SATISH SCIENCE ACADEMY

Where We Shape The Career **Time :**

Date : **MHTCET MOCK TEST 02** **No. MCQ**

1. Diffraction and interference of light suggest
(a) Nature of light is electro-magnetic
(b) Wave nature
(c) Nature is quantum
(d) Nature of light is transverse

2. In case of Fraunhoffer diffraction at a single slit the diffraction pattern on the screen is correct for which of the following statements?

(a) Central dark band having uniform brightness on either side.

(b) Central dark band having alternate dark and bright bands of decreasing intensity on either side.

(c) Central bright band having dark bands on either side.

(d) Central bright band having alternate dark and bright bands of decreasing intensity on either side.

3. For the myopic eye, the defect is cured by
(a) Convex lens (b) Concave lens
(c) Cylindrical lens (d) Toric lens

4. The aperture of the objective is 24.4 cm. The resolving power of this telescope. If a light of wavelength 2440 A is used to see the object will be
(a) 8.1×10^6 (b) 10.0×10^7
(c) 8.2×10^5 (d) 1.0×10^{-8}

5. The dominant mechanisms for motion of charge carriers in forward and reverse biased silicon *P-N* junctions are
(a) Drift in forward bias, diffusion in reverse bias
(b) Diffusion in forward bias, drift in reverse bias
(c) Diffusion in both forward and reverse bias
(d) Drift in both forward and reverse bias

6. Which of these is unipolar transistor
(a) Point contact transistor (b) Field effect transistor
(c) *PNP* transistor (d) None of these

7. The minimum energy required to excite a hydrogen atom from its ground state is
(a) 13.6 *eV* (b) –13.6 *eV*
(c) 3.4 *eV* (d) 10.2 *eV*

8. The electron emitted in beta radiation originates from
(a) Inner orbits of atoms
(b) Free electrons existing in nuclei
(c) Decay of a neutron in a nucleus
(d) Photon escaping from the nucleus

9. The threshold wavelength for photoelectric effect of a metal is 6500 Å. The work function of the metal is approximately
(a) 2 *eV* (b) 1 *eV*
(c) 0.1 *eV* (d) 3 *eV*

10. A 60 W source emits monochromatic light of wavelength 662.5 nm. The number of photons emitted per second is
(a) 5×10^{17} (b) 2×10^{20}
(c) 5×10^{26} (d) 2×10^{29}

11. A lamp consumes only 50% of peak power in an a.c. circuit. What is the phase difference between the applied voltage and the circuit current
(a) $\frac{\pi}{6}$ (b) $\frac{\pi}{3}$
(c) $\frac{\pi}{4}$ (d) $\frac{\pi}{2}$

12. An *LCR* circuit contains $R = 50\ \Omega$, $L = 1\ mH$ and $C = 0.1\ \mu F$. The impedance of the circuit will be minimum for a frequency of
(a) $\frac{10^5}{2\pi} s^{-1}$ (b) $\frac{10^6}{2\pi} s^{-1}$
(c) $2\pi \times 10^5 s^{-1}$ (d) $2\pi \times 10^6 s^{-1}$

13. A coil of area $100\ cm^2$ has 500 turns. Magnetic field of $0.1\ weber\ /\ metre^2$ is perpendicular to the coil. The field is reduced to zero in 0.1 second. The induced e.m.f. in the coil is
(a) 1 V (b) 5 V
(c) 50 V (d) Zero

14. A circular disc of radius 0.2 meter is placed in a uniform magnetic field of induction $\frac{1}{\pi}\left(\frac{Wb}{m^2}\right)$ in such a way that its axis makes an angle of 60^o with $\vec{B}$. The magnetic flux linked with the disc is
(a) 0.08*Wb* (b) 0.01*Wb*
(c) 0.02*Wb* (d) 0.06*Wb*

15. Two magnets *A* and *B* are identical in mass, length and breadth but have different magnetic moments. In a vibration magnetometer, if the time period of *B* is twice the time period

of A. The ratio of the magnetic moments M_A / M_B of the magnets will be

(a) $1/2$ (b) 2

(c) 4 (d) $1/4$

16. Magnetic permeability is maximum for

(a) Diamagnetic substance (b) Paramagnetic substance

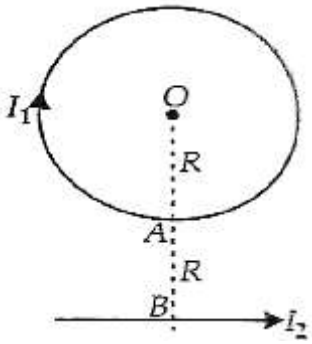
(c) Ferromagnetic substance (d) All of these

17. A toroid has number of turns per unit length n, current i, then the magnetic field is

(a) $\mu_0 ni$ (b) $\mu_0 n^2 i$

(c) $\mu_0 i/n$ (d) None of these

18. In the diagram, I_1, I_2 are the strength of the currents in the loop and straight conductors respectively. $OA = OB = R$. The net magnetic field at the centre O is zero. Then the ratio of the



currents in the loop and the straight conductors is

(a) π (b) 2π

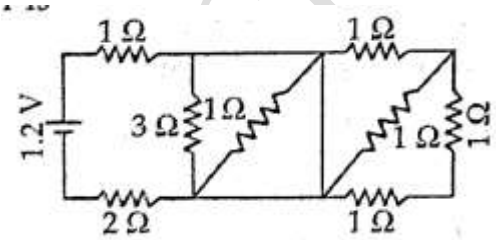
(c) $1/\pi$ (d) $1/2\pi$

19. A 30 V, 90 W lamp is to be operated on a 120 V D.C. line. For proper glow, a resistor of ohm should be connected in series with the lamp.

(a) 40 (b) 10

(c) 20 (d) 30

20. In the given circuit, the current through 2Ω resistor is



(a) 0.4 A (b) 0.2 A

(c) 0.1 A (d) 0.3 A

21. Two charges each equal to $2\mu C$ are $0.5m$ a part. If both of them exist inside vacuum, then the force between them is

(a) 1.89 N (b) 2.44 N

(c) 0.144 N (d) 3.144 N

22. Two opposite and equal charges 4×10^{-8} *coulomb* when placed 2×10^{-2} *cm* away, form a dipole. If this dipole is placed in an external electric field 4×10^{8} *newton/coulomb*, the value of maximum torque and the work done in rotating it through $180°$ will be

(a) 64×10^{-4} *Nm* and 64×10^{-4} *J*

(b) 32×10^{-4} *Nm* and 32×10^{-4} *J*

(c) 64×10^{-4} *Nm* and 32×10^{-4} *J*

(d) 32×10^{-4} *Nm* and 64×10^{-4} *J*

23. A source of sound S of frequency 500 *Hz* situated between a stationary observer O and a wall W, moves towards the wall with a speed of 2 *m/s*. If the velocity of sound is 332 *m/s*, then the number of beats per second heard by the observer is (approximately)

(a) 8 (b) 6

(c) 4 (d) 2

24. Two cars moving in opposite directions approach each other with speed of 22 ms^{-1} and 16.5 ms^{-1} respectively. The driver ofthe first car blows a horn having a frequency 400 Hz. The frequency heard by the driver of the second car is (velocity of sound is 340 ms^{-1})

(a) 361 Hz (b) 411 Hz

(c) 448 Hz (d) 350 Hz

25. When the length of the vibrating segment of a sonometer wire is increased by 1%, the percentage change in its frequency is

(a) $\frac{100}{101}$ (b) $\frac{99}{100}$

(c) 1 (d) 2

26. A particle executing simple harmonic motion has an amplitude of 6 cm. Its acceleration at a distance of 2 cm from the mean position is $8\ cm/s^2$. The maximum speed of the particle is

(a) 8 cm/s (b) 12 cm/s

(c) 16 cm/s (d) 24 cm/s

27. A rectangular block of mass m and area of cross-section A floats in a liquid of density p. If it is given a small vertical displacement from equilibrium it undergoes with a time period T, then

(a) $T \propto \frac{1}{\sqrt{m}}$ (b) $T \propto \sqrt{p}$

(c) $T \propto \frac{1}{\sqrt{A}}$ (d) $T \propto \frac{1}{p}$

28. The temperature on Celsius scale is $25°C$. What is the corresponding temperature on the Fahrenheit scale

(a) $40°F$ (b) $77°F$

(c) $50°F$ (d) $45°F$

29. A *litre* of alcohol weighs

(a) Less in winter than in summer

(b) Less in summer than in winter

(c) Some both in summer and winter

(d) None of the above

30. A big water drop is formed by the combination of n small water drops of equal radii. The ratio of the surface energy of n drops to the surface energy of big drop is

(a) $n^2:1$ (b) $n:1$

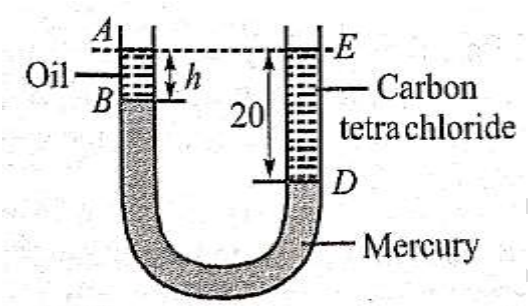
(c) $\sqrt{n}:1$ (d) $\sqrt[3]{n}:1$

31. Calculate the value of h in U-tube shown in the following figure.

Given: Density of oil $= 0.9\ g/cm^3$,

Density of carbon tetrachloride $= 1.6\ g/cm^3$

Density of mercury $= 13.6\ g/cm^3$



(a)18.9cm (b)20.9cm

(c)30.9cm (d)40.9cm

32. A soap bubble in vacuum has a radius of 3 *cm* and another soap bubble in vacuum has a radius of 4 *cm*. If the two bubbles coalesce under isothermal condition, then the radius of the new bubble is

(a) 2.3 *cm* (b) 4.5 *cm*

(c) 5 *cm* (d) 7 *cm*

33. Water rises in a capillary tube when its one end is dipped vertically in it, is 3 *cm*. If the surface tension of water is 75×10^{-3} *N/m*, then the diameter of capillary will be

(a) 0.1 *mm* (b) 0.5 *mm*

(c) 1.0 *mm* (d) 2.0 *mm*

34. Two planets have the same average density but their radii are R_1 and R_2. If acceleration due to gravity on these planets be g_1 and g_2 respectively, then

(a) $\frac{g_1}{g_2} = \frac{R_1}{R_2}$ (b) $\frac{g_1}{g_2} = \frac{R_2}{R_1}$

(c) $\frac{g_1}{g_2} = \frac{R_1^2}{R_2^2}$ (d) $\frac{g_1}{g_2} = \frac{R_1^3}{R_2^3}$

35. Radius of orbit of satellite of earth is R. Its kinetic energy is proportional to

(a) $\frac{1}{R}$ (b) $\frac{1}{\sqrt{R}}$

(c) R (d) $\frac{1}{R^{3/2}}$

36. The resultant force of 5 N and 10 N can not be

(a) 12 N (b) 8 N

(c) 4 N (d) 5 N

37. A $0.5kg$ ball moving with a speed of 12m/s strikes a hard wall at an angle of 30^o with the wall. It is reflected with the same speed at the same angle. If the ball is in contact with the wall for 0.25 seconds, the average force acting on the wall is

(a) 96 N (b) 48 N (c) 24 N (d) 12 N.

38. A particle of mass mwith an initial velocity ui collides perfectly elastically with a mass 3 mat rest. It moves with a velocity vì after collision, then, v is given by

(a) $v = \frac{1}{\sqrt{6}}u$ (b) $v = \frac{u}{\sqrt{3}}$

(c) $v = \sqrt{\frac{2}{3}}u$ (d) $v = \frac{u}{\sqrt{2}}$

39. A uniform metal chain is placed on a rough table such that one end of chain hangs down over the edge of the table. When one-third of its length hangs over the edge, the chain starts sliding. Then, the coefficient of static friction is

(a) $\frac{3}{4}$ (b) $\frac{1}{4}$

(c) $\frac{2}{3}$ (d) $\frac{1}{2}$

40. A cyclist riding the bicycle at a speed of $14\sqrt{3}\ ms^{-1}$ takes a turn around a circular road of radius $20\sqrt{3}\ m$ without skidding. Given $g = 9.8\ ms^{-2}$, what is his inclination to the vertical

(a) 30^o (b) 90^o

(c) 45^o (d) 60^o

41. A bullet is dropped from the same height when another bullet is fired horizontally. They will hit the ground

(a) One after the other (b) Simultaneously

(c) Depends on the observer (d) None of the above

42. A tangential force F is applied on a disc of radius R, due to which it deflects through an angle θ from its initial position. The work done by this force would be

(a) FR (b) $F\theta$

(c) $\frac{FR}{\theta}$ (d) $FR\theta$

43. A block of mass $2\,kg$ hangs from the rim of a wheel of radius $0.5\,m$. On releasing from rest the block falls through $5\,m$ height in $2\,s$. The moment of inertia of the wheel will be

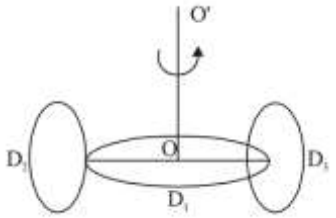
(a)1 $kg\text{-}m^2$

(b)3.2 $kg\text{-}m^2$

(c)2.5 $kg\text{-}m^2$

(d)1.5 $kg\text{-}m^2$

44. A circular disc D_1 of mass M and radius R has two identical D_2 and D_3 of the same mass M and radius R attached rigidlyat its opposite ends (see figure). The moment of inertiaof the system about the axis OO', passing through the centre of D_1, as shown in the figure, will be :



(a) MR^2 (b) $3MR^2$

(c) $\frac{4}{5}MR^2$ (d) $\frac{2}{3}MR^2$

45. A perfect gas at $27°C$ is heated at constant pressure so as to triple its volume. The temperature of the gas will be

(a) $81°C$ (b) $900°C$

(c) $627°C$ (d) $450°C$

46. The maximum wavelength of a radiation emitted by a star is 289.8 nm. Then intensity of radiation for the star is (Given : Stefan's constant $= 5.67\times10^{-8}$ W m^{-2} K^{-4}, Wien's constant, $b = 2898\mu$mK)

(a) 5.67×10^{-12} W m^{-2}

(b) 10.67×10^{14}Wm^{-2}

(c) 5.67×10^{8} W m^{-2}

(d) 10.67×10^{7} W m^{-2}

47. The speed of sound in an ideal gas at a given temperature T is v. Then rms speed of gas molecules at that temperature is v_{rms}. The ratio of the velocities v and v_{rms} for helium and oxygen gases are X and X' respectively. Then $\frac{X}{X'}$ is equal to

(a) $\frac{21}{\sqrt{5}}$ (b) $\frac{5}{\sqrt{21}}$

(c) $\sqrt{\frac{5}{21}}$ (d) $\frac{21}{5}$

48. Two infinitely long parallel wires having linear charge densities λ_1 and λ_2 respectively are placed at a distance of R metres. The force per unit length on either wire will be $\left(K=\frac{1}{4\pi\varepsilon_0}\right)$

(a) $K\frac{2\lambda_1\lambda_2}{R^2}$ (b) $K\frac{2\lambda_1\lambda_2}{R}$

(c) $K\frac{\lambda_1\lambda_2}{R^2}$ (d) $K\frac{\lambda_1\lambda_2}{R}$

49. Three parallel plate air capacitors are connected in parallel. Each capacitor has plate area $\frac{A}{3}$ and the separation between the plates is d, $2d$ and $3d$ respectively. The equivalent capacity of combination is (ϵ_0 = absolute permittivity of free space)

(a) $\frac{7\epsilon_0 A}{18d}$ (b) $\frac{11\epsilon_0 A}{18d}$

(c) $\frac{13\epsilon_0 A}{18d}$ (d) $\frac{17\epsilon_0 A}{18d}$

50. If current in an electric bulb changes by 1%, then the power will change by

(a) 1% (b) 2%

(c) 4% (d) $\frac{1}{2}$%

51. What volume of NH_3 gas at STP would be needed to prepare $100ml$ of 2.5 molal (2.5m) ammonium hydroxide solution

(a) 0.056 litres (b) 0.56 litres

(c) 5.6 litres (d) 11.2 litres

52. The volume of 10 Nand 4 NHCl required to make 1 litre of 7 NHCl are

(a) 0.50 litre of 10 NHCl and 0.50 litre of 4 N HCl

(b) 0.60 litre of 10 NHCl and 0.40 litre of 4 N HCl

(c) 0.80 litre of 10 NHCl and 0.20 litre of 4 N HCl

(d) 0.75 litre of 10 NHCl and 0.25 litre of 4 N HCl.

53. Which one of the following groupings represents a collection of isoelectronic species

(a) Na^+, Ca^{2+}, Mg^{2+} (b) N^{3-}, F^-, Na^+

(c) Be, Al^{3+}, Cl^- (d) Ca^{2+}, Cs^+, Br

54. Uncertainty principle gave the concept of

(a) Probability

(b) An orbital

(c) Physical meaning of Ψ the Ψ^2

(d) All the above

55. Out of the following hybrid orbitals, the one which forms the bond at angle 120^o, is

(a) d^2sp^3 (b) sp^3

(c) sp^2 (d) sp

56. When common salt is dissolved in water
(a) Melting point of the solution increases
(b) Boiling point of the solution increases
(c) Boiling point of the solution decreases
(d) Both melting point and boiling point decreases

57. Match List-I and List-II.

List-I	List-II
A. Osmosis	I. Solvent molecules pass through semi permeable membrane towards solvent side.
B. Reverse osmosis	II. Movement of charged colloidal particles under the influence of applied electric potential towards oppositely charged electrodes.
C. Electro osmosis	III. Solvent molecules pass through semi permeable membrane towards solution side
D. Electrophoresis	IV. Dispersion medium moves in an electric field.

Choose the correct answer from the options given below:
(a)A-I,B-III,C-IV,D-II
(b) A-III, B-I, C-IV, D-II
(c) A-III, B-I, C-II, D-IV
(d) A-I, B-III, C-II, D-IV

58. If the radius ratio is in the range of $0.414 - 0.732$, then the coordination number will be
(a) 2 (b) 4
(c) 6 (d) 8

59. If the distance between Na^+ and Cl^- ions in NaCl crystal is a, pm, what is length of the cell edge?
(a) 4a pm
(b) a / 4pm
(c) a / 2pm
(d) 2apm

60. BF_3 is used as a catalyst in several industrial processes due to its
(a) Strong reducing agent
(b) Weak reducing agent
(c) Strong Lewis acid nature
(d) Weak Lewis acid character

61. The aqueous solution of $FeCl_3$ is acidic due to
(a) Acidic impurities (b) Ionisation
(c) Hydrolysis (d) Dissociation

62. ΔG^o for the reaction $X + Y \rightleftharpoons Z$ is $-4.606\ kcal$. The value of equilibrium constant of the reaction at 227^oC is $(R = 2.0\ cal.mol^{-1}K^{-1})$
(a) 100 (b) 10
(c) 2 (d) 0.01

63. Hess law deals with
(a) Changes in heat of reaction
(b) Rate of reaction
(c) Equilibrium constant
(d) Influence of pressure on volume of a gas

64. For the reaction $2A + B \rightarrow C$, the values of initial rate at different reactant concentration are given in the table below.

The rate law for the reaction is :

[A] (mol L^{-1})	[B] (mol L^{-1})	Initial Rate (mol $L^{-1}s^{-1}$)
0.05	0.05	0.045
0.10	0.05	0.090
0.20	0.10	0.72

(a) Rate $= k[A][B]^2$
(b) Rate $= k[A]^2[B]^2$
(c) Rate $= k[A][B]$
(d) Rate $= k[A]^2[B]$

65. For the reaction $A + 2B \longrightarrow C$, rate is given by, $R = [A][B]^2$ then the order of the reaction is
(a) 3 (b) 6
(c) 5 (d) 7

66. In 3d series, the metal having the highest M^{2+}/M standard electrode potential is
(a)Cr (b)Fe
(c) Cu (d) Zn

67. The reference electrode is made by using
(a) $ZnCl_2$
(b) $CuSO_4$
(c) $HgCl_2$
(d) Hg_2Cl_2

68. What is the density of solution of sulphuric acid usetid as an electrolyte in lead accumulator?
(a) 1.5 g L^{-1} (b) 1.2 g L^{-1}
(c) 1.8 g L^{-1} (d) 2.0 g L^{-1}

69. Identify the process in which change in the oxidation state is five :
(a) $Cr_2O_7^{2-} \rightarrow 2Cr^{3+}$ (b) $MnO_4^- \rightarrow Mn^{2+}$
(c) $CrO_4^{2-} \rightarrow Cr^{3+}$ (4) $C_2O_4^{2-} \rightarrow 2CO_2$

70. Gold number is maximum for the lyophilic sol is

(a) Gelatin (b) Haemoglobin
(c) Sodium oleate (d) Potato starch

71. Zinc does not show variable valency like *d*-block elements because
(a) It is a soft metal
(b) *d*-orbital is complete
(c) It is low melting
(d) Two electrons are present in the outermost orbit

72. Permanent magnet is made from
(a) Cast iron (b) Steel
(c) Wrought Iron (d) All of these

73. Which of the following complexes exhibits the highest paramagnetic behaviour?.
(a) $[Co(ox)_2(OH)_2]^-$
(b) $[Ti(NH_3)_6]^{3+}$
(c) $[V(gly)_2(OH)_2(NH_3)_2]^+$
(d) $[Fe(en)(bpy)(NH_3)_2]^{2+}$ where $gly =$ glycine, $en =$ ethylenediamine and $bpy =$ bipyridylmoities. (At. nos. Ti $= 22$, $V = 23, Fe = 26, Co = 27$) (*2008*)

74. What is the correct order of the following elements with respect to their density?
(a) Cr < Fe < Co < Cu < Zn
(b) Cr < Zn < Co < Cu < Fe
(c) Zn < Cu < Co < Fe < Cr
(d) Zn < Cr < Fe < Co < Cu

75. When the hybridization state of carbon atom changes from sp^3 to sp^2 and finally to sp, the angle between the hybridized orbitals
(a) decreases gradually
(b) decreases considerably
(c) is not affected
(d) increases progressively. (*1993*)

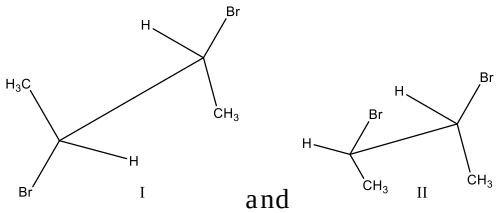
76. In the reaction

$$H{-}C{\equiv}CH \xrightarrow[(ii)\ CH_3CH_2Br]{(i)\ NaNH_2\ /\ liQ.\ NH_3} X \xrightarrow[(ii)\ CH_3CH_2Br]{(i)\ NaNH_2\ /\ liQ.\ NH_3} Y$$

(a) $X = 2$-Butyne, $Y = 2$-Hexyne
(b) $X = 1$-Butyne, $Y = 2$-Hexyne
(c) $X = 1$-Butyne, $Y = 3$-Hexyne
(d) $X = 2$-Butyne, $Y = 3$-Hexyne. (*NEET-I2016*)

77. In nucleophilic aliphatic substitution, the nucleophiles are generally
(a) Acids (b) Bases
(c) Salts (d) Neutral molecules

78. Given:



I and II are
(a) identical
(b) a pair of conformers
(c) a pair of geometrical isomers
(d) a pair of optical isomers.(*KarnatakaNEET2013*)

79. According to Lewis concept of acids and bases, ether is
(a) Acidic (b) Basic
(c) Neutral (d) Amphoteric

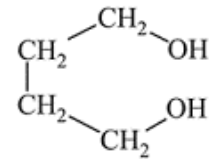
80. Primary and secondary alcohols on action of reduced copper give
(a) Aldehydes and ketones respectively
(b) Ketones and aldehydes respectively
(c) Only aldehydes
(d) Only ketones

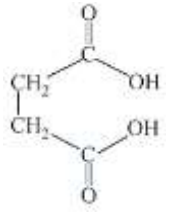
81. Acetaldehyde cannot show
(a) Iodoform test (b) Lucas test
(c) Benedict's test (d) Tollen's test

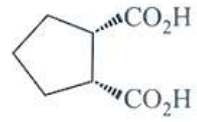
82. Which one of the following esters cannot undergo Claisen self-condensation?
(a) $C_6H_5CH_2COOC_2H_5$
(b) $C_6H_5COOC_2H_5$
(c) $CH_3CH_2CH_2CH_2COOC_2H_5$
(d) $C_6H_{11}CH_2COOC_2H_5$ (*1998*)

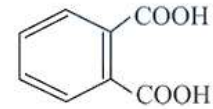
83. CH_3COOH is reacted with $CH \equiv CH$ in presence of Hg^{++}, the product is
(a) $CH_3(OOCCH_3)$ with $CH_2(OOCH_3)$ (b) CH_3 with $CH_2-(OOC-CH_3)$
(c) CH_3 with $CH(OOC-CH_3)_2$ (d) None of these

84. Which dicarboxylic acid in presence of a dehydrating agent is least reactive to give an anhydride ?

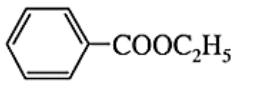
(a) 

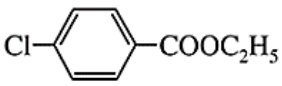
(b) 

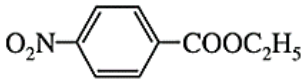
(c) 

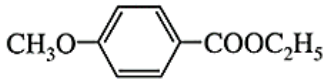
(d) 

85. The decreasing order of ease of alkaline hydrolysis for the following esters is


I

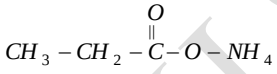

II

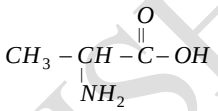

III

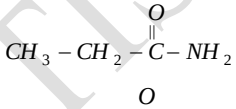

IV

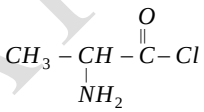
(a) III > II > IV > I
(b) III > II > I > IV
(c) IV > II > III > I
(d) II > III > I > IV

86. Which of the following compounds is an amino acid

(a) 

(b) 

(c) 

(d) 

87. Which of the following amines can be prepared by Gabriel phthalimide reaction ?

(a) *n*- butylamine
(b) trimethylamine
(c) *t*- butylamine
(d) neo-pentylamine

88. Hinsberg's reagent is

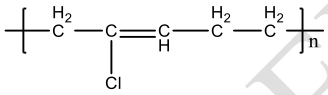
(a) $C_6H_5SO_2Cl$ (b) $C_6H_5SO_2NH_2$

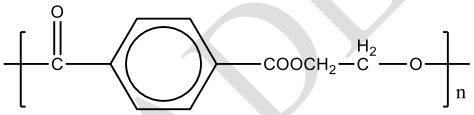
(c) CH_3COCl/ pyridine (d) $(CH_3CO)_2O$/ pyridine

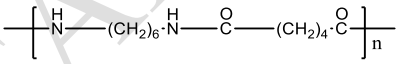
89. Which of the following is a biodegradable polymer

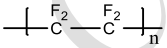
(a) Cellulose (b) Polythene
(c) Polyvinyl chloride (d) Nylon-6

90. Structures of some common polymers are given. Which one is not correctly presented?.

(a) Neoprene- 

(b) Terylene- 

(c) Nylon 6,6 - 

(d) Teflon -  (*2009*)

91. The catalyst used in the manufacture of polyethene of Ziegler method is:

(a) lithium tetrachloride and triphenyl aluminium
(b) titanium tetrachloride and trimethyl aluminium
(c) titanium oxide
(d) titanium isoperoxide

92. Chemically considering digestion is basically

(a)anabolism
(b)hydrogenation
(c)hydrolysis
(d)dehydrogenation. (*1994*)

93. The structure of protein that is unaffected by heating is :

(a) secondary structure (b) tertiary structure
(c) primary structure (d) quaternary structure

94. The correct match between Item-I and Item-II is:

Item I (drug)	**Item II (test)**
A. Norethindrone	P. Antibiotic
B. Ofloxacin	Q. Antifertility
C. Equanil	R. Hypertension
	S. Analgesics

(a) A→Q; B→R; C→S
(b) A→Q; B→P; C→R
(c) A→R; B→P; C→S
(d) A→R; B→P; C→R

95. When H_2S is passed through an ammoniacal salt solution *X*, a white precipitate is obtained. Then *X* can be a
(a) Co^{2+} solution (b) Mn^{2+} solution
(c) Ni^{2+} solution (d) Zn^{2+} solution

96. The conversion of hydroxyapatite occurs due to presence of F^- ions in water. The correct formula ofhydroxyapatite is:
(a) $[3Ca_3(PO_4)_2 \cdot Ca(OH)_2]$
(b) $[3Ca(OH)_2 \cdot CaF_2]$
(c) $[Ca_3(PO_4)_2 \cdot CaF_2]$
(d) $[3Ca_3(PO_4)_2 \cdot CaF_2]$

97. Which of the following expression represents the first law of thermodynamics?
(a) $\Delta U = -q + W$ (b) $\Delta U = q - W$
(c) $\Delta U = q + W$ (d) $\Delta U = -q - W$

98. Reaction of aqueous sodium hydroxide on (i) ethyl bromide and (ii) chlorobenzene gives
(a) (i) Ethene and (ii) *o*-chlorophenol
(b) (i) Ethyl alcohol and (ii) *o*-chlorophenol
(c) (i) Ethyl alcohol and (ii) phenol
(d) (i) Ethyl alcohol and (ii) no reaction

99. Which of the following is the example of SN^2 reaction
(a) $CH_3Br + OH^- \text{———} CH_3OH + Br^-$
(b) $CH_3\underset{\underset{Br}{|}}{CH}CH_3 + OH^- \longrightarrow CH_3\underset{\underset{OH}{|}}{CH}CH_3 + Br^-$
(c) $CH_3CH_2OH \xrightarrow{-H_2O} CH_2 = CH_2$
(d) $CH_3 - \underset{\underset{Br}{|}}{\overset{\overset{CH_3}{|}}{C}} - CH_3 + OH^- \rightarrow CH_3 - \underset{\underset{H}{|}}{\overset{\overset{CH_3}{|}}{C}} - O - CH_3 + Br^-$

100. Given the molecular formula of the hexa coordinated complexes (A) $CoCl_3.6NH_3$ (B) $CoCl_3.5NH_3$ (C) $CoCl_3.4NH_3$. If the number of co-ordinated NH_3 molecules in *A*, *B* and *C* respectively are 6, 5 and 4, the primary valency in (*A*), (*B*) and (*C*) are:
(a) 6, 5, 4 (b) 3, 2, 1
(c) 0, 1, 2 (d) 3, 3, 3

101. $\tan^{-1}x + \cot^{-1}(x+1) =$
(a) $\tan^{-1}(x^2+1)$ (b) $\tan^{-1}(x^2+x)$
(c) $\tan^{-1}(x+1)$ (d) $\tan^{-1}(x^2+x+1)$

102. If the functions are defined as $f(x) = \sqrt{x}$ and $g(x) = \sqrt{1-x}$, then what is the common domain of thefollowing functions:
$f+g, f-g, f/g, g/f, g-f$ where $(f \pm g)(x) = f(x) \pm g(x), (f/g)(x) = \frac{f(x)}{g(x)}$
(a) $0 \le x \le 1$ (b) $0 \le x < 1$
(c) \$0 (d) \$0

103. The equation of the straight line joining the point (a, b) to the point of intersection of the lines $\frac{x}{a} + \frac{y}{b} = 1$ and $\frac{x}{b} + \frac{y}{a} = 1$ is
(a) $a^2y - b^2x = ab(a-b)$ (b) $a^2y + b^2y = ab(a+b)$
(c) $a^2y + b^2x = ab$ (d) $a^2x + b^2y = ab(a-b)$

104. Equation of line passing through the point $(1, 2)$ and perpendicular to the line $y = 3x - 1$ is
(a) $x - 3y = 0$
(b) $x + 3y = 0$
(c) $x + 3y - 7 = 0$
(d) $x + 3y + 7 = 0$

105. The value of λ for which the equation $x^2 - \lambda xy + 2y^2 + 3x - 5y + 2 = 0$ may represent a pair of straight lines is
(a) 2 (b) 3
(c) 4 (d) 1

106. The lines joining the origin to the points of intersection of the line $y = mx + c$ and the circle $x^2 + y^2 = a^2$ will be mutually perpendicular, if
(a) $a^2(m^2+1) = c^2$ (b) $a^2(m^2-1) = c^2$
(c) $a^2(m^2+1) = 2c^2$ (d) $a^2(m^2-1) = 2c^2$

107. The equation of the chord of the circle $x^2 + y^2 = a^2$ having (x_1, y_1) as its mid-point is
(a) $xy_1 + yx_1 = a^2$ (b) $x_1 + y_1 = a$
(c) $xx_1 + yy_1 = x_1^2 + y_1^2$ (d) $xx_1 + yy_1 = a^2$

108. The diameter of a circle is *AB* and *C* is another point on circle, then the area of triangle *ABC* will be
(a) Maximum, if the triangle is isosceles
(b) Minimum, if the triangle is isosceles
(c) Maximum, if the triangle is equilateral
(d) None of these

109. The sum of two forces is 18 *N* and resultant whose direction is at right angles to the smaller force is 12*N*. The magnitude of the two forces are
(a) 13, 5 (b) 12, 6
(c) 14, 4 (d) 11, 7

110. If $\mathbf{a} + \mathbf{b} + \mathbf{c} = \mathbf{0}$, then which relation is correct
(a) $\mathbf{a} = \mathbf{b} = \mathbf{c} = \mathbf{0}$ (b) $\mathbf{a}.\mathbf{b} = \mathbf{b}.\mathbf{c} = \mathbf{c}.\mathbf{a}$
(c) $\mathbf{a} \times \mathbf{b} = \mathbf{b} \times \mathbf{c} = \mathbf{c} \times \mathbf{a}$ (d) None of these

111. If $3\mathbf{i} + 4\mathbf{j}$ and $-5\mathbf{i} + 7\mathbf{j}$ are the vector sides of any triangle, then its area is given by
(a) 41 (b) 47
(c) $\frac{41}{2}$ (d) $\frac{47}{2}$

112. If $f(x) = e^{2x}$ and $g(x) = \log\sqrt{x}$ $(x > 0)$, then $fog(x)$ is equal to
(a) e^{2x} (b) $\log\sqrt{x}$

(c) $e^{2x}\log\sqrt{x}$ (d) x

113. A condition for a function $y = f(x)$ to have an inverse is that it should be

(a) Defined for all x

(b) Continuous everywhere

(c) Strictly monotonic and continuous in the domain

(d) An even function

114. The domain of $f(x) = \frac{\log_{(x+1)}(x-2)}{e^{2\log_e x-(2x+3)}}, x\epsilon R$

(a) $\mathbb{R}-\{1-3\}$ (b) $(2,\infty)-\{3\}$

(c) $(-1,\infty)-\{3\}$ (d) $\mathbb{R}-\{3\}$

115. If $f(x)$ is a function such that $f''(x)+f(x)$ 政 0 and $g(x) = |\int (x)|^2 + |f'(x)|^2$ and $g(3) = 3$ then $g(8) =$

(a) 5 (b) 0

(c) 3 (d) 8

116. A stone moving vertically upwards has its equation of motion $s = 490\,t - 4.9t^2$. The maximum height reached by the stone is

(a) 12250 (b) 1225

(c) 36750 (d) None of these

117. The speed v of a particle moving along a straight line is given by $a + bv^2 = x^2$ (where x is its distance from the origin). The acceleration of the particle is

(a) bx (b) x/a

(c) x/b (d) x/ab

118. The function $f(x) = 2x^3 - 15x^2 + 36x + 4$ is maximum at

(a) $x = 2$ (b) $x = 4$

(c) $x = 0$ (d) $x = 3$

119. The length of the subtangent to the curve $x^2y^2 = a^4$ at $(-a,a)$ is

(a) $a/2$ (b) $2a$

(c) a (d) $a/3$

120. The value of $\int \sec^3 x\,dx$ will be

(a) $\frac{1}{2}[\sec x\tan x + \log(\sec x + \tan x)]$

(b) $\frac{1}{3}[\sec x\tan x + \log(\sec x + \tan x)]$

(c) $\frac{1}{4}[\sec x\tan x + \log(\sec x + \tan x)]$

(d) $\frac{1}{8}[\sec x\tan x + \log(\sec x + \tan x)]$

121. $\int e^{\tan^{-1}x}\left(1+\frac{x}{1+x^2}\right)dx$ **is equal to**

(a) $\frac{1}{2}e^{\tan^{-1}x} + c$

(b) $\frac{1}{2}xe^{\tan^{-1}x} + c$

(c) $xe^{\tan^{-1}x} + c$

(d) $e^{\tan^{-1}x} + c$

122. $\int_0^{\pi} \frac{\cos^4 x}{\cos^4 x+\sin^4 x}dx =$

(a) $\frac{\pi}{4}$ (b) $\frac{\pi}{2}$

(c) $\frac{\pi}{8}$ (d) π

123. $\int_0^{\pi/2} \sqrt{\cos\theta}\,\sin^3\theta\,d\theta =$

(a) $\frac{20}{21}$ (b) $\frac{8}{21}$

(c) $\frac{-20}{21}$ (d) $\frac{-8}{21}$

124. The value of the integral $\int_{-\pi/4}^{\pi/4} \sin^{-4} x\,dx$ is

(a) 3/2 (b) –8/3

(c) 3/8 (d) 8/3

125. Area enclosed between the curve $y^2(2a-x) = x^3$ and line $x = 2a$ above x-axis is

(a) πa^2 (b) $\frac{3\pi a^2}{2}$

(c) $2\pi a^2$ (d) $3\pi a^2$

126. The solution of the differential equation $\frac{dy}{dx} = x^2 + \sin 3x$ is

(a) $y = \frac{x^3}{3} + \frac{\cos 3x}{3} + c$ (b) $y = \frac{x^3}{3} - \frac{\cos 3x}{3} + c$

(c) $y = \frac{x^3}{3} + \sin 3x + c$ (d) None of these

127. The order of the differential equation whose general solution is given by $y = C_1e^{2x+C_2} + C_3e^x + C_4\sin(x + C_5)$ is

(a) 5 (b) 4

(c) 3 (d) 2

128. Let $y = y(x)$ be the solution of the differential equation, $x\frac{dy}{dx} + y = x\log_e x, (x < 1)$. If $2y(2) = \log_e 4 - 1$, then $y(e)$ is equal to :

(a) $-\frac{e}{2}$ (b) $-\frac{e^2}{2}$

(c) $\frac{e}{4}$ (d) $\frac{e^2}{4}$

129. If the odds in favour of an event be 3 : 5, then the probability of non-occurrence of the event is

(a) $\frac{3}{5}$ (b) $\frac{5}{3}$

(c) $\frac{3}{8}$ (d) $\frac{5}{8}$

130. If the mean of the numbers $27+x$, $31+x$, $89+x$, $107+x, 156+x$ is 82, then the mean of $130+x, 126+x, 68+x, 50+x, 1+x$ is

(a) 75 (b) 157

(c) 82 (d) 80

131. If the arithmetic mean of the numbers $x_1, x_2, x_3, ..., x_n$ is $\bar{x}$, then the arithmetic mean of numbers $ax_1+b, ax_2+b, ax_3+b, ..., ax_n+b$, where a, b are two constants would be

(a) $\bar{x}$ (b) $n a\bar{x}+nb$

(c) $a\bar{x}$ (d) $a\bar{x}+b$

132. $\sim (p \vee q) \vee (\sim p \wedge q)$ is logically equivalent to

(a) $\sim p$ (b) p

(c) q (d) $\sim q$

133. Consider the statement. "For an integer n, if n^3-1 is even, then n is odd." The contrapositive statement of this statement is:

(a) For an integer n, if n is odd, then n^3-1 is even.

(b) For an integer n, if n is even, then n^3-1 is even.

(c) For an integer n, if n is even, then n^3-1 is odd.

(d) For an integer n, if n^3-1 is noteven, then n is even.

134. The amplitude of $\sin\frac{\pi}{5}+i\left(1-\cos\frac{\pi}{5}\right)$

(a) $\pi/5$ (b) $2\pi/5$ (c) $\pi/10$ (d) $\pi/15$

135. If $\alpha_1, \alpha_2, \alpha_3, \alpha_4, \alpha_5$ are roots of the equation $z^5+z^4+z^3+z^2+z+1=0$ then $\prod_{i=1}^{5}(2-\alpha_i)$ is equal to -

(a) 63 (b) 31 (c) 32 (d) 64

136. The direction cosines of the normal to the plane $2x+3y-6z=5$ are

(a) $2, 3, -6$ (b) $\frac{2}{7}, \frac{3}{7}, -\frac{6}{7}$

(c) $\frac{2}{5}, \frac{3}{5}, -\frac{6}{5}$ (d) None of these

137. If the angle between the lines whose direction ratios are $2, -1, 2$ and $a, 3, 5$ be $45°$, then a =

(a) 1 (b) 2

(c) 3 (d) 4

138. If a plane cuts off intercepts $OA=a, OB=b, OC=c$ from the co-ordinate axes, then the area of the triangle ABC =

(a) $\frac{1}{2}\sqrt{b^2c^2+c^2a^2+a^2b^2}$ (b) $\frac{1}{2}(bc+ca+ab)$

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

139. The angle between two planes $x+2y+2z=3$ and $-5x+3y+4z=9$ is

(a) $\cos^{-1}\frac{3\sqrt{2}}{10}$ (b) $\cos^{-1}\frac{19\sqrt{2}}{30}$

(c) $\cos^{-1}\frac{9\sqrt{2}}{20}$ (d) $\cos^{-1}\frac{3\sqrt{2}}{5}$

140. If line $\frac{x-x_1}{l}=\frac{y-y_1}{m}=\frac{z-z_1}{n}$ is parallel to the plane $ax+by+cz+d=0$, then

(a) $\frac{a}{l}=\frac{b}{m}=\frac{c}{n}$ (b) $al+bm+cn=0$

(c) $\frac{a}{l}+\frac{b}{m}+\frac{c}{n}=0$ (d) None of these

141. If the angle θ between the line $\frac{x+1}{1}=\frac{y-1}{2}=\frac{z-2}{2}$ and the plane $2x-y+\sqrt{\lambda}z+4=0$ is such that $\sin\theta=\frac{1}{3}$, the value of λ is

(a) 3/4 (b) – 4/3

(c) 5/3 (d) – 3/5

142. The expression

$\cos^2(A-B)+\cos^2 B-2\cos(A-B)\cos A\cos B$ is

(a) Dependent on B (b) Dependent on A and B

(c) Dependent on A (d) Independent of A and B

143. For any $\theta \in (\frac{\pi}{4}, \frac{\pi}{2})$ the expression $3(\sin\theta-\cos\theta)^4+6(\sin\theta+\cos\theta)^2+4\sin^6\theta$ equals:

(a) $13-4\cos^2\theta+6\sin^2\theta\cos^2\theta$ (b) $13-4\cos^6\theta$

(c) $13-4\cos^2\theta+6\cos^4\theta$ (d) $13-4\cos^4\theta+2\sin^2\theta\cos^2\theta$

144. If matrix $A=\begin{bmatrix}1 & 2\\ 4 & 3\end{bmatrix}$ such that $AX=I$, then X =

(a) $\frac{1}{5}\begin{bmatrix}1 & 3\\ 2 & -1\end{bmatrix}$ (b) $\frac{1}{5}\begin{bmatrix}4 & 2\\ 4 & -1\end{bmatrix}$

(c) $\frac{1}{5}\begin{bmatrix}-3 & 2\\ 4 & -1\end{bmatrix}$ (d) $\frac{1}{5}\begin{bmatrix}-1 & 2\\ -1 & 4\end{bmatrix}$

145. The inverse of the matrix $\begin{bmatrix}1 & 0 & 0\\ 3 & 3 & 0\\ 5 & 2 & -1\end{bmatrix}$ is

(a) $-\frac{1}{3}\begin{bmatrix}-3 & 0 & 0\\ 3 & 1 & 0\\ 9 & 2 & -3\end{bmatrix}$ (b) $-\frac{1}{3}\begin{bmatrix}-3 & 0 & 0\\ 3 & -1 & 0\\ -9 & -2 & 3\end{bmatrix}$

(c) $-\frac{1}{3}\begin{bmatrix}3 & 0 & 0\\ 3 & -1 & 0\\ -9 & -2 & 3\end{bmatrix}$ (d) $-\frac{1}{3}\begin{bmatrix}-3 & 0 & 0\\ -3 & -1 & 0\\ -9 & -2 & 3\end{bmatrix}$

146. If $A=\begin{bmatrix}1 & 3 & -2\\ -3 & 0 & -5\\ 2 & 5 & 0\end{bmatrix}$ and $A(\text{adj } A)=KI$, then the value of K is (where I is unit matrix of order 3)

(a) -25 (b) -85

(c) 85 (d) 25

147. The value of $\int_{-1}^{3}\tan^{-1}\left(\frac{x}{x^2+1}\right)+\tan^{-1}\left(\frac{x^2+1}{x}\right)dx$ is

(a) 2π (b) π

(c) $\frac{\pi}{2}$ (d) $\frac{\pi}{4}$

148. $\lim_{x\to\infty}\left[\frac{1}{n}+\frac{n}{(n+1)^2}+\frac{n}{(n+2)^2}+\right.$ $\left.\cdots\cdots+\frac{n}{(2n-1)^2}\right]$ is equal to

(a) 1 (b) $\frac{1}{3}$

(c) $\frac{1}{2}$ (d) $\frac{1}{4}$

149. If $\int_0^{100\pi}\frac{\sin^2 x}{e^{\left(\frac{x}{\pi}\left[\frac{x}{\pi}\right]\right)}}dx=\frac{\alpha\pi^3}{1+4\pi^2},\alpha\in R$ where [x] is the greatest integer less than or equal to x, then the value of α is:

(a) 200 $(1-e^{-1})$ (b) 100(1 − e)

(c) 50(e − 1) (d) 150 $(e^{-1}-1)$

150. $\int\frac{x-1}{(x-3)(x-2)}dx=$

(a) $\log(x-3)-\log(x-2)+c$

(b) $\log(x-3)^2-\log(x-2)+c$

(c) $\log(x-3)+\log(x-2)+c$

(d) $\log(x-3)^2+\log(x-2)+c$