D3ACH2103 **(3 Pages)** **Name.....**
Reg.No.....

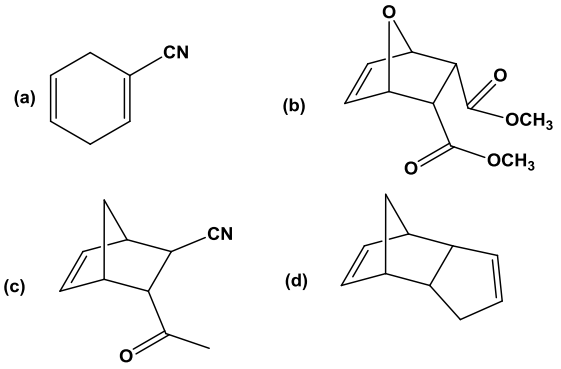
THIRD SEMESTER M.Sc. DEGREE EXAMINATION, NOVEMBER 2022
(Regular/Improvement/Supplementary)

CHEMISTRY
FCHE3C11 - PHOTOCHEMISTRY AND PERICYCLIC REACTIONS

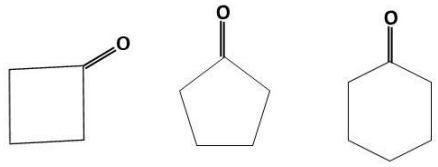
Time: 3 Hours **Maximum Weightage: 30**

Section A: Short answer questions. Answer any *eight* questions. Each carries *one* weightage.

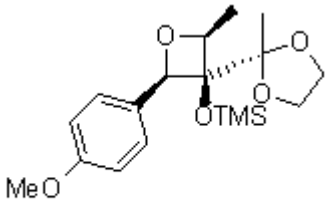
1. What is chelotropic elimination? Give an example.
2. Which diene and dienophile could be used in the synthesis of each of the following:



3. Comment on the rate of Norrish type-I reaction of the following carbonyl compounds. Justify.



4. The compound B is synthesized from anisaldehyde and compound A in the presence of light. Identify the reaction and the compound A.



B

5. Depict a synthesis of oxiranes involving the use of ylides.
6. Illustrate how Paal-Knorr reaction is useful in the synthesis of thiophenes.

(P.T.O.)

7. On the basis of energy diagram, explain the meaning of first and second excited states.
8. What is quantum yield? What are the reasons for low quantum yield in some photochemical reactions?
9. Draw the structure of any one monoterpene and mark the isoprene units in it.
10. What are the main steps involved in the replication of DNA?
11. Give a steroid core containing seventeen C atoms.
12. What are the forces responsible for the α-helix structure of proteins?

(8 × 1 = 8 weightage)

Section B: Short essay questions. Answer any *four* questions. Each carries *three* weightage.

13. Predict the product(s) and suggest a mechanism for each of the following reactions:

(i) $Ph\text{-}O\text{-}CH_2\text{-}CH{=}CH\text{-}CH_3 \xrightarrow{\Delta} ?$

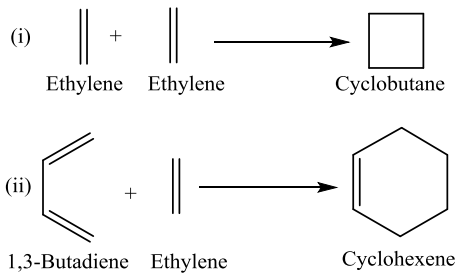
(ii) $Ph\text{-}CH_2\text{-}O\text{-}CH_2\text{-}Ph \xrightarrow[(ii)\ H_3O^+]{(i)\ PhLi} ?$

14. Discuss the important aspects of the stereochemistry of Diels-Alder reaction.
15. Mechanistically illustrate Di-pi methane and photo Fries rearrangements.
16. What is Barton reaction? Discuss its mechanism and important applications.
17. Mechanistically illustrate the photo reduction of benzophenone leading to the formation of benzpinacol.
18. Depict schematically the conversion of cholesterol to testosterone.
19. Discuss in detail the synthesis of 1,2,3-triazole and 1,2,4-triazoles.

(4 x 3= 12 weightage)

Section C: Essay questions. Answer any *two* questions. Each carries *five* weightage.

20. Discuss the FMO and correlation methods for predicting the viability of the following reactions:



21. a) Illustrate the Corey's strategy for the synthesis of Longifoline.

    b) Comment on the tertiary structure of proteins.

22. a) Using Jablonski diagram, explain the following terms.

i) Energy cascade ii) Vibrational cascade

iii) Internal conversion iv) Phsophorescence

b) Give a synthetic method each for: i) Oxazole ii) Isoxazole iii) Imidazole.

23. a) Ketones mainly give four types of photochemical reactions. Give the name of the reactions with one example each.

b) Elucidate the structure of atropine.

(2 × 5 = 10 weightage)