Total No. of Printed Pages : 3 **Roll No. .....**

1(CCE.M)2

Chemistry—II

(05)

Time : Three Hours] [Maximum Marks : 300

INSTRUCTIONS

(i) Answers must be written in English.

(ii) The number of marks carried by each question is indicated at the end of the question.

(iii) The answer to each question or part thereof should begin on a fresh page.

(iv) Your answer should be precise and coherent.

(v) The part/parts of the same question must be answered together and should not be interposed between answers to other questions.

(vi) Candidates should attempt any **five** questions.

(vii) If you encounter any typographical error, please read it as it appears in the text-book.

(viii) Candidates are in their own interest advised to go through the General Instructions on the back side of the title page of the Answer Script for strict adherence.

(ix) No continuation sheets shall be provided to any candidate under any circumstances.

(x) Candidates shall put a cross (×) on blank pages of Answer Script.

(xi) No blank page be left in between answer to various questions.

(xii) No programmable Calculator is allowed.

(xiii) No stencil (with different markings) is allowed.

1. (a) Discuss the relative stabilities of carbocations and free radicals. 20

   (b) Explain S_N2 mechanism with a suitable example. 15

   (c) How is frequency of vibration of a diatomic molecule related to reduced mass ? 15

   (d) Explain free-radical polymerisation with example. 10

2. (a) What are nitrenes ? How are they obtained ? Give any four properties of nitrenes. 20

   (b) Give the mechanism for the formation of 1,3-butadiene with HBr. 20

   (c) What is meant by chemical shift ? Discuss the various factors on which the value of chemical shift depends. 20

3. (a) Write the mechanism involved in any **two** of the following :

   (i) Aldol Condensation

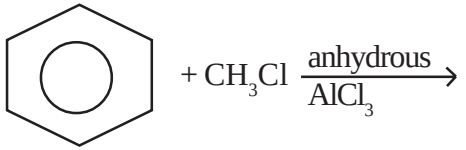
   (ii) Cannizzaro reaction

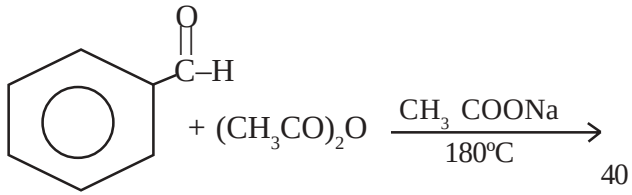
   (iii) Reimer-Tiemann reaction. 30

   (b) Discuss the principles of Infrared (IR) spectroscopy. 20

   (c) Give the important use and mechanism of the reaction brought about by Lithium aluminium hydride. ($LiAlH_4$) 10

4. (a) Write the structure of the product in the following reactions and give their mechanism.

   (i) 

   (ii) 

40

   (b) What are silicones ? How are they formed ? Give their types and applications. 20

5. (a) Explain Pinacol-Pinacolone rearrangement with mechanism. 20

   (b) What are Ziegler-Natta polymerisation ? What are the advantages over free radical vinyl polymerisation ? 20

   (c) Describe the working of UV spectrophotometer ? 20

6. (a) Explain the principle of nuclear magnetic resonance spectroscopy. 15

   (b) What are pericyclic reactions ? How are they classified ? Give an example for each class. 15

   (c) A compound having molecular formula C_8H_8O shows strong peaks at 1685 cm^{-1}. Which of the following is the likely structure of the compound ?

   (i) $C_6H_5\ COCH_3$

   (ii) $C_6H_5CH_2CHO$

   (iii) $C_6H_5OCH{=}CH_2$ 10

   (d) Explain the process of Nylon preparation. 20