Total number of printed pages-6

14 (CHM-3) 303

2019

CHEMISTRY

Paper : CH-303

(Foundations of Organic Synthesis)

Full Marks : 60

Time : Three hours

The figures in the margin indicate full marks for the questions.

Answer **any five** of the following questions : 3×5=15

- Using suitable examples differentiate between stereoselective and stereospecific reactions.
 3
- 2. How do polar protic and aprotic solvents affect the reactivity of enolates? 3

3. Explain the stereochemistry of the products obtained in the following reactions : 3



- Using appropriate examples, show how 1,2-, 1,3- and 1,4- difunctional compounds can be disconnected and identify the synthons for each.
- Identify suitable methods for the protection and deprotection of (a) carbonyl groups, (b) amino groups, and (c) alcoholic groups.
 3
- 6. Predict the major products of the following reactions, and explain which of the two diasteromeric substrates react faster :



Answer any nine of the following questions : 5×9=45 topbong to virtual

7. Dihydroxylation using OsO₄ of maleic acid results *meso*-tartaric acid whereas fumaric acid yields (±)-tartaric acid. Explain why.

8. Predict the epoxidation products of the rigid cyclic alkenes (I, II) and examine the reasons for the formation of respective products.

2+3=5

5



9. Complete the following transformations, by identifying the key steps and intermediates :

(B)



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- formation : OsO aniau noitelyxorb2.5×2=5 results meso-tartaric acid whereas NMe₂ acid yields (±)-HOBN MeS (a) (H) (G) Predict the epoxidat 13. Write the major products of any two of the EtO. following reactions : $2.5 \times 2 = 5$ Heat KH (c)11. Complete the following multistep synthesis, HCI, EtOH depicting the possible stereochemical control Me₂N Complete the follo 5^e in the reaction : (1 equivalent) LDA, -78 °C KNH2, liq. NH3 (c)(1 equivalent 14 (CHM-3) 303/G 14 (CHM-3) 303/G 5 14 (CHM-3) 303/G 4 Contd.
- 10. Suggest plausible mechanistic explanations for any two among the following reactions, and explain the stereoselectivity of product

12. On the basis of retrosynthetic analysis, identify starting materials and synthons for the following target molecules : 2.5 + 2.5 = 5

14. Propose suitable retrosynthetic analysis for the following diketones, and give a possible synthesis illustrating the application of 'Umpolung' strategy : 5



- Examine the synthesis for the dipeptide, aspartame, and the application of protecting groups for carboxylic and amino groups.
 5
- 16. Give reasons for the following : (a) Furan has a diene character. (b) C-3 position of indole is more reactive than C-2 position in indole towards aromatic electrophilic substitution reactions. 2.5+2.5=5
- 17. How will you accomplish the following conversions? Give plausible mechanism in each case, identifying the important intermediates : 2.5+2.5=5
 - (a) Furan derivative from acetophenone
 - (b) Pyridine derivative by a four component reaction.

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