

**M.Sc. IV Semester Degree Examination, October - 2023****CHEMISTRY****Modern Organic Synthesis****(NEP)**

Time : 3 Hours

Maximum Marks : 70

Note : Answer **any five** of the following questions with Question No. 1 (Q 1. **Compulsory**), each question carries **equal** marks.

1. (a) Discuss the transformation of coumarins into benzofurans. Provide an example reaction illustrating the process. **5**
- (b) Explain the transformation of thiophenes into alkanes through functional group transformation and discuss the significance of this transformation in the context of sulfur-containing heterocycles. **5**
- (c) Describe the step-by-step reaction mechanism for Fischer Indole Cyclization. **4**

2. (a) Discuss the key factors that influence stereoselectivity in acyclic systems and provide specific examples of reactions that showcase different aspects of acyclic stereoselective synthesis. **5**
- (b) Highlight the importance of retrosynthetic analysis in streamlining the synthesis of target molecules and optimizing reaction pathways with suitable reaction. **5**
- (c) Perform a retroanalysis of the following compounds and outline the potential starting materials and key synthetic steps : **4**
 - (i) Benzocaine
 - (ii) Indole-3-acetic acid

3. (a) Discuss the *Jablonski* diagram as a visual representation. How does this diagram aid in understanding the fate of excited molecules ? **5**
- (b) Detail the rearrangement of 1, 4- and 1, 5-dienes. Provide an overview of the reaction mechanisms involved in these rearrangements. **5**
- (c) Describe the key components and conditions required for the *Paterno-Büchi* reaction. Provide a step-by-step explanation of the reaction mechanism. **4**



4. (a) What are non-steroidal estrogens, and how do they differ from endogenous steroidal estrogens? Explain the therapeutic applications of non-steroidal estrogens in medical treatments. 5
- (b) Discuss the synthesis and mode of action of androsterone. Explain the biosynthetic pathway that leads to the formation of Androsterone. 5
- (c) Explain the synthesis of hexestrol. Describe the synthetic pathway used to produce hexestrol. 4
5. (a) Describe the roles of messenger RNA, transfer RNA and ribosomal RNA in protein synthesis and how they work together to ensure accurate and efficient translation of genetic information? 5
- (b) Explain the Fluid Mosaic Model of membrane structure. Describe the main features and components of the model. 5
- (c) Discuss the concept of ionophores and their applications in membrane transport. 4
6. (a) Describe how the elimination or modification of specific functional groups can simplify the synthesis of a target molecule? Give example. 5
- (b) Provide specific examples and mechanism of retrosynthetic analysis involving the disconnection of bonds connecting rings to functional groups. 5
- (c) Describe the chemical reactions of α, β unsaturated carbonyl compounds. 4
7. (a) Discuss the therapeutic applications of dienestrol. How dienestrol functions as a non-steroidal hormone and its mode of action? 5
- (b) Discuss membrane fluidity and its importance in cellular function. What factors influence membrane fluidity? 5
- (c) Discuss the potential applications of protein synthesis inhibitors in research and medicine. 4
8. (a) How is foreign DNA inserted into host cells, mention the potential applications of recombinant DNA technology? 5
- (b) Explain the biosynthesis and mode of action of testosterone, highlighting the main steps and enzymes responsible for its production. 5
- (c) Provide examples of Norrish Type I and II reactions and describe the synthetic and mechanistic implications of these transformations. 4

