

Q.P. Code – 50827

Final Year B.Sc. Degree Examination

SEPTEMBER/OCTOBER 2013

(Directorate of Distance Education)

(DSC 261) Paper IV – CHEMISTRY

Time : 3 Hours]

[Max. Marks : 75/85

Instructions to Candidates :

- 1) *The question paper contains five Sections. Answer all Sections.*
- 2) *Section **A** contains **one** mark questions and should be answered in the first **two** pages of the main answer book. The questions of Section **A** answered in any other part of the answer book **will not** be valued.*
- 3) *Write equations and neat diagrams **wherever** necessary.*
- 4) *Section-**E** is **compulsory** for **85** marks scheme **only**.*

SECTION – A

Answer **ALL** the following in a word, a phrase or in a sentence : **10 × 1 = 10**

1. Write the general electronic configuration of 'd' block elements.
2. What is the trade name of PTFE?
3. Write the expression for zero point energy.
4. Give the relationship between absorbance and transmittance.
5. Write the IUPAC name of the complex $[\text{RhCl}(\text{PPh}_3)_3]$.
6. What are microwave active molecules?
7. Give an example for six numbered heterocyclic compound.

Q.P. Code – 50827

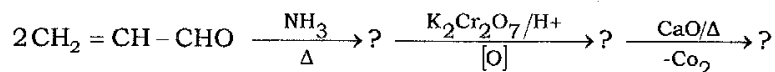
8. What are azo dyes?
9. Give the structure of sulphathiazole.
10. How many stereogenic centres are there in lactic acid?

SECTION – B

Answer any **FIVE** of the following :

5 × 3 = 15

11. Complete the following reaction :



12. Discuss the effects of chlorofluoro carbons in air pollution.
13. Write the structures of possible isomers for the complex $[\text{RhCl}_2(\text{en})_2]^{2+}$.
Explain their optical activities.
14. Define the terms :
 - (a) Racemisation
 - (b) Asymmetric synthesis
 - (c) Walden inversion
15. Write a note on Fricke dosimeter.
16. Calculate the Einstein of energy in eV corresponding to the light of frequency 3×10^{13} Hz.
17. (a) Write the differences between photochemical and thermochemical reactions. **2**
(b) Define smog. **1**

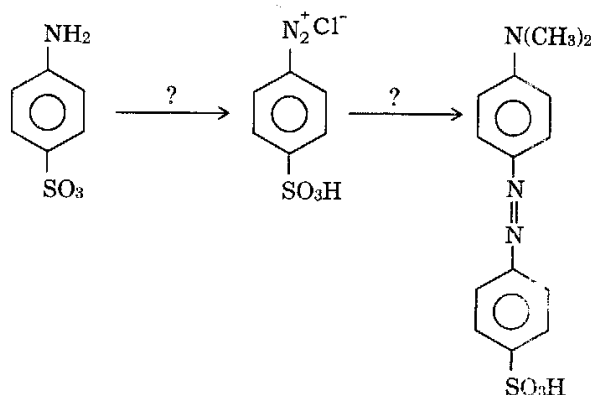
Q.P. Code – 50827

SECTION – C

Answer any **FIVE** of the following :

5 × 6 = 30

18. (a) How many isomers are possible for the neutral complex $[\text{Co}(\text{NH}_3)_3\text{Cl}_3]$?
Sketch them. **3**
- (b) Derive Bragg's equation. **3**
19. (a) Discuss the optical isomerism in the Tartaric acid. **4**
- (b) The molar extinction coefficient of phenanthroline complex of iron (II) is $12,000 \text{ dm}^3 \text{ mol}^{-1} \text{ cm}^{-1}$ and the minimum detectable absorbance is 0.01. Calculate the minimum molar concentration of the complex that can be detected in a Lambert-Beer's law cell of path length 1.00 cm. **2**
20. (a) How will you synthesise isobutyric acid from ethylacetoacetate? **4**
- (b) What are selection rules? Write the selection rules for rotational and vibrational spectroscopy. **2**
21. (a) Write the mechanism of Free radical polymerisation of poly vinyl chloride. **4**
- (b) Suggest the suitable reagent for the following reaction : **2**



Q.P. Code – 50827

22. (a) Discuss symmetry elements in crystalline systems. **3**
(b) Write the neat labelled pictorial representation of molecular energy levels. **3**
23. Account for the following : **3 × 2 = 6**
(a) $[\text{Co}(\text{en})_3]^{3+}$ is more stable than $[\text{Co}(\text{NH}_3)_6]^{3+}$.
(b) $[\text{Ni}(\text{CH}_3)_4]^{2-}$ is diamagnetic whereas $[\text{NiCl}_4]^{2-}$ is paramagnetic.
(c) Pyridine is more basic than pyrrole.
24. (a) Discuss the application of complex formation in metallurgy, qualitative and quantitative analysis. **4**
(b) What is dipole moment? Arrange the hydro acids of halogens with increasing order of polarity. **2**

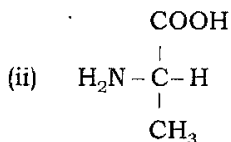
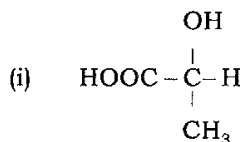
SECTION – D

Answer any **TWO** of the following : **2 × 10 = 20**

25. (a) Apply VBT to the complex $[\text{Fe}(\text{CN})_6]^{4-}$ formation. **5**
(b) Explain why the salts of Zn, Cd and Hg are white. **2**
(c) A complex $[\text{MX}_4]^{2-}$ having paramagnetic moment 5.92 BM. Calculate the number of unpaired electrons. **2**
(d) Write the structure of oxine. **1**
26. (a) Discuss the photochemical decomposition of Hydrogen iodide. **5**
(b) Identify the crystal system to which some solids having the following dimensions for their unit cell belong. Give examples of the solids.
(i) $a \neq b \neq c$ $\alpha \neq \beta \neq \gamma \neq 90^\circ$
(ii) $a \neq b \neq c$ $\alpha = \beta = \gamma = 90^\circ$. **3**
- (c) How do you establish the planar structure of benzene using dipole moment measurement? **2**

Q.P. Code – 50827

27. (a) Assign R or S configuration to the following compounds : **2**



- (b) Write the E and Z configuration for BrClC = CFI. **2**
- (c) If the specific rotation of one enantiomer of 2-butanol is + 13.5°. What is the specific rotation of other enantiomer? **2**
- (d) What happens when Leuco base undergo oxidation with lead oxide followed by treatment with HCl? Write the reactions. **3**
- (e) Name the drug which is used for the treatment of malaria. **1**

SECTION – E

Answer any **ONE** of the following : **1 × 10 = 10**

(Compulsory question for 85 marks scheme only)

28. (a) What are water pollutants? How do they contaminate water bodies? **3**
- (b) Identify the type of isomers in the following pairs of complexes. **5**
- (i) $[\text{Co}(\text{NH}_3)_5\text{Br}]\text{SO}_4$ and $[\text{Co}(\text{NH}_3)_5\text{SO}_4]\text{Br}$
- (ii) $[\text{Cr}(\text{H}_2\text{O})_6]\text{Cl}_3$ and $[\text{Cr}(\text{H}_2\text{O})_4\text{Cl}_2]\text{Cl} - 2\text{H}_2\text{O}$
- (iii) $[\text{Pd}(\text{NH}_3)_2(\text{SCN})_2]$ and $[\text{Pd}(\text{NH}_3)_2(\text{NSC})_2]$
- (iv) $[\text{Co}(\text{NH}_3)_6][\text{Cr}(\text{CN})_6]$ and $[\text{Cr}(\text{NH}_3)_6][\text{Co}(\text{CN})_6]$
- (v) cis - $[\text{PtCl}_2(\text{NH}_3)_2]$ and trans - $[\text{PtCl}_2(\text{NH}_3)_2]$
- (c) Give two examples for condensation polymer. **2**

Q.P. Code – 50827

29. (a) Discuss the fluorescence and phosphorescence with examples. **3**
- (b) The fundamental vibrational frequency of HCl is 2890 cm^{-1} . Calculate the force constant (K) for this molecule. The atomic masses are $H^1 = 1.673 \times 10^{-27}\text{ kg}$; $Cl^{35} = 58.06 \times 10^{-27}\text{ kg}$. **3**
- (c) Distinguish D from d and L from l with respect to stereochemistry. **2**
- (d) Write the equations showing the synthesis of cinnamic acid from ethylacetoacetate. **2**
-