 = 0$ from $p(3, 3)$ is $\tan^{-1}\left(\frac{a}{b}\right)$ where a and b are relatively prime then the value of $a - 3b$ is:
- (1) 15 (2) 0
 (3) 13 (4) 8
- Q. 68. The equation of a circle passing through $(3, -6)$ and touching both the axes is :
- (1) $x^2 + y^2 - 6x + 6y + 8 = 0$
 (2) $x^2 + y^2 + 6x - 6y + 9 = 0$
 (3) $x^2 + y^2 + 30x - 30y + 225 = 0$
 (4) $x^2 + y^2 - 30x + 30y + 225 = 0$
- Q. 69. The centre of the circle passing through the point $(0, 1)$ and touching the parabola $y = x^2$ at the point $(2, 4)$ is :
- (1) $\left(-\frac{53}{10}, \frac{16}{5}\right)$ (2) $\left(\frac{6}{5}, \frac{53}{10}\right)$
 (3) $\left(\frac{3}{10}, \frac{16}{5}\right)$ (4) $\left(-\frac{16}{5}, \frac{53}{10}\right)$
- Q. 70. Let The ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ has latus rectum equal 8 units - if the ellipse passes through $(\sqrt{5}, 4)$ Then The radius of the directive circle is
- (1) $5\sqrt{3}$ (2) $3\sqrt{5}$
 (3) $\sqrt{15}$ (4) 15

- Q. 71. The equation of conjugate axis for the hyperbola $\frac{(x+y+1)^2}{4} - \frac{(x-y+2)^2}{9} = 1$ is :
 (1) $x + y + 1 = 0$ (2) $x - y + 2 = 0$
 (3) $x = -3/2$ (4) $x + y + 2 = 0$
- Q. 72. The curve $\left(\frac{x}{a}\right)^n + \left(\frac{y}{b}\right)^n = 2$, touches the line $\frac{x}{a} + \frac{y}{b} = 2$ at the point (a, b) for n is equal to
 (1) 1
 (2) 2
 (3) 3
 (4) all non zero values of n
- Q. 73. If $f(x) = x + \cos x - a$ then
 (1) $f(x)$ is an increasing function
 (2) $f(x)$ is a decreasing function
 (3) $f(x) = 0$ has one positive root for $a < 1$
 (4) $f(x) = 0$ has no positive root for $a > 1$
- Q. 74. The set of values of p for which the points of extremum of the function $f(x) = x^3 - 3px^2 + 3(p^2 - 1)x + 1$ lie in the interval $(-2, 4)$, is
 (1) $(-3, 5)$ (2) $(-3, 3)$
 (3) $(-1, 3)$ (4) $(-1, 5)$
- Q. 75. The value of the expression $1 \cdot (2 - \omega) \cdot (2 - \omega^2) + 2 \cdot (3 - \omega) \cdot (3 - \omega^2) + \dots + (n - 1) \cdot (n - \omega) \cdot (n - \omega^2)$, where ω is an imaginary cube root of unity is :
 (1) $\left(\frac{n(n+1)}{2}\right)^2$ (2) $\left(\frac{n(n+1)}{2}\right)^2 - n$
 (3) $\left(\frac{n(n+1)}{2}\right)^2 + n$ (4) $\frac{n^2(n+1)^2 - n}{2}$
- Q. 76. A single letter is selected at random from the word 'PROBABILITY'. The probability that it is a vowel is :
 (1) $\frac{3}{11}$ (2) $\frac{2}{11}$
 (3) $\frac{4}{11}$ (4) $\frac{7}{11}$
- Q. 77. If the following equations
 $x + y - 3 = 0$
 $(1 + \lambda)x + (2 + \lambda)y - 8 = 0$
 $x - (1 + \lambda)y + (2 + \lambda) = 0$
 are consistent then the value of λ can be
 (1) 1 (2) -1
 (3) 0 (4) 2
- Q. 78. How many matrices can be obtained by using one or more numbers from four given numbers :
 (1) 76 (2) 148
 (3) 124 (4) 82
- Q. 79. \vec{A} , \vec{B} and \vec{C} are three non coplanar vectors, then $(\vec{A} + \vec{B} + \vec{C}) \cdot ((\vec{A} + \vec{B}) \times (\vec{A} + \vec{C}))$ is equal to
 (1) 0 (2) $[\vec{A}, \vec{B}, \vec{C}]$
 (3) $2[\vec{A}, \vec{B}, \vec{C}]$ (4) $-[\vec{A}, \vec{B}, \vec{C}]$
- Q. 80. A point moves in such a way that sum of squares of its distances from the co-ordinate axis is 36, then distance of then given point from origin are :
 (1) 6 (2) $2\sqrt{3}$
 (3) $3\sqrt{2}$ (4) $\sqrt{6}$

Section B

Q. 81. The maximum value of the expression $5\cos \alpha + 12\sin \alpha - 8$ is equal to

Q. 82. If $b = \left(3 + \cot \frac{\pi}{8} + \cot \frac{11\pi}{24} - \cot \frac{5\pi}{24}\right)$, then the value of $|b\sqrt{2}|$ is

Q. 83. The value of

$$\lim_{x \rightarrow 0} \left\{ \frac{\sin x - x + \frac{x^3}{6}}{x^5} \right\} \text{ is } \frac{1}{k},$$

then k is....

Q. 84. Number of values of x satisfying the system of equations

$$\sin^{-1} \sqrt{2 + e^{-2x} - 2e^{-x}} + \sec^{-1} \sqrt{1 - x^2 + x^4} = \frac{\pi}{2}$$

and $5^{1+\tan^{-1}x} = 4 + [\cos^{-1}x]$ is (where $[.]$ denotes greatest integer function)

Q. 85. If $f : [0, 1] \rightarrow [0, 1]$ is defined by $f(x) = \frac{x+1}{4}$ and

$$\frac{d}{dx} \left(\underbrace{(f \circ f \circ f \dots \circ f)}_{n \text{ times}}(x) \right) \Big|_{x=\frac{1}{2}} = \frac{1}{m^n}, m \in N,$$

then the value of ' m ' is

Q. 86. If $L = \lim_{x \rightarrow \infty} \frac{x^2 \sin \frac{1}{x} - x}{1 - |x|}$, then value of L is

Q. 87. A function $y = f(x)$ satisfies the differential equation $\frac{dy}{dx} + x^2y = -2x$, $f(1) = 1$. The value of $|f''(1)|$ is

Q. 88. Let $f(x) = x + \frac{x^2}{2} + \frac{x^3}{3} + \frac{x^4}{4} + \frac{x^5}{5}$ and

$g(x) = f^{-1}(x)$, then $|g''(0)|$ is

Q. 89. If $\int \frac{2e^{5x} + e^{4x} - 4e^{3x} + 4e^{2x} + 2e^x}{(e^{2x} + 4)(e^{2x} - 1)^2} dx$

$= \tan^{-1}\left(\frac{e^x}{a}\right) - \frac{1}{b(e^{2x} - 1)} + C$, where C is constant of integration, then value of $a + b$ is equal to

Q. 90. Let f be continuous periodic function with period 3, such that $\int_0^3 f(x) dx = 1$. Then the value of $\int_{-4}^8 f(2x) dx$ is

Answers

Physics

Q. No.	Answer
1	(2)
2	(3)
3	(1)
4	(2)
5	(1)
6	(4)
7	(2)
8	(2)
9	(3)
10	(2)
11	(2)
12	(1)
13	(2)
14	(4)
15	(4)

Q. No.	Answer
16	(1)
17	(1)
18	(3)
19	(1)
20	(1)
21	2.00
22	5.00
23	33.00
24	8
25	7.83
26	0.01
27	2.00
28	2.00
29	99.90
30	2.00

Chemistry

Q. No.	Answer
31	(3)
32	(1)
33	(2)
34	(1)
35	(1)
36	(1)
37	(3)
38	(3)
39	(1)
40	(1)
41	(2)
42	(2)
43	(2)
44	(1)
45	(1)

Q. No.	Answer
46	(3)
47	(2)
48	(2)
49	(4)
50	(3)
51	1.20
52	2.00
53	2.00
54	5.00
55	6.00
56	3200
57	4.00
58	9.84
59	5.00
60	100

Mathematics

Q. No.	Answer
61	(2)
62	(1)
63	(2)
64	(2)
65	(2)
66	(4)
67	(3)
68	(4)
69	(4)
70	(2)
71	(1)
72	(4)
73	(1)
74	(3)
75	(2)

Q. No.	Answer
76	(3)
77	(1)
78	(2)
79	(4)
80	(3)
81	5.00
82	6.00
83	120
84	1.00
85	4.00
86	0.00
87	1.00
88	1.00
89	4.00
90	4.00