

SEAL

Test Booklet Number

21476

[Time : 2 Hours]

Subject Code - 1202

PHYSICS & CHEMISTRY

Roll Number

11348

[Maximum Marks : 400]

INSTRUCTIONS TO CANDIDATES

Read the following instructions carefully before you answer the questions given in this Test Booklet :

1. Answers to questions in this Test Booklet are to be given on an **OMR Answer Sheet** provided to the candidate **separately**.
2. Candidate must fill up Name, Category, Test Booklet Number, Subject Code and Roll Number in the Answer Sheet carefully as per instructions given.
3. This Test Booklet consists of 100 questions. All questions are compulsory and carry equal marks.
4. Each question in this Test Booklet has four possible alternative answers namely, (A), (B), (C) and (D), one of which is correct. Candidate should choose the correct answer against each question out of four alternative answers.
5. Candidate is instructed to answer the questions by **darkening (●)** with **Ball Point Pen** only in the circle bearing the correct answer.
6. Candidate should not attempt more than one answer in each question. More than one attempt in any form against a question shall be treated as incorrect.
7. Marking of answer other than darkening shall be cancelled and darkening should remain within the circle or otherwise computer shall not accept during evaluation of answer-script.
8. Rough work must not be done on the Answer Sheet. Use the blank space given in the Test Booklet for rough work.
9. Candidate is to hand over the Answer Sheet to the Invigilator before leaving the Examination Hall.
10. **NEGATIVE MARKING** : Each question carries 4 (four) marks for correct response. For each incorrect response, 1 (one) mark will be deducted from the total score. More than one answer indicated against a question will be deemed as incorrect response and will be negatively marked.

P.T.O.

SEAL

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PHYSICS

1. Which of the following quantities has dimensions ?
 (A) Refractive index
 (B) Poisson's ratio
 (C) Strain
 (D) Young's modulus
2. A body dropped from the top of a tower covers a distance $7x$ in the last second of its journey, where x is the distance covered in first second. How much time it takes to reach the ground ?
 (A) 3 sec
 (B) 4 sec
 (C) 5 sec
 (D) 6 sec
3. The range of a projectile is R . When the angle of projection is 30° , the value of the other angle of projection for the same range is
 (A) 60°
 (B) 45°
 (C) 50°
 (D) 40°
4. What is the angular velocity in radians per second of a flywheel making 300 revolutions per minute ?
 (A) 600π
 (B) 20π
 (C) 10π
 (D) 30
5. A balloon of mass ' M ' is descending at a constant acceleration α . When a mass ' m ' is released from the balloon it starts rising with the same acceleration α . Assuming that its volume does not change, the value of ' m ' is
 (A) $\frac{\alpha}{\alpha + g} M$
 (B) $\frac{2\alpha}{\alpha + g} M$
 (C) $\frac{\alpha + g}{\alpha} M$
 (D) $\frac{\alpha + g}{2\alpha} M$
6. A block slides with a velocity 10 m/s on a rough horizontal surface. It comes to rest after covering a distance of 50 m. If g is 10 m/s^2 , then the coefficient of dynamic friction between the block and the surface is
 (A) 0.1
 (B) 0.2
 (C) 0.3
 (D) 0.5
7. A toy gun uses a spring of force constant k . When charged before being triggered in the upward direction, the spring is compressed by a distance x . If the mass of the shot is m , on being triggered it will go up to a height of
 (A) $\frac{kx^2}{mg}$
 (B) $\frac{x^2}{kmg}$
 (C) $\frac{kx^2}{2mg}$
 (D) $\frac{k^2x^2}{mg}$

8. A particle of mass m moving towards the east with speed v collides with another particle of the same mass and same speed v moving towards the north. If the two particles stick to each other, the new particle of mass $2m$ will have a speed of
- (A) v
 (B) $\frac{v}{2}$
 (C) $v\sqrt{2}$
 (D) $\frac{v}{\sqrt{2}}$
9. Particles of masses $m, 2m, 3m, \dots, nm$ grams are placed on the same line at distances $l, 2l, 3l, \dots, nl$ cm from a fixed point. The distance of centre of mass of the particles from the fixed point in centimetres is
- (A) $\frac{(2n+1)l}{3}$
 (B) $\frac{n(n+1)l}{2}$
 (C) $\frac{l}{(n+1)}$
 (D) $\frac{2l}{n(n+1)}$
10. The orbital velocity of a satellite at a height R above the surface of earth is v . The escape velocity from that location will be
- (A) v
 (B) $\sqrt{2}v$
 (C) $2v$
 (D) $2\sqrt{2}v$
11. When the tension in a metal wire is T_1 , its length is l_1 . When the tension is T_2 , its length is l_2 . The natural length of wire is
- (A) $\frac{T_2}{T_1}(l_1 + l_2)$
 (B) $\frac{T_1 l_1 + T_2 l_2}{T_1 + T_2}$
 (C) $\frac{l_1 T_2 - l_2 T_1}{T_2 - T_1}$
 (D) $\frac{l_1 T_2 + l_2 T_1}{T_2 + T_1}$
12. If work W is done in blowing a bubble of radius R from a soap solution, then the work done in blowing a bubble of radius $2R$ from the same solution is
- (A) $\frac{W}{2}$
 (B) $2W$
 (C) $2\frac{1}{3}W$
 (D) $4W$
13. A tank has a hole at its bottom. The time needed to empty the tank from level h_1 to h_2 will be proportional to
- (A) $(h_1 - h_2)$
 (B) $(h_1 + h_2)$
 (C) $(\sqrt{h_1} - \sqrt{h_2})$
 (D) $(\sqrt{h_1} + \sqrt{h_2})$

14. Two identical vessels are filled with equal amounts of ice. The vessels are made from different materials. If the ice melts in the two vessels in time t_1 and t_2 respectively, then their thermal conductivities are in the ratio
- (A) $t_1 : t_2$
 (B) $t_2 : t_1$
 (C) $t_2^2 : t_1^2$
 (D) $t_1^2 : t_2^2$
15. The density of a substance at 0°C is 10 g/c.c. and at 100°C , its density is 9.7 g/c.c. The coefficient of linear expansion of substance is
- (A) $0.0001 / ^\circ\text{C}$
 (B) $0.0002 / ^\circ\text{C}$
 (C) $0.0003 / ^\circ\text{C}$
 (D) $0.0009 / ^\circ\text{C}$
16. An ideal gas A and a real gas B have their volumes increased from V to $2V$ under isothermal conditions. The increase in internal energy
- (A) will be same in both A and B
 (B) will be zero in both the gases
 (C) of B will be more than that of A
 (D) of A will be more than that of B
17. If γ is the ratio of specific heats of a perfect gas, the number of degrees of freedom of a molecule of the gas is
- (A) $\frac{25}{2}(\gamma - 1)$
 (B) $\frac{3\gamma - 1}{2\gamma - 1}$
 (C) $\frac{2}{\gamma - 1}$
 (D) $\frac{9}{2}(\gamma - 1)$
18. Two vessels A and B are identical. A has 1 g hydrogen at 0°C and B has 1 g oxygen at 0°C . Vessel A contains x molecules and B contains y molecules. The ratio $\frac{x}{y}$ is
- (A) $16 : 1$
 (B) $1 : 16$
 (C) $8 : 1$
 (D) $1 : 8$
19. An ideal gas heat engine operates in a Carnot cycle between 227°C and 127°C . It absorbs 6×10^4 calories at the higher temperature. The amount of heat converted into work is equal to
- (A) $4.8 \times 10^4 \text{ cal}$
 (B) $3.5 \times 10^4 \text{ cal}$
 (C) $1.6 \times 10^4 \text{ cal}$
 (D) $1.2 \times 10^4 \text{ cal}$
20. The function $(\sin^2 \omega t)$ represents
- (A) a simple harmonic motion with a period of $\frac{2\pi}{\omega}$
 (B) a simple harmonic motion with a period of $\frac{\pi}{\omega}$
 (C) a periodic with a period $\frac{2\pi}{\omega}$ but not simple harmonic motion
 (D) a periodic with a period $\frac{\pi}{\omega}$ but not simple harmonic motion

21. Two pendulums of length 121 cm and 100 cm start vibrating. At some instant of time, the two are in the mean position in the same phase. After how many vibrations of the shorter pendulum the two will be in phase in the mean position ?
 (A) 10
 (B) 11
 (C) 20
 (D) 21
22. 'A' sings with a frequency (n) and 'B' sings with a frequency $\left(\frac{n}{8}\right)$. If the energy remains the same and the amplitude 'A' is a , then the amplitude of 'B' is
 (A) a
 (B) $2a$
 (C) $8a$
 (D) $16a$
23. At what temperature, the velocity of sound will be doubled its value at 273 K ?
 (A) 273 K
 (B) 546 K
 (C) 819 K
 (D) 1092 K
24. An open pipe is suddenly closed with the result that the second overtone of the closed pipe is observed to be higher in frequency by 100 Hz than the first overtone of the original pipe. The fundamental frequency of the open end will be
 (A) 100 Hz
 (B) 300 Hz
 (C) 150 Hz
 (D) 200 Hz
25. A whistle of frequency 500 Hz tied to the end of a string of length 1.2 m revolves at 400 revolutions per minute. A listener standing some distance away in the plane of rotation of whistle hears frequencies in the range of (speed of sound = 340 m/s)
 (A) 436 to 574 Hz
 (B) 426 to 586 Hz
 (C) 426 to 574 Hz
 (D) 436 to 586 Hz
26. Two metal plates having charges Q and $-Q$ face each other at some separation and are dipped into an oil tank. If the oil is pumped out, the electric field between the plates will
 (A) increase
 (B) decrease
 (C) remain the same
 (D) become zero
27. Eight drops of mercury of equal radii and possessing equal charges combine to form a big drop. Then the capacitance of bigger drop compared to each individual drop is
 (A) 8 times
 (B) 4 times
 (C) 2 times
 (D) 1 time
28. The masses of the three wires of copper are in the ratio 1 : 3 : 5 and their lengths are in the ratio 5 : 3 : 1. The ratio of their electrical resistance is
 (A) 1 : 3 : 5
 (B) 5 : 3 : 1
 (C) 1 : 15 : 125
 (D) 125 : 15 : 1

29. An electric bulb rated for 500 W at 100 V is used in a circuit having a 200 V supply. The resistance R that must be put in series with the bulb, so that the bulb draws 500 W is
- (A) $10\ \Omega$
 (B) $20\ \Omega$
 (C) $40\ \Omega$
 (D) $50\ \Omega$
30. To reduce the range of voltmeter, its resistance needs to be reduced. A voltmeter has resistance R and range V . Which of the following resistances when connected in parallel will convert it into a voltmeter of range $\frac{V}{n}$?
- (A) nR
 (B) $(n+1)R$
 (C) $(n-1)R$
 (D) The range of voltmeter cannot be decreased
31. Same current I is flowing in three infinitely long wires along positive x , y and z directions. The magnetic field at a point $(0, 0, -a)$ is
- (A) $\frac{\mu_0 I}{2\pi a} (\hat{j} - \hat{i})$
 (B) $\frac{\mu_0 I}{2\pi a} (\hat{i} + \hat{j})$
 (C) $\frac{\mu_0 I}{2\pi a} (\hat{i} - \hat{j})$
 (D) $\frac{\mu_0 I}{2\pi a} (\hat{i} + \hat{j} + \hat{k})$
32. A magnet of magnetic moment M is rotated through 360° in a magnetic field H . The work done is
- (A) MH
 (B) $2MH$
 (C) $2\pi MH$
 (D) zero
33. A steel wire of length l has a magnetic moment M . It is bent in L-shape at its midpoint. The new magnetic moment is
- (A) M
 (B) $\frac{M}{\sqrt{2}}$
 (C) $\frac{M}{2}$
 (D) $2M$
34. A small square loop of wire of side l is placed inside a large square loop of wire of side L ($L \gg l$). The loops are coplanar and their centres coincide. The mutual inductance of the system is proportional to
- (A) $\frac{l}{L}$
 (B) $\frac{l^2}{L}$
 (C) $\frac{L}{l}$
 (D) $\frac{L^2}{l}$
35. A direct current of 2A and an alternating current having a maximum value of 2A flow through two identical resistances. The ratio of heat produced in the two resistances will be
- (A) 1 : 1
 (B) 1 : 2
 (C) 2 : 1
 (D) 4 : 1

36. In an a.c. circuit, a resistance of R ohm is connected in series with an inductance L . If phase angle between voltage and current is 45° , the value of inductive reactance will be
- (A) $\frac{R}{4}$
 (B) $\frac{R}{2}$
 (C) R
 (D) $2R$
37. An equiconvex lens is made from glass of refractive index 1.5. If the radius of each surface is changed from 5 cm to 6 cm, then the power
- (A) remains unchanged
 (B) decreases by 3.33 D
 (C) increases by 3.33 D
 (D) decreases by 5.5 D
38. A short linear object of length 'b' lies along the axis of a concave mirror of focal length f at a distance 'u' from the pole of the mirror. The size of the image is equal to
- (A) $b\sqrt{\frac{u-f}{f}}$
 (B) $b\sqrt{\frac{f}{u-f}}$
 (C) $b\left(\frac{u-f}{f}\right)$
 (D) $b\left(\frac{f}{f-u}\right)^2$
39. The refracting angle of a prism is A and the refractive index of material of a prism is $\cot \frac{A}{2}$. The angle of minimum deviation is
- (A) $180^\circ - 3A$
 (B) $180^\circ + 2A$
 (C) $90^\circ - A$
 (D) $180^\circ - 2A$
40. A person with defective eyesight is unable to see objects clearly nearer than 1.5 m. He wants to read a book placed at a distance of 30 cm from his eyes. The power required for his spectacles is
- (A) + 2.67 D
 (B) - 2.67 D
 (C) + 2.5 D
 (D) - 2.5 D
41. Two interfering beams of monochromatic light have intensities in the ratio of 16 : 9. The ratio of maximum to the minimum intensity of fringe system formed on the screen is
- (A) 7 : 1
 (B) 25 : 7
 (C) 49 : 1
 (D) 256 : 81
42. A screen is placed at 50 cm from a single slit, which is illuminated with 600 nm light. If separation between the first and the third minima in the diffraction pattern is 3.0 mm, then width of the slit is
- (A) 0.4 mm
 (B) 0.1 mm
 (C) 0.2 mm
 (D) 0.3 mm

43. Polaroid sheets are often used for making sun glasses. This is because polaroid glasses
 (A) cut off glare
 (B) absorb more light than coloured glasses
 (C) are light-weight
 (D) remove the polarisation of direct sun light
44. The kinetic energy of the photoelectrons is E when the incident light wavelength is $\frac{\lambda}{2}$. The kinetic energy becomes $2E$ when the incident light wavelength is $\frac{\lambda}{3}$. The work function of the metal is
 (A) $\frac{hc}{\lambda}$
 (B) $\frac{2hc}{\lambda}$
 (C) $\frac{3hc}{\lambda}$
 (D) $\frac{hc}{3\lambda}$
45. If R is the Rydberg constant for hydrogen, the wave number of the first line in the Lyman series is
 (A) $\frac{R}{2}$
 (B) $2R$
 (C) $\frac{R}{4}$
 (D) $\frac{3R}{4}$
46. How many revolutions does an electron complete in 1 s in the first orbit of hydrogen atom?
 (A) 6.67×10^{15}
 (B) 100
 (C) 1000
 (D) 1
47. If N_0 is the original mass of the substance of half-life period 5 years, then the amount of substance left after 15 years is
 (A) $\frac{N_0}{3}$
 (B) $\frac{N_0}{4}$
 (C) $\frac{N_0}{8}$
 (D) $\frac{N_0}{125}$
48. Barrier potential of a p - n junction diode does not depend on
 (A) diode design
 (B) temperature
 (C) forward biasing
 (D) doping density
49. The LED is made from
 (A) silicon
 (B) germanium
 (C) gallium arsenide phosphide
 (D) indium phosphide
50. In fission the percentage of mass converted into energy is
 (A) 10
 (B) 1
 (C) 0.1
 (D) 0.01

CHEMISTRY

51. In which of the following components, central atom has no octet ?
 (A) PF_3
 (B) SO_3
 (C) BCl_3
 (D) CCl_4
52. Which one of the following sets of quantum numbers is correct ?

	n	l	m_l
(A)	2	1	+2
(B)	2	1	+1
(C)	3	1	-2
(D)	3	4	-2
53. The real gases approach ideal gas behaviour at
 (A) low temperature and low pressure
 (B) low temperature and high pressure
 (C) high temperature and high pressure
 (D) high temperature and low pressure
54. The ion that is isoelectronic with CO is
 (A) CN^-
 (B) O_2^+
 (C) O_2^-
 (D) N_2^+
55. Number of atom in the following sample of substances is the largest in (atomic mass : $\text{Cl} = 35.5$, $\text{Mg} = 24$ and $\text{I} = 127 \text{ u}$; Avogadro's Constant, $N_A = 6.02 \times 10^{23} \text{ mol}^{-1}$)
 (A) 71 g of chlorine
 (B) 48 g of magnesium
 (C) 127 g of iodine
 (D) 4 g of hydrogen
56. The molecular velocities of two gases of the same temperature are u_1 and u_2 and their molecular masses are m_1 and m_2 respectively. Which one of the following expressions is correct ?
 (A) $\frac{m_1}{u_1^2} = \frac{m_2}{u_2^2}$
 (B) $m_1 u_1 = m_2 u_2$
 (C) $\frac{m_1}{u_1} = \frac{m_2}{u_2}$
 (D) $m_1 u_1^2 = m_2 u_2^2$
57. The standard enthalpy of formation ($\Delta_f H^\circ$) at 298 for methane (CH_4) is $-74.9 \text{ kJ mol}^{-1}$. In order to calculate from this the average energy given out in the formation of a C-H link it is necessary to know also
 (A) the dissociation energy of the hydrogen molecule, H_2
 (B) the dissociation energy of H_2 and enthalpy of sublimation of carbon
 (C) the first four ionization energies of carbon
 (D) the first four ionization energies of carbon and electron affinity of hydrogen
58. Which of the following molecules is linear ?
 (A) $\text{CH} \equiv \text{CH}$
 (B) H_2O
 (C) NH_3
 (D) CH_3OH

59. The first ionization energy of sodium is 500 kJ mol^{-1} . This denotes
- the energy given out when one mole of sodium atoms dissolves in water to form sodium ions
 - the energy required to remove 1 electron to infinity from 1 atom of sodium
 - the energy required to raise the electrons in one mole of gaseous sodium atoms to a higher energy level
 - the energy required to change one mole of gaseous sodium atoms into gaseous ions (Na^+)
60. What mass of barium hydroxide, $\text{Ba}(\text{OH})_2$ (formula mass = 171) should be dissolved to make 1 litre of solution of concentration 0.01 M with respect to hydroxide ion?
- 0.855 g
 - 1.71 g
 - 3.42 g
 - 85.5 g
61. A saturated solution of Ag_2CrO_4 prepared by dissolving solid Ag_2CrO_4 in water has $[\text{CrO}_4^{2-}] = 6.5 \times 10^{-5} \text{ M}$. The solubility product of Ag_2CrO_4 is
- 1.30×10^{-13}
 - 1.09×10^{-12}
 - 1.51×10^{-11}
 - 1.81×10^{-14}
62. Unit of the rate constant for the zero order reaction is
- $\text{Mol}^{-1} \text{ L s}^{-1}$
 - $\text{Mol L}^{-1} \text{ s}^{-1}$
 - s^{-1}
 - $\text{Mol}^{-2} \text{ L}^4 \text{ s}^{-1}$
63. Which of the following is *not* a state function?
- $(q + W)$
 - H
 - S
 - W
64. The entropy change for vapourisation of water at 100°C will be, (molar latent heat of vapourisation of water is 40.8 kJ mol^{-1})
- $109.4 \text{ JK}^{-1} \text{ mol}^{-1}$
 - $0.109 \text{ JK}^{-1} \text{ mol}^{-1}$
 - $40.8 \text{ JK}^{-1} \text{ mol}^{-1}$
 - $0.408 \text{ JK}^{-1} \text{ mol}^{-1}$
65. In the cell
- $$\text{Ni(s)} \mid \text{Ni}^{2+}(\text{aq}) \parallel \text{Cu}^{2+}(\text{aq}) \mid \text{Cu(s)} ; E^\circ = 0.77 \text{ V}$$
- which of the following changes would increase the e.m.f. of the cell?
- Pass some ammonia into the Cu^{2+} solution
 - Increase the size of the metal electrodes
 - Decrease the concentration of $\text{Cu}^{2+}(\text{aq})$
 - Decrease the concentration of $\text{Ni}^{2+}(\text{aq})$

66. A solid compound has a cubic structure in which X atoms are located at the corners of the cube, O atoms are at the centre of edges and M atoms are at the centre of the cube. The formula of the compound is
- (A) MXO_2
 (B) MXO_3
 (C) MXO_4
 (D) M_2XO_3
67. Which of the following aqueous solutions should have the highest boiling point?
- (A) 1.0 M KNO_3
 (B) 1.0 M NH_4NO_3
 (C) 1.0 M Na_2SO_4
 (D) 1.0 M $NaOH$
68. The dissociation constant (K_a) of a weak monobasic acid is 1×10^{-5} . The pH of 0.1 M of that acid would be
- (A) 3
 (B) 2
 (C) 1
 (D) 5
69. In which of the following options ions/elements are isoelectronic?
- (A) Zn^{2+} , Ca^{2+} , Ga^{3+} and Al^{3+}
 (B) K^+ , Ca^{2+} , Zn^{2+} and Cl^-
 (C) P^{3-} , S^{2-} , Cl^- and K^+
 (D) Ti^{4+} , Ar, Cr^{3+} and V^{5+}
- (Atomic No. : Al = 13, Ga = 31, Ti = 22, V = 23, Cr = 24, Ar = 18)
70. Group-2 metals form basic hydroxides. Which one of the following hydroxides is the *least* basic?
- (A) $Mg(OH)$
 (B) $Ca(OH)_2$
 (C) $Sr(OH)_2$
 (D) $Ba(OH)_2$
71. Plaster of Paris has formula
- (A) $CaSO_4$
 (B) $CaSO_4 \cdot \frac{1}{2}H_2O$
 (C) $CaSO_4 \cdot H_2O$
 (D) $CaSO_4 \cdot 2H_2O$
72. The tendency of catenation in Group-14 elements follows the order
- (A) $Ge > Sn > Si > C$
 (B) $Si > C > Ge > Sn$
 (C) $C > Si > Ge = Sn$
 (D) $Si > C > Sn > Ge$
73. Which of the following reactions is a disproportionation reaction?
- (A) $CH_4 + 4Cl_2 \rightarrow CCl_4 + 4HCl$
 (B) $CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$
 (C) $2F_2 + 2OH^- \rightarrow 3F^- + OF_2 + H_2O$
 (D) $2NO_2 + 2OH^- \rightarrow NO_2^- + NO_3^- + H_2O$
74. Which of the following is *not* an actinoid?
- (A) Terbium ($Z = 105$)
 (B) Uranium ($Z = 92$)
 (C) Curium ($Z = 96$)
 (D) Californium ($Z = 98$)

75. $[\text{Kr}] 5s^1$ is electronic configuration of
 (A) K
 (B) Rb
 (C) Cs
 (D) Ba
76. The first ionization enthalpy of elements of the second period of the periodic table varies in the order
 (A) $\text{Be} < \text{Li} < \text{C} > \text{N}$
 (B) $\text{Be} < \text{C} < \text{Li} < \text{N}$
 (C) $\text{Li} < \text{Be} < \text{C} < \text{N}$
 (D) $\text{Li} < \text{C} < \text{Be} > \text{N}$
77. Given Cl_2O , ClO_2 , KBrO_3 and NaClO_4
 Oxidation states of halogen in the above compounds are respectively
 (A) +2, +1, +3 and +4
 (B) +1, +2, +5 and +7
 (C) +1, +4, +5 and +7
 (D) +2, +4, +5 and +6
78. Which one of the following nitrates will leave behind a metal on strong heating?
 (A) Copper nitrate
 (B) Manganese nitrate
 (C) Silver nitrate
 (D) Ferric nitrate
79. Which of the following species is *not* expected to be a ligand?
 (A) NO
 (B) NH_4^+
 (C) $\text{NH}_2\text{CH}_2\text{CH}_2\text{NH}_2$
 (D) CO
80. Which of the following complex ions will show paramagnetic behaviour?
 (A) $[\text{Co}(\text{NH}_3)_6]^{3+}$
 (B) $[\text{Fe}(\text{CN})_6]^{4-}$
 (C) $[\text{Ni}(\text{CN})_4]^{2-}$
 (D) $[\text{CoF}_6]^{3-}$
81. A complex involving dsp^2 hybridization has
 (A) a square planar geometry
 (B) a tetrahedral geometry
 (C) an octahedral geometry
 (D) trigonal planar geometry
82. $[\text{Co}(\text{NH}_3)_5\text{Br}]\text{SO}_4$ and $[\text{Co}(\text{NH}_3)_5\text{SO}_4]\text{Br}$ are related to each other as
 (A) ionization isomer
 (B) linkage isomer
 (C) coordination isomer
 (D) optical isomer
83. Which oxidation state of nickel is shown in nickel tetracarbonyl $[\text{Ni}(\text{CO})_4]$?
 (A) 0
 (B) +2
 (C) +3
 (D) +4
84. The complex ion formed by the reaction of NH_3 with CO^{3+} ion has an octahedral structure. Therefore, on the basis of valence bond theory, the hybrid orbitals on CO^{3+} ion are,
 (A) dsp^2
 (B) d^2sp^3
 (C) sp^3d^2
 (D) sp^3
85. Which one of the following species is not an electrophile?
 (A) Cl^\oplus
 (B) SO_3
 (C) NH_4^\oplus
 (D) NO_2^\oplus

86. Which of the following reactions does not give carbocation as the intermediate ?

- (A) $\text{>C}=\text{C<} + \text{HBr} \rightarrow$
 (B) $\text{>C}=\text{C<} + \text{HBr} \xrightarrow{\text{Peroxide}}$
 (C) $\text{-}\overset{\text{|}}{\text{C}}\text{-}\overset{\text{|}}{\text{C}}\text{-OH} + \text{H}^+ \rightarrow$
 (D) $\text{>C}=\text{C<} \xrightarrow{\text{anhydrous AlCl}_3}$


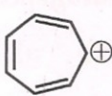
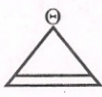
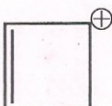
87. Which of the following statements is *incorrect* about diastereomers ?

- (A) They do not have mirror image relationship
 (B) They react differently with achiral reagents
 (C) They have different melting points
 (D) They have same refractive index

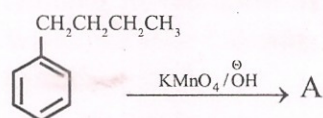
88. Two liquids which have boiling points close to each other, can be purified by

- (A) steam distillation
 (B) simple distillation
 (C) distillation under reduced pressure
 (D) fractional distillation

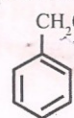
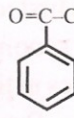
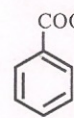
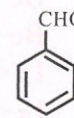
89. Which of the following species is aromatic ?

- (A) 
 (B) 
 (C) 
 (D) 

90. Consider the following reaction



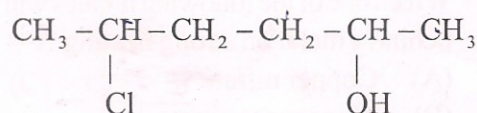
The product 'A' is

- (A)  (B) 
 (C)  (D) 

91. In the Lassaigne's extract, sodium nitroprusside is used for the detection of

- (A) nitrogen
 (B) sulphur
 (C) phosphorus
 (D) halogens

92. IUPAC name of the compound given below



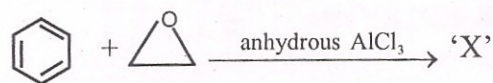
will be

- (A) 2-hydroxy-5-chlorohexane
 (B) 2-chloro-5-hydroxyhexane
 (C) 5-chlorohexane-2-ol
 (D) 2-chlorohexane-5-ol

93. The correct order of increasing acidic strength is

- (A) phenol < ethanol < chloroacetic acid < acetic acid
 (B) ethanol < phenol < chloroacetic acid < acetic acid
 (C) ethanol < phenol < acetic acid < chloroacetic acid
 (D) chloroacetic acid < acetic acid < phenol < ethanol

94. Consider the following reaction :



The product 'X' is

- (A) (B)
 (C) (D)

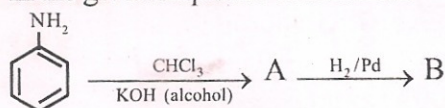
95. Which of the following compounds most readily dehydrated in acidic medium ?

- (A) (B)
 (C) (D)

96. Which of the following cannot reduce Fehling solution ?

- (A) acetic acid
 (B) formic acid
 (C) formaldehyde
 (D) acetaldehyde

97. In the given sequence of reactions



Compound 'B' is

- (A) (B)
 (C) (D)

98. Which one of the following is the strongest base ?

- (A) CH_3NH_2
 (B) NCCH_2NH_2
 (C) $(\text{CH}_3)_2\text{NH}$
 (D) $\text{C}_6\text{H}_5\text{NHCH}_3$

99. Which of the following is a vat dye ?

- (A) Alizarin
 (B) Indigo
 (C) Methyl orange
 (D) Aniline yellow

100. Monomeric unit(s) in starch is (are)

- (A) glucose
 (B) fructose
 (C) glucose and fructose
 (D) glucose and galactose