Roll No. 21311233500 22 **Exam Code : M-24**

Subject Code—61438

B.Sc. EXAMINATION

(Main/Reappear) (Batch 2019 Onwards)

(Sixth Semester)

CHEMISTRY

CCL-604 (i)

Polynuclear Hydrocarbons and UV, IR Spectroscopy (Course IV)

Time : 3 *Hours* *Maximum Marks* : 80

Note : Attempt *Five* questions in all, selecting *one* question from each Unit. Q. No. **1** is compulsory.

1. (a) Why is pyridine more basic than pyrrole ?

(b) Why α-position in naphthalene is more reactive than β-position towards electrophilic substitution reaction ?

(c) In Ethylacetoacetate which hydrogens are more acidic, explain by drawing structure.

(d) Explain the role of acid catalysis in keto enol tautomerism.

(e) Explain Auxochromes.

(f) What is meant by Hypsochromic Shift ?

(g) How will you distinguish between acetone and acetic acid with IR spectroscopy ?

(h) What is meant by stretching vibrations ?

2×8=16

Unit I

2. (a) Discuss the orientation of mono and di-substitution in naphthalene. **10**

(b) Explain the effect of temperature in sulphonation of naphthalene. **4**

(c) How will you synthesize α-nitronaphthalene from naphthalene ? **2**

3. (a) Explain mechanisms and orientation of nucleophilic substitution in pyridine. 8

(b) Compare the basicity of Aniline and Pyridine. 2

(c) Convert the following : 6

(i) Pyrrole into 2-nitropyrrole

(ii) Furan into tetrahydrofuran

(iii) Pyridine into 2-aminopyridine

(iv) Pyridine into piperidine.

Unit II

4. (a) Explain the laboratory preparation of acetoacetic ester with mechanism. 6

(b) Convert acetoacetic ester into : 10

(i) Succinic acid

(ii) Acetic acid

(iii) 2-Hexanone

(iv) Pentanoic acid

(v) Acetyl acetone.

5. (a) Explain the role of acid and base catalysis in keto-enol tautomerism. 6

(b) Acetoacetic ester is aversatile synthetic reagent. Discuss the reason for its synthetic importance. 10

Unit III

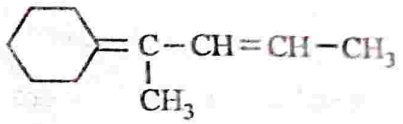
6. (a) Why does UV spectrum give rise to absorption bands rather than sharp peaps ? 4

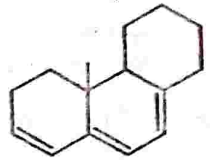
(b) How does change in polarity of a solvent affect the n-π^* and π-π^* transitions ? 6

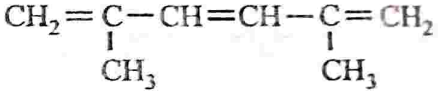
(c) What is the effect of conjugation on UV spectra of enes ? 3

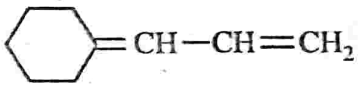
(d) How UV spectroscopy can be used to distinguish between *cis* and *trans* isomers ? 3

7. (a) Calculate the value of λ_{max} for the following : 12

(i) 

(ii) 

(iii) 

(iv) 

(b) Explain the following with example : 4

(i) Homoannular diene

(ii) Heteroannular diene.

Unit IV

8. (a) Explain the factors influencing vibrational frequency. 10

(b) What is the necessary condition for the absorption of IR radiations by a molecule ? 3

(c) How is the absorption peak due to O-H stretching shifted if hydrogen is replaced by denterium ? 3

9. (a) Deduce the number of fundamental vibrations for the following molecules : 3

(i) H_2

(ii) H_2O

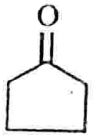
(iii) CO_2

(b) Deduce the structure of a saturated open chain compound C_3H_8O which has an infrared absorption band at 2950 cm^{-1} but none hear 3300 cm^{-1} and 1725 cm^{-1}. 3

(c) Compare the relative stretching frequencies for carbon-halogen bonds in CH_3-F, CH_3-Cl, CH_3-Br and CH_3-I. 4

(d) Give approximate positions of characteristics carbonyl absorption bands in IR of the following compounds : 6

(i) 
(Cyclohexanone)

(ii) 
(Cyclopentanone)

(iii) 
(Acetone)