---------- your Roll No.

SEMESTER-IV EXAMINATIONS-2022
M.Sc. CHEMISTRY
PAPER CODE: MCHCCO-402
PAPER TITLE: Organic Synthesis-II
(Write your Roll No. at the top immediately on receipt of this question paper)

Time: Three Hours **Maximum Marks: 75**

Attempt all questions. All parts of a question must be attempted in continuation.
Start answer of a fresh question on a new page. Cite examples and draw labeled diagrams wherever necessary.

1. Write True (T) or False (F) for the following statements. Write the corrected statement for all the False (F) statements. **[10 x 1.5]**

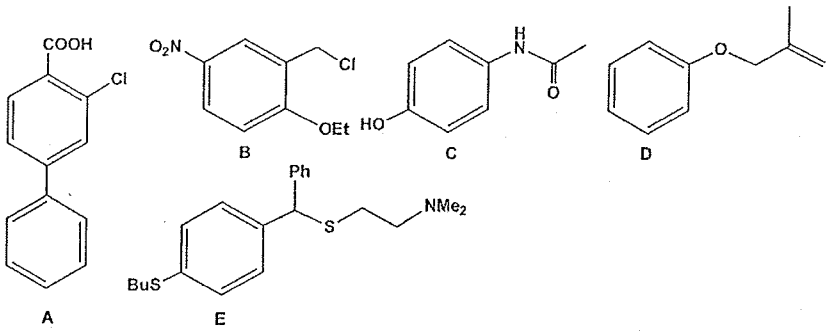
i) In the Prins reaction of styrene and formaldehyde, a Lewis base is required. (F/Lewis Acid)
ii) The Bergman cyclization requires low reaction temperatures, and H transfer happens from benzene. (F/High temp., cyclohexadiene)
iii) Dihydropyrimidines (DHPM) can be prepared in a one-pot three component condensation reaction by Baylis-Hillman reaction. (F/Biginelli reaction)
iv) An allylic alcohol can be prepared by applying the Sakurai reaction. The reaction requires a ketone, allyl trimethyl silane and a Lewis base. (F/homoallylic alcohol, Lewis Acid).
v) The Reserpine structure consists of three methoxy groups and three ester groups. (F/five, two)
vi) Vitamin D_3 differs from Vitamin D_2 in having a double bond and methyl group in the side chain. (F/double bond and methyl group in Vitamin D_2)
vii) N-alkylcarboxamides can be prepared from aliphatic nitriles, alcohol and a base utilizing the Ugi reaction. (F/Ritter reaction)
viii) RCHO can be converted to RCDO by utilizing the concept of reversal of polarity. In this, RCHO is first treated with propane diol for protecting the carbonyl group. (F/SH-$(CH_2)_3$-SH).
ix) Robinson annulation can be performed both by acid or base catalyzed reaction. (T)
x) Benzyl (Bn) groups used for protecting alcohols can be removed by acid or base. (F, hydrogenolysis).

Q2. Attempt ***any three*** of the following: **(3X5=15)**

A Provide the synthetic steps involved for the synthesis of Camphor.
B Provide the synthetic approach for obtaining Ergocalciferol (Vitamin D_2).
C Explain the structural differences in Vitamin D_3 and Vitamin D_5.
D Illustrate the total synthesis of Longifoline
E Explain the chiral approach for the total synthesis of Juvabioine

Q3. Attempt ***any three*** of the following: **(3X5=15)**

With a proper bond disconnection approach and retrosynthetic steps, discuss the stepwise synthesis of the following with the required reagents.



Q4. Attempt ***any three*** of the following: **(3X5=15)**

A Write the general mechanism of the Baylis-Hillman reaction explaining each step.

B Give the general mechanism of the Kulinkovich reaction.

C Cyclopentenones can be prepared by a famously named reaction by cycloaddition. Give the stepwise mechanism and details of the reagents and catalyst involved.

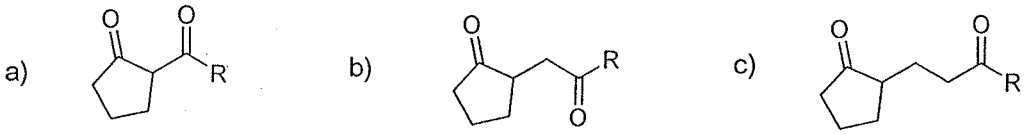
D Explain with mechanism a general multi-component Ugi reaction.

E With suitable examples explain chemoselective functional group protection with Cbz group.

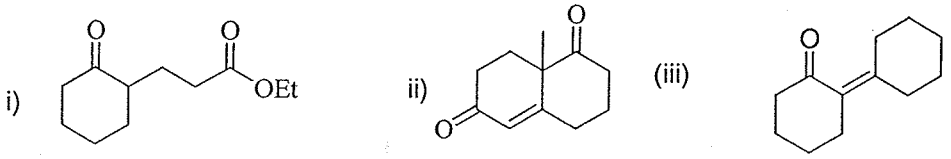
Q5. Attempt ***any three*** of the following: **(3X5=15)**

A. What is umpolung? State any two umpolung synthons and their utility in organic synthesis.

B. Explain how the relationship between the two functional groups influences the synthesis of the following molecules.



C. Design a convenient synthesis of the following molecules using the disconnection approach.



D. Give a brief account of the methods to control chemoselectivity and regioselectivity problems in carbonyl condensations.

E. Outline the synthesis of the following target molecules using retrosynthetic analysis.