

BCHET-147

ASSIGNMENT BOOKLET

**Bachelor's Degree Programme
(BSCM)**

**ORGANOMETALLICS, BIOINORGANIC CHEMISTRY, POLYNUCLEAR
HYDROCARBONS AND UV, IR SPECTROSCOPY**

Valid from 1st January, 2025 to 31st December, 2025

**It is Compulsory to submit the Assignment before filling in the Term-
End Examination Form.**



**School of Sciences
Indira Gandhi National Open University
Maidan Garhi, New Delhi-110068
(2025)**

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:

.....

.....

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, 2025 to 31st December, 2025.** If you have failed in this assignment or fail to submit it by December, 2025, then you need to get the assignment for the year 2026, 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.

Tutor Marked Assignment

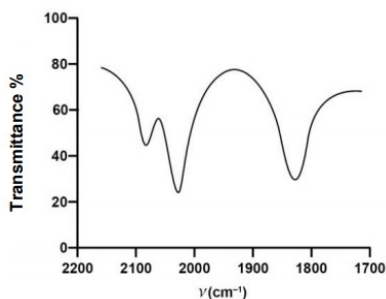
BCHET-147: ORGANOMETALLICS, BIOINORGANIC CHEMISTRY, POLYNUCLEAR HYDROCARBONS AND UV, IR SPECTROSCOPY

Course Code: BCHET-147
Assignment Code: BCHET-147/TMA/2025
Maximum Marks: 100

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

PART A: ORGANOMETALLICS, BIOINORGANIC CHEMISTRY

- 1 Give the IUPAC nomenclature of potassium dichromate. Also give its reaction with potassium iodide in acidic medium. (5)
- 2 Give the structure of methyl lithium. (5)
- 3 With the help of suitable equations, give any two methods for preparation of metal carbonyls by reductive carbonylation. (5)
- 4 Explain the structure of $\text{Fe}(\text{CO})_5$ based on valence bond approach. (5)
- 5 With suitable reactions (any two) explain how carbonyl hydrides are formed by reaction of metal carbonyls with hydrogen. (5)
- 6 With suitable diagrams explain the polarity of the free CO molecule as well as when it binds with a transition metal cation. (5)
- 7 What information is obtained from the IR spectrum of $\text{Fe}_2(\text{CO})_9$? (5)

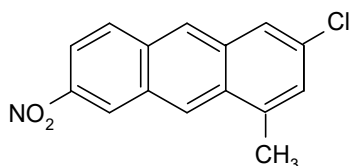
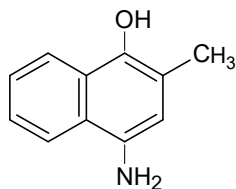


The IR spectrum of $\text{Fe}_2(\text{CO})_9$

- 8 Give a short account of the essential and non essential elements occurring in biological systems. (5)
- 9 Give the different ways by which lead affects the human body. (5)
- 10 Explain the conversion of heme to hemin along with a suitable diagram. (5)

PART B: POLYNUCLEAR HYDROCARBONS AND UV, IR SPECTROSCOPY

- 11 How will you prepare pentan-2-one from ethyl 3-oxobutanoate. Give the reactions involved. (5)
- 12 (a) Give IUPAC name the following compounds. (2)



- (b) Is anthracene aromatic compound? Explain. (3)
- 13 (a) Among pyridine and pyrrole which one is more basic? Explain (5)
- 14 In pyridine substitution occur which at the 3 position. Explain. (5)
- 15 Which are the two main parameters on which the absorption bands in ultraviolet and visible spectra are measured? (5)
- 16 Explain Woodward rules for predicting π - π^* absorption in dienes. (5)
- 17 Explain with the help of a diagram the orbital energy relationship between isolated and conjugated C=C and C=O groups. (5)
- 18 For polyatomic molecule, what are the different types of normal modes of vibration? Give the normal modes of vibrations for the symmetric stretching of a triatomic linear and triatomic angular molecule with suitable diagrams. (5)
- 19 Give the characteristic frequencies of the ketones and aldehydes. How are they different from esters? (5)
- 20 (a) List the factors affecting the position and intensity of IR bands in the IR spectrum. (2)
- (b) Explain the bands appearing in the IR spectrum of an alkane giving a suitable example. (3)