BBCCT-123

ASSIGNMENT BOOKLET

Bachelor's Degree Programme
B.Sc. Hons in Biochemistry (BSCBCH) & Bachelor of Science (Biochemistry, BSCFBC)
GENE EXPRESSION AND REGULATION

Valid from Jan, 2026 to Dec, 2026

School of Sciences
Indira Gandhi National Open University
Maidan Garhi
New Delhi-110068.

Dear Student,

Please read the section on assignments in the Programme Guide for Core Courses 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 total marks 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.

1. Use only foolscap size writing paper (but not of very thin variety) for writing your answers.
2. Leave 4 cm margin on the left, top and bottom of your answer sheet.
3. Your answers should be precise.
4. The assignment answer sheets are to be submitted to your Study Centre as per the schedule made by the study centre. **Answer sheets received after the due date shall not be accepted.**
5. **We strongly suggest that you retain a copy of your answer sheets.**
6. This assignment is **valid from Jan, 2026 to Dec, 2026** and submit it as per the instructions given in the Programme Guide.
7. **You cannot fill the exam form for this course** till you have submitted this assignment.

We wish you good luck.

ASSIGNMENT

GENE EXPRESSION AND REGULATION

Course Code: BBCCT-123
Assignment Code: BBCCT-123/TMA/2026
Maximum Marks: 100

Answer **all the questions** given below. All Questions carry equal marks.

1. A) Describe the structure and function of prokaryotic RNA polymerase and the role of the sigma factor in transcription initiation. 5

   B) Explain how DNA foot printing is used to identify promoter regions. 5

2. A) Describe the three stages of transcription in prokaryotes, highlighting rho-dependent and rho-independent termination. 5

   B) Discuss how inhibitors of bacterial transcription act as antimicrobial agents and explain their mode of action. 5

3. A) Describe transcription by RNA polymerase II, including core promoters and general transcription factors. 5

   B) Explain how differences between prokaryotic and eukaryotic transcription influence gene regulation complexity in eukaryotes. 5

4. A) Describe the roles of RNA polymerases I and III in eukaryotic transcription. 5

   B) Compare the fidelity of transcription and DNA replication and discuss the biological significance of transcriptional errors. 5

5. A) Describe the mechanism of pre-mRNA splicing and the role of the spliceosome. 5

   B) Explain how alternative splicing and RNA editing contribute to proteomic diversity in eukaryotes. 5

6. A) Explain the salient features genetic code. 5

   B) Discuss how wobble base pairing allows efficient translation with a limited number of tRNAs. 5

7. A) Describe the structure and functions of mRNA and tRNA in protein synthesis. 5

   B) Explain how antibiotics have been used to elucidate the mechanism of translation and their clinical applications. 5

8. A) Describe the role of signal sequences in protein targeting to different cellular compartments. 5

   B) Explain the physiological significance of regulated protein degradation in cell cycle control and stress responses. 5

9. A) Explain the principles of positive and negative regulation of gene expression with reference to operons. 5

   B) Explain how coordinated regulation of ribosomal protein synthesis is achieved in prokaryotes. 5

10. A) Differentiate between euchromatin and heterochromatin and explain chromatin remodeling. 5

    B) Explain the mechanism of RNA interference and discuss its applications in gene silencing and therapeutics. 5