

Test Booklet Number

Test - 1002

Roll Number

U6340

PHYSICS & CHEMISTRY

[Time : 2 Hours]

[Maximum Marks : 200]

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 a computerised **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 2 (two) marks for correct response. For each incorrect response, $\frac{1}{2}$ (half) 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.

SET - I (PHYSICS)

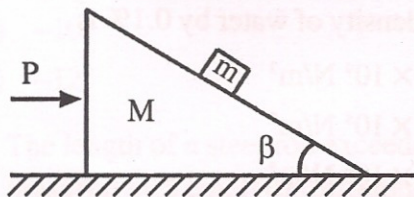
1. Which of the following pairs do not have identical dimensions?

- a) Pressure and Stress
- b) Angular momentum and Planck's constant
- c) Moment of force and momentum
- d) Light year and wave length

2. A projectile is given an initial velocity of $\hat{i} + 2\hat{j}$. The cartesian equation of its path is ($g=10\text{m/s}^2$)

- a) $y = 2x - 5x^2$
- b) $y = x - 5x^2$
- c) $4y = 2x - 5x^2$
- d) $y = 2x - 25x^2$

3. Two wooden blocks are moving on a smooth horizontal surface such that mass m remains stationary with respect to block of mass M as shown in the figure. The magnitude of force P is



- a) $(M + m) g \tan \beta$
- b) $Mg \tan \beta$
- c) $mg \cos \beta$
- d) $(M + m) g \operatorname{cosec} \beta$

4. A block of mass M is placed on a rough inclined plane having angle of inclination 45° . The coefficient of friction is 0.5. What is the acceleration of the block down the inclined plane?

- a) $0.20 g$
- b) $0.25 g$
- c) $0.30 g$
- d) $0.30 g$

5. A particle is moving along a circular path. The angular velocity, linear velocity, angular acceleration and centripetal acceleration of the particle at any instant respectively are w , v , α and a . which of the following relations is incorrect?

- a) $w \perp v$
- b) $w \perp \alpha$
- c) $w \perp a$
- d) $v \perp a$

6. A long spring is stretched by 2 cm, its potential energy is U . If the spring is stretched by 10 cm, the potential energy stored in it will be

- a) $\frac{U}{5}$
- b) $5 U$
- c) $25 U$
- d) $\frac{U}{25}$

7. 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
- v
 - $\frac{v}{2}$
 - $\frac{v}{\sqrt{2}}$
 - $v\sqrt{2}$
8. Centre of mass of three particles of masses 1 kg, 2 kg and 3 kg lies at point (1, 2, 3) and centre of mass of another system of particles 3 kg and 2 kg lies at point (-1, 3, -2). Where should we put a particle of mass 5 kg so that the centre of mass of the entire system lies at the centre of mass of the first system?
- (0, 0, 0)
 - (1, 3, 2)
 - (-1, 2, 3)
 - (3, 1, 8)
9. A rigid massless rod of length L is hinged at its one end and a weight W is hung at a distance l ($< L$) from this end. What force P should be applied upward at the other end so that the rod remains in equilibrium horizontally?
- $\frac{W(L-l)}{L}$
 - $\frac{W(L-l)}{l}$
 - $\frac{Wl}{L}$
 - $\frac{WL}{l}$
10. A body starts from rest from a point at a distance r_0 from the centre of the earth. It reaches the surface of the earth whose radius is R . The velocity acquired by the body is
- $2GM\sqrt{\left(\frac{1}{R} - \frac{1}{r_0}\right)}$
 - $\sqrt{2GM\left(\frac{1}{R} - \frac{1}{r_0}\right)}$
 - $GM\sqrt{\left(\frac{1}{R} - \frac{1}{r_0}\right)}$
 - $\sqrt{GM\left(\frac{1}{R} - \frac{1}{r_0}\right)}$
11. Bulk modulus of water is $2 \times 10^9 \text{ N/m}^2$. The change in pressure required to increase the density of water by 0.1% is
- $2 \times 10^9 \text{ N/m}^2$
 - $2 \times 10^8 \text{ N/m}^2$
 - $2 \times 10^6 \text{ N/m}^2$
 - $2 \times 10^4 \text{ N/m}^2$
12. Two spherical soap bubbles of radii r_1 and r_2 in vacuum coalesce under isothermal condition. The resulting bubble has a radius R such that
- $R = r_1 + r_2$

b) $R = \sqrt{(r_1 + r_2)}$

c) $R = \sqrt{(r_1^2 + r_2^2)}$

d) $R = \frac{r_1 r_2}{r_1 + r_2}$

13. Coefficient of viscosity of water = 0.01 poise, density of water = 1 g/c.c. The maximum velocity with which water can flow through a capillary tube of radius 0.05 cm, without turbulent flow setting in, is

- a) 2000 cm/s
- b) 200 cm/s
- c) 20 cm/s
- d) 2 cm/s

14. On a hypothetical scale X, the ice point is 40° and the steam point is 120° . For another scale Y, the ice point and the steam point are -30° and 130° respectively. If X reads 50° , then Y reads

- a) -5°
- b) -8°
- c) -10°
- d) -12°

15. The length of a steel rod exceeds that of a brass rod by 5 cm. If the difference in their lengths remains same at all temperatures, then the length of brass rod will be (α for iron and brass rods are $12 \times 10^{-6}/^\circ\text{C}$ and $18 \times 10^{-6}/^\circ\text{C}$ respectively).

- a) 15 cm
- b) 10 cm

c) 5 cm

d) 2 cm

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 be the ratio of specific heats of a perfect gas, the number of degrees of freedom of a molecule of the gas is

a) $\frac{2}{(\gamma - 1)}$

b) $\frac{9}{2(\gamma - 1)}$

c) $\frac{(3\gamma - 1)}{(2\gamma - 1)}$

d) $\frac{25}{2(\gamma - 1)}$

18. A vessel A contains hydrogen and another vessel B whose volume is twice that of A contains the same mass of oxygen at the same temperature. The ratio of the average kinetic energies of hydrogen and oxygen molecules is

- a) 1 : 1
- b) 1 : 2
- c) 2 : 1
- d) 2 : 3

19. A fixed mass of a gas at constant pressure occupies a volume V . The gas undergoes a rise in temperature so that the root mean square velocity of the molecules is doubled. The new volume will be

a) $\frac{V}{2}$
 b) V
 c) $2V$
 d) $4V$

20. For a particle executing simple harmonic motion, the kinetic energy K is given by $K = K_0 \cos^2 \omega t$. The maximum value of potential energy is

a) K_0
 b) Zero
 c) $\frac{K_0}{2}$
 d) not obtainable

21. Two pendulums of lengths 121 cm and 100 cm start vibrating. At some instant 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) 21
 b) 20
 c) 11
 d) 10

22. The amplitude of a wave disturbance propagating in the positive y -direction is given

by

$$y = \frac{1}{1+x^2} \text{ at } t = 0\text{s}$$

$$y = \frac{1}{[1+(x-1)^2]} \text{ at } t = 2\text{s}$$

a) 1 m/s
 b) 1.5 m/s
 c) 0.5 m/s
 d) 2.0 m/s

23. In a plane progressive harmonic wave particle speed is always less than the wave speed if

a) amplitude of wave $> \frac{\lambda}{2\pi}$
 b) amplitude of wave $< \lambda$
 c) amplitude of wave $> \frac{\lambda}{\pi}$
 d) amplitude of wave $< \frac{\lambda}{2\pi}$

24. What is the value of end correction for a closed organ pipe of radius r ?

a) $0.3 r$
 b) $0.6 r$
 c) $0.9 r$
 d) $1.2 r$

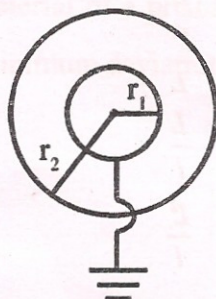
25. A car with a horn of frequency 620 Hz travels towards a large wall with a speed of 20 m/s. Velocity of sound is 330 m/s. The frequency of echo of sound of horn as heard by the driver is

a) 700 Hz
 b) 660 Hz

- c) 620 Hz
d) 550 Hz

26. Charge on the outer sphere is q and the inner sphere is grounded. Then the charge on the inner sphere is q' for ($r_2 > r_1$)

- a) Zero
b) $q' = q$
c) $q' = -\frac{r_1}{r_2}q$
d) $q' = \frac{r_1}{r_2}q$



27. Electric potential at a point is $\phi = x^2y + yz$. The electric field at point (1, 3, 1) is

- a) 7 units
b) 70 units
c) 49 units
d) 490 units

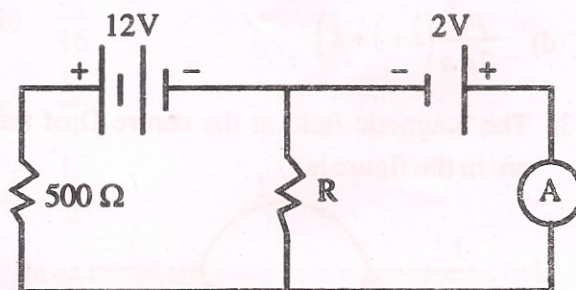
28. A $2\mu\text{F}$ capacitor is charged to 100 V and then its plates are connected by a conducting wire. The heat produced is

- a) 1 J
b) 0.1 J
c) 0.01 J
d) 0.001 J

29. 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

30. In the circuit, the ammeter reading is zero. The value of resistance R is



- a) 50 Ω
b) 100 Ω
c) 200 Ω
d) 400 Ω

31. A heater boils 1 kg of water in time t_1 and another heater boils the same water in time t_2 . If both are connected in series, the combination will boil the same water in time

- a) $\frac{t_1 t_2}{t_1 + t_2}$
b) $\frac{t_1 t_2}{t_1 - t_2}$
c) $(t_1 - t_2)$
d) $(t_1 + t_2)$

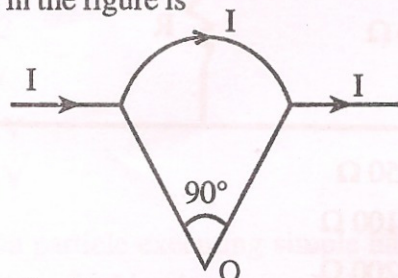
32. Same current I is flowing in three infinitely long wires along positive x , y and z directions. The magnetic field at a point $(0, 0, -a)$ would be

- 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) $\frac{\mu_0 I}{2\pi a}(\hat{i} + \hat{j} + \hat{k})$

33. The magnetic field at the centre O of the arc in the figure is



a) $\frac{\mu_0 I}{4\pi} + \frac{2I}{r}(\sqrt{2} + \pi)$

b) $\frac{\mu_0 I}{4\pi} + \frac{2I}{r}\left(\sqrt{2} + \frac{\pi}{4}\right)$

c) $\frac{\mu_0 I}{4\pi r} + \frac{2I}{r}(\sqrt{2} + \pi)$

d) $\frac{\mu_0 I}{4\pi r}\left(\sqrt{2} + \frac{\pi}{4}\right)$

34. A steel wire of length l has a magnetic moment M . It is bent in L-shape at its mid-point. The new magnetic moment is

a) M

b) $\frac{M}{\sqrt{2}}$

c) $\frac{M}{2}$

d) $2M$

35. 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) $\frac{L^2}{l}$

36. A coil of resistance 10Ω and inductance $5H$ is connected to a $100V$ battery. Then the energy stored in the coil is

a) $250J$

b) 250 ergs

c) $125J$

d) 125 ergs

37. What is the rms value of an alternating current which when passed through a resistor produces heat, which is thrice that produced by a current of $2A$ in the same resistor?

a) A

b) $2A$

c) $3.46A$

d) $0.65A$

38. In an ideal transformer, the most important function of the soft-iron core is

a) to reduce eddy currents

b) to improve the flux-linkage between the primary and secondary coils

- c) to dissipate the heat generated by the two coils
 d) to eliminate the back e.m.f. produced in the secondary coil.
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
- $180^\circ - 3A$
 - $180^\circ + 2A$
 - $90^\circ - A$
 - $180^\circ - 2A$
40. An astronomical telescope has objective and eyepiece of focal lengths 200 cm and 2 cm respectively. The magnifying power of the telescope for normal vision is
- 201.85
 - 100
 - 108
 - 202
41. A screen is placed at 50 cm from a single slit, which is illuminated with 600 nm light. If separation between the first and third minima in the diffraction pattern is 3.0 mm, then width of the slit is
- 0.4 mm
 - 0.1 mm
 - 0.3 mm
 - 0.2 mm
42. In Young's double slit experiment, the intensity of central maximum is I_0 . If one slit is closed, the intensity at the same site is
- I_0
 - $\frac{I_0}{16}$
 - $\frac{I_0}{4}$
 - $\frac{I_0}{2}$
43. In an electromagnetic wave, the electric field oscillated sinusoidally with amplitude 48 V/m. The r.m.s. value of oscillating magnetic field will be
- $1.6 \times 10^{-8} \text{ T}$
 - $16\sqrt{3} \times 10^{-8} \text{ T}$
 - $144 \times 10^{-8} \text{ T}$
 - $8\sqrt{3} \times 10^{-8} \text{ T}$
44. Light of wavelength λ strikes a photoelectric surface and electrons are ejected with kinetic energy K . If K is to be increased to exactly twice its original value, the wave length must be changed to λ' such that
- $\lambda' < \frac{\lambda}{2}$
 - $\lambda' = \frac{\lambda}{2}$
 - $\lambda > \lambda' > \frac{\lambda}{2}$
 - $\lambda' = 2\lambda$
45. If λ_1 and λ_2 denote the wavelengths of de Broglie waves for electrons in the first and second Bohr orbits in hydrogen atom, then

$\frac{\lambda_1}{\lambda_2}$ is equal to

- a) $\frac{2}{1}$
- b) $\frac{1}{2}$
- c) $\frac{1}{4}$
- d) $\frac{4}{1}$

46. Transistors between three energy levels in a particular atom give rise to three spectral lines of wavelengths, in increasing magnitudes λ_1 , λ_2 , and λ_3 . Which one of the following equations correctly relates λ_1 , λ_2 , and λ_3 ?

- a) $\lambda_1 = \lambda_2 - \lambda_3$
- b) $\lambda_1 = \lambda_3 - \lambda_2$
- c) $\frac{1}{\lambda_1} = \frac{1}{\lambda_2} + \frac{1}{\lambda_3}$
- d) $\frac{1}{\lambda_1} = \frac{1}{\lambda_3} - \frac{1}{\lambda_2}$

47. The half life of a radioactive substance, as compared to its mean life, is nearly

- a) 30%
- b) 60%
- c) 70%
- d) 100%

48. The nuclear radius of a nucleus with nucleon number 16 is $3 \times 10^{-15}\text{m}$. Then, the nuclear radius of a nucleus with nucleon number 128 is

- a) $3 \times 10^{-15}\text{m}$
- b) $6 \times 10^{-15}\text{m}$
- c) $\frac{3}{8} \times 10^{-15}\text{m}$
- d) $24 \times 10^{-15}\text{m}$

49. The electrical resistance of the following decreases with rise in temperature.

- a) Copper
- b) Silver
- c) Gold
- d) Germanium

50. The following truth table corresponds to the logic gate

A	B	X
0	0	0
0	1	1
1	0	1
1	1	1

- a) NAND
- b) AND
- c) XOR
- d) OR

SET - II (CHEMISTRY)

51. The amount of dibasic acid (m.w. = 200) which should be present in 100 ml of solution to give 0.1N is :

- a) 2 g
- b) 1 g
- c) 10 g
- d) 20 g

52. The cell potential of the cell $\text{Al}|\text{Al}^{3+}||\text{Mg}^{2+}|\text{Mg}$ (given $E_{\text{Al}^{3+}/\text{Al}}^0 = -1.66\text{V}$ and

$$E_{\text{Mg}^{2+}/\text{Mg}}^0 = -2.36\text{V}) \text{ is}$$

- a) - 0.70 V
- b) - 4.02 V
- c) + 0.70 V
- d) + 4.02 V

53. By rearranging the ideal gas equation, $PV=nRT$, the concentration (C) of an ideal gas can be expressed as,

- a) $\frac{PV}{RT}$
- b) $\frac{RT}{P}$
- c) $\frac{P}{RT}$
- d) $\frac{RT}{V}$

54. Calculate $\Delta H_{298\text{K}}^0$ for the reaction $\text{H}_2\text{O}_{(\text{g})} + \text{C}_{(\text{graphite})} = \text{H}_{2(\text{g})} + \text{CO}_{(\text{g})}$ given the following standard enthalpies of formation :

$$\text{H}_2\text{O}_{(\text{g})}, \Delta H_{f, 298\text{K}}^0 = -242\text{kJ mol}^{-1}$$

$$\text{CO}_{(\text{g})}, \Delta H_{f, 298\text{K}}^0 = -111\text{kJ mol}^{-1}$$

- a) + 131 kJ mol⁻¹
- b) - 131 kJ mol⁻¹
- c) + 353 kJ mol⁻¹
- d) + 353 kJ mol⁻¹

55. When the kinetics of the reaction with stoichiometry $x + 2y \rightarrow P$ are followed experimentally, the following data are obtained :

Experiment No.	Initial concentration mol dm ⁻³		Initial rate of reaction mol dm ⁻³ s ⁻¹
	X	Y	
1	0.25	0.25	1.0×10^{-2}
2	0.50	0.25	4.0×10^{-2}
3	0.50	0.50	8.0×10^{-2}

Based on the information above, all of the following deductions about the reaction are correct EXCEPT that

- a) the reaction is of second order with respect to X
- b) it is of first order in Y
- c) the overall order of the reaction is three
- d) the rate expression for the reaction is $k[\text{X}][\text{Y}]^2$

56. Salt/acid pairs and the pKa values of the acids respectively are given. Which salt/acid pair will form suitable buffer in the pH range 4-6?

- a) $\text{NaH}_2\text{PO}_4/\text{H}_3\text{PO}_4$, pK_{a_1} of $\text{H}_3\text{PO}_4 = 2.15$
- b) $\text{Na}_2\text{HPO}_4/\text{NaH}_2\text{PO}_4$, pK_{a_2} of $\text{H}_3\text{PO}_4 = 7.20$
- c) $\text{Na}_3\text{PO}_4/\text{Na}_2\text{HPO}_4$, pK_{a_3} of $\text{H}_3\text{PO}_4 = 12.38$
- d) $\text{CH}_3\text{COONa}/\text{CH}_3\text{COOH}$, pK_a of $\text{CH}_3\text{COOH} = 4.76$

57. $\text{Fe}^{3+}(\text{aq}) + \text{e}^- \rightarrow \text{Fe}^{2+}(\text{aq})$ $E = +0.77 \text{ V}$

$\text{Sn}^{2+}(\text{aq}) + 2\text{e}^- \rightarrow \text{Sn}(\text{s})$ $E = -0.14 \text{ V}$

According to the E values what is the potential for this reaction under standard conditions?

$\text{Sn}^{2+}(\text{aq}) + 2\text{Fe}^{3+}(\text{aq}) \rightarrow 2\text{Fe}^{2+}(\text{aq}) + \text{Sn}^{2+}(\text{aq})$

- a) 1.68 V
- b) 1.40 V
- c) 0.91 V
- d) 0.63 V

58. The hydrogen line spectrum provides evidence for the

- a) Heisenberg Uncertainty Principle
- b) Wavelike properties of light
- c) diatomic nature of H_2
- d) quantized nature of atomic energy states

59. In which of the following conditions a reaction is not feasible?

- a) $\Delta H = +\text{Ve}$, $T\Delta S = +\text{Ve}$ but $T\Delta S < \Delta H$
- b) $\Delta H = -\text{Ve}$, $T\Delta S = +\text{Ve}$ but $T\Delta S > \Delta H$
- c) $\Delta H = -\text{Ve}$, $T\Delta S = -\text{Ve}$ but $T\Delta S < \Delta H$
- d) $\Delta H = +\text{Ve}$, $T\Delta S = +\text{Ve}$ but $T\Delta S > \Delta H$

60. The critical temperature of H_2 is -240°C . At which of the following highest temperature it can be liquefied?

- a) 33°K
- b) 30°K
- c) 100°K
- d) 200°K

61. Which of the following molecules is paramagnetic?

- a) F_2
- b) N_2
- c) B_2
- d) C_2

62. Which of the following chemical species is the conjugate acid of $^+\text{NH}_3\text{CH}_2\text{COO}^-$?

- a) $^+\text{NH}_4\text{CH}_2\text{COO}^-$
- b) $^+\text{NH}_3\text{CH}_2\text{COOH}$
- c) $\text{NH}_2\text{CH}_2\text{COOH}$
- d) $\text{NH}_2\text{CH}_2\text{COO}^-$

63. The half life, $\frac{t_1}{2}$, of a chemical reaction is doubled when the initial concentration of the reaction is doubled. Find out the order of the chemical reaction.

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

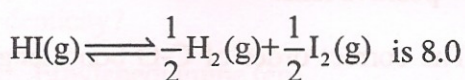
64. Oxidation number of oxygen in KO_2 , BaO_2 , $\text{Mg}(\text{OH})\text{Cl}$ and OF_2 are respectively :

- a) $-\frac{1}{2}$, -1, -2 and +2
- b) -2, +1, -2 and +2
- c) $-\frac{1}{2}$, -4, -1 and -2
- d) -2, -4, -2 and +2

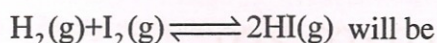
65. Treatment of phosphate rock with phosphoric acid yields :

- a) $\text{Ca}(\text{H}_2\text{PO}_4)_2 \cdot \text{H}_2\text{O}$
- b) $\text{Ca}(\text{H}_2\text{PO}_4)_2$
- c) NaH_2PO_4
- d) $\text{Ca}_2\text{P}_2\text{O}_7$

66. The equilibrium constant of the reaction

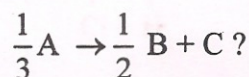


The equilibrium constant of the reaction



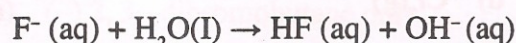
- a) $\frac{1}{8}$
- b) $\frac{1}{16}$
- c) $\frac{1}{32}$
- d) $\frac{1}{64}$

67. How many moles of B are formed when 0.5 mole of A is allowed to completely dissociate into B and C as per the following stoichiometric expressions :



- a) 0.5 mol
- b) 1.0 mol
- c) 0.75 mol
- d) 1.5 mol

68. The K_0 for hydrofluoric acid is 6.9×10^{-4} . What is K for this reaction



- a) 6.9×10^{-11}
- b) 1.4×10^{-11}
- c) 2.6×10^{-9}
- d) 8.3×10^{-6}

69. For production of iron in the blast furnace reaction which does not take place is :

- a) $3\text{Fe}_2\text{O}_3 + \text{CO} \rightarrow \text{Fe}_3\text{O}_4 + \text{CO}_2$
- b) $\text{CaO} + \text{SiO}_2 \rightarrow \text{CaSiO}_3$
- c) $2\text{FeO} \rightarrow 2\text{Fe} + \text{O}_2$
- d) $\text{FeO} + \text{CO} \rightarrow \text{Fe} + \text{CO}_2$

70. XeO_4 is tetrahedral and the number of lone pairs on Xe is

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

71. Amongst the following ions which one has the highest magnetic moment value?
- $[\text{Zn}(\text{H}_2\text{O})_6]^{2+}$
 - $[\text{Fe}(\text{H}_2\text{O})_6]^{2+}$
 - $[\text{Cr}(\text{H}_2\text{O})_6]^{3+}$
 - $[\text{Fe}(\text{CN})_6]^{3-}$
72. Which one of the following cannot function as an oxidising agent?
- $\text{S}_{(s)}$
 - $\text{NO}_3^-(aq)$
 - $\text{I}^-(aq)$
 - $\text{Cl}_2(g)$
73. Which of the following reagents will not intensify the hydrolysis of FeCl_3 when added to its solution?
- NaOH
 - Na_2CO_3
 - NH_4Cl
 - $\text{Zn}(\text{OH})_2$
74. Which of the following is predicted to have a square planar structure?
- IF_7
 - BrF_3
 - SF_4
 - XeF_4
75. Identify the element which has the ground state electron configuration $[\text{Xe}]4f^{14}5d^56s^2$ in the following :
- Ta ($z = 73$)
 - Os ($z = 76$)
 - At ($z = 85$)
 - Re ($z = 75$)
76. Which pair among the following will show the same degree of paramagnetism?
- Mn, Mn^{2+}
 - Cr, Cr^{2+}
 - Fe, Fe^{3+}
 - Fe^+ , Fe^{2+}
- (At nos. Cr = 24, Mn = 25, Fe = 26)
77. Which one of the following statements about a crystal is incorrect?
- Face centred cubic unit cell contains 4 atoms.
 - Metallic crystals are good conductors of heat and electricity.
 - Octahedral voids are formed due to contacts of eight atoms in a crystal.
 - Frensel defects appear in crystals due to much larger size of negative ions than positive ions.
78. The correct order of C-O bond length in CO, CO_2 and CO_3^{2-} is :
- $\text{CO} > \text{CO}_2 > \text{CO}_3^{2-}$
 - $\text{CO}_2 > \text{CO}_3^{2-} > \text{CO}$
 - $\text{CO}_3^{2-} > \text{CO}_2 > \text{CO}$
 - $\text{CO} > \text{CO}_3^{2-} > \text{CO}_2$
79. When xenon hexafluoride reacts with excess of water, the main product (s) is (are) :

- a) XeO_2F_2 and HF
 b) XeO_2F_2 and HF
 c) XeOF_4 and HF
 d) XeO_3 and HF
80. In extractive metallurgy, leaching is a process of :
 a) oxidation
 b) reduction
 c) concentration
 d) refining
81. Identify the incorrect statement
 a) $(\text{CH}_3)_2\text{SiCl}_2$ reacts with water to give $(\text{CH}_3)_2\text{Si}(\text{OH})_2$
 b) $(\text{CH}_3)_2\text{Si}(\text{OH})_2$ polymerizes with elimination of water.
 c) The polymers resulting from hydrolysis of chloromethylsilanes and subsequently condensation are known as silicones.
 d) Silicones are thermally unstable.
82. Which of the following has the maximum denticity?
 a) Ethylenediamine (en)
 b) Ethylenediamine tetra acetic acid
 c) Acetylacetone
 d) Dimethylglyoxime
83. The reaction of $\text{C}_6\text{H}_5\text{NH}_2$ with COCl_2 gives the product :
 a) $\text{C}_6\text{H}_5\text{CN}$
 b) $\text{C}_6\text{H}_5-\text{N}=\text{C}=\text{O}$
 c) $\text{C}_6\text{H}_5\text{NHCONHC}_6\text{H}_5$
 d) $\text{C}_6\text{H}_5\text{CN}$
84. Which one of the following has asymmetric carbon atom?
 a) $\begin{array}{c} \text{H} \quad \text{Br} \\ | \quad | \\ \text{Cl}-\text{C}-\text{C}-\text{H} \\ | \quad | \\ \text{Cl} \quad \text{H} \end{array}$ b) $\begin{array}{c} \text{OH} \quad \text{Cl} \\ | \quad | \\ \text{HO}-\text{C}-\text{C}-\text{H} \\ | \quad | \\ \text{H} \quad \text{H} \end{array}$
 c) $\begin{array}{c} \text{H} \quad \text{Cl} \\ | \quad | \\ \text{H}-\text{C}-\text{C}-\text{OH} \\ | \quad | \\ \text{H} \quad \text{H} \end{array}$ d) $\begin{array}{c} \text{H} \quad \text{H} \\ | \quad | \\ \text{H}-\text{C}-\text{C}-\text{CH}_3 \\ | \quad | \\ \text{Cl} \quad \text{H} \end{array}$
85. On addition of Br_2 to Cis - 2 - butene produces :
 a) (-) 2, 3 - dibromobutane only
 b) (+) 2, 3 - dibromobutane only
 c) rac - 2, 3 - dibromobutane
 d) meso - 2, 3 - dibromobutane
86. Oxidation of $\begin{array}{c} \text{CH}_3 \\ \diagup \\ \text{CH}_3 \end{array} \text{CHOH}$ under drastic conditions gives :
 a) $\begin{array}{c} \text{CH}_3 \\ \diagup \\ \text{CH}_3 \end{array} \text{COOH}$
 b) CH_3CHO
 c) $\begin{array}{c} \text{CH}_3 \\ \diagup \\ \text{CH}_3 \end{array} \text{C}=\text{O}$
 d) CH_3COOH
87. The best reagent to distinguish between an aldehyde and a isetone is
 a) 2,4 - dinitrophenylhydrazine
 b) Semicarbazide
 c) Fehling's reagent
 d) Sanger's reagent

88. Which of the following is expected to be the strongest nucleophile?

- a) $\text{O}_2\text{N} - \text{CH} = \text{CH} - \text{O}^-$
- b) $\text{O}_2\text{N} - \text{CH}_2 - \text{CH}_2 - \text{O}^-$
- c) $\text{CH}_3 - \text{CH}_2 - \text{O}^-$
- d) $\text{CH}_3 - \text{O}^-$

89. Paracetamol is

- a) An analgesic
- b) An antiseptic
- c) An antihistamine drug
- d) An antifertility drug

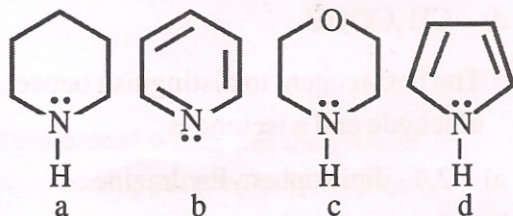
90. The debromination of (dl)-2, 3 - dibromobutane with Zinc gives

- a) 1 - butene
- b) 1, 3 - butadiene
- c) trans -2 -butene
- d) cis -2 - butene

91. 2-pentanone can be distinguished from 3-pentanone by

- a) Tollen's test
- b) Iodoform test
- c) Molisch's test
- d) Ninhydrin test

92. In the following compounds



The order of basicity is

- a) $d > a > c > b$
- b) $a > c > b > d$
- c) $c > a > b > d$
- d) $b > d > a > c$

93. In the organic compound

$\text{CH}_2 = \text{CHCH}_2\text{CH}_2\text{CH}_2\text{C} \equiv \text{CH}$ the pair of hybridized orbitals involved in the formation of $\text{C}_2 - \text{C}_3$ bond is

- a) $\text{Sp}^3 - \text{Sp}^3$
- b) $\text{Sp}^2 - \text{Sp}^3$
- c) $\text{Sp} - \text{Sp}^3$
- d) $\text{Sp}^3 - \text{Sp}^2$

94. The monomers present in Buna-N are :

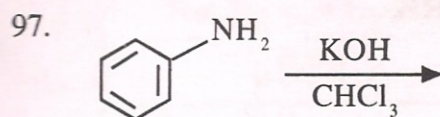
- a) butadiene and styrene
- b) butadiene and acrylonitrile
- c) butadiene and isoprene
- d) butadiene and chloroprene

95. α -(D) glucose and β -(D)-glucose are

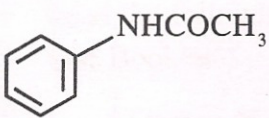
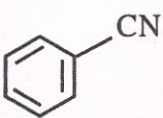
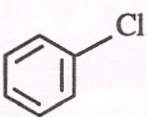
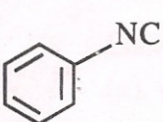
- a) Enantiomers
- b) Functional isomers
- c) Position isomers
- d) Diastereomers

96. The C-C bond distance is longest in :

- a) C_2H_2
- b) C_2H_4
- c) C_2H_6
- d) C_6H_6



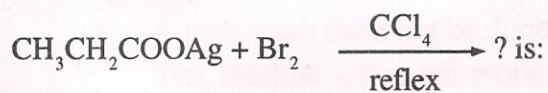
The major product formed in the above reaction is

- a) 
- b) 
- c) 
- d) 

98. Which of the following is a condensation polymer?

- a) polyacrylonitrile
- b) polyisoprene
- c) nylon
- d) polythene

99. The major product of



- a) $\text{CH}_3\text{CH}_2\text{Br}$
- b) $\text{CH}_3\text{CH}_2\text{COOH}$
- c) $\text{CH}_2\text{Br} \cdot \text{CH}_2\text{Br}$
- d) CH_3CHBr_2

100. The number of structural and configurational isomers of a bromo compound $\text{C}_6\text{H}_{11}\text{Br}$, formed by the addition of HBr to 2-hexyne respectively are :

- a) 4 and 2
- b) 2 and 1
- c) 2 and 4
- d) 1 and 2