

N.B. All questions are compulsory

Numbers to the right indicate marks

Draw neat labeled diagram wherever necessary

Duration: 2.5 hours

Total marks: 60

Q.1 Answer any four of the following

16

- a. Justify: Genetic code is degenerate.
- b. Diagrammatically represent initiation of bacterial translation.
- c. Discuss the steps involved in termination of bacterial translation.
- d. Justify: Specificity of codon recognition lies in the tRNA molecule, not in the amino acid it carries.
- e. Write a note on the process of peptide bond formation involved in the elongation phase of bacterial translation.
- f. Elaborate on any two approaches to decipher the genetic code.
- g. Give a detailed account on the process of binding of aminoacyl tRNA to ribosome.
- h. Diagrammatically represent protein sorting in the cell.

Q.2 Answer any four of the following

16

- a. Justify: RNA polymerase binding to DNA at promoters regulate gene expression.
- b. Explain the working of lac operon with lacZ and lacY mutations.
- c. Write a note on promoter mutations of lac operon.
- d. Diagrammatically represent common patterns of regulation of transcription initiation.
- e. Discuss in brief positive control and catabolite repression with respect to lac operon.
- f. Diagrammatically explain components of trp operon.
- g. Why does attenuation occur in bacteria?

- h. Write a note on attenuation with respect to trp operon.

Q.3 Answer **any four** of the following

16

- Define point mutations. Add a note on silent and neutral mutation.
- What are spontaneous mutations? Elaborate on spontaneous chemical changes causing mutations.
- Write the characteristic differences between base excision repair and Nucleotide excision repair.
- Explain transition and transversion mutation with suitable diagrams.
- Write a note on mismatch repair mechanism.
- What type of mutations can be caused by intercalating agents? How?
- What is recombination repair? Draw an explanatory diagram.
- Give examples of base modifying agents and the predicted transition caused by them.

Q.4 Answer **any six** of the following

12

- Name the two amino acids which are encoded by only one codon.
- What is the wobble hypothesis?
- tRNA consists of anticodon sequences in loop _____ (I/ II/ III) and _____ (5'-CCA-3'/ 5'-TCA-3'/ 3'-GCA-5') at their 3' end.
- What are polyribosomes?
- Following is the lac operon genotype of *E. coli*: $lacI^+ lacP^+ lacO^0 lacZ^-$
Predict whether beta-galactosidase will be produced
(a) if lactose is absent from the growth medium and
(b) if lactose is present in the growth medium.
- Following is the lac operon genotype of partial diploid *E. coli*:
 $lacI^+ lacP^+ lacO^+ lacZ^- lacY^- / lacI^- lacP^+ lacO^+ lacZ^+ lacY^+$
Predict whether beta-galactosidase and permease will be produced if lactose is absent from the growth medium.
- Explain the term: constitutive gene expression.

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- h. What is specificity factor? Give one example for the same.
- i. What is chromosomal mutation? Give examples.
- j. If the mutation changes a wild type gene to a mutant gene it is a type of _____ mutation.(Null/Forward/Reverse)
- k. Define transposons. What are three types of transposons?
- l. What is depurination? Why does it occur?