

Test Booklet Number

Test - 0802

Roll Number

# 5868

**PHYSICS & CHEMISTRY**

3415

[Time : 2 Hours]

[Maximum Marks : 200]

### INSTRUCTIONS TO CANDIDATES

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

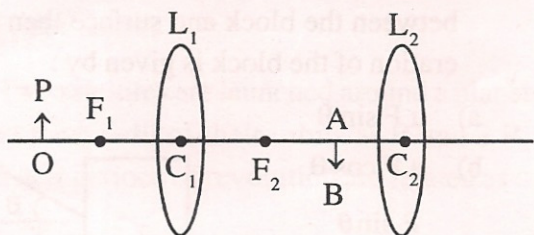
1. Answers to questions in this Test Booklet are to be given on a computerised **Answer Sheet** provided to the candidate **separately**.
2. Candidate must fill up Name, Category, Test Booklet Number, Subject Code, and Roll Number in the answer sheet carefully as per instruction given.
3. This Test Booklet 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 HB pencil only) the circle bearing the correct answer.
6. After attempting a question, if candidate wants to change his/her answer, erase completely to change the response and re-dark another circle.
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 this purpose.
9. Candidate is to hand over both the Test Booklet and 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. A particle is projected with a linear momentum  $|\vec{p}|$  making an angle  $\theta$  with the horizontal. At the end of its flight, the change in momentum is :

- $2p$
- $2p \sin\theta$
- $2p \cos\theta$
- zero

2. Two convex lenses  $L_1$  and  $L_2$  are co-axially placed with respect to each other as shown in figure which also shows the position  $F_1$  and  $F_2$  of their focal points. An object  $OP$  placed in front of the lens  $L_1$  forms an image  $AB$  close to  $F_2$  between  $F_2$  and  $C_2$ . The final image as seen by eye will be formed :



- inverted and formed beyond object.
  - inverted and formed at infinity.
  - erect and formed between  $C_1$  and  $C_2$ .
  - inverted and formed between  $C_1$  and  $C_2$ .
3. An object of mass  $4m$ , initially at rest, breaks up into three pieces of masses  $m$ ,  $m$  and  $2m$  respectively. The two pieces, of equal mass, fly off along the  $x$  and  $y$  axis, with equal speeds  $v$  each. The third piece would then move along a direction inclined at :

- $225^\circ$  to the  $x$ -axis with a speed  $\sqrt{2} v$ .
- $225^\circ$  to the  $x$ -axis with a speed  $\frac{v}{\sqrt{2}}$ .

c)  $45^\circ$  to the  $x$ -axis with a speed  $\sqrt{2} v$ .

d)  $45^\circ$  to the  $x$ -axis with a speed  $\frac{v}{\sqrt{2}}$ .

- $\sigma$  4. The frequency ' $\nu$ ' oscillation of a soap bubble depends on pressure  $p$ , density  $\rho$  and surface tension  $\sigma$ . The correct representation for  $\nu^2$  is

a)  $\frac{p^3}{\rho\sigma^2}$

b)  $\frac{p^3\sigma}{\rho}$

c)  $\frac{\sigma}{\rho p^3}$

d)  $\frac{\rho}{p^3\sigma}$

5. Vector sum of  $N$  coplanar forces each of magnitude  $\vec{F}$ , when each force makes an angle of  $\frac{2\pi}{N}$  with the preceding one, is :

a)  $N\vec{F}$

b)  $\frac{N}{2}\vec{F}$

c)  $\frac{\vec{F}}{2N}$

d) zero

6. A body of mass  $m$  is supported by a light spiral string and causes a stretch of  $1.6$  cm in the spring. If the mass is now set in vertical oscillations of small amplitude, the time period of oscillation is : [Take  $g = 10 \text{ ms}^{-2}$ ]

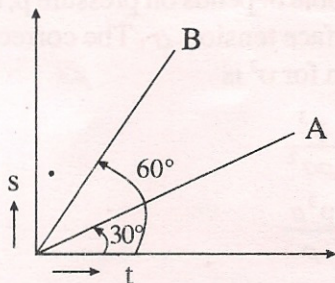
a)  $0.25$  sec

b)  $0.5$  sec

c)  $1.0$  sec

d)  $2.0$  sec

7. The adjoining figure shows displacement-time graph of two bodies A and B. If  $a_1$  and  $a_2$  denote accelerations of the bodies respectively, then :



- a)  $a_1 < a_2$   
 b)  $a_1 > a_2$   
 c)  $a_1 = a_2$   
 d)  $\frac{a_1}{a_2} = \frac{\tan 60^\circ}{\tan 30^\circ}$
8. A given liquid, at a given temperature, rises to a height  $h$  in a capillary tube of radius  $r$ . It is next allowed to rise in a capillary tube of radius  $r/2$  and length  $7/4 h$ . The liquid would now rise to a height :
- a)  $3/2 h$  and there would be no change in its angle of contact.  
 b)  $7/4 h$  and the excess liquid would overflow.  
 c)  $3/2 h$  and the angle of contact would also change.  
 d)  $7/4 h$  and the angle of contact would also change.

9. Two particles of same mass are projected from the same place with same velocity 'u', such that their ranges are same. If ' $h_1$ ' and ' $h_2$ ' are maximum heights attained by them, then the relation between  $h_1$ ,  $h_2$  and R is :

- a)  $R^2 = \frac{h_1^2}{h_2^2}$   
 b)  $R^2 = \frac{h_1^3}{h_2}$   
 c)  $R^2 = 16 h_1 h_2$   
 d)  $R^2 = 2 h_1 h_2$

10. A wooden block of mass M resting on a rough horizontal surface is pulled with a force F at an angle with the horizontal. If  $\mu$  ( $\mu$ ) is the co-efficient of kinetic friction between the block and surface then acceleration of the block is given by :

- a)  $\mu F \sin \theta$   
 b)  $\mu F \cos \theta$   
 c)  $\frac{F \sin \theta}{M}$



- d)  $\frac{F}{M} (\cos \theta + \mu \sin \theta) - \mu g$

11. A mass is oscillating on an elastic spring with a period T. If the length of the spring is increased by 1%, the time periods will :

- a) remain T  
 b) increase by 1%  
 c) increase by 0.5%  
 d) decrease by 0.5%

12. A truck, of mass  $M$ , and a car of mass  $m$ , moving with equal momenta, are brought to rest by applying brakes. If the brakes provide equal retarding forces in both the cases, the ratio of the distances, moved by them, before coming to rest, is given by :
- $(M + m) : (M - m)$
  - $(M - m) : (M + m)$
  - $M : m$
  - $m : M$
13. The angular momentum vector of the earth, due to its daily rotation, is directed :
- tangent to the equator toward the east.
  - tangent to the equator toward the west.
  - due north.
  - due south.
14. Two satellites are launched around a planet to have radii of their orbits as  $R$  and  $2R$ . Their periods of revolution are related as :
- $T_1 = \sqrt{2} T_2$
  - $T_2 = \sqrt{2} T_1$
  - $T_1 = 2\sqrt{2} T_2$
  - $T_2 = 2\sqrt{2} T_1$
15. A black body at a temperature of  $227^\circ\text{C}$  radiates heat at a rate of  $10 \text{ cal cm}^{-2} \text{ s}^{-1}$ . At a temperature of  $727^\circ\text{C}$  the rate of heat radiated in  $\text{cal cm}^{-2} \text{ s}^{-1}$  is :
- 40
  - 160
  - 200
  - 400
16. The temperature of the molecules of an ideal gas goes up from  $27^\circ\text{C}$  to  $252^\circ\text{C}$ . The average K. E. and root mean square speed of the gas molecules then go up by factors of :
- $\left(\frac{252}{27}\right)^2$  and  $\left(\frac{252}{27}\right)$  respectively
  - $\left(\frac{252}{27}\right)$  and  $\sqrt{\frac{252}{27}}$  respectively
  - $\left(\frac{7}{4}\right)^2$  and  $\left(\frac{7}{4}\right)$  respectively
  - $\left(\frac{7}{4}\right)$  and  $\sqrt{\frac{7}{4}}$  respectively
17. After one complete cycle of a reversible heat engine, which of the following quantities is not zero?
- Pressure
  - Temperature
  - Work done
  - Internal energy
18. The coefficient of thermal conductivity of a gas is proportional to :
- $T^2$
  - $T$
  - $\frac{1}{T}$
  - $\sqrt{T}$
19. The work done,  $W$ , during an iso-thermal process in which the gas expands from an initial volume  $V_1$  to a final volume  $V_2$  is given by : ( $R$  : Gas constant,  $T$  : Temperature)
- $R (V_2 - V_1) \ln \left(\frac{T_1}{T_2}\right)$
  - $R (T_2 - T_1) \ln \left(\frac{V_2}{V_1}\right)$

- c)  $2RT \ln \left( \frac{V_1}{V_2} \right)$   
 d)  $RT \ln \left( \frac{V_2}{V_1} \right)$
20. A source emits a sound wave of frequency  $f$ . If it were possible for a man to travel toward the source at the speed of sound, he would observe the emitted sound to have a frequency of :
- a) zero  
 b)  $f/2$   
 c)  $2f$   
 d) infinity
21. A 1 m long string of mass  $4.9 \times 10^{-4}$  kg is held under a tension of 19.6 N. If the string vibrates in one segment, then the frequency of vibration will be :
- a) 200 Hz  
 b) 100 Hz  
 c) 50 Hz  
 d) 400 Hz
22. A convex lens of focal length 10 cm forms the image at the least distance of distinct vision. The magnification produced is :
- a) 1.5  
 b) 3.5  
 c) 4.5  
 d) 5.5
23. A ray of light, passing through a prism having refractive index  $\sqrt{2}$ , suffers minimum deviation. If angle of incidence is double of angle of refraction within prism, the angle of prism is :
- a)  $30^\circ$   
 b)  $90^\circ$   
 c)  $45^\circ$   
 d)  $60^\circ$
24. In a Young's double slit experiment, the distance between the two slits is 0.08 mm and width of the fringes is 6.0 mm on a screen placed 1.2 m away. If a thin sheet of refractive index 1.6 is placed in one of the beams, and 12 fringes shift as a result, the thickness of the sheet is :
- a)  $3 \mu\text{m}$   
 b)  $4 \mu\text{m}$   
 c)  $6 \mu\text{m}$   
 d)  $8 \mu\text{m}$
25. An alpha particle and a proton are accelerated through voltages of 500 V and 1 KV respectively. The ratio of their associated de-Broglie wave lengths is then :
- a) 4 : 1  
 b) 1 : 4  
 c) 1 : 2  
 d) 2 : 1
26. The output current of a half-wave rectifier is a rectangular wave of peak value  $I_0$ . What will be the rms value of the current?
- a)  $I_0/2$   
 b)  $I_0/\sqrt{2}$   
 c)  $\sqrt{2} I_0$   
 d)  $I_0$

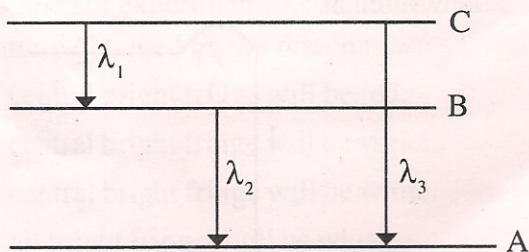
27. A neutron is moving with velocity  $u$ . It collides head-on and elastically with an atom of mass-number  $A$ . If the initial kinetic energy of the neutron be  $E$ , how much kinetic energy will be retained by the neutron after collision?

- a)  $\left\{ \frac{A}{A+1} \right\}^2 E$   
 b)  $\left\{ \frac{A}{(A+1)^2} \right\} E$   
 c)  $\left\{ \frac{(A-1)}{A+1} \right\}^2 E$   
 d)  $\left\{ \frac{(A-1)}{(A+1)^2} \right\} E$

28. An hydrogen atom goes from the ground state to the first excited state. In such a case :

- a) both K. E. and P. E. increase.  
 b) both K. E. and P. E. decrease.  
 c) K. E. increases and P. E. decreases.  
 d) K. E. decreases and P. E. increases.

29. Energy levels A, B, C of an atom corresponds to increasing values of energy i.e.  $E_A < E_B < E_C$ . If  $\lambda_1, \lambda_2, \lambda_3$  are the wavelengths of radiation corresponding to the transitions C to B, B to A and C to A respectively, which of the following statement is correct?

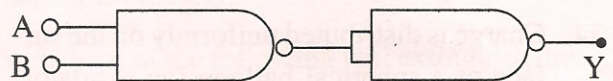


- a)  $\lambda_3 = \lambda_1 + \lambda_2$   
 b)  $\lambda_3 = \frac{\lambda_1 \cdot \lambda_2}{\lambda_1 + \lambda_2}$   
 c)  $\lambda_1 + \lambda_2 + \lambda_3 = 0$   
 d)  $\lambda_3^2 = \lambda_1^2 + \lambda_2^2$

30. In a photocell, the frequency of incident radiations is doubled and the intensity is reduced to half. The stopping potential :

- a) becomes half.  
 b) becomes double.  
 c) becomes more than double.  
 d) remains unchanged.

31. The combination of the gates shown in the figure produces :

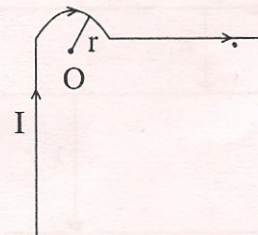


- a) NOR gate.  
 b) OR gate.  
 c) AND gate.  
 d) XOR gate.

32. A nucleus may change over to another nucleus by processes like (a) positron emission (b) electron-capture (nucleus captures an electron from, say, the k-shell of an electron), (c) electron - emission and (d) alpha emission. The two possible ways, in which

a given nucleus  ${}^A_Z X$  may change over to another nucleus  ${}^A_{Z-1} Y$ , are represented by processes :

- a) (a) and (c)  
 b) (a) and (d)  
 c) (b) and (c)  
 d) (a) and (b)
33. An inductor and a resistor when individually connected to a d.c. source allow 1 ampere current each. The two when connected in series to the same source will allow a current of :
- a) 2 A.  
 b)  $\sqrt{2}A$ .  
 c)  $\frac{1}{2}A$ .  
 d)  $\frac{1}{\sqrt{2}}A$ .
34. Charge is distributed uniformly on the surface of a spherical balloon (an insulator) with a point charge  $q$  inside. The electrical force on  $q$  is greatest when it is :
- a) near the inside surface of the balloon.  
 b) at the centre of the balloon.  
 c) halfway between the balloon centre and the inside surface.  
 d) anywhere inside (the force is zero everywhere).
35. A magnet moves inside a coil. Consider the following factors  
 I. strength of the magnet.  
 II. number of turns in the coil.  
 III. speed at which the magnet moves.  
 Which can affect the e.m.f. induced in the coil?
- a) I only  
 b) II only  
 c) III only  
 d) I, II, III
36. An LCR series circuit, connected to a source  $E$ , is at resonance. Then :
- a) the voltage across R is zero.  
 b) the voltage across R equals the applied voltage.  
 c) the voltage across C is zero.  
 d) the voltage across L equals the applied voltage.
37. A constant current is flowing through a long metallic pipe of uniform wall-thickness. The magnetic field :
- a) outside the pipe is zero.  
 b) inside the pipe is zero.  
 c) inside the pipe is uniform.  
 d) inside the pipe is maximum along its axis.
38. A magnetic dipole is placed in stable equilibrium position in a uniform magnetic field of intensity  $B$ . If it is rotated to unstable equilibrium position the work done in the process is :
- a)  $MB$   
 b)  $MB/2$   
 c) zero  
 d)  $2MB$
39. The magnetic field induction at point O can be written as :



- a)  $\frac{\mu_o I}{4r}$
- b)  $\frac{\mu_o I}{4r} + \frac{\mu_o I}{2\pi r}$
- c)  $\frac{\mu_o I}{4r} + \frac{\mu_o I}{4\pi r}$
- d)  $\frac{\mu_o I}{4r} - \frac{\mu_o I}{4\pi r}$
40. Two capacitors are identical except that one is filled with air and the other with oil. Both capacitors carry the same charge. The ratio of the electric fields  $E_{\text{air}} / E_{\text{oil}}$  is :
- a) between 0 and 1.
- b) between 1 and infinity.
- c) 0.
- d) 1.
41. A pure semiconductor at room temperature has :
- a) more electrons /  $m^3$  in its conduction band than holes /  $m^3$  in its valence band.
- b) more electrons /  $m^3$  in its conduction band than in a metal.
- c) more electrons /  $m^3$  in its valence band than at  $T = 0K$ .
- d) equal number of electrons /  $m^3$  in its conduction band and holes /  $m^3$  in its valence band.
42. A white light source is used in a Young's double slit experiment. In the interference pattern obtained on the screen :
- a) central bright fringe will be red.
- b) central bright fringe will be violet.
- c) central bright fringe will be white.
- d) all bright fringes will be white.
43. A mutual force acts between two charges placed a distance apart. A third charge is brought near them. The force between the first two charges will :
- a) increase.
- b) decrease.
- c) remain unchanged.
- d) depend upon sign of the third charge.
44. An infinite number of identical point masses, each of mass ' $m$ ' are placed at points  $x = 1, 2, 4, 8, \dots, \infty$ . The total gravitational potential at  $x = 0$  will be :
- a)  $-Gm$ .
- b)  $-2Gm$ .
- c)  $-3Gm$ .
- d) infinity.
45. Which of the following will extinguish the fire faster?
- a) Ice at  $0^\circ C$
- b) Water at  $0^\circ C$
- c) Water at  $100^\circ C$
- d) Steam at  $100^\circ C$
46. 2 gm of helium is enclosed in a vessel at NTP. How much heat should be added to it to double the pressure? [Specific heat of helium is  $3 J/gk$ ]
- a) 800 J
- b) 1600 J
- c) 1638 J
- d) 819 J

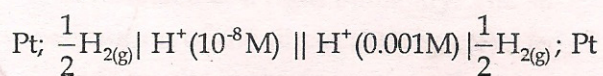


47. A simple harmonic wave, represented by,  $y = a \sin(kx - \omega t)$ , gets reflected at a rigid boundary. The superposition of the direct and the reflected sounds results in the formation of stationary waves with displacement and pressure nodes located, respectively, at :
- $(2n + 1)\frac{\pi}{2k}$  and  $(2n + 1)\frac{\pi}{2k}$ .
  - $n\frac{\pi}{k}$  and  $n\frac{\pi}{k}$ .
  - $(2n + 1)\frac{\pi}{2k}$  and  $n\frac{\pi}{k}$ .
  - $n\frac{\pi}{k}$  and  $(2n + 1)\frac{\pi}{2k}$ .
48. Two beams of light having intensities  $I$  and  $2I$  interfere to produce a fringe pattern on a screen. The phase difference between beams reaching at point A on the screen is  $\frac{\pi}{2}$  and that reaching at point B is  $\frac{\pi}{4}$ . Then difference between the resultant intensities at A and B is :
- $2I$ .
  - $5I$ .
  - $3I$ .
  - $I$ .
49. Radiations of wavelength 450 nm, 550 nm and 650 nm are incident on a metal surface of work function 2eV. Number of photons for each of them is  $N$ . If number of photons for each is doubled, the number of photoelectrons emitted will be :
- $2N$ .
  - $3N$ .
  - $4N$ .
  - $6N$ .
50. An electric dipole is placed in the electric field of a point charge.
- The net electric force on the dipole may be zero.
  - The net electric force on the dipole must be zero.
  - The torque on the dipole may be zero.
  - The torque on the dipole must be zero.

SET - II (CHEMISTRY)

51. The mass of oxygen which will completely react with 13.5 g of aluminium is : (At mass of Al = 27 g mol<sup>-1</sup>)
- 4 g.
  - 8 g.
  - 12 g.
  - 16 g.
52. The correct order of first ionisation enthalpy of Be, B, C, N, and O is :
- Be < B < C < N < O.
  - B < Be < C < N < O.
  - Be < B < C < O < N.
  - B < Be < C < O < N.
53. Which one of the following molecules has Sp<sup>2</sup> hybridization?
- HC ≡ CH
  - SO<sub>2</sub>
  - XeO<sub>4</sub>
  - PCl<sub>5</sub>
54. Which of the following will be most effective in coagulating Fe(OH)<sub>3</sub> Sol?
- Al<sub>2</sub>(SO<sub>4</sub>)<sub>3</sub>
  - [Cr (NH<sub>3</sub>)<sub>6</sub>] Cl<sub>3</sub>
  - Na<sub>3</sub> PO<sub>4</sub>
  - K<sub>4</sub> [Fe(CN)<sub>6</sub>]
55. In a spontaneous, exothermic dissolving process, which of the values, (I) Δ<sub>soln</sub> H, (II) Δ<sub>soln</sub> G and (III) T has/have a negative sign?
- (I) and (II)
  - (II) and (III)
  - (I) and (III)
  - (I), (II) and (III)
56. A saturated solution of Ag<sub>2</sub> CrO<sub>4</sub> prepared by dissolving solid Ag<sub>2</sub> CrO<sub>4</sub> in water has concentration, [CrO<sub>4</sub><sup>2-</sup>] = 6.5 x 10<sup>-5</sup> M. The solubility product of Ag<sub>2</sub> CrO<sub>4</sub> is :
- 1.8 x 10<sup>-12</sup>.
  - 1.5 x 10<sup>-11</sup>.
  - 1.1 x 10<sup>-12</sup>.
  - 1.3 x 10<sup>-13</sup>.
57. For a second order reaction, the half-life period is related to the concentration of the reactant in which of the following manner? (R<sub>0</sub> = initial concentration)
- t<sub>1/2</sub> ∝ [R<sub>0</sub>]
  - t<sub>1/2</sub> is independent of [R<sub>0</sub>]
  - t<sub>1/2</sub> ∝  $\frac{1}{[R_0]}$
  - t<sub>1/2</sub> ∝  $\frac{1}{[R_0]^2}$
58. The pH of 0.1 M acetic acid solution having Ka = 1.85 x 10<sup>-5</sup> is :
- log [1.85 x 10<sup>-5</sup>].
  - log [1.36 x 10<sup>-3</sup>].
  - log [1.36 x 10<sup>-5</sup>].
  - log [1.85 x 10<sup>-3</sup>].

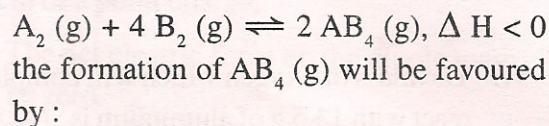
59. Consider the cell containing two hydrogen electrodes as represented below :



The potential of this cell is :

- a)  $-0.295\text{ V}$ .
  - b)  $-0.0591\text{ V}$ .
  - c)  $0.295\text{ V}$ .
  - d)  $0.591\text{ V}$ .
60. The molal freezing point constant for water is  $1.86\text{ K kg mol}^{-1}$ . If  $34.2\text{ g}$  of sucrose ( $\text{C}_{12}\text{H}_{22}\text{O}_{11}$ ) is dissolved in  $100\text{ g}$  of water, the solution will freeze at :
- a)  $271.14\text{ K}$ .
  - b)  $270.58\text{ K}$ .
  - c)  $275.42\text{ K}$ .
  - d)  $276.86\text{ K}$ .
61. The de Broglie wavelength of a particle of mass  $9.1 \times 10^{-31}\text{ kg}$  travelling at  $1\%$  speed of light is : ( $h = 6.63 \times 10^{-34}\text{ Js}$  and speed of light =  $3.0 \times 10^8\text{ ms}^{-1}$ )
- a)  $242.00\text{ pm}$ .
  - b)  $24.22\text{ pm}$ .
  - c)  $2.4 \times 10^3\text{ pm}$ .
  - d)  $2.2 \times 10^4\text{ pm}$ .
62. The pH of  $0.1\text{ M}$  solution of  $\text{NH}_4\text{OH}$  having dissociation constant  $K_b = 1 \times 10^{-5}$ , is :
- a)  $10$ .
  - b)  $6$ .
  - c)  $11$ .
  - d)  $12$ .

63. In a reaction,



- a) low temperature and high pressure.
  - b) high temperature and low pressure.
  - c) low temperature and low pressure.
  - d) high temperature and high pressure.
64. The difference between  $\Delta H$  and  $\Delta U$  for the combustion of methane at  $300\text{ K}$  will be (in  $\text{kJ mol}^{-1}$ ) : ( $R = 8.314\text{ JK}^{-1}\text{ mol}^{-1}$ )
- a)  $-6.734$
  - b)  $-7.482$
  - c)  $-4.988$
  - d)  $-2.994$
65. A reaction is found to have rate constant of  $2.0 \times 10^{-2}\text{ mol L}^{-1}\text{ s}^{-1}$ . What will be the effect as the rate of reaction if concentration of the reactants are doubled? The rate of reaction will :
- a) double.
  - b) become four times.
  - c) become eight times.
  - d) not change.
66. In the reaction,
- $$\text{H}_2(\text{g}) + \text{Cl}_2(\text{g}) \longrightarrow 2\text{HCl}(\text{g}), \Delta H = -182\text{ kJ mol}^{-1}$$
- If bond energy of  $\text{H} - \text{H} = 430\text{ kJ mol}^{-1}$ , B. E. of  $\text{Cl} - \text{Cl} = 242\text{ kJ mol}^{-1}$ , the B. E. of  $\text{HCl}$  is :
- a)  $763\text{ kJ mol}^{-1}$
  - b)  $426\text{ kJ mol}^{-1}$
  - c)  $336\text{ kJ mol}^{-1}$
  - d)  $154\text{ kJ mol}^{-1}$

67. 0.1 M solutions of the following compounds are prepared in water. Which one of these will exhibit the highest pH?
- Li Cl
  - Be Cl<sub>2</sub>
  - Ca Cl<sub>2</sub>
  - Ba Cl<sub>2</sub>
68. The quantity of electricity required to liberate 112 cm<sup>3</sup> of hydrogen at STP from acidified water is : (F = 96500 C mol<sup>-1</sup>)
- 9.65 C
  - 482 C
  - 965 C
  - 960 C
69. Given :
- |       |   |                                |               |
|-------|---|--------------------------------|---------------|
| (I)   | [COF <sub>6</sub> ] <sup>3-</sup>                   | sp <sup>3</sup> d <sup>2</sup> | octahedral    |
| (II)  | [CO (NH <sub>3</sub> ) <sub>6</sub> ] <sup>3+</sup> | d <sup>2</sup> sp <sup>3</sup> | octahedral    |
| (III) | [Ni (CN) <sub>4</sub> ] <sup>2-</sup>               | dsp <sup>2</sup>               | square planar |
| (IV)  | [Ni Cl <sub>4</sub> ] <sup>2-</sup>                 | sp <sup>3</sup>                | tetrahedral   |
| (V)   | [Ni (CO) <sub>4</sub> ]                             | dsp <sup>2</sup>               | square planar |
- Identify the mismatch in the above coordination compounds.
- (I) and (II)
  - (III) and (IV)
  - (V) only
  - (IV) only
70. The correct sequence of decrease in the bond angles of the hydrides NH<sub>3</sub>, PH<sub>3</sub>, AsH<sub>3</sub> and SbH<sub>3</sub> is :
- NH<sub>3</sub> > PH<sub>3</sub> > AsH<sub>3</sub> > SbH<sub>3</sub>.
  - SbH<sub>3</sub> > AsH<sub>3</sub> > PH<sub>3</sub> > NH<sub>3</sub>.
  - SbH<sub>3</sub> > PH<sub>3</sub> > NH<sub>3</sub> > AsH<sub>3</sub>.
  - NH<sub>3</sub> > AsH<sub>3</sub> > PH<sub>3</sub> > SbH<sub>3</sub>.
71. Oxidation of ethylbenzene with chromic acid will give :
- Benzoic Acid.
  - Benzophenone.
  - Acetophenone.
  - Benzaldehyde.
72. Structure of black phosphorus is :
- tetrahedral.
  - chain of tetrahedrons.
  - square pyramidal.
  - extended layer structure.
73. IUPAC name of the coordination compound [Ni (NH<sub>3</sub>)<sub>6</sub>]<sub>3</sub> [CO (NO<sub>2</sub>)<sub>6</sub>]<sub>2</sub> is :
- nickel hexaammine cobalt hexanitrite.
  - hexaamminenickel (II) hexanitrocobaltate (III).
  - hexaamminenickel (II) cobalt (II) hexanitrite.
  - hexaamminenickel (III) hexanitrocobaltate (II)
74. According to nuclear reaction
- $$X + {}^4_2\text{He} \rightarrow {}^{12}_6\text{C} + {}^1_0\text{n}$$
- the mass number and atomic number of 'X' respectively are :
- 4, 9
  - 6, 3
  - 8, 4
  - 9, 4
75. Pb<sub>3</sub>O<sub>4</sub> on reaction with conc. nitric acid gives :
- Pb (NO<sub>3</sub>)<sub>2</sub>.
  - PbO<sub>2</sub>.
  - PbO<sub>2</sub> + Pb (NO<sub>3</sub>)<sub>2</sub>.
  - PbO.

76. In fixing the photograph, the unused silver halide dissolves to form
- $[\text{Ag}(\text{S}_2\text{O}_3)_2]^{3-}$
  - $[\text{Ag}(\text{CN})_2]^-$
  - $[\text{Ag}(\text{NH}_3)_2]^+$
  - $[\text{Ag}(\text{NH}_3)\text{Cl}]$
77. K - electron capture involves :
- capture of electron by potassium metal.
  - capture of electron by nucleus from K-shell in an atom.
  - capture of positron by nucleus.
  - capture of electron by nucleus to form anion.
78. In the reaction,
- $$5\text{Br}^- + \text{BrO}_3^- + 6\text{H}^+ \longrightarrow 3\text{Br}_2 + 3\text{H}_2\text{O}$$
- the oxidation states of bromine in  $\text{Br}^-$ ,  $\text{BrO}_3^-$  and  $\text{Br}_2$  are respectively :
- +5, -1, -1.
  - 1, +5, 0.
  - 1, +3, -1.
  - 1, -1, -1.
79. Which one of the following complex entities will have the largest number of stereoisomers?
- Octahedral  $[\text{Ru}(\text{NH}_3)_4\text{Cl}_2]^{2+}$
  - Square planar  $[\text{Pt}(\text{NH}_3)_2\text{Cl}_2]$
  - Tetrahedral  $[\text{COCl}_3(\text{H}_2\text{O})]^-$
  - Octahedral  $[\text{Cr}(\text{en})_2\text{Cl}_2]^+$   
(en - ethylenediamine)
80. In which of the following pairs, the two species are not isostructural?
- $\text{CO}_2$  and  $\text{NO}_2$
  - $\text{CO}_3^{2-}$  and  $\text{NO}_3^-$
  - $\text{SO}_4^{2-}$  and  $\text{PO}_4^{3-}$
  - $\text{ClO}_3^-$  and  $\text{XeO}_3$
81. Which one of following ions represents the collection of isoelectronic species?
- $\text{Li}^+$ ,  $\text{Be}^{2+}$ ,  $\text{Ba}^{2+}$ ,  $\text{Al}^{3+}$
  - $\text{N}^{3-}$ ,  $\text{O}^{2-}$ ,  $\text{F}^-$ ,  $\text{S}^{2-}$
  - $\text{Na}^+$ ,  $\text{Mg}^{2+}$ ,  $\text{Al}^{3+}$ ,  $\text{F}^-$
  - $\text{K}^+$ ,  $\text{Ca}^{2+}$ ,  $\text{Sr}^{2+}$ ,  $\text{O}^{2-}$
82. Which one of the following transition metal ions has highest magnetic moment?
- $\text{V}^{3+}$
  - $\text{Cr}^{3+}$
  - $\text{Fe}^{3+}$
  - $\text{Co}^{3+}$
- (At Nos. V = 23, Cr = 24, Fe = 26, Co = 27)
83. An old wooden table shows C-14 activity as 4 counts / min / g of carbon. If a freshly cut wood gives 16 counts / min / g of carbon and half - life of C-14 is 5770 years, the age of the wooden table is :
- 1443 years.
  - 11,540 years.
  - 17,310 years.
  - 23,080 years.
84. The non-metal which brings out the highest oxidation state of a transition element in its compounds is :
- chlorine.
  - bromine.
  - nitrogen.
  - fluorine.

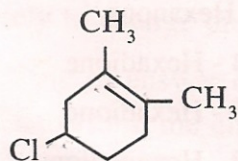
85. Ethylene glycol is used as an antifreezing agent for avoiding any damage to the radiator of a car. The amount of ethylene glycol to be added to 5 kg of water to prevent it from freezing at  $-6^{\circ}\text{C}$  ( $K_f$  for water =  $1.85 \text{ K mol}^{-1} \text{ kg}$  and molar mass of ethylene glycol is  $62 \text{ g mol}^{-1}$ ) is :

- 0.804 kg.
- 1.680 kg.
- 1.005 kg.
- 1.500 kg.

86. Predict which of the following equimolar solutions will show lowest Van't Hoff factor "e"?

- $\text{C}_6\text{H}_5\text{COOH}$  in benzene
- $\text{CH}_3\text{COOH}$  in water
- $\text{CaCl}_2$  in water
- $\text{K}_4[\text{Fe}(\text{CN})_6]$  in water

87. The correct IUPAC name of the organic compound



is :

- 4-chloro-1,2-dimethylcyclohexene
- 5-chloro-1,2-dimethylcyclohexene
- 3-chloro-5,6-dimethylcyclohexene
- 4-chloro-1,2-dimethylcyclohexene

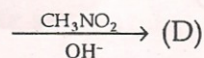
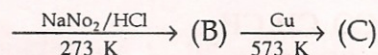
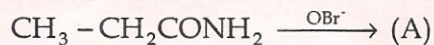
88. Given the following compounds,

- chlorine
- sulphur dioxide
- phenol

Which of the above are disinfectants?

- (I) and (II)
- (II) and (III)
- (I) and (III)
- (I), (II) and (III)

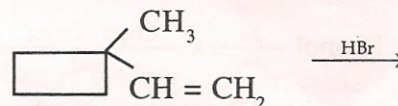
89. Given below a series of chemical reactions :



Identify the unknown compound (D)

- $\text{CH}_3\text{CH}_2 - \underset{\text{OH}}{\text{CH}} - \text{CH}_2\text{NO}_2$
- $\text{CH}_3 - \text{CH} = \text{CH} - \text{CHO}$
- $\text{CH}_3 - \text{CH}_2 - \text{CH} = \text{CHNO}_2$
- $\text{CH}_3 - \text{CH} = \text{CH} - \text{NO}_2$

90. The product formed in the given below reaction is :



- 
- 
- 
-

SEAL

91. Cobalt is present in :  
 a) chlorophyll.  
 b) vitamin B<sub>12</sub>.  
 c) insulin.  
 d) haemoglobin.
92. C<sub>4</sub>H<sub>8</sub>O is an optically active compound. It is :  
 a) CH<sub>3</sub>CO CH<sub>2</sub>CH<sub>3</sub>.  
 b) CH<sub>3</sub>CH<sub>2</sub>CH<sub>2</sub>CHO.  
 c) (CH<sub>3</sub>)<sub>2</sub>CHCHO.  
 d) CH<sub>2</sub> = CHCHOHCH<sub>3</sub>.
93. The formation of cyanohydrin from an aldehyde and ketone is an example of :  
 a) electrophilic addition.  
 b) nucleophilic addition.  
 c) nucleophilic substitution.  
 d) electrophilic substitution.
94. In the following sequence of reactions,  

$$\text{Phenol} \xrightarrow[\text{dust}]{\text{Zn}} \text{X} \xrightarrow[\text{AlCl}_3]{\text{Cu}_2\text{O}, \text{Cu}_2\text{Cl}_2} \text{Y} \xrightarrow[\text{KOH}]{\text{KMnO}_4} \text{Z}$$
  
 Y and Z are respectively :  
 a) benzaldehyde and benzoic acid.  
 b) toluene and benzaldehyde.  
 c) cumene and benzoic acid.  
 d) benzoic acid and benzene.
95. Synthesis of each molecule of glucose in photosynthesis involves how many molecules of ATP?  
 a) 8 molecules of ATP  
 b) 6 molecules of ATP  
 c) 10 molecules of ATP  
 d) 18 molecules of ATP
96. The order of reactivity of haloalkanes towards nucleophile is :  
 a) R Cl > R Br > RI.  
 b) R Br > R Cl > RI.  
 c) RI > R Br > R Cl.  
 d) R Br > RI > R Cl.
97. A vitamin which is neither water soluble nor fat soluble is :  
 a) vitamin C.  
 b) vitamin K.  
 c) vitamin H.  
 d) vitamin E.
98. The blue colour developed during the Lassaigne's test for nitrogen is due to :  
 a) Fe<sub>3</sub> [Fe (CN)<sub>6</sub>]<sub>4</sub>.  
 b) Fe<sub>4</sub> [Fe (CN)<sub>6</sub>]<sub>3</sub>.  
 c) K<sub>4</sub> [Fe (CN)<sub>6</sub>].  
 d) Fe (CNS)<sub>3</sub>.
99. Which of the following has most acidic hydrogen?  
 a) 3 - Hexanone  
 b) 2, 4 - Hexadione  
 c) 2, 5 - Hexadione  
 d) 2, 3 - Hexanedione
100. Caprolactam is the monomer of  
 a) PTFE.  
 b) melamine.  
 c) nylon - 6.  
 d) clyptal.

SEAL