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Time: **3 hrs.** Total Marks: **70**

General Instruction:

There are total **26** questions and five sections in the question paper.
All questions are compulsory
1. Section A contains questions number **1 to 5**; very short answer type questions of 1 mark each.
2. Section B contains questions number **6 to 10**, short-answer type I questions of 2 marks each.
3. Section C contains questions number **11 to 22**, short answer type II questions of 3 marks each.
4. Section D contains question number **23**, value based question of 4 marks.
5. Section E contains questions number **24 to 26**, long-answer type questions of 5 marks each.
6. There is no overall choice in the question paper; however, an internal choice is provided in one question of 2 marks, one question of 3 marks and all the three questions of 5 marks. In these questions, an examinee is to attempt any of the two given alternatives.

Section A

1. Write the IUPAC name of the given compound:
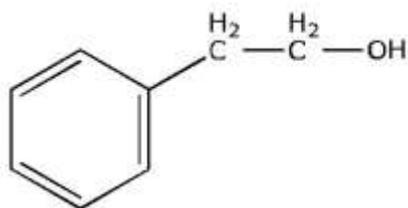
2. Write the structure of an isomer of compound C4H9Br which is most reactive towards SN1 reaction.
3. What is the reason for the stability of colloidal sols?
4. Give an example each of a molecular solid and an ionic solid.
5. $Pb(NO_3)_2$ on heating gives a brown gas which undergoes dimerization on cooling? Identify the gas.

Section B

6.

For a reaction: $H_2 + Cl_2 \xrightarrow{h\nu} 2HCl$ Rate = k

   (i) Write the order and molecularity of this reaction.
   (ii) Write the unit of k.

7. Write the chemical equations involved in the following reactions:
   (i) Hoffmann-bromamide degradation reaction
   (ii) Carbylamine reaction

8.

   (i) Gas (A) is more soluble in water than Gas (B) at the same temperature. which one of the two gases will have the higher value of K_H (Henry's constant) and why?

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(ii) In non-ideal solution, what type of deviation shows the formation of maximum boiling azeotropes?

7. When a coordination compound $CoCl_3.6NH_3$ is mixed with $AgNO_3$, 3moles of AgCl are precipitated per mole of the compound. Write
   (i) Structural formula of the complex
   (ii) IUPAC name of the complex

9. Write the structures of the following:

   (i) BrF_3
   (ii) XeF_4

   OR

   What happens when?
   (i) SO_2 gas is passed through an aqueous solution Fe^{+3} salt?
   (ii) XeF_4 reacts with SbF_5?

Section C
10. Write the final product(s) in each of the following reactions:

   (a)
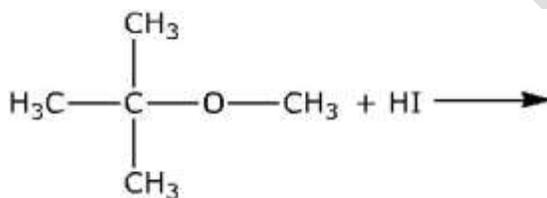
   (b)
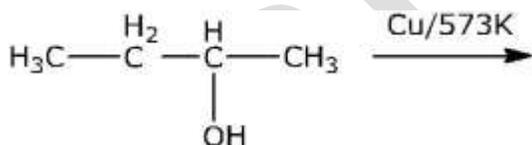
   (c)
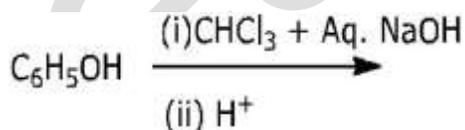
12. How do you convert:
    (i) Chlorobenzene to biphenyl
    (ii) Propene to 1-iodopropane
    (iii) 2-bromobutane to but-2-ene

    OR

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Write the major products(s) in the following:

(i)
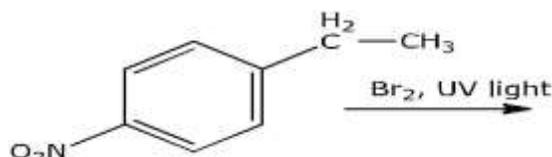
(ii)
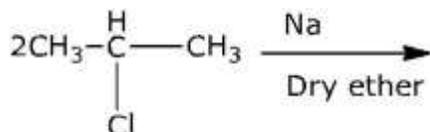
(iii)
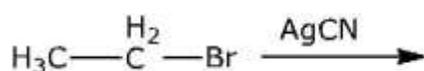
13.
    (i) Write the structural difference between starch and cellulose.
    (ii)What type of linkage is present in nucleic acids?
    (iii)Give one example each for fibrous protein and globular protein.

14. Give reasons:
    (i)Name the method of refining of nickel.
    (ii)What is the role of cryolite in the extraction of aluminum?
    (iii)What is the role of limestone in the extraction of iron from its oxides?

15. Give reasons:
    (i) SO_2 is reducing while TeO_2 is an oxidizing agent.
    (ii) Nitrogen does not form pentahalide.
    (iii) ICl is more reactive than I_2.

16.
    (a)   For the complex $[Fe\,(H_2O)_6]^{+3}$, write the hybridization, magnetic character and spin
        of the complex. (At, number : Fe = 26)
8. Draw one of the geometrical isomers of the complex $[Pt\,(en)_2Cl_2]^{+2}$ which is optically inactive.

17. An element crystallizes in a b.c.c lattice with cell edge of 500 pm. The density of the element is 7.5g
    cm^{-3}. How many atoms are present in 300 g of the element?

18.
    (i) What is the role of Sulphur in the vulcanization of rubber?
    (ii) Identify the monomers in the following polymer:

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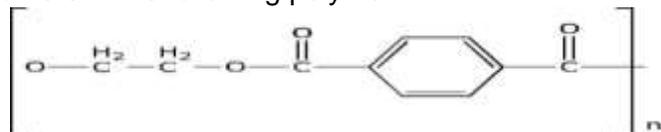
(iii) Arrange the following polymers in the decreasing order of their intermolecular forces:
   Terylene, Polythene, Neoprene

19. For the first order thermal decomposition reaction, the following data were obtained:

$$C_2H_5Cl_{(g)} \xrightarrow{\text{hv}} C_2H_4{}_{(g)} + HCl_{(g)}$$

Time / sec	Total pressure / atm
0	0.30
300	0.50

Calculate the rate constant.
(Given: log 2 = 0.301, log3 = 0.4771, log 4 = 0.6021)

20. Give reasons for the following:
   (i)Aniline does not undergo Friedal- Crafts reaction.
   (ii)$(CH_3)_2NH$ is more basic than $(CH_3)_3N$ in an aqueous solution.
   (iii)Primary amines have higher boiling point than tertiary amines.

21. Define the following terms:
   (i)Lyophilic colloid
   (ii)Zeta potential
   (iii)Associated colloids

22. Calculate the boiling point of solution when 4g of $MgSO_4$ (M= 120 g mol^{-1}) was dissolved in 100g of water, assuming $MgSO_4$ undergoes complete ionization. (K_b for water = 0.52 K $kgmol^{-1}$)

Section D

23. Due to hectic and busy schedule, Mr. Angad made his life full of tensions and anxiety. He started taking sleeping pills to overcome the depression without consulting the doctor. Mr. Deepak, a close friend of Mr. Angad advised him to stop taking sleeping pills and suggested to change his life lifestyle by doing yoga, meditation and some physical exercise. Mr. Angad followed his friend's advice and after few days he started feeling better. After reading the above passage, answer the following"
   (i) What are the values (at least two) displayed by Mr. Deepak?
   (ii) Why is it not advisable to take sleeping pills without consulting doctor?
   (iii)What are tranquilisers? Give two examples.

Section E

24.
   (a) Write the structures of A and B in the following reactions:

   (i) $CH_3COCl \xrightarrow{H_2, Pd-BaSO_4} A \xrightarrow{H_2N-OH} B$

   (ii) $CH_3MgBr \xrightarrow[2. H_3O^+]{1. CO_2} A \xrightarrow{PCl_5} B$

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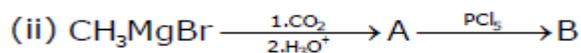
(b) Distinguish between:
   (i)C_6H_5-$COCH_3$ and C_6H_5-CHO
   (ii)CH_3COOH and $HCOOH$

(c)Arrange the following in the increasing order of their boiling points: CH_3CHO, CH_3COOH, CH_3CH_2OH

OR

(a) Write the chemical reaction involved in Wolff-Kishner reduction.
(b) Arrange the following in the increasing order of their reactivity towards nucleophilic addition reaction:
$C_6H_5COCH_3$, CH_3-CHO, CH_3COCH_3
(c) Why carboxylic acid does not give reactions of carbonyl group?
(d) Write the product in the following reaction

$$CH_3CH_2CH = CH - CH_2CN \xrightarrow[2.H_2O]{1.(i-Bu)_2 AlH}$$
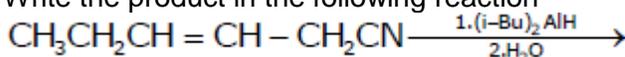
(e) A and B are two functional isomers of compound C3H6O.On heating with NaOH and I2, isomer B forms yellow precipitate of iodoform whereas isomer A does not form any precipitate. Write the formulae of A and B.

25.
(a) Calculate $E°_{cell}$ for the following reaction at 298K: $2Al_{(s)}$ + $3Cu^{+2}$(0.01M) → $2Al^{+3}$(0.01M) + $3Cu_{(s)}$ Given: E_{cell} = 1.98V
(b) Using the E° values of A and B, predict which is better for coating the Surface of iron [E° (Fe^{+2}/Fe) = -0.44V] to prevent corrosion and why? Given: E° (A^{+2}/A) =-2.37 V: E° (B^{+2}/B) = -0.14V

OR

(a) The conductivity of 0.001 mol L-1 solution of CH_3COOH is 3.905$\times$ 10-5 S Cm-1. Calculate its molar conductivity and degree of dissociation (α) given $\lambda°$ (H^+) = 349.6 S cm^2 mol^{-1} and $\lambda°$ (CH_3COO^-) = 40.9S $cm^2 mol^{-1}$.
(b) Define electrochemical cell. What happens if external potential applied becomes greater than $E°_{cell}$ of electrochemical cell?

26.
(a)Account for the following:
   (i) Mn shows the highest oxidation state of +7 with oxygen but with fluorine, it shows oxidation state of +4.
   (i) Cr^{+2} is a strong reducing agent.
   (ii) Cu^{+2} salts are coloured, while Zn^{+2} salts are white.

   (ii) Complete the following equations:
   (iii) $2MnO_2 + 4KOH + O_2 \xrightarrow{\Delta}$
   (iv) $Cr_2O_7^{2-} + 14H^+ + 6I^- \longrightarrow$

OR

   The elements of 3d transition series are given as:
   Sc Ti V Cr Mn Fe Co

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Answer the following:
  (i) Write the element which shows maximum number of oxidation states. Give reason.
      (ii) Which element has the highest m.p?
      (iii) Which element shows only +3 oxidation state?
      (iv) Which element is a strong oxidizing agent in +3 oxidation state and why?