

Roll No.

Exam Code : M-25

Subject Code—64111

B.Sc. EXAMINATION

(Main/Re-appear)

(Batch 2020 Onwards)

(Sixth Semester)

CHEMISTRY

Course-IV (CCL-604 (i))

Polynuclear Hydrocarbons and

UV, IR Spectroscopy

Time : 3 Hours

Maximum Marks : 80

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

1. (a) Write a note on bending vibrations ?
- (b) Define Chromophores.
- (c) What are active methylene compounds ?
Give examples.
- (d) Compare basicity of pyridine and triethylamine.
- (e) Distinguish between acetone and acetic acid with IR spectroscopy.
- (f) Why UV-spectroscopy is called electronic spectroscopy ?
- (g) Discuss enolates with examples.
- (h) Give name and structure of two heterocyclic compounds which exhibit aromatic character.

8×2=16

Unit I

2. (a) Discuss the chemical properties of naphthalene.

4

(b) Give two methods of synthesis of naphthalene. 4

(c) Why α -position in naphthalene is more reactive than β -position towards electrophilic substitution reaction ? 8

~~3.~~ (a) Why electrophilic substitution reactions in case of pyrrole, furan and thiophene undergoes predominantly at α -position ? 6

~~(b)~~ Out of pyrrole, piperidine and pyridine, which one is more basic ? Explain. 5

~~(c)~~ Which is most aromatic and least aromatic out of furan, pyrrole and thiophene ? Give reasons. 5

Sp³
25%

sp² $\frac{1}{3} \times 100$ (33%)

~~Unit II~~

~~1.~~ (a) Explain claisen ester condensation with mechanism. 6

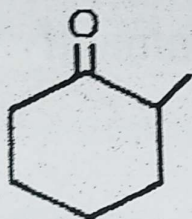
(b) How will you prepare each of the following from ethylacetoacetate ? 6

~~(i)~~ Butan-1,4-dioic acid

~~(ii)~~ Pentan-2-one

~~(iii)~~ But-2-enoic acid.

~~(c)~~ How many tautomers can you draw for the following ketone ? 4



5. (a) How will you synthesize the following compounds : 6

(i) 2-ethyl pentan-2-one

(ii) 3-methyl 2-hexanone from ethylacetoacetate ?

(b) What is keto enol tautomerism ? Explain the factors influencing the relative amount of keto and enol forms. 10

Unit III

6. (a) State and explain Beer-Lamberts law. 4
- (b) Explain Bathochromic and Hypsochromic shift. 6
- (c) Describe the various types of electronic transitions observed in organic compounds when exposed to UV-visible light. 6

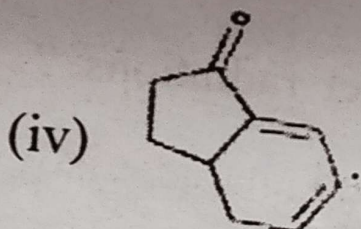
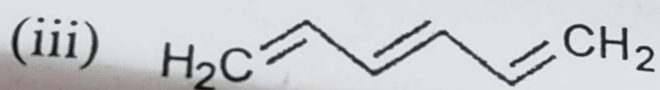
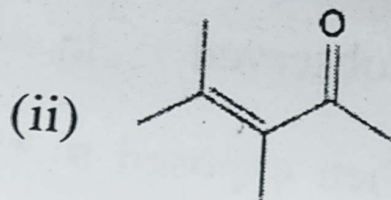
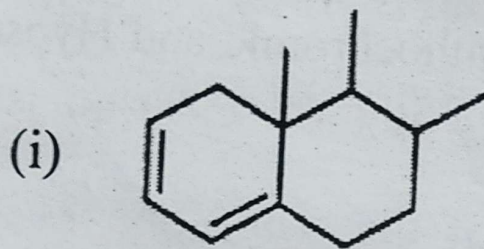
7. (a) Which of the following compounds absorb ultraviolet radiations ? 4

- (i) Acetaldehyde
- (ii) Cyclohexane
- (iii) Aniline
- (iv) Butadiene.

Give reasons in support your answer.

P.T.O.

(b) Using Woodward-Fieser rules, calculate λ_{max} values for the following compounds : 12



Unit IV

8. (a) How will you distinguish the type of hydrogen bonding by IR spectroscopy ?

(b) An aromatic compound with molecular formula C_8H_8O shows an IR absorption maximum at 1690 cm^{-1} but not a broad peak near 3300 cm^{-1} . What is possible structure of the compound ? 4

(c) Explain the following terms : 8

(i) Overtone

(ii) Coupling peaks

(iii) Fermi resonance

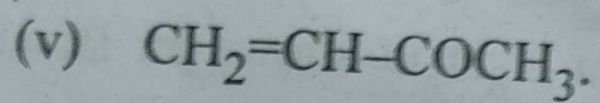
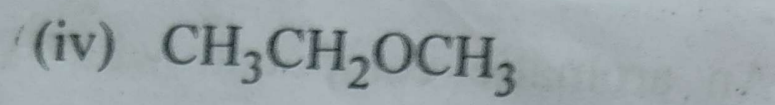
(iv) Fingerprint region.

9. (a) Write the expected characteristic IR peaks of the following compounds : 10

(i) CH_3CH_2COOH

(ii) $CH_3COOC_2H_5$

(iii) $C_6H_5NH_2$



(b) Discuss the principle of IR spectroscopy.

Distinguish between cis and trans butene
by IR spectroscopy.

