Name: **Enrolment No:**	

UPES

End Semester Examination, December 2024

Course: Organic Synthesis & Spectroscopy **Semester: III**

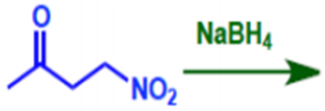
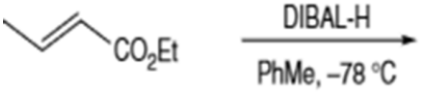
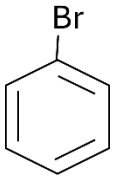
Program: M.Sc. Chemistry **Time : 03 hrs.**

Course Code: CHEM8049P **Max. Marks: 100**

Instructions: 1. Write your Enrollment number on the question paper.
2. Internal choices are given in question numbers 8 and 11.
3. Attempt all parts of a question at one place only.

SECTION A
(5Qx4M=20Marks)

S. No.		Marks	CO
Q 1	What do you mean by molecular ions. Explain its two characteristics.	**4**	**CO1**
Q 2	Identify the nuclei in the following, which are NMR active: $_6C^{12}$, $_8O^{16}$, $_7N^{14}$, $_7N^{15}$	**4**	**CO1**
Q 3	Which compound is used as reference compound in H-NMR and why?	**4**	**CO3**
Q 4	Explain the principle of ^{13}C NMR?	**4**	**CO1**
Q 5	Differentiate between H-NMR and ^{13}C-NMR.	**4**	**CO1**
	SECTION B **(4Qx10M= 40 Marks)**		
Q 6	a) What is the operating frequency required by an H-NMR spectrometer that generates a magnetic field of 11.744 Tesla. Given, $\gamma = 2.675 \times 10^8$ Tesla^{-1}sec^{-1} b) Discuss the influence of hydrogen bonding on chemical shift in ^{13}C-NMR spectroscopy.	**5+5**	**CO3**
Q 7	Write short notes on the following organic reagents: a) SeO_2 b) $NaBH_4$	**5+5**	**CO2**
Q 8	Suggest the possible products, if the following compounds are treated with $LiAlH_4$: a) Prop-2-enal b) Propyl chloride c) ethyl acetate d) acetamide Mention the reactions. **OR** Apply the disconnection approach to the following molecules: a. n-butanol b. toluene	**10** **10**	**CO2**

Q 9	Complete the following reactions and discuss the mechanism: a)  b) 	**5+5**	**CO2**
SECTION-C (2Qx20M=40 Marks)			
Q 10	A compound with molecular formula C_3H_7Br has the following data: a) Base peak at m/e 43, a large peak at m/e 42, one large peak at m/e 122 and a very weak peak at m/e 93. Assign the structure to the compound and show all the fragmentations. b) What is chemical shift. Why is it called so and how is it measured relative to TMS?	**10+10**	**CO3**
Q 11	a) A compound with molecular formula $C_4H_8O_2$ gives the following signals in the H-NMR spectrum: i) Triplet δ 1.1 (3H) ii) Quartet δ 2.3. (2H) i) singlet δ 3.6 (3H) Deduce the structure of the compound. b) Identify the number of signals and multiplicity obtained in ^{13}C NMR in the following compounds: i) $CH_3CH_2CH_3$ ii)  iii) $CH_3COOC_2H_5$ iv) $CH_3CH(OH)CH_3$ **OR** a) Explain spin-spin coupling. b) Explain the fragmentation of 2-butanol in mass spectroscopy with all m/z values.	**10 + 10** **10+10**	**CO3**