

**BCHET-147**

**ASSIGNMENT BOOKLET**

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

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

**Valid from 1<sup>st</sup> January, 2023 to 31<sup>st</sup> December, 2023**



**School of Sciences  
Indira Gandhi National Open University  
Maidan Garhi  
New Delhi-110068  
(2023)**

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:

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**ROLL NO.:** .....

**NAME:** .....

**ADDRESS:** .....

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**COURSE CODE:** .....

**COURSE TITLE:** .....

**ASSIGNMENT NO.:** .....

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

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**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 1<sup>st</sup> January, 2023 to 31<sup>st</sup> December, 2023**. If you have failed in this assignment or fail to submit it by December, 2024, then you need to get the assignment for the year 2024, 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

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

Course Code: BCHCET-147  
Assignment Code: BCHET-147/TMA/2023  
Maximum Marks: 100

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

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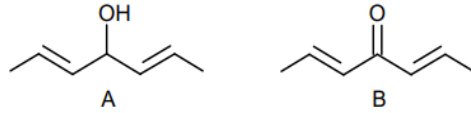
#### PART A: ORGANOMETALLICS, BIOINORGANIC CHEMISTRY

- 1 What is chromyl chloride test? Give suitable equations. (5)
- 2 Give the suitable equations for the reaction of potassium permanganate in acidic medium with the following: (5)  
Sulphuric acid, potassium iodide, ferrous sulphate in acidic medium.
- 3 What is Zeise's salt? Give suitable diagram to explain its structure. (5)
- 4 Explain the structure of  $\text{Fe}(\text{CO})_5$  based on valence bond approach. (5)
- 5 If the complex  $\text{M}_2(\text{CO})_9$  is obeying 18 electron rule, then identify the  $3d$  metal in it. (5)
- 6 Draw the isomers of  $\text{Co}_2(\text{CO})_8$  and give the differences in their structures. (5)
- 7 Explain with suitable diagrams the synergic bonding in metal carbonyls. (5)
- 8 Give the classification of the elements according to their occurrence in three different biological environments. (5)
- 9 Give the main reactions in photosynthesis. (5)
- 10 Explain the conversion of heme to hemin along with suitable diagrams. (5)

#### PART B: POLYNUCLEAR HYDROCARBONS AND UV, IR SPECTROSCOPY

- 11 Discuss the preparation of ethyl 3-oxobutanoate starting from ethyl ethanoate. Also write the mechanism of this reaction. (5)
- 12 By giving a suitable example, write the mechanism of electrophilic substitution reaction of naphthalene. (5)
- 13 Which one is more basic-pyrrole or pyridine? Explain. (5)
- 14 (a) Explain why nucleophilic substitution is taken place mainly at 2 and 4-positions of pyridine? (2)  
(b) Complete the following reactions: (3)
  - i) Naphthalene  $\xrightarrow[\Delta]{\text{V}_2\text{O}_5}$
  - ii) Naphthalene  $\xrightarrow{\text{Na, C}_2\text{H}_5\text{OH}}$
  - iii) Furan  $\xrightarrow{\text{Br}_2}$
- 15 What are auxochromes? Give suitable examples from small organic molecules to explain this. (5)

- 16 What are the two main parameters on which the characteristics of the absorption bands in ultraviolet and visible spectra depends on? Also explain in what ways the intensity of absorption can be expressed. (5)
- 17 With suitable diagram give the transitions that are observed in the electronic spectra of the carbonyl chromophore. (5)
- 18 Which of the following molecules absorbs at the longer wavelength? (5)



- 19 Why the band for  $\text{-C}\equiv\text{N}$  has greater intensity than that of the  $\text{-C}\equiv\text{C-}$  group in the  $2500 - 2000 \text{ cm}^{-1}$  region of the IR spectrum? (5)
- 20 What are the main absorption bands in the IR spectra of aldehydes and ketones? Giving suitable examples, discuss the effect of conjugation on the carbonyl stretching frequency in aldehydes and ketones. (5)