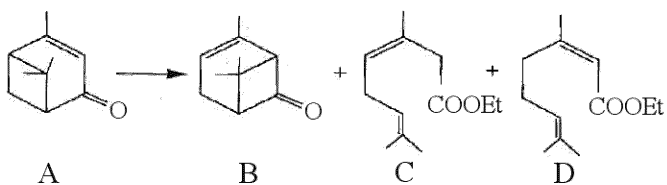
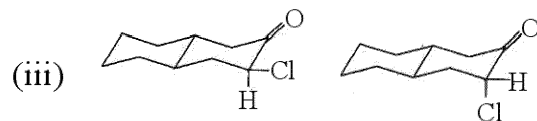
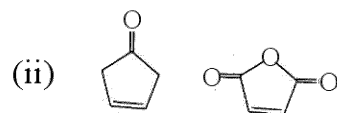
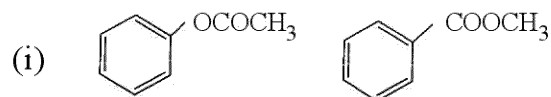


- (b) Offering suitable explanation, write down how will you identify A, B, C and D in the following transformation with the help of IR spectroscopy : **5**



- (c) Explain the effect of hybridization on the force constant of the bond in IR. **4**
- (d) How would you distinguish between the following on the basis of IR : **6**



No. of Printed Pages : 08

Roll No.

CC-297

M. Sc. EXAMINATION, Dec. 2018

(Third Semester)

(Main & Re-appear)

CHEMISTRY

CH613B

Organic Chemistry Special-I

(Organic Spectroscopy)

Time : 3 Hours]

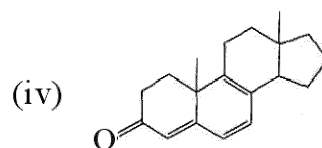
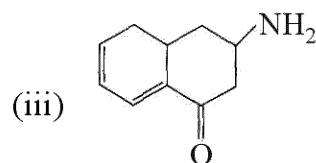
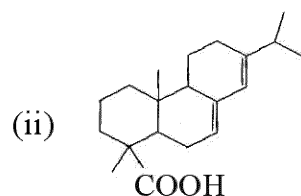
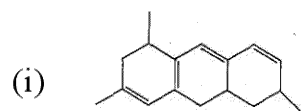
[Maximum Marks : 100

Before answering the question-paper candidates should ensure that they have been supplied to correct and complete question-paper. No complaint, in this regard, will be entertained after the examination.

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit.

Unit I

1. (a) Why a polar solvent usually shift $\pi-\pi^*$ transition to longer wavelength and $n-\pi^*$ transition to shorter wavelength ? **5**
- (b) Calculate λ_{\max} for the following compounds : **10**



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- (c) Discuss the structural features that may produce a bathochromic or a hypsochromic effect in the UV-Vis. spectra an organic compound. **5**

2. (a) Write briefly about : **9**

- (i) Chromophores and Auxochrome
- (ii) Far and near UV regions
- (iii) Molar extinction coefficient.

- (b) Explain, why β -carotene absorbs in visible range and what is the colour absorbed ? **4**

- (c) Based upon electronic transitions, the selection rules and Beer-Lamber law, explain the UV spectroscopy. **7**

Unit II

3. (a) How will you ascertain whether a disubstituted benzene is ortho, meta or para on the basis of IR spectroscopy ? **5**

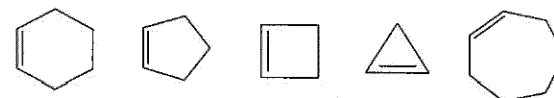
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P.T.O.

- (c) In the mass spectrum of cyclohexanone, some prominent peaks appear at m/z value of 98, 83, 70, 50 (base peaks) and 42. What are most probable species responsible for these peaks ? **5**
- (d) Explain, McLafferty rearrangement with mechanism by taking example of : **5**
CH3CD2CH2CH2COCH3.
8. (a) How could the following pairs of compound be differentiate by mass spectrometry ? **8**
- Ethyl amine and Diethyl amine
 - 3-methylcyclohexene and 4-methylcyclohexane
 - 2° and 3° alcohol
 - But-1-ene and but-2-ene
- (b) Comment upon salient features of mass spectra of compounds containing : **8**
- Two Chlorine and one bromine atoms
 - Two Chlorine and two bromine atoms
- (c) What is significance of M, M+1, and M+2 peaks in mass spectrometry. **4**

4. (a) Offering suitable explanation, arrange the following compounds in order of increasing value of C = C stretching band in their IR spectra. **5**



- (b) A hydrocarbon containing 10% hydrogen shows the following bands in its IR spectrum : 3295, 2130 and 625 cm^{-1} . Deduce the structure of the hydrocarbon. **5**
- (c) An organic compound, $\text{C}_7\text{H}_8\text{O}_3$ shows the following bands in the IR spectrum : 3000-2600 cm^{-1} (s, br), 1680 (s), 1600 (m), 1590 (m), 1340 (m), 1300 (sharp), 817 (s), 710 (s). Deduce the structure of compound. **5**
- (d) How would you distinguish between the following on the basis of IR : **5**
- Fermi resonance and overtone
 - Primary, secondary and tertiary amines.

Unit III

5. (a) Explain in detail what do you understand by terms CW NMR and FT NMR. What are the advantages of pulsed FT NMR over CW NMR ? **8**
- (b) An organic compound of molecular formula C_6H_{10} absorbs only one mole of hydrogen on catalytic hydrogenation. Its 1H -NMR spectrum records signals at δ 4.82 (2H), 2.22 (4H), 1.65 (4H). Propose the structure. **5**
- (c) How will you distinguish between inter and intra molecular hydrogen bonding on the basis of PMR spectroscopy ? **4**
- (d) What do you understand by shielding and Deshielding of nucleus in NMR spectroscopy ? **3**
6. (a) Explain anisotropic effect in acetylene, ethylene and benzene. **5**
- (b) Write short notes on the following :
(i) Lanthanide shift reagent
(ii) Nuclear Overhauser effect. **7**

- (c) Giving suitable explanations, deduce the structure of compound having following data : **5**

Molecular formula : $C_9H_9O_2Cl$

1H -NMR : δ 7.06-7.14 (5H, m), 6.17 (2H, s), 3.51 (2H, s)

^{13}C -NMR : δ 171.3, 134.8, 129.8, 129.2, 127.6, 68.5, 45.2

- (d) How can you differentiate between *ortho*, *meta* and *para*-dichlorobenzene on the basis of ^{13}C -NMR spectroscopy ? **3**

Unit IV

7. (a) Predict the fragmentation pattern of the following compounds :
(i) Diphenylether
(ii) Benzyl alcohol
(iii) Nitrobenzene. **5**
- (b) Define octant rule and give its applications. **5**