

**ASSIGNMENT BOOKLET****Bachelor's Degree Programme  
(BSCG)****ORGANOMETALLICS, BIOINORGANIC CHEMISTRY, POLYNUCLEAR  
HYDROCARBONS AND UV, IR SPECTROSCOPY****Valid from 1<sup>st</sup> January, 2024 to 31<sup>st</sup> December, 2024****It is Compulsory to submit the Assignment before filling in the Term-  
End Examination Form.****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  
Maidan Garhi, New Delhi-110068  
(2024)

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, 2024 to 31<sup>st</sup> December, 2024**. 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.

## Tutor Marked Assignment

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

Course Code: BCHCET-147  
Assignment Code: BCHET-147/TMA/2024  
Maximum Marks: 100

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

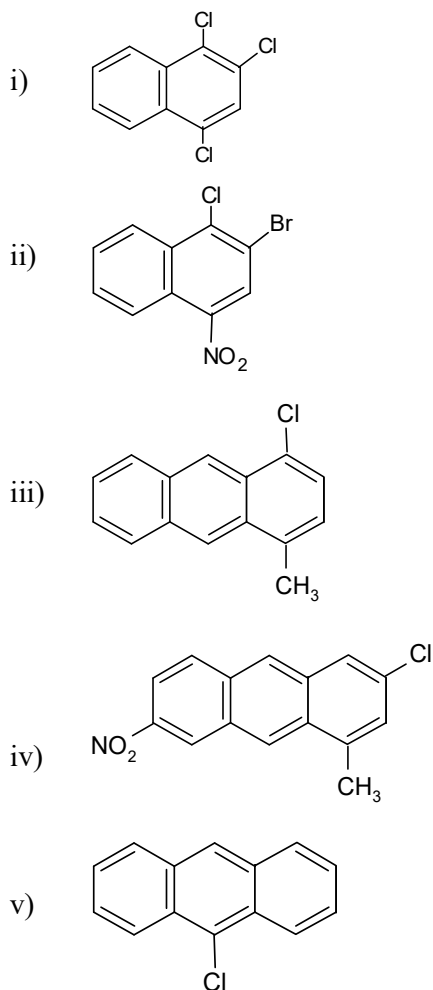
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#### PART A: ORGANOMETALLICS, BIOINORGANIC CHEMISTRY

- 1 Give the reactions where sodium nitroprusside is used for the qualitative analysis for the detection of  $S^{2-}$  and S in organic compounds. (5)
- 2 Give the differences between organometallic compounds and organic compounds. (5)
- 3 What is the structure of ferrocene in the solid state? What happens to the structure at extremely low temperature? (5)
- 4 Explain the structure of  $Ni(CO)_4$  based on valence bond approach. (5)
- 5 With suitable reactions (any two) explain reductive carbonylation. (5)
- 6 How are binuclear carbonyls characterized? Give the structure of  $Fe_2(CO)_9$  and explain the different types of bond present in it. (5)
- 7 Give the following reactions for the formation of: (5)
  - (i) carbonylate anion by addition of alkali or reduction (any two)
  - (ii) carbonyl hydrides (any one)
  - (iii) carbonyls by displacement of CO by other ligands (any two).
- 8 Discuss the classification of the elements on the basis of mechanism of action. (5)
- 9 Discuss the importance of cadmium of biological system. Why they cannot harm newborn babies? What is the effect of long term cadmium exposure in animals and human? (5)
- 10 What are the reactions involved in photosystem I and II. Give the Z-scheme of photosynthesis also. (5)

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

- 11 Discuss the preparation of the following compounds starting from ethyl 3-oxobutanoate? (5)
  - i) 2-Butenoic acid (crotonic acid)
  - ii) 4-ketopentanoic acid
- 12 Why 1-position ( $\alpha$ -position) of naphthalene is more reactive than the 2-position ( $\beta$ -position). Explain. (5)
- 13 Give IUPAC name of the following compounds: (5)



- 14 (i) The attack of the electrophile in furan occurs at the C-2 (or  $\alpha$ ) position. Explain with the help of a suitable example. (3)
- (ii) Write the preparation of pyridine.
- 15 Give the schematic diagram of the order of molecular orbital energies and give the possible electronic transitions in them. (5)
- 16 Explain bathochromic shift with a suitable example. (5)
- 17 Explain the electronic spectra of the acetylenic and benzenoid chromophore. (5)
- 18 Explain the degrees of freedom for polyatomic molecules. (5)
- 19 i) List different factors which govern the position and intensity of bands appearing in the IR spectrum of an organic compound. (5)
- ii) The C–C stretching vibration is infrared inactive (or nearly inactive). Give reason. In which region, C–H stretching absorptions of alkanes are exhibited?
- 20 Give the characteristics bands observed in the IR spectra of carboxylic acids and carboxylic acid anhydrides. (5)