Seat No: _____ Enrollment No: _____

PARUL UNIVERSITY

FACULTY OF APPLIED SCIENCE

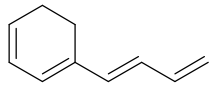
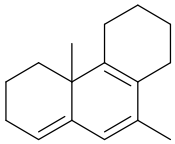
M.Sc. Summer 2018-19 Examination

Semester: 3 **Date: 09/04/2019**
Subject Code: 11205204 **Time: 02:00pm to 04:30pm**
Subject Name: Spectroscopy of organic compounds **Total Marks: 60**

Instructions:
1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start new question on new page.

Q.1. A) Essay type/ Brief note (4x2) (Each of 04 marks) **(08)**

(a) Solve the following using woodward fieser rule-

i)  ii) 

The base value for homoannualar is 253 nm and base value for hetroannular is 215 nm

(b) State the main differences between ^{13}C NMR and ^{1}H NMR Spectroscopy?

Q.1. B) Answer the following questions (Any two)

(a) Short note/ Brief note (2x2)/ Schematically label the figures (2x2) (Each of 02 marks) **(04)**
1. What is the principle of NMR Spectroscopy? Explain with suitable flipping diagram
2. Explain the term coupling constant (J)?

(b) Show schematically the types of stretching and bending vibrations that occurs in IR Spectroscopy? **(04)**

(c) Short note on electronic excitation in UV-spectroscopy. **(04)**

Q.2. A) Answer the following questions.

(a) Short note/ Brief note (2x2)/ Fill in the blanks. (Each of 02 marks) **(04)**
1. In mass spectrometry the neutral atoms are converted to _____ .
2. The base value for extra double bond is _____ nm

(b) Why TMS is chosen as a reference compound in NMR spectroscopy? **(04)**

Q.2. B) Answer the following questions (Any two)

(a) Choose the correct option- (Each of 01 marks) **(03)**
1. Olefins and ketones are-
a) Chromophores b) Auxochromes c) NMR active
2. The range of C=O stretching is –
a) 3650-3200cm^{-1} b) 1250-1050cm^{-1} c) 1780-1650cm^{-1}
3. In IR spectroscopy selection rule change in dipole moment is-
a) not mandatory b) equals to zero c) mandatory

(b) How many NMR signals will be observed in the following compounds- **(03)**
a) p-chlorobenzene b) $CH_3COCH_2CH_3$ c) $HCOOCH_3$

(c) Show the fragmentation in phenol with m/z values of 93 and 65? **(03)**

Q.3. A) Answer the following question in brief **(08)**

(a) In mass spectrometry a compound shows m/z values at 43,57,87,101 and 116. Which of the following molecule exhibit the following values among the two given below and show the fragmentation in both.
1. Propyl Chloride
2. S- butyl isopropyl ether

(b) Explain Nuclear overhausser effect in ^{13}C NMR?

Q.3. B) Answer the following questions (Any two)

(a) Short note/ Brief note (2x2)/ Schematically label the figures (2x2) (Each of 02 marks) **(04)**
1. Why mass is spectrometry method and not spectroscopy?
2. State the nitrogen rule of mass spectrometery?

(b) The hydrogen bonding lowers the stretching frequency in IR spectroscopy explain why? **(04)**

(c) Show the increasing order of stretching frequency in β- lactones, γ-lactones and δ- lactones and explain why? **(04)**

Q.4. A) Answer the following questions.

(a) Short note/ Brief note (2x2)/ Fill in the blanks. (Each of 02 marks) **(04)**

1. The natural abundance of ^{13}C is _____ % and spin quantum (I) =_____
2. $n \rightarrow \pi^*$ is a _____ transition

(b) Explain chemical shift term and explain the scale schematically? **(04)**

Q.4. B) Answer the following questions (Any two)

(a) Short note/ Multiple choice questions. (Each of 01 marks) **(03)**

1. Which scientist were awarded noble prize for NMR-

a) Block and Purcell
b) Ingold and agust
c) Einstein and curie

2. Selection rule for UV-Visible spectroscopy is-

a) $\Delta S=0, \Delta L=+-1$ b) $\Delta S=+-1, \Delta L=0$ c) $\Delta S=1, \Delta L=1$

3. Selection rule for NMR Spectroscopy is-

a) I= ½ b) I=0 c) I±0

(b) Write the selection rule for UV-Visible spectroscopy? **(03)**

(c) Explain the Fundamental mode of vibrations and formula to calculate them? **(03)**