

(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:**

- 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.

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

- i) DNA Polymerases
- ii) SOS repair

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

- 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.

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

- 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 \_\_\_\_\_.

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

- i) Genetic code
- ii) Splicing

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

- 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

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- 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:**

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- 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
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