

**BBCCT-125**

**ASSIGNMENT BOOKLET**

**Bachelor's Degree Programme  
B.Sc. Hons in Biochemistry (BSCBCH)**

**GENETIC ENGINEERING AND BIOTECHNOLOGY**

**Valid from January, 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 assignment is in this booklet, and it consists of three parts, Part A, B and C. 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) Complete each of Part A, Part B and Part C of this assignment separately, and **submit them together.**
- 6) 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.**

**We strongly suggest that you retain a copy of your answer sheets.**

- 7) This assignment is **valid from 1<sup>st</sup> January, 2026 to 31<sup>st</sup> Dec, 2026** and submit it as per the instructions given in the Programme Guide.
- 8) **You cannot fill the exam form for this course** till you have submitted this assignment.

We wish you good luck.

ASSIGNMENT  
MOLECULES OF LIFE

**Course Code: BBCCT-125**  
**Assignment Code: BBCCT-125/TMA/2026**  
**Maximum Marks: 100**

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

1. A) Describe the principle of recombinant DNA technology and list the major enzymes used in DNA manipulation. 5  
B) Explain how restriction endonucleases and gel electrophoresis are used together to isolate and analyze a specific DNA fragment. 5
2. A) Describe the essential features of an ideal cloning vector and explain the structure of pBR322. 5  
B) Compare pUC and bacteriophage-based vectors and justify their use for cloning genes of different sizes. 5
3. A) Describe the types of vectors used for gene cloning in yeast, plants, and animal cells. 5  
B) Explain the choice of suitable eukaryotic vectors for expression of a human gene in yeast or plant systems. 5
4. A) Explain the role of DNA ligase in joining DNA fragments and differentiate between sticky and blunt ends. 5  
B) Describe how linkers, adapters, and synthetic oligonucleotides are used to clone blunt-ended DNA fragments. 5
5. A) Describe the methods used for introduction of recombinant DNA into bacterial cells. 5  
B) Explain the use of electroporation for DNA transfer into animal cells and its advantages over chemical methods. 5
6. A) Explain the principles of insertional inactivation and blue-white selection. 5  
B) Describe how recombinant phages are identified during bacteriophage-based cloning experiments. 5
7. A) Describe the concept of gene libraries and the need for clone identification. 5  
B) Explain how real-time PCR is used for quantitative analysis of gene expression. 5
8. A) Describe the principle of Sanger's DNA sequencing method. 5  
B) Explain the challenges in producing recombinant proteins in *E. coli* and the role of fusion tags in purification. 5

9. A) Describe the principle of site-directed mutagenesis and outline the commonly used techniques. 5
- B) Discuss the role of protein engineering in the development of biopharmaceuticals and industrial enzymes. 5
10. A) Describe major applications of recombinant DNA technology in medicine and agriculture. 5
- B) Discuss the production of recombinant insulin and analyze the safety concerns associated with genetically modified crops. 5