

ASSIGNMENT BOOKLET**Organic Chemistry****Bachelor's Degree Programme (B.Sc.)****(Valid from 1st January, 2025 to 31st December, 2025)****Please Note**

- You can take electives (56 to 64 credits) from a minimum of TWO and a maximum of FOUR science disciplines, viz. Physics, Chemistry, Life Sciences and Mathematics.
- You can opt for elective courses worth a MINIMUM OF 8 CREDITS and a MAXIMUM OF 48 CREDITS from any of these four disciplines.
- At least 25% of the total credits that you register for in the elective courses from Life Sciences, Chemistry and Physics disciplines must be from the laboratory courses. For example, if you opt for a total of 64 credits of electives in these 3 disciplines, at least 16 credits should be from lab courses.
- You cannot appear in the Term-End Examination of any course without registering for the course. Otherwise, your result will not be declared and the onus will be on you.



School of Sciences
Indira Gandhi National Open University
New Delhi
(2025)

Dear Student,

We hope, you are familiar with the system of evaluation to be followed for the Bachelor's Degree Programme. At this stage you may probably like to re-read the section on assignments in the Programme Guide that we sent you after your enrolment. A weightage of 30 percent, as you are aware, has been earmarked for continuous evaluation, which would consist of one tutor-marked assignment. The assignment is based on Blocks 1, 2, 3 and 4.

Instructions for Formatting Your Assignments

Before attempting the assignments, please read the following instructions carefully.

- 1 On top of the first page of your answer sheet, please write the details exactly in the following format:

ENROLMENT NO.....

NAME:.....

ADDRESS:.....

.....

.....

COURSE CODE :

COURSE TITLE :

ASSIGNMENT NO.:

STUDY CENTRE : DATE:.....
(NAME AND CODE)

PLEASE FOLLOW THE ABOVE FORMAT STRICTLY TO FACILITATE EVALUATION AND TO AVOID DELAY.

- 2 Use only foolscap size writing paper (but not of very thin variety) for writing your answers.
- 3 Leave 4 cm margin on the left, top and bottom of your answer sheet.
- 4 Your answers should be precise.
- 5 While writing answers, clearly indicate the Question No. and part of the question being solved.
- 6 Please note that:
 - i) The Assignment is valid from 1st January, 2025 to 31st December, 2025.
 - ii) The response to this assignment is to be submitted to the Study Centre Coordinator within eight weeks of the receipt of this booklet in order to get the feedback and comments on the evaluated assignment.
 - iii) In any case, you have to submit the assignment response before appearing in the term end examination.

7 We strongly suggest that you should retain a copy of your assignment responses.

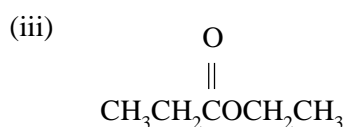
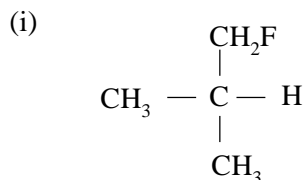
Wishing you all good luck.

Tutor Marked Assignment CHE-05: Organic Chemistry

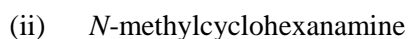
Course Code: CHE-05
Assignment Code: CHE-05/TMA/2025
Maximum Marks: 100

- Note:** * This assignment is based on all the four Blocks of the entire course.
* All questions are compulsory. Marks for the questions are shown within brackets on the right hand side.
* Please answer in your **own words**; do not copy from the course material.
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1. (a) Give the IUPAC names of the following compounds: (3)



- (b) Give the structure of the following compounds: (2)



2. Draw various stereoisomers of 2, 3-pentanediol and classify them as enantiomers or diastereomers. (5)

3. Draw the potential energy diagram for the conformations of *n*-butane. Compare the stabilities of the important conformations. (5)

4. Differentiate between intermolecular and intramolecular hydrogen bonding giving suitable examples. (5)

5. Arrange the following in the increasing order of their acid strengths: (5)
Chloroethanoic acid, fluoroethanoic acid, propanoic acid.

Give reason in support of your answer.

6. (a) How can cyclopentane be prepared from hexanedioic acid? (1)

- (b) How would you prepare alkanes from the following? (Give only one example). (2)



- (c) Explain the following: (2)

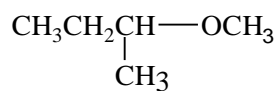
(i) In the mass spectra, alkanes give a series of peaks separated by 14 mass units.

ii) Alkanes with odd number of carbon atoms have lower melting points than those with an even number of carbon atoms.

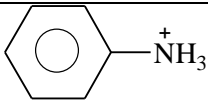
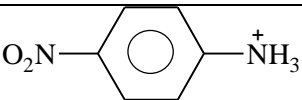
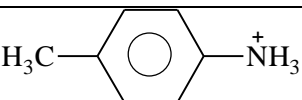
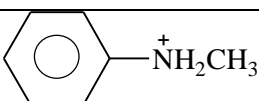
7. (a) Addition reactions of alkenes are exothermic processes. Explain. (1)

- (b) An alkene having molecular formula C_6H_{12} on ozonolysis yielded butanal and ethanal. What is the structural formula of alkene (2)

- (c) Complete the following reactions: (2)
- (i) $\text{CH}_3\text{CH}_2\text{CH}_2\text{BH}_2 \xrightarrow{\text{CH}_3\text{COOH}} \dots\dots\dots$
- (ii) $(\text{CH}_3)_2\text{C}=\text{O} + \text{Ph}_3\text{P}=\text{CH}_2 \xrightarrow{\text{CH}_3\text{CH}=\text{CH}-\overset{\cdot\cdot}{\text{C}}\text{H}\text{O}} \dots\dots\dots$
8. (a) Arrange the following bases in increasing order of basic strength and give reason for your answer. (3)
 CH_3CH_2^- , $\text{CH}_2=\overset{-}{\text{C}}\text{H}$, $\text{CH}\equiv\text{C}^-$
- (b) How would you prepare the following? (2)
- (i) 3-Octyne from 1-hexyne
- (ii) *cis*-3-Hexene from 3-hexyne
9. (a) Why does nitrobenzene not undergo Friedel-Crafts alkylation? (1)
- (b) What do you understand by *para*-directing activators, *para*-directing deactivators and *meta*-directing deactivators? (2)
- (c) What is Huckel's rule? Which of the following compound(s) is aromatic? Justify your answer. (2)
- (i) Cyclooctatetraene
- (ii) Nitrobenzene
10. (a) Predict the major and minor products of the following reactions: (2)
- (i) Friedel-Crafts acylation of pyrrole
- (ii) Friedel-Crafts alkylation of pyridine
- (b) Write the structure of 3-methyl-1,3-thiazol. (1)
- (c) Explain the following: (2)
- (i) 2-Position in furan is more reactive than the 3-position towards electrophilic substitution
- (ii) Pyrrole is more basic than pyridine.
11. Among alkyl halides, order of reactivity of $\text{S}_{\text{N}}2$ reaction is (5)
 $\text{CH}_3\text{X} > p\text{-RX} > \text{Sec-RX} > \text{tert-RX}$
 Discuss the factors which are mainly responsible for this order.
12. Write the chemical equation for following named reactions: (5)
- a) Reimer-Tiemann reaction
- b) Kolbe reaction
- c) Claisen reaction
- d) Knoevenagel reaction
- e) Willgerodt reaction
13. Suggest the reaction that can best be used to prepare following ethers by Williamson ether synthesis (5)
- (a) $\text{CH}_3\text{CH}_2\text{—O—CH}=\text{CH}_2$



- (b)
14. Write the mechanism for the haloform reaction. (3)
15. Explain Hell-Vollhard-Zelinski reaction. Also illustrate its synthetic importance. (2)
16. Write chemical reactions for the following: (5)
- Kolbe Schmidt reaction
 - Strecker synthesis
 - Dieckmann condensation
 - Knoevenagel reaction
 - Perkin condensation
17. Discuss various methods of reduction of esters giving the products formed. (5)
18. (a) Why do nitro compounds dissolve in sodium hydroxide? (2)
- (b) What is *aci* form of nitroethane? Discuss. (3)
19. Match the following ions with their correct pK_a values and give reasons for your answer (5)

	Column I, Ion		Column II, pK_a
(a)		(i)	5.07
(b)		(ii)	4.62
(c)		(iii)	4.85
(d)		(iv)	1.11

20. What are nucleotides? Draw the structures of nucleotides present in DNA and give their names. (5)