

Roll No.

Total No. of Questions : 9]
(2034)

[Total No. of Printed Pages : 8

UG (CBCS) IIIrd Year Annual Examination
2988

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 *one* question each from Sections--A, B, C and D. All questions carry equal marks. Section E is compulsory.

Section-A

1. (a) Describe the Haworth synthesis of naphthalene.
(b) How will you explain the greater reactivity of positions -9 and -10 in anthracene towards electrophilic substitution reactions ?

CH-288

(1)

Turn Over

- (c) Discuss the acetylation of naphthalene in CS_2 and in nitrobenzene. 4,3,3
2. (a) Discuss the Pschorr synthesis of Phenanthrene.
- (b) Why benzene and naphthalene do not undergo Diels Alder reaction ?
- (c) Discuss in brief classification of dyes on the basis of their mode of application. 3,3,4

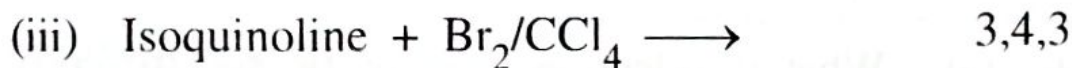
Section-B

3. (a) Write down the mechanism of Fischer Indole synthesis of Indole.
- (b) Which is more reactive and why ? – Pyrrole *or* Furan *or* Thiophene
- (c) What happens when :
- (i) Pyrrole is treated with Br_2 -ethanol at 273K ?
- (ii) Furan reacts with Maleic anhydride ?
- (iii) Thiophene is heated with CH_2N_2 in presence/HCl and CuBr 4,3,3

4. (a) Discuss the orientation and mechanism of Nucleophilic substitution reactions in pyridine.

(b) Discuss Skraup synthesis of Quinoline with mechanism.

(c) Complete the following reactions :



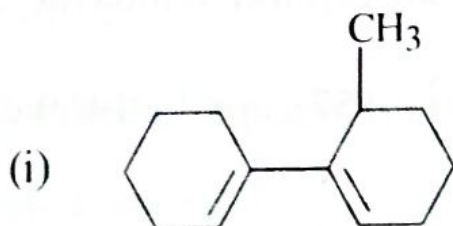
Section-C

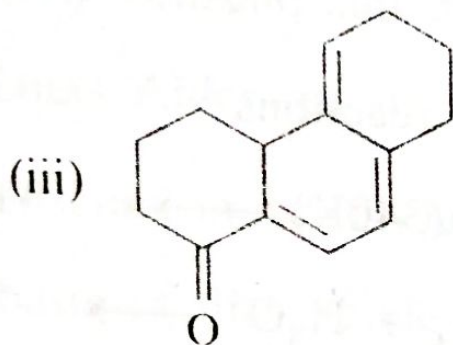
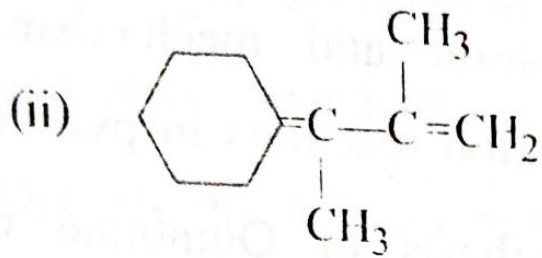
5. (a) What are the advantages of spectroscopic methods over classical methods ?

(b) Discuss various shifts and effects in UV spectroscopy.

(c) How does the change in polarity of solvent affect the $n - \pi^*$ and $\pi - \pi^*$ transitions ?

(d) Calculate the value of λ_{max} for the following :





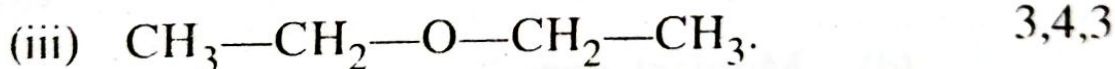
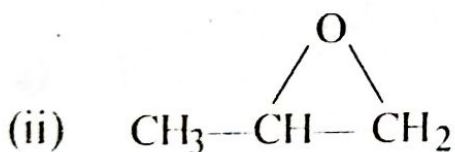
2,2,3,3

6. (a) What is selection rule for IR spectroscopy ?
- (b) What is meant by stretching and bending vibrations ? Discuss briefly various types of bending vibrations.
- (c) Discuss in brief the factors which affect the vibrational frequencies.
- (d) Identify the compound having molecular formula C_8H_{10} which shows absorption bands at :
 3016 cm^{-1} , 1602 cm^{-1} , 1578 cm^{-1} , 1460 cm^{-1} ,
 705 cm^{-1} , 690 cm^{-1} .

2,4,2,2

Section-D

7. (a) Discuss the scales used to express the chemical shift and how are they related ?
- (b) Describe the rules of spin-spin splitting of proton signals.
- (c) Write down the number of signals and their multiplicity shown by the following compounds in PMR spectroscopy :



8. (a) Explain the terms shielding and deshielding with appropriate examples.
- (b) Discuss the factors which affect the chemical shifts.
- (c) Describe the salient features of PMR spectrum of Toluene. 3,3,4

Section-E

9. Multiple choice questions/True *or* False/Fill in the blanks :

(i) Naphthalene is reactive than benzene towards substitution and addition.

(more/less)

(ii) Dyes which need some additional substance for binding themselves to the fabric are called

- (a) Vat dyes
- (b) Ingrain dyes
- (c) Disperse dyes
- (d) Mordant dyes

(iii) Electrophilic substitution reactions in Indole occur preferentially at -position.

- (a) 1
- (b) 2
- (c) 3
- (d) 4

- (iv) Pyrrole undergoes coupling reaction with benzene diazonium iodide. (True/False)
- (v) IR Region extends from to μm .
- (vi) C-H stretching in all aldehydes is observed at and cm^{-1} .
- (vii) Nuclear spin quantum number of nuclei having even mass number and even atomic number is
- (a) 1
- (b) 1/2
- (c) 0
- (d) 5/2
- (viii) 2-chloro propane exhibits number of nmr signals.
- (ix) Congo dye is not a good dye to impart colour to the fabric. (True/False)

(x) Twisting is an out of plane vibration in which one atom moves the plane while other moves the plane with respect to central atom.

$$1 \times 10 = 10$$