

MCH-021

ASSIGNMENT BOOKLET

**M.Sc. in Chemistry Programme
(MSCCHEM)**

CHEMISTRY OF POLYMERS AND MATERIALS

(Valid from 1st July 2026 to 30th June 2027)

It is compulsory to submit the assignment before
filling in the examination form



School of Sciences
Indira Gandhi National Open University
New Delhi-110068
(2026-2027)

Dear Learner,

Please read the section on assignments in the Programme Guide for M.Sc. in Chemistry 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 covers both the blocks of the course. The total marks of all the parts are 100, of which 40% 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:

ENROLAMENT 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 paper (but not of very thin variety) for writing your answers.
3. Leave about 4 cm margin on the left, top and bottom of your assignment response sheet.
4. Your answers should be precise.
5. 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 July, 2026 to 30th June, 2027. If you have failed in this assignment or fail to submit it by June 2027, then you need to get the assignment for the year 2027-2028, 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 the assignment.

Wishing you good luck

Tutor Marked Assignment

Chemistry of Polymers and Materials (MCH-021)

Course Code: MCH-021

Assignment Code: MCH-021/TMA/26-27

Maximum Marks: 100

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

1. Answer **any five** of the following in brief. (2x5)
 - (a) Define the term degree of polymerisation (DM).
 - (b) Distinguish between graft and block copolymers.
 - (c) List two factors that affect the Glass Transition Temperature (T_g).
 - (d) What is the chemical significance of 'tacticity' in polymers?
 - (e) Define stimuli responsive polymers with one example.
 - (f) Explain the term biodegradation in the context of polymers.
 - (g) What are hydrogels and mention one biomedical application.

2.
 - (a) Describe the classification of polymers based on their origin and structure (linear, branched, cross-linked) using specific examples like polyethylene and bakelite. (5)
 - (b) Explain the concepts of number average and weight average molecular mass. Include a directive to calculate the dispersity of a polymer sample. (5)

3.
 - (a) Compare the mechanisms of chain-growth and step-growth polymerisation as defined by Carothers and Flory. (5)
 - (b) Discuss the kinetics of copolymerisation and describe how random and alternating copolymers are formed. (5)

4.
 - (a) Discuss the synthesis and mechanism of conduction in conducting polymers. (5)
 - (b) Explain the mechanism of action for pH-responsive and temperature-responsive polymers. (5)

5.
 - (a) Describe the importance of functional polymers in the development of artificial organs. (5)
 - (b) Explain biomimetics and the properties of 'Shape Memory Polymers'. (5)

6. Answer **any five** of the following in brief. (2x5)
- (a) Define liquid crystals and their intermediate state.
 - (b) What are polymeric liquid crystals?
 - (c) Define Critical Micelle Concentration (CMC).
 - (d) Mention two properties of ceramics that distinguish them from plastics.
 - (e) What is the role of the matrix and reinforcement in composite materials?
 - (f) Define nanomaterials and their scale-dependent properties.
 - (g) What are Langmuir-Blodgett Films?
- 7.
- (a) Classify various types of liquid crystals and discuss their characteristic properties. (5)
 - (b) Explain the chemistry and industrial importance of surface active agents. (5)
- 8.
- (a) Describe the structure and applications of glasses and ceramics. (5)
 - (b) Discuss the formation of composites and classify them based on the type of fibers used. (5)
- 9.
- (a) Discuss the unique physical and chemical properties of nanomaterials. (5)
 - (b) Outline the major applications of nanomaterials in modern electronics and health industries. (5)
- 10.
- (a) Describe the step-by-step formation process of Langmuir-Blodgett films. (5)
 - (b) Explain the various applications of thin films in optical and electronic devices. (5)