

Roll No. ....17.....

Total No. of Questions : 9]  
(2041)

[Total No. of Printed Pages : 7

**UG (CBCS) IIIrd Year (Annual)  
Examination**

**2518**

**B.Sc. CHEMISTRY**

**(Polynuclear Hydrocarbons, Dyes, Heterocyclic  
Compounds and Spectroscopy)**

**(UV, IR, NMR)**

**(DSE-2A)**

**Paper : CHEM 301 TH**

**Time : 3 Hours]**

**[Maximum Marks : 50**

*Note :- Attempt five questions in all, selecting at least one question from each Section. Question No. 9 is compulsory. All questions carry equal marks.*

**Section-A**

1. (a) Give reactions involved in any *one* of the following methods for preparation of naphthalene :

(i) Fittig synthesis

**CH-350**

( 1 )

Turn Over

(ii) Haworth synthesis

(iii) Diels–Alder reaction

(b) Write short note on electrophilic substitution reaction, mechanism in naphthalene. Give reason why such substitution occurs readily at  $\alpha$ -position than at  $\beta$ -position.

5,5

2. (a) How will you prepare anthracene from the following? (Attempt any *two*)

(i) Phthalic anhydride and benzene

(ii) Benzyl chloride

(iii) 1, 4-Naphthaquinone and 1, 3-Butadiene

(b) Explain why positions 9 and 10 of anthracene are more reactive than other positions towards substitution and addition reactions.

5,5

### Section-B

3. (a) Discuss molecular orbital structure and the aromatic character of any *one* of the following :

- (i) Furan
- (ii) Pyrrole or
- (iii) Pyridine

(b) Give ring expansion reaction in which pyrrole is converted into pyridine.

(c) What happens when : (attempt any *three*)

- (i) Furan react with  $\text{SO}_3$  in pyridine.
- (ii) Thiophene react with fuming nitric acid in acetic anhydride
- (iii) Pyrrole react with  $\text{H}_2$  in presence of Ni
- (iv) Pyridine react with n-butyl lithium.
- (v) Pyridine react with sulphuric acid at

623 K.

4.3.3

4. (a) Write chemical equations for chlorination, nitration and sulphonation of Indole.
- (b) What product is expected when quinoline undergo reduction by : (Attempt any *two*)
- (i)  $\text{H}_2\text{—Pt}$  in  $\text{CH}_3\text{COOH}$
  - (ii)  $\text{LiAlH}_4$  or  $\text{Na—Liq. NH}_3$
  - (iii)  $\text{H}_2\text{—Ni}$  or  $\text{HCl—Sn}$

6,4

### Section—C

5. (a) What is principle of UV-spectroscopy ? Discuss briefly the various types of electronic transitions.
- (b) Define any *two* of the following :
- (i) Chromophores
  - (ii) Auxochromes
  - (iii) Bathochromic shift
  - (iv) Hypsochromic shift
- (c) What is exocyclic double bond ? Draw a molecule having such bond.

4,4,2

6. (a) What is principle of IR spectroscopy ?
- (b) What do you understand by fingerprint region in IR spectrum ?
- (c) The stretching frequency of C—C single bond is  $1200\text{ cm}^{-1}$  whereas of C=C double bond is around  $1650\text{ cm}^{-1}$ . Give reason for this difference. 3,3,4

### Section-D

7. (a) Write short notes on any *one* of the following :
- (i) Equivalent and non-equivalent protons,
  - (ii) Chemicals shift
  - (iii) Spin-spin coupling
- (b) Explain the expected characteristic spectra ( $^1\text{H}$ —NMR) of any *one* :
- (i) Ethyl bromide
  - (ii) 1, 1-Dibromoethane
  - (iii) Methanol 5,5

8. (a) Discuss briefly the principle of proton magnetic resonance (PMR).
- (b) Explain the inductive and resonance effect on chemical shift value.
- (c) Write *two* characteristic features of TMS indicator.

4,4,2

### Section-E

9. Do as directed :

- (i) Naphthalene is .....  
(Aromatic/Antiaromatic)
- (ii) Nitration of pyrrole gives .....
- (iii)  $\sigma \rightarrow \sigma^*$  transition of an electron require more energy than for  $\pi \rightarrow \pi^*$  transition.  
(True/False)
- (iv) Due to conjugation ..... shift is observed in the  $\lambda_{\max}$  value.  
(Red/Blue)
- (v) Ethanol has ..... types of magnetically equivalent protons.  
(1, 2 or 3)

(vi) In chloroform ( $\text{CHCl}_3$ ) the proton is .....

(Shielded/Deshielded)

(vii) Pyrrole is slightly acidic in behaviour.

(True/False)

(viii) Indole has condensed structure of carbocyclic and ..... ring.

(Pyrrole/Pyridine)

(ix) Vibrational transition are mainly caused by ..... radiations.

(Microwaves/Infrared)

(x) Tetra methylsilane is commonly used indicator in PMR spectroscopy.

(True/False)

1×10=10