BCHCT-131

ASSIGNMENT BOOKLET

Bachelor's Degree Programme
(BSCG/BSCM)

ATOMIC STRUCTURE, BONDING, GENERAL ORGANIC CHEMISTRY AND ALIPHATIC HYDROCARBONS

Valid from 1st January, 2026 to 31st December, 2026

School of Sciences
Indira Gandhi National Open University
Maidan Garhi
New Delhi-110068
(2026)

Dear Student,

Please read the section on assignments in the Programme Guide for B. Sc. that we sent you after your enrolment. A weightage of 30 per cent, as you are aware, has been earmarked for continuous evaluation, **which would consist of one tutor-marked assignment** for this course. The assignment is in this booklet, and it consists of two parts, Part A and B. It covers all blocks of the course. The total marks of all the parts are 100, of which 35% are needed to pass it.

Instructions for Formatting Your Assignments

Before attempting the assignment 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:

ROLL NO.: ……

NAME: ……

ADDRESS: ……

……

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COURSE CODE: …….

COURSE TITLE: …….

ASSIGNMENT NO.: ……..…

STUDY CENTRE: ……..….. **DATE:** …….……...

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) Solve Part (A) and Part (B) of this assignment, and **submit the complete assignment answer sheets within the due date.**

6) The assignment answer sheets are to be submitted to your Study Centre within the due date. **Answer sheets received after the due date shall not be accepted.**

   We strongly suggest that you retain a copy of your answer sheets.

7) This assignment is **valid from 1st January, 2026 to 31st December, 2026**. If you have failed in this assignment or fail to submit it by December, 2026, then you need to get the assignment for the year 2027, and submit it as per the instructions given in the Programme Guide.

8) **You cannot fill the examination form for this course** until you have submitted this assignment.

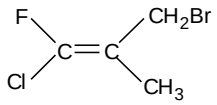
We wish you good luck.

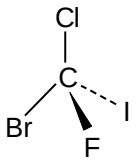
ASSIGNMENT

Atomic Structure, Bonding, General Organic Chemistry and Aliphatic Hydrocarbons
Core Course in Chemistry

Course Code: BCHCT-131
Assignment Code: BCHCT-131/TMA/2026
Maximum Marks: 100

Note: Attempt all questions. The marks for each question are indicated against it.

	PART-(A)		**(50)**
1.	Explain Geiger and Marsden's α-particle experiment using a suitable diagram.		(5)
2.	(a)	Name different lines exhibited in the atomic spectrum of hydrogen.	$\left(2\frac{1}{2}\right)$
	(b)	Write the de-Brogile relationship for dual nature of matter. Also define matter waves.	$\left(2\frac{1}{2}\right)$
3.	Briefly discuss photoelectric effect. Also give the explanation of this effect given by Einstein.		(5)
4.	(a)	List the applications of Schrodinger equation.	(3)
	(b)	Explain the significance of ψ and ψ^2.	(2)
5.	What are four quantum numbers? Give their significance.		(5)
6.	(a)	Explain the stability of half-filled and completely filled orbitals giving suitable examples.	(3)
	(b)	Give any two examples of atoms showing anomalous electronic configurations.	(2)
7.	State and illustrate Fajan's rules giving suitable examples.		(5)
8.	(a)	What is electronegativity? Arrange the following in the decreasing order of their electronegativities: K, F and I.	(3)
	(b)	Compare the characteristics of ionic and covalent compounds.	(2)
9.	(a)	Write the resonance structures of dimethylsulphone.	(2)
	(b)	Give the type of hybridisation in the following molecules: (i) BrF_5 (ii) XeF_2 (iii) $[Ni(CN)_4]^{2-}$	(3)
10.	(a)	Draw p_y-p_y combination of atomic orbitals to give the suitable molecular orbitals.	(3)
	(b)	Calculate the bond order of F_2 molecule from its molecular orbital configuration.	(2)
	PART-(B)		
11.	(a)	Assign the *E* or *Z* configuration to the following molecule giving the steps involved:  Also assign the priorities to the different groups.	(3)
	(b)	How will you distinguish maleic acid and fumaric acid?	(2)

12.	(a)	Assign *R/S* configuration to the following compound:  Also give the steps involved.	(3)
	(b)	Give example of a *meso* compound. Also comment on its optical activity giving reason.	(2)
13.		Draw the energy profile for various confirmations exhibited by cyclohexane. Also explain the relative energies of various conformations.	(5)
14.		Explain the relative stability of the following carbocations: (i) methyl carbocation (ii) a tertiary carbocation (iii) a primary carbocation (iv) a secondary carbocation	(5)
15.	(a)	Differentiate between the basicity and nucleophilicity giving suitable examples.	(3)
	(b)	Briefly explain the mechanism of β-elimination.	(2)
16.	(a)	Briefly explain Kolbe's electrolytic method for the synthesis of alkanes.	(5)
	(b)	What is aromatisation of gasoline? Illustrate giving appropriate reactions.	(2)
17.	(a)	State and explain Saytzeff rule giving a suitable example.	(3)
18.	(b)	Explain retro Diels-Alder reaction giving a suitable example.	(2)
19.	(a)	(i) State Markowinkoff's Rule. (ii) What is peroxide effect? Explain.	(3)
	(b)	Write the reactions for the hydroboration of propene followed by the oxidation by alkaline H_2O_2.	(2)
20.	(a)	How will you prepare 3-octyne from 1-hexyne? Write the steps involved.	(3)
	(b)	Write the products of oxidation of 2-hexyne using alkaline $KMnO_4$.	(2)