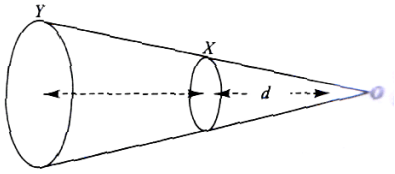
# GYAN VIHAR

**MOCK TEST CLASS – XII DATE M.M - 360**

**Note:--**
**Negative marking is -1 for each incorrect answer**
**Marks for each correct answer is 4**
**Each subject has 30 questions that contain 120 marks**

## PHYSICS

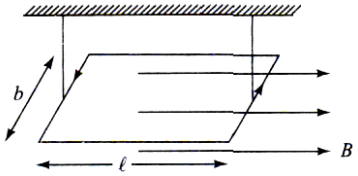
**Q.1** Two circular coils X and Y, having equal number of turns and carrying equal currents in the same sense, subtend same solid angle at point O. if the smaller coil X is midway between O and Y and if we represent the magnetic induction due to bigger coil Y at O as $B_y$ and that due to smaller coil X at O as $B_x$, then




(A) $\frac{B_Y}{B_X}=1$ (B) $\frac{B_Y}{B_X}=2$

(C) $\frac{B_Y}{B_X}=\frac{1}{2}$ (D) $\frac{B_Y}{B_X}=\frac{1}{4}$

**Q.2** A uniform conducting rectangular loop of sides $\ell, b$ and mass $m$ carrying current $i$ is hanging horizontally with the help of two vertical strings. There exists a uniform horizontal magnetic field $B$ which is parallel to the longer side of loop. The value of tension which is least is




(A) $\frac{mg-Bbi}{2}$ (B) $\frac{mg+Bbi}{2}$

(C) $\frac{mg-2iBb}{2}$ (D) $\frac{mg+2Bbi}{2}$

**Q.3** A circular loop of radius R carrying a current I is placed in a uniform magnetic field B perpendicular to the loop. The force on the loop is

(A) $2\pi RIB$ (B) $2\pi RI^2B^3$

(C) $\pi R^2IB$ (D) Zero

**Q.4** A current of 10A is flowing in a wire of length 1.5m. A force of 15 N act on its when it is placed in a uniform magnetic field of 2 T. The angle between the magnetic field and the direction of the current is

(A) 30° (B) 45°

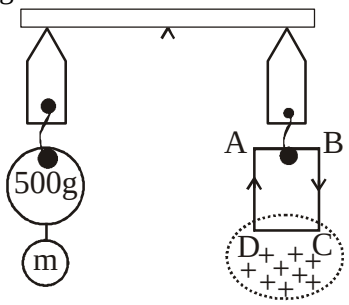
(C) 60° (D) 90°

**Q.5** The magnetic force per unit length on a wire carrying a current of 10A and making an angle of 45° with the direction of a uniform magnetic field of 0.20 T is

(A) $2\sqrt{2}\text{Nm}^{-1}$ (B) $\frac{2}{\sqrt{2}}\text{Nm}^{-1}$

(C) $\frac{\sqrt{2}}{2}\text{Nm}^{-1}$ (D) $4\sqrt{2}\text{Nm}^{-1}$

**Q.6** A rectangular coil ABCD is hung from on side of a balance as shown in figure. A 500 g mass is added to the other arm to balance the weight of the coil. A current of 9.8 A is passed through the coil and a constant magnetic field of 0.4 T acting inward (in xz plane) is switched on such that only arm CD of length 1.5 cm lies in the field. The additional mass m must be added to regain the balance is




(A) 4g (B) 5g
(C) 6g (D) 7g

**Q.7**An electron of energy 1800 eV describes a circular path in magnetic field of flux density 0.4 T. The radius of path is
($q = 1.6 \times 10^{-19}$ C, $m_e = 9.1 \times 10^{-31}$ kg)
(A) $2.58 \times 10^{-4}$ m (B) $3.58 \times 10^{-4}$ m
(C) $2.58 \times 10^{-3}$ m (D) $3.58 \times 10^{-3}$ m

**Q.8** Two α-particles have the ratio of their velocities as 3 : 2 on entering the field. If they move in different circular paths, then the ratio of the radii of their paths is
(A) 2 : 3 (B) 3 : 2
(C) 9 : 4 (D) 4 : 9

**Q.9** A charged particle with charge q enters a region of constant, uniform and mutually orthogonal fields $\vec{E}$ and $\vec{B}$ with a velocity $\vec{v}$ perpendicular to both $\vec{E}$ and $\vec{B}$, and comes out without any change in its magnitude or direction. Then
(A) $\vec{v} = \vec{B} \times \vec{E} / E^2$ (B) $\vec{v} = \vec{E} \times \vec{B} / B^2$
(C) $\vec{v} = \vec{B} \times \vec{E} / B^2$ (D) $\vec{v} = \vec{B} \times \vec{E} / B^2$

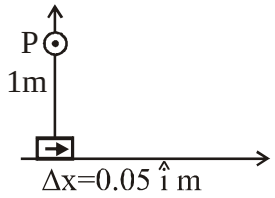
**Q.10** A cyclotron is operated at an oscillator frequency of 12MHz an has a dee radius R = 50 cm. What is the magnitude of the magnetic field needed for a proton to be accelerated in the cyclotron ?
(A) 0.72 T (B) 0.65 T
(C) 0.39 T (D) 0.12 T

**Q.11** If an electron is moving is a magnetic field of $5.4 \times 10^{-4}$ T on a circular path of radius 32 cm having a frequency of 2.5 MHz, then its speed will be
(A) $8.56 \times 10^6$ ms$^{-1}$ (B) $5.024 \times 10^6$ ms$^{-1}$
(C) $8.56 \times 10^4$ ms$^{-1}$ (D) $5.024 \times 10^4$ ms$^{-1}$

**Q.12** A proton, a deuteron and an α-particle with same kinetic energy enter perpe4ndicularly in a uniform magnetic field, then the ratio of radii of their circular paths is
(A) $1:1:\sqrt{2}$ (B) $\sqrt{2}:1:1$
(C) $1:\sqrt{2}:1$ (D) $1:2:\sqrt{2}$

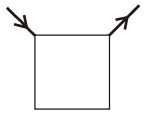
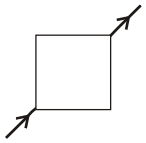
**Q.13** A electron is moving in a cyclotron at a speed of $3.2 \times 10^7$ ms$^{-1}$ in a magnetic field of $5 \times 10^{-4}$ Perpendicular to it. What is the frequency of this electron ?
($q = 1.6 \times 10^{-19}$ C, $m_e$ = = $9.1 \times 10^{-31}$ kg)
(A) $1.4 \times 10^5$ Hz (B) $1.4 \times 10^7$ Hz
(C) $1.4 \times 10^6$ Hz (D) $1.4 \times 10^9$ Hz

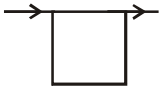
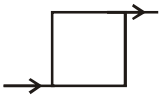
**Q.14** An element of $0.05\hat{i}\,m$ is placed at the origin as shown in figure which carries a large current of 10 A. The magnetic field at a distance of 1 m in perpendicular direction is




(A) $4.5 \times 10^{-8}$T (B) $5.5 \times 10^{-8}$T
(C) $5.0 \times 10^{-8}$T (D) $7.5 \times 10^{-8}$T

**Q.15** Current flows through uniform, square frames as shown in the figure. In which case is the magnetic field at the centre of the frame not zero ?

(A)  (B) 

(C)  (D) 

**Q.16** A circular coil of wire consisting of 100 turns each of radius 9 cm carries a current of 0.4 A. The magnitude of magnetic field at the centre of the coil is
(A) $2.4 \times 10^{-4}$T (B) $3.4 \times 10^{-4}$T
(C) $2.79 \times 10^{-4}$T (D) $3 \times 10^{-4}$T

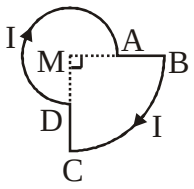
**Q.17** A 4 A current carrying loop consists of three identical quarter circles of radius 5 cm lying in the positive quadrants of the x-y, y-z and z-x planes with their centres at the origin joined together, value of $\vec{B}$ at the origin is

(A) $\frac{\mu_0}{10}(\hat{i}+\hat{j}-\hat{k})$T (B) $\frac{\mu_0}{10}(-\hat{i}+\hat{j}+\hat{k})$T

(C) $\frac{\mu_0}{5}(-\hat{i}+\hat{j}+\hat{k})$T (D) $10\mu_0(\hat{i}+\hat{j}+\hat{k})$T

**Q.18** A current I is flowing through a loop. The direction of the current and the shape of the loop are as shown in the figure. The magnetic field at the centre of the loop is $\frac{\mu_0 I}{R}$ times

(Here MA = R, MB = 2R, $\angle$DMA = 90°)



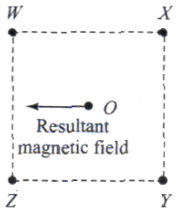

(A) $\frac{5}{16}$, Out of the plane of the paper

(B) $\frac{5}{16}$, Into the plane of the paper

(C) $\frac{7}{16}$, out of the plane of the paper

(D) $\frac{7}{16}$, Into the plane of the paper

**Q.19** Four parallel conductors, carrying equal currents, pass vertically through the four corners of a square *WXYZ*. In two conductors, the current is flowing into the page, and in the other two out of the page. In what directions must the currents flow to produce a resultant magnetic field in the direction shown at *O*, the center of the square?




| **In to the page** | **Out of the page** |
|---|---|
| (A) W and Y | X and Z |
| (B) X and Z | W and Y |
| (C) W and Z | X and Y |
| (D) W and X | Y and Z |

**Q.20** Along straight wire in the horizontal plane carries a current of 75 A in north to south direction, magnitude and direction of field B at a point 3 m east of the wire is
(A) $4 \times 10^{-6}$ T, vertical up
(B) $5 \times 10^{-6}$ T, vertical down
(C) $5 \times 10^{-6}$ T, vertical up
(D) $4 \times 10^{-6}$ T, vertical down

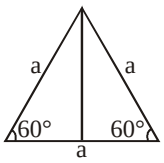
**Q.21** The inner and outer radius of a toroid core are 28 cm and 29 cm respectively and around the core 3700 turns of a wire are wounded. If the current in the wire is 10 A, then the magnetic field inside the core of the toroid is
(A) $2.60 \times 10^{-2}$ T (B) $2.60 \times 10^{-3}$ T
(C) $4.52 \times 10^{-2}$ T (D) $4.52 \times 10^{-3}$ T

**Q.22** The nature of parallel and anti- parallel currents are
(A) parallel currents repel and anti-parallel currents attract.
(B) parallel currents attract and anti-parallel currents repel
(C) Both currents attract
(D) Both currents repel

**Q.23** A conductor of length 2 m carrying current 2 A is held parallel to an infinitely long conductor carrying current of 12A at a distance of 100 mm, the force on small conductor is
(A) $8.6 \times 10^{-5}$ N (B) $6.6 \times 10^{-5}$ N
(C) $7.6 \times 10^{-5}$ N (D) $9.6 \times 10^{-5}$ N

**Q.24**A 200 turn closely would circular coil of radius 15 cm carries a current of 4 A. The magnetic moment of this coil is
(A) 36.5 A $m^2$ (B) 56.5 A $m^2$
(C) 66.5 A $m^2$ (D) 108 A $m^2$

**Q.25** A uniform conducting wire of length 10a and resistance R is wound up into four turn as a current carrying coil in the shape of equilateral triangle of side a. If current I is flowing through the coil then the magnetic moment of the coil is




(A) $\frac{\sqrt{3}}{2}a^2I$ (B) $\frac{a^2I}{\sqrt{3}}$

(C) $\sqrt{3}a^2I$ (D) $\frac{2a^2I}{\sqrt{3}}$

**Q.26** Magnetic field at the centre of a circular loop of area A is B. The magnetic moment of the loop is

(A) $\frac{BA^2}{\mu_0\pi}$ (B) $\frac{BA\sqrt{A}}{\mu_0}$

(C) $\frac{BA\sqrt{A}}{\mu_0\pi}$ (D) $\frac{2BA\sqrt{A}}{\mu_0\sqrt{\pi}}$

**Q.27** A circular coil of radius 10 cm having 100 turns carries a current of 3.2 A. The magnetic field at the centre of the coil is

(A) $2.01 \times 10^{-3}$ T (B) $5.64 \times 10^{-3}$ T

(C) $2.64 \times 10^{-4}$ T (D) $5.64 \times 10^{-4}$ T

**Q.28** A circular coil of 25 turns and radius 12 cm is placed in a uniform magnetic field of 0.5 t normal to the plane of the coil. If the current in the coil is 6 A then total torque acting on the coil is

(A) Zero (B) 3.4 N m

(C) 3.8 N m (D) 4.4 N m

**Q.29** The final torque on a coil having magnetic moment 25 A $m^2$ in a 5 T uniform external magnetic field, if the coil rotates through an angle of 60° under the influence of the magnetic field is

(A) 216.5 N m (B) 108.25 N m

(C) 102.5 N m (D) 258.1 N m

**Q.30** A coil having magnetic moment 15 A $m^2$ placed in a uniform, magnetic field of 4 T in the horizontal direction exists such that initially the axis of coil is in the direction of the field. If the coil is rotated by 45° and the moment of inertia of the coil is 0.5 kg $m^2$ then the angular speed acquired by the coil is

(A) 20 rad $s^{-1}$ (B) 10 rad $s^{-1}$

(C) 8.34 rad $s^{-1}$ (D) 4.5 rad $s^{-1}$

**CHEMISTRY**

31. Standard electrode potentials of three metals A, B and C are + 0.5 V, – 3.0 V and – 1.2 V respectively. The reducing power of these metals is in the order

(a) B > C > A (b) A > B > C

(c) C > B > A (d) A > C > B

32The electrode potential becomes equal to standard electrode potential when reactants and products concentration ratio is

(a) Equal to 1 (b) Greater than 1

(c) Less than 1 (d) None of the above

33. In $H_2$ $O_2$ fuel cell the reaction occuring at cathode is

(a) $2H_2O + O_2 + 4e^- \longrightarrow 4OH^-$

(b) $2H_2 + O_2 \longrightarrow 2H_2O(l)$

(c) $H^+ + OH^- \longrightarrow H_2O$

(d) $H^+ + e^- \longrightarrow H_2$.

34. When 9.65 Coulombs of electricity is passed through a solution of silver nitrate (At. wt. of Ag =107.87 taking as 108) the amount of silver deposited is

(a) 10.8 mg (b) 5.4 mg (c) 16.2 mg (d) 21.2 mg

35. Three faradays of electricity are passed through molten $Al_2O_3$, aqueous solution of $CuSO_4$ and molten $NaCl$ taken in different electrolytic cells. The amount of Al Cu and Na deposited at the cathodes will be in the ratio of

(a) $1mole : 2mole : 3mole$ (b) $3mole : 2mole : 1mole$

(c) $1mole : 1.5mole : 3mole$ (d) $1.5mole : 2mole : 3mole$

36. When electricity is passed through the solution of $AlCl_3$, 13.5 gm of Al are deposited. The number of Faraday must be

(a) 0.50 (b) 1.00 (c) 1.50 (d) 2.00

37. The EMF of the cell, $Ni|\ Ni^{2+}\ ||\ Cu^{2+}|\ Cu$ is 0.59 volt. The standard electrode potential (reduction potential) of copper electrode is 0.34 volt. The standard electrode potential of nickel electrode will be

(a) 0.25 volt (b) – 0.25 volt

(c) 0.93 volt (d) – 0.93 volt

38. The rate constant of a first order reaction is $3\times10^{-6}$ per second. If the initial concentration is 0.10mol, the initial rate of reaction is

(a) $3\times10^{-5} mol\ s^{-1}$ (b) $3\times10^{-6} mol\ s^{-1}$

(c) $3\times10^{-8} mol\ s^{-1}$ (d) $3\times10^{-7} mol\ s^{-1}$

39. The rate of formation of $SO_3$ in the following reaction: $2SO_2 + O_2 \rightarrow 2SO_3$ is 10 g $sec^{-1}$. The rate of disappearance of $O_2$ will be -

(a) 5 g $sec^{-1}$ (b) 100 g $sec^{-1}$ (c) 20 g sec (d) 2 g $sec^{-1}$

40.For reaction A + 2B $\longrightarrow$ C + D rate law

R = $k[A]^1[B]^2$. By what factor would the rate changes if concentration of A is doubled & that of B is halved ?

(a) 2 (b) 4 (c) 8 (d) ½

41. The energies of activation for forward and reverse reactions for $A_2 + B_2 \rightleftharpoons 2AB$ are 180 kJ $mol^{-1}$ and 200 kJ $mol^{-1}$ respectively. The presence of a catalyst lowers the activation energy of both (forward and reverse) reactions by100 kJ $mol^{-1}$. The enthalpy change of the reaction ($A_2 + B_2$® 2AB) in the presence of catalyst will be (in kJ $mol^{-1}$).

(a) 280 (b) 20 (c) 300 (d) 120

42. For the reaction $N_2 + 3H_2 \rightleftharpoons 2NH_3$, if

$\frac{\Delta[NH_3]}{\Delta t} = 2\times10^{-4} mol\ l^{-1}s^{-1}$, the value of $\frac{-\Delta[H_2]}{\Delta t}$ would be

(a) $1\times10^{-4} moll^{-1}s^{-1}$ (b) $3\times10^{-4} moll^{-1}s^{-1}$

(c) $4\times10^{-4} moll^{-1}s^{-1}$ (d) $6\times10^{-4} moll^{-1}s^{-1}$

43. The rate constant of a first order reaction is $10^{-3}$ $min^{-1}$ at 300 K. The temperature coefficient of the reaction is 2. What is the rate constant of the reaction at 350 K approximately ?

(a) $16 \times 10^{-3}$ (b) $64 \times 10^{-3}$ (c) $32 \times 10^{-3}$ (d) $2^{50}$

44. In the first order reaction, the concentration of the reactants is reduced to 25% in one hour. The half-life period of the reaction is -

(a) 2 hr (b) 4 hr (c) 1/2 hr (d) 1/4 hr

45. The following mechanism has been proposed for the reaction of NO with $Br_2$ to from NOBr

$NO(g) + Br_2(g) \rightleftharpoons NOBr_2(g)$

$NOBr_2(g) + NO(g) \rightarrow 2NOBr(g)$

If the second step is the rate determining step, the order of the reaction with respect to NO(g) is

(a) 0 (b) 3 (c) 2 (d) 1

46. The activation energy of a reaction is $9 kcal/mole$. The increase in the rate constant when its temperature is raised from 295 to 300 K is approximately

(a) 10% (b) 50% (c) 100% (d) 28.8%

47. Observe the following reaction :

$A(g) + 3B(g) \rightarrow 2C(g)$

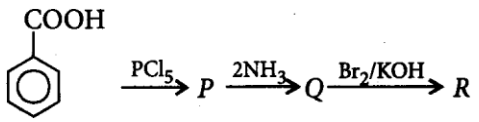
The rate of this reaction $\left\{\frac{-d[A]}{dt}\right\}$ is

$3 \times 10^{-3}$mollitre$^{-1}$ $min^{-1}$. What is the value of $\frac{-d[B]}{dt}$ in

mollitre$^{-1}$ $min^{-1}$?

(a) $3 \times 10^{-3}$ (b) $9 \times 10^{-3}$ (c) $10^{-3}$ (d) $1.5 \times 10^{-3}$

48. What is the end product in the following sequence of reactions?



(a) Aniline (b) Phenol
(c) Benzene (d) Benzenediazonium chloride.

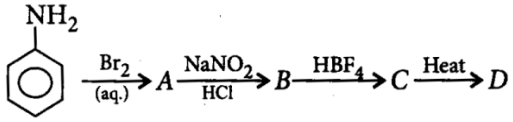
49. $CH_3CH_2Cl \xrightarrow{NaCN} X \xrightarrow{Ni/H_2} Y \xrightarrow[\text{anhydride}]{\text{Acetic}} Z$. Z in the above reaction is.

(a) $CH_3CH_2CH_2NHCOCH_3$ (b) $CH_3CH_2CH_2NH_2$
(c) $CH_3CH_2CH_2CONHCH_3$ (d) $CH_3CH_2CH_2CONHCOCH_3$

50. $C_6H_6 \xrightarrow[H_2SO_4]{HNO_3} P \xrightarrow{Sn/HCl} Q \xrightarrow[HCl]{NaNO_2} P \xrightarrow[H_2O]{H_3PO_2} S$ The end product S in the given sequence of reaction of reactions is

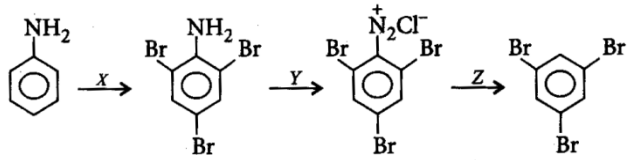
(a) Benzoic acid (b) Benzene
(c) Phenol (d) Chlorobenzene

51. The product 'D' in the following sequence of reaction is



(a) 2,4,6-tribromofluorobenzene (b) Fluorobenzene
(c) p-bromofluorobanzene (d) tribromobenzene

52. Identify X, Y and Z in the given sequence of reactions.



(a) $X = HBr; Y = NaNO_2 + HCl; Z = heat$
(b) $X = Br_2/CCl_4; Y = HNO_2; Z = CH_3OH$
(c) $X = Br_2/CuBr; Y = NaNO_2 + HCl; Z = NaOH$
(d) $X = Br_2(aq); Y = NaNO_2 + HCl(0 - 4^oC);$ $Z = H_3PO_2 + H_2O\_$

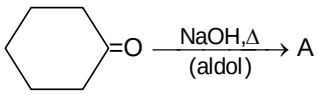
53. Match the compounds given in column I with column II and mark the appropriate choice.

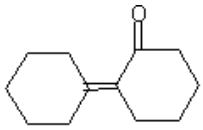
| **Column I** | | **Column II** | |
|---|---|---|---|
| (A) | Benzenesulphonyl chloride | (i) | Zwitter ion |
| (B) | Sulphanilic acid | (ii) | Hinsberg reagent |
| (C) | Alkyldiazonium salts | (iii) | Dyes |
| (D) | Aryldiazonium salts | (iv) | Conversion to Alcohols |

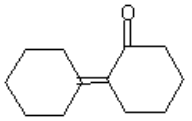
(a) (A) → (iv), (B) → (iii), (C) → (i), (D) → (ii)
(b) (A) → (ii), (B) → (iv), (C) → (iii), (D) → (i)
(c) (A) → (ii), (B) → (i), (C) → (iv), (D) → (iii)

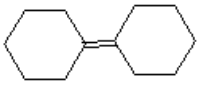
(d) (A) $\rightarrow$ (ii), (B) $\rightarrow$ (iii), (C) $\rightarrow$ (iv), (D) $\rightarrow$ (i)

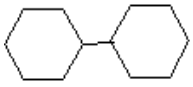
54.




(a) 

(b) 

(c) 

(d) 

55. An organic compound (X) with molecular formula $C_9H_{10}O$ gives positive 2,4- DNP and Tollen's tests. It undergoes cannizzaro reaction and on vigorous oxidation it gives 1,4- benzenedicarboxylic acid. Compound (X) is

(a) Benzaldehyde (b) o-Methylbenzaldehyde
(c) p-ethylbenzaldehyde (d) 2,2-dimethylhexanal

56. Which of the following compounds would have the smallest value for $PK_a$ ?

(a) $CHF_2CH_2CH_2COOH$ (b) $CH_3CH_2CF_2COOH$
(c) $CH_2FCFCH_2COOH$ (d) $CH_3CF_2CH_2COOH$

57. What are the correct steps to convert acetaldehyde to acetone?

(a) $CH_3MgBr, H_2O,$ Oxidation
(b)Oxidation, $Ca(OH)_2, Heat$
(c) Reduction, KCN, Huydrolysis
(d)Oxidation, $C_2H_5ONa,$ Heat

58. –OH group present in alcohols is neutral while it is acidic in carboxylic acid because

(a) In carboxylic acid –OH group is attached to electron withdrawing carbonyl group.
(b) In alcohols – OH group is attached to alkyl group which is electron withdrawing.
(c) Carboxylic group is an electron releasing group.
(d) Alcoholic group is an electron withdrawing group.

59. Few simple chemical tests are given below to differentiate between the pairs of compounds. Which of the following tests is not correct for differentiation?

(a) Propanal and Propanone – Silver mirror test
(b) Acetophenone and benzophenone – Iodoform test
(c) Ethanal and propanal – Fehling's test
(d) Benzoci acid and ethyl benzoate – Sodium bicarbonate test.

60. Which is the most suitable reagent for the following conversion?

$$CH_3-CH=CH-CH_2-\overset{\overset{O}{\|}}{C}-CH_3 \rightarrow$$

$$CH_3-CH=CH-CH_2-\overset{\overset{O}{\|}}{C}-OH$$

(a) Tollen's reagent (b) Benzoyl peroxide
(c) $I_2$ and NaOH solution (d) Sn and NaOH solution

## MATHEMATICS

**Q.61** f(c) is a maximum value of f(x) if -

(A) $f'(c) = 0, f''(c) > 0$
(B) $f'(c) = 0, f''(c) < 0$
(C) $f'(c) \neq 0, f''(c) = 0$
(D) $f'(c) < 0, f''(c) > 0$

**Q.62** f(c) is a minimum value of f(x) if -
(A) $f'(c) = 0, f''(c) > 0$
(B) $f'(c) = 0, f''(c) < 0$
(C) $f'(c) \neq 0, f''(c) = 0$
(D) $f'(c) < 0, f''(c) > 0$

**Q.63** f(c) is a maximum value of f(x) when at x = c-
(A) f ′(x) changes sign from +ve to –ve
(B) f ′(x) changes sign from –ve to +ve
(C) f ′(x) does not change sign
(D) f ′(x) is zero

**Q.64** f(c) is a minimum value of f(x) when at x = c-
(A) f ′(x) changes sign +ve to –ve
(B) f ′(x) changes sign from –ve to +ve
(C) f ′(x) does not change sign
(D) f ′(x) is zero

**Q.65** The correct statement is -
(A) f(c) is an extreme value of f(x) if f ′(c) = 0
(B) If f(c) is an extreme value of f(x) then f ′(c) = 0
(C) If f ′(c) = 0 then f(c) is an extreme value of f(x)
(D) All the above statements are incorrect

**Q.66** If for a function f(x), $f'(a) = 0 = f''(a) = ....$
$= f^{n-1}(a)$ but $f^n(a) \neq 0$ then at x = a, f(x) is minimum if -
(A) n is even and $f^n(a) > 0$
(B) n is odd and $f^n(a) > 0$
(C) n is even and $f^n(a) < 0$
(D) n is odd and $f^n(a) < 0$

**Q.67** The point of maxima of sec x is -
(A) x = 0 (B) $x = \pi/2$
(C) $x = \pi$ (D) $x = 3\pi/2$

**Q.68** $x^3 - 3x + 4$ is minimum at -
(A) x = 1 (B) x = –1
(C) x = 0 (D) No where

**Q.69** The maximum value of $2x^3 - 9x^2 + 100$ is -
(A) 0 (B) 100
(C) 3 (D) 30

**Q.70** If $f(x) = x^3 - kx + 7$ is maximum at x = –1, then the value of k is -
(A) 3 (B) 6 (C) –3 (D) –6

**Q.71** $f(x) = 2x^3 - 21x^2 + 36x + 7$ has a maxima at -
(A) x = 2 (B) x = 1 (C) x = 6 (D) x = 3

**Q.72** The minimum value of the function $x^x$ $(x > 0)$ is at -

(A) $x = 1$ (B) $x = e$

(C) $x = e^{-1}$ (D) None of these

**Q.73** If x = p and x = q are respectively the maximum and minimum points of the function $x^5 - 5x^4 + 5x^3 - 10$, then -

(A) p = 0, q = 1 (B) p = 1, q = 0

(C) p = 1, q = 3 (D) p = 3, q = 1

**Q.74** Let x, y be two variables and x> 0, xy = 1. Then minimum value of x + y is -

(A) 1 (B) 2 (C) 3 (D) 4

**Q.75** The maximum value of function sin x (1+ cos x) occurs at -

(A) $x = \pi/4$ (B) $x = \pi/2$

(C) $x = \pi/3$ (D) $x = \pi/6$

**Q.76** The maximum value of 3 sin x + 4 cos x is -

(A) 3 (B) 4 (D) 5 (D) 7

**Q.77** If x = –1 and x = 2 are extreme points of the function $y = a \log x + bx^2 + x$, then-

(A) a = 2, b = 1/2 (B) a = 2, b = – 1/2

(C) a = – 2, b = 1/2 (D) a = – 2, b = – 1/2

**Q.78** In $[0, 2\pi]$ one maximum value of x + sin 2x is -

(A) $\frac{2\pi}{3}+\frac{\sqrt{3}}{2}$ (B) $\frac{2\pi}{3}-\frac{\sqrt{3}}{2}$

(C) $\frac{\pi}{3}+\frac{\sqrt{3}}{2}$ (D) $\frac{\pi}{3}-\frac{\sqrt{3}}{2}$

**Q.80** If $0 \le c \le 5$, then the minimum distance of the point (0, c) from parabola $y = x^2$ is-

(A) $\sqrt{c-4}$ (B) $\sqrt{c-1/4}$

(C) $\sqrt{c+1/4}$ (D) None of these

**Q.81** If $\frac{dy}{dx} = (x-1)^3 (x-2)^4$, then y is -

(A) maximum at x = 1 (B) maximum at x = 2

(C) minimum at x = 1 (D) minimum at x = 2

**Q.82** The maximum area of a rectangle of perimeter 176 cms. is -

(A) 1936 sq.cms. (B) 1854 sq.cms.

(C) 2110 sq.cms. (D) None of these

**Q.83** Two parts of 10 such that the sum of the twice of first with the square of second is minimum, are-

(A) 9, 1 (B) 5, 5 (C) 4, 6 (D) 1, 9

**Q.84** For the curve $y = xe^x$ -

(A) x = 0 is a point of maxima (B) x = 0 is a point of minima

(C) x = – 1 is a point of minima (D) x = – 1 is a point of maxima

**Q.85** $x(1-x^2)$, $0 \le x \le 2$ is maximum at -

(A) $x = 0$ (B) $x = 1$

(C) $x = 1/\sqrt{3}$ (D) Nowhere

**Q.86** A curve whose slope at (x,y) is $x^2 - 2x$, passes through the point (2,0). The point with greatest ordinate on the curve is-

(A) (0, 0) (B) (0, 4)

(C) (0, 4/3) (D) (0,3/4)

**Q.87** $f(x) = 1 + 2\sin x + 3\cos^2 x$ $(0 \le x \le 2\pi/3)$ is-

(A) minimum at $x = \pi/2$ (B) maximum at $x = \sin^{-1}(1/\sqrt{3})$

(C) minimum at $x = \pi/3$ (D) minimum at $x = \sin^{-1}(1/3)$

**Q.88** 20 is divided into two parts so that product of cube of one quantity and square of the other quantity is maximum. The part are-

(A) 10, 10 (B) 16, 4

(C) 8, 12 (D) 12, 8

**Q.89** Which of the following point lying on the line $x + 2y = 5$ is at minimum distance from the origin

(A) (1, 2) (B) (3, 1)

(C) (–1, 3) (D) (2, 3/2)

**Q.90** The point on the curve $x^2 = 2y$ which is nearest to (0, 5) is -

(A) $(2\sqrt{2}, 0)$ (B) (0, 0)

(C) (2, 2) (D) None