2018 III 09 1000 Seat No. :

Time : 2½ Hours CHEMISTRY (New Pattern)

Subject Code

H	7	0	3

Total No. of Questions : 27 (Printed Pages : 4) Maximum Marks : 55

*INSTRUCTIONS : 1) **All** questions are **compulsory**; however question number **16, 21, 26** and **27** have internal choice.*

*2) Section **A** consists of **9** questions of **1** mark **each**.*
*Section **B** consists of **10** questions of **2** marks **each**.*
*Section **C** consists of **6** questions of **3** marks **each**.*
*Section **D** consists of **2** questions of **4** marks **each**.*

*3) Every question should be attempted **only once**.*

*4) **Use** of calculator is **not** permitted, however logarithmic table will be provided on **request**.*

SECTION – A

1. Nucleic acids are polymers of _____ [1]
   - nucleosides
   - globulins
   - nucleons
   - nucleotides

2. The metal which has the lowest melting point is _____ [1]
   - cesium
   - mercury
   - manganese
   - copper

3. The most basic amine from amongst the following is _____ [1]
   - CH_3NH_2
   - $(CH_3)_2 NH$
   - $(CH_3)_3N$
   - $C_6H_5NH_2$

4. Acetic acid can be converted to ethyl alcohol by using _____ [1]
   - Li AlH_4 in ether, followed by acid hydrolysis
   - PCC
   - heating with P_2O_5
   - CrO_3/H_2SO_4
5. The polymer in which the monomers are joined by ester linkages is _____ [1]
   - Nylon 6
   - Bakelite
   - Terylene
   - PVC
6. State why 1, 4 – dichlorobenzene melts at a higher temperature than 1, 2 – dichlorobenzene. [1]
7. Draw a neat diagram to show the alignment of domains of an antiferromagnetic substance under the influence of magnetic field. [1]
8. Why does the conductivity of a solution of an electrolyte decrease with dilution ? [1]
9. What are biodegradable polymers ? [1]

SECTION – B

10. State Raoult's Law for a binary solution containing volatile solute and solvent. Draw a graph of the deviation from Raoult's Law shown by the solution of phenol and aniline. [2]
11. Do as directed :
    a) Arrange the hydrogen halides of group 17 elements in the increasing order of their acidic strength.
    b) Why do noble gases have large positive values of electron gain enthalpy ? [2]
12. A piece of wood shows C^{14} activity which is 20% of the activity found today. If the decay follows first order kinetics, calculate the age of the wood sample. (Given $t_{1/2}$ for $^{14}_{6}C$ = 5770 years. [2]
13. A solution is prepared by dissolving 1.05 grams of glucose in 160 grams of water. If molal depression constant for water is 1.86 K $Kgmol^{-1}$, calculate the freezing point of the solution. [2]
14. Name the type of defect observed in ionic crystals in which there is a large difference in the size of ions.
    A solid is made up of 2 elements P and Q. Atoms Q are in ccp arrangement, while P atoms occupy all the tetrahedral sites. What is the formula of the compound ? [2]
15. What are monosaccharides ? What happens when a protein is subjected to denaturation ? [2]

16. Write chemical equations to show how you will convert :
    a) Ethyl chloride to nitroethane
    b) Chlorobenzene to 4-chlorotoluene. [2]

OR

Write chemical equations to show how you will convert :
    a) 2 – chloropropane to 2 – iodopropane
    b) Benzene diazonium chloride to chlorobenzene.

17. Write chemical equations to show the following reactions :
    a) Hoffmann bromamide degradation of propanamide.
    b) Carbylamine reaction of aniline. [2]

18. Derive the integrated rate law expression for a zero order reaction. [2]

19. Distinguish between bacteriocidal and bacteriostatic antibiotics. Name the analgesic which also finds use in the prevention of heart attack. [2]

SECTION – C

20. Draw a neat labelled diagram to show electrodialysis of a colloidal solution. Define emulsion. Give one point of distinction between physisorption and chemisorption. [3]

21. Draw a neat labelled diagram of the H_2/O_2 fuel cell. Calculate the e.m.f. at 298K of an electrochemical cell which is represented as :

    $Al(s)/Al^{+3}$ (0.02M)$||Cu^{+2}$(0.01M)/Cu(s)

    (Given $E^{\circ}Al^{+3}/Al = -1.66V$ and $E^{\circ}Cu^{+2}/Cu = +0.34$ V) [3]

OR

Draw a neat labelled diagram of the dry cell. Calculate the standard Gibbs free energy for a cell in which the following reaction occurs :

$2\,Cr(s) + 3\,Cu^{+2}(aq) \rightarrow 2\,Cr^{+3}(aq) + 3\,Cu(s)$

(Given $E^{\circ}Cr^{+3}/Cr = -0.74$ V

and $E^{\circ}Cu^{+2}/Cu = 0.34$ V

$F = 96500$ C)

22. Using the VBT concept deduce the structure of $[Ni(CN)_4]^{2-}$ and comment on its geometry. Draw the structures of the geometrical isomers of Tetrammine dibromido cobalt (III) ion. [3]

23. Draw a neat labelled diagram of the magnetic separation for the concentration of an ore. State the role of the following in metallurgical processes :
    a) Limestone in the extraction of iron.
    b) Pine oil in the froth floatation process. [3]

24. Draw the structure of the manganate iron. Give reasons for the following :
    a) Transition metals form a large number of complexes.
    b) Zirconium and Hafnium are difficult to separate. [3]

25. Write chemical equations to show what happens when :
    a) Phenol is heated with zinc dust.
    b) 2-ethoxy – 2 – methyl propane is treated with HI.
    c) Tertiatry butyl alcohol vapours are passed over heated copper tubes at 573 K. [3]

SECTION – D

26. Attempt the following : [4]
    a) Draw the structure of ortho phosphoric acid.
    b) Why is BiH_3 a stronger reducing agent than NH_3 ?
    c) Write equation to show the action of concentrated nitric acid on copper.
    d) Give two properties to show the anomalous behaviour of nitrogen.

OR

Attempt the following :
    a) Draw the structure of sulphuric acid.
    b) Why is ozone used as a powerful oxidising agent ?
    c) Write equation to show the action of sulphuric acid on sugar.
    d) Give two reasons for the anomalous behaviour of oxygen.

27. Write chemical equations for the following and label the reactant product : [4]
    a) Cannizaro reaction using benzaldehyde.
    b) Preparation of propanal from a suitable ester.
    c) Stephen reaction using ethane nitrile.
    d) Preparation of acetic acid from dry ice.

OR

Write chemical equations for the following and label the reactant /product :
    a) Gattermann Koch reaction using benzene.
    b) Action of dilute base on acetaldehyde followed by heating.
    c) Hell – Volhard Zelinsky reaction using propanoic acid and bromine.
    d) Preparation of 2 – methyl propane from an aldehyde.