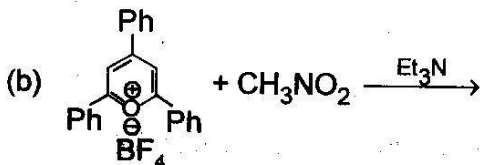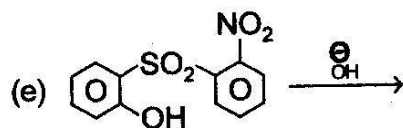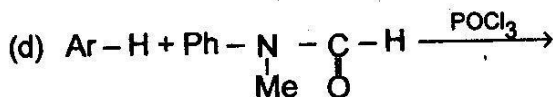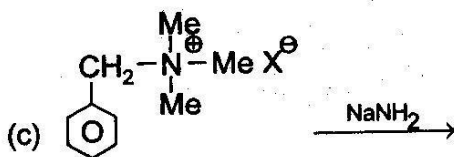## JLR – 10/10
CHEMISTRY

Time : 3 hours

Full Marks : 100

The figures in the right-hand margin indicate marks.

*Answer any **five** questions.*

1. Write notes on the following : $5 \times 4 = 20$

   (a) Importance of DCC in synthesis

   (b) Mechanism of Osazone formation

   (c) DL and Cahn-Ingold-Prelog System in the Stereochemistry

   (d) Biochemical aspects of Zinc complexes

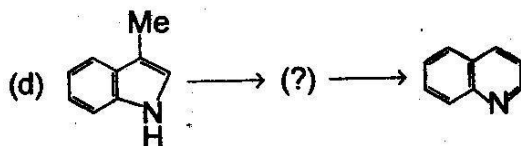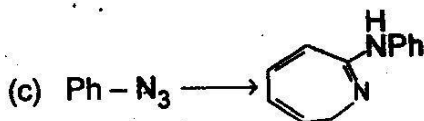2. Predict the product(s) of the following. Give the mechanisms involved : $4 \times 5 = 20$

   (a) $-\underset{|}{C} = \underset{|}{C} - + Mn(OAc)_3 \xrightarrow{HOAc}$

   (b) $+ CH_3NO_2 \xrightarrow{Et_3N}$

(c)

$$CH_2-\overset{\overset{\displaystyle Me}{|}}{\underset{\underset{\displaystyle Me}{|}}{N}}{}^{\oplus}-Me \;\; X^{\ominus} \quad \xrightarrow{\;NaNH_2\;}$$

(d) $Ar-H + Ph-\overset{}{\underset{\underset{\displaystyle Me}{|}}{N}} - \overset{\overset{}{}}{\underset{\underset{\displaystyle O}{\|}}{C}}-H \quad \xrightarrow{\;POCl_3\;}$

(e)

$$\xrightarrow{\;\overset{\ominus}{OH}\;}$$

3. How can the following synthesis achieved ?

$$5 \times 4 = 20$$

(a) Anthranilic acid $\longrightarrow$ Saccharin

(b) α-Naphthol $\longrightarrow$ α-Alkylated amino naph-thalene

(c) $Ph-N_3 \longrightarrow$

(d) $\longrightarrow$ (?) $\longrightarrow$

4. (a) Discuss the theory of Emulsification.　10

(b) How do you determine the "Entropy" by Statistical method ? 10

5. (a) Discuss the theory behind radioactive disintegration. 10

(b) What is Chemisorption ? 5

(c) By applying Clapeyron-Clausius Equation, calculate the latent heat of vaporisation of water at 100° C. 5

[Sp. volume of water vapour = 1674 cc and liquid water = 1 cc].

6. (a) Explain the "Crystal Field Theory" of co-ordination compounds. 10

(b) Give the principle, working and applications of AAS. 10

7. (a) Comment on the structures of the following Werner's Complexes : 10

(i) $Os_3(CO)_{12}$

(ii) $Rh(CO)_{16}$

(iii) $(B_4H_8) Fe(CO)_3$

(iv) $Fe_3(CO)_{12}$

(b) What are "Cage compounds" **or** "Clathrate compounds" ? Why they are so important ? Can you separate Potassium and Nickel from a solution using the above compounds ? 10

8. (a) Explain the different types of Symmetry operations ? What is the significance in Chemistry ? 10

(b) What do you mean by "Transport Number" ? How do you determine it ? 5

(c) Explain, in brief, TG analysis. 5

9. (a) Explain "Magnetic Circular Dichroism". 5

(b) Write a note on "Heavy Metals". 7

(c) Explain the structures of the following : 8

(i) $CO_3(CO)_9 CH$

(ii) $CO_4(CO)_{12}$

10. (a) Predict the splitting pattern of NMR (Proton) signals for the following compounds. Give the approximate 'δ' values also : 10

(i) H₃C—

(ii)

(iii)

(iv)
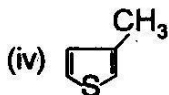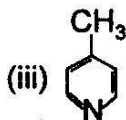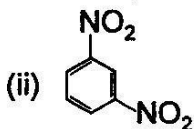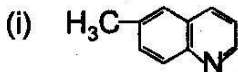
(b) Explain the terms Spin Decoupling and Anisotropic Effects. 5+5 = 10

————— ✳ —————