(3 Hours) **(Total Marks : 100)**

Instructions to the candidates:-

1) **All** the questions are **compulsory**. **Choice** is **internal**.
2) **Figures** to the **right** indicate **full marks**.
3) **All** questions carry **equal marks**.
4) Draw **flowcharts /diagrams** wherever **necessary**.

Q1 A) Fill in the blanks: **4**

i) The site for DNA replication is _____
ii) Thymine dimers occur due to _____ light
iii) The enzyme used to join bits of DNA is _____.
iv) Okazaki fragments are present on _____ strand.

Q1 B) Write a note on (any one): **4**

i) DNA Polymerases
ii) SOS repair

Q1 C) Answer the following: (any two) **12**

i) Discuss the various proteins required to be synthesised in a cell to enable it to multiply.
ii) Elaborate on the Excision repair mechanism.
iii) Discuss the structural mutations that can occur during or after replication.

Q2 A) Fill in the blanks: **4**

i) Post-transcriptional modification occurs in _____.
ii) ___ is a stop codon.
iii) The synthesis of polynucleotide chain of mRNA is catalysed by the enzyme _____.
iv) Protein synthesis in bacteria takes place on/in _____.

Q2 B) Write a note on (any one): **4**

i) Genetic code
ii) Splicing

Q2 C) Answer the following: (any two) **12**

i) Write a note on (i) inhibitors of mechanisms of central dogma of molecular biology (ii) post-translational modifications.
ii) Schematically ONLY represent the process of elongation in translation
iii) Explain the process of initiation of protein synthesis

Q3 A) Fill in the blanks: **4**

i) EcoR1 cleaves DNA at _____

ii) In pUC vectors, if the gene of interest is inserted in_____ gene

iii) Restriction endonucleases isolated from unidentified micro-organisms is named as _____.

iv) _____ chemical is used to increase the copy number of a plasmid.

Q3 B) Attempt the following: (any one) **4**

i) Diagrammatically represent and explain the process of cloning a foreign gene into a plasmid cloning vector.

ii) Create a note on genetically modified food.

Q3 C) Answer the following: (any two) **12**

i) Write a short note on probe. Briefly explain about labelling of probe and its applications.

ii) Elaborate on 'Molecular Scissors' and 'Molecular Stitchers.'

iii) Justify: 'pBR322 is an ideal vector'

Q4 A) Fill in the blanks: **4**

i) At _____ temperature denaturation of DNA double helix takes place in PCR.

ii) _____ library only involves expressible genes.

iii) _____ chemical enhances transformation efficiency.

iv) _____ developed the polymerase chain reaction.

Q4 B) Attempt the following: (any one) **4**

i) Highlight on the contribution of E.M. Southern to the field of recombinant DNA technology.

ii) Discuss the (a) experimental set-up and (b) advantages of a chemical method of gene transfer.

Q4 C) Answer the following: (any two) **12**

i) Explain selection of recombinant cells by the use of antibiotic-resistance gene.

ii) Elaborate on a technique of DNA amplification.

iii) In a stepwise manner, explain the formation of a DNA library. Also, state the difference between a cDNA library and genomic library.

Q5 A) Define and explain: **8**

a) Okazaki Fragments

OR

b) Aneuploidy

c) Shine-Dalgarno sequence

OR

d) TATA box

e) 1 unit of restriction endonuclease

OR

f) R plasmid

g) Colony hybridization

OR

h) Transformation

Q5 B) State True or False with justification: **12**

i) Hind III is a blunt-end cutter.

ii) Reverse transcriptase has a DNA dependent DNA polymerase activity.

iii) Lac selection method is also known as blue-white colony method.

iv) All repair mechanisms are error free

v) Meselson and Stahl proved that translation is by semi-conservative process

vi) SSB are a requirement in repair
