

This question paper contains 3 printed pages]

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S. No. of Question Paper : 9841

Unique Paper Code : 3183010021

Name of the Paper : Advance Molecular Biology and Genetic Engineering (NEP-UGCF)

Name of the Course : B.Sc. (H) Biomedical Sciences

Semester : VII

Duration : 2 Hours

Maximum Marks : 60

(Write your Roll No. on the top immediately on receipt of this question paper.)

Attempt five questions in all.

Question No. 1 is compulsory.

Give illustrations and examples wherever required.

Sub-parts of the questions should be attempted together.

1. (a) Define the following :

6×1=6

(i) DNA triple helix

(ii) P-elements

(iii) Therapeutics

(iv) Recombinants

(v) Blotting

(vi) Fusion proteins.

P.T.O.

(b) Differentiate between (any three) :

3×2=6

(i) A-DNA and B-DNA

(ii) Tn3 elements and P-elements

(iii) DNA and cDNA

(iv) Tyrosine recombinase and Hin recombinase

(c) State true and false. Also justify the statement :

4×2=8

(i) Site-specific recombination is highly specific to the DNA sequence.

(ii) Ac-Ds system is commonly found in maize.

(iii) Terminal transferase is the enzyme that add nucleotides to both ends of DNA.

(iv) Expression vectors are the DNA molecule that multiply the cloned gene in cell.

2. (a) Explain the regulation of the lac operon in *E. coli*. Describe the role of the repressor, operator, promoter, CAP-cAMP complex, and inducer. Explain negative and positive regulation ?

5

(b) Elaborate on double-strand break repair and its significance in genetic stability. Explain the role of strand invasion and strand displacement during homologous recombination.

5

3. (a) Choose any therapeutics gene of interest as example, details the steps involved in its cloning, expression and purification. 5
- (b) Briefly describe the methods used for functional analysis of cloned genes in transgenic. 5
4. (a) Elaborate the legal and socio-economic issues raised by modern Biotechnology. 5
- (b) Give in detail the restriction and modification enzymes used in rDNA technology. 5
5. (a) Describe the underlying principle of DNA footprinting and detail the steps involved in a standard DNase I footprinting assay to identify a protein's binding site on a DNA fragment. 5
- (b) Recombinant hormones have evolved significantly since the approval of the first generation. Describe the defining characteristics of each of the three generations, highlighting the key biotechnological advancements that enabled the transition from one generation to the next. 5
6. Write short notes on (any two) : 2×5=10
 - (i) Applications of transgenic animals
 - (ii) Regulatory sequences in eukaryotes
 - (iii) Role of enzymes in site specific recombination
 - (iv) Nucleosome.