(6 pages)

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Paper II — ORGANIC CHEMISTRY — I

Time : Three hours Maximum : 100 marks

Answer ALL questions.

UNIT I

1. (a) Distinguish between transition state and intermediate. (2)

(b) Azulene has appreciable dipole moment. Why? (2)

2. (a) Explain the rules for writing resonance structures. (6)

Or

(b) Discuss the concept of antiaromaticity and homoaromaticity. (6)

3. (a) (i) Discuss the factors which affect the stability of carbocations. (6)

(ii) Explain primary and secondary kinetic isotope effects with suitable examples. (4)

Or

(b) Write notes on :

(i) Hyperconjugation.

(ii) Taft equation. (5 + 5)

UNIT II

4. (a) What do you understand by the terms nucleophilicity and basicity? (2)

(b) What is the major product obtained during Friedel–Craft's reaction of *n*–propyl chloride with benzene in presence of anhydrous $AlCl_3$. Justify your answer. (2)

5. (a) Discuss nucleophilic substitution at vinylic carbon. (6)

Or

(b) Explain S_NAr mechanism with suitable examples. (6)

6. (a) Give an account of the following :

(i) AAC^2 mechanism

(ii) SE^1 mechanism. (5 + 5)

Or

(b) (i) Discuss the effect of substrate structure, nucleophile and leaving group on S_N2 reaction. (6)

(ii) Account for the observation that O–Bromoanisole on treatment with KNH_2 in liquid NH_3 gives *m*–anisidine. (4)

UNIT III

7. (a) State Bredt's rule. Explain with an example. (2)

(b) What is a carbenoid? Explain its reaction with an alkene. (2)

8. (a) Elimination of meso - 2, 3–dibromobutane gives trans–2–butene while racemic –2, 3–dibromobutane gives cis–2– butene. Explain. What is your conclusion from these reactions? (6)

Or

(b) Explain the mechanism and applications of Perkin reaction. (6)

9. (a) (i) With suitable examples, explain regioselectivity and chemoselectivity in addition reactions. (6)

(ii) Outline the preparation and synthetic utility of lithium dimethyl cuprate. (4)

Or

(b) Write notes on :

(i) Chugaev reaction.

(ii) Reformatsky reaction.

(iii) Diels–Alder reaction. (3 + 3 + 4)

UNIT IV

10. (a) Differentiate between enantiomers and diastereomers. (2)

(b) Define a prochiral centre and give an example of a molecule that contain this centre. (2)

11. (a) State and illustrate Cram's rule. (6)

Or

(b) Discuss free radical oxidation reactions with suitable examples. (6)

12. (a) Describe any two chemical methods and any two physical methods of determining configuration of geometrical isomers. (10)

Or

(b) Write briefly on :

(i) Biphenyl isomerism.

(ii) Hunsdiecker reaction. (5 + 5)

UNIT V

13. (a) Write the structures of indigo and benzothiazole. (2)

(b) What happens when

(i) imidazole is treated with perbenzoic acid.

(ii) Caffeine is oxidised with $KClO_3$/HCl. (2)

14. (a) Discuss briefly on

(i) Baker–Venkataraman rearrangement.

(ii) Fischer indole synthesis. (6)

Or

(b) How are the following prepared?

(i) Uracil

(ii) Coumarin. (6)

15. (a) How is the structure of uric acid elucidated? (1(

Or

(b) Give an account of the chemistry anthocyanins. (1(