[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 8046 **J**

Unique Paper Code : 2163010007

Name of the Paper : Recombinant DNA Technology and Proteomics (DSE)

Name of the Course : **B.Sc. (H) Botany / B.Sc. Life Science**

Semester : VI

Duration : 2 Hours Maximum Marks : 60

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Question **1** is compulsory and attempt **three** questions from the remaining.
3. **All** parts of the questions should be answered together.
4. **All** questions carry equal marks.
5. Draw well-labeled diagrams wherever necessary.

1. (a) State whether True or False **(any five)** : (5×1=5)

   (i) PCR is used to cut DNA molecules into smaller fragments, which are then analyzed by electrophoresis.

   (ii) In recombinant DNA technology, a cDNA library is created from mRNA by reverse transcription to study gene expression.

   (iii) Gene cloning refers to the process of creating an identical copy of a gene within the same organism.

   (iv) DNA ligase is used to break the phosphodiester bonds between nucleotides in a DNA strand.

P.T.O.

(v) Transformation is the process by which a host cell takes up foreign DNA from the environment and incorporates it into its genome.

(vi) An expression vector is designed to ensure that the inserted gene is expressed and translated into protein within the host cell.

(vii) Golden rice is a genetically modified (GMO) rice variety engineered to produce beta-carotene, which the body converts into vitamin A.

(b) Match the following : (5×1=5)

(i) Restriction enzymes	(a) Ti Plasmid
(ii) pBR322	(b) Ulrich K. Laemmli
(iii) PCR	(c) Arber, Smith, and Nathans
(iv) *Agrobacterium tumefaciens*	(d) Kary Mullis
(v) SDS PAGE	(e) Francisco Bolivar & Raymond L. Rodriguez

(c) Expand the following **(any five)** : (5×1=5)

(i) Taq Polymerase

(ii) pUC18

(iii) BAC

(iv) GFP

(v) SDS PAGE

(vi) RNAi

(vii) ELISA

2. Write short notes on the following **(any three)** : (3×5=15)

(a) *Agrobacterium* mediated gene transfer

(b) Antisense RNA Technology

(c) Western Blotting

(d) Types and roles of restriction endonucleases

(e) pBR322

3. Differentiate between the following **(any three)** : (3×5=15)

(a) Ion exchange chromatography and affinity chromatography

(b) Expression vectors and shuttle vectors

(c) Linker and Adaptor

(d) Exonucleases and Endonucleases

(e) 1-D SDS PAGE and 2-D gel electrophoresis

4. (a) Discuss how the recombinant DNA technology and proteomics has helped in developing biofortified food crops and in the production of medically important products such as insulin and vaccines. (7)

(b) Discuss the direct gene transfer methods in recombinant DNA technology. Provide its advantages and limitations. (8)

5. Answer **any two** of the following : (2×7.5=15)

(a) Explain the principles and steps involved in the construction of genomic and cDNA libraries. Highlight the differences between the two types of libraries and discuss their applications in recombinant DNA technology.

(b) Explain SDS-PAGE with the help of diagrams. Give its applications in plant sciences.

(c) How are target DNA sequences screened and identified using DNA hybridization and immunological methods? Explain.

(d) Give the roles and significance of different enzymes used in recombinant DNA technology apart from restriction enzymes.