

BIOLOGY

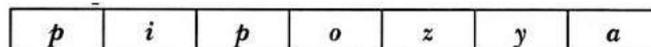
Class: XII

Chapter -06 Molecular Basis of Inheritance

TIME ALLOTTED: 45 MINIS.

MM: 25

1. What does the gene *z* code for in the lactose operon? 1
2. DNA packing involves few amino acids in eukaryotic. Name the two amino acid residues. 1
3. (i) Mention two functions of the codon AUG. 2
(ii) hn RNA is required to undergo splicing. Why?
4. In eukaryotes gene expression is regulated at four different levels. Mention. 2
5. Write down the roles of DNA polymerase during replication. 3
6. Replication of DNA is a continuous process in one strand while discontinuous in other strand. Give reason. 3
7. Draw and label a secondary structure of t-RNA. Mention the utility of anticodon binding site. 3
8. (i) Study the schematic representation of the genes involved in the lac operon given below and answer the questions that follow: 5



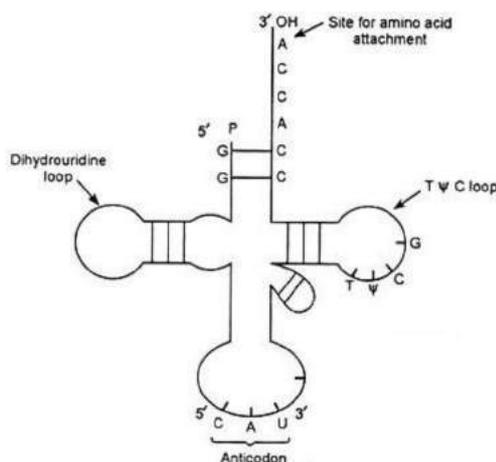
- a) Identify and name the regulatory gene in this operon. Explain its role in 'switching off' the operon.
- b) Name the inducer molecule and the products of the genes 'a' and 'y' of the operon.
- (ii) How did the scientists make it possible to distinguish the heavy DNA molecule from the light DNA molecule?
- (iii) Expand the term ESTs. Mention their role in Human genome project.

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1. It codes for an enzyme beta-galactosidase which is responsible for the hydrolysis of lactose. 1
2. Lysine and Arginine 1
3. (i) Initiator codon and it codes for methionine. 2
(ii) Since hnRNA is non-functional due to presence of introns. Once it is spliced introns are removed and exons are joined to each other.
4. 1. Transcriptional level (formation of transcript), 2
2. Processing level (regulation of splicing),
3. Transport of mRNA from nucleus to cytoplasm,
4. Translational level
5. 1. It uses a DNA template to catalyse the polymerization of nucleotides. 3
2. It removes RNA primer.
3. It is involved in proof reading and DNA repair.
6. DNA replication is continuous in one strand and discontinuous in lagging strand because: 3
 1. In lagging strand the replication fork is runs in 5' to 3' direction while in leading strand it opens from 3' to 5' direction while DNA polymerase can synthesize new DNA only in 5' to 3' direction.
 2. Since DNA polymerase strand works anti parallel to its template strand it means it needs to extend in 3' to 5' direction. which is not feasible
 3. Once DNA polymerase extends DNA on leading strand and increase the unwinded region of DNA, several RNA primase binds to different positions randomly on lagging DNA strand in the opposite fashion to movement of DNA polymerase.
7. (i) 3



(ii) At the time of protein synthesis, anticodon pairs with its complementary “codon” on mRNA.

8. (i) i gene is the regulatory gene and stands for inhibition. It synthesizes repressor. In the absence of inducer, repressor molecule binds to the promoter and thus prevent RNA polymerase from binding. Thus proteins will not be transcribed and operon will be switched off. **5**

(i) y : Permease, a : transacetylase

Permease: It increase permeability of the cell for lactose.

transacetylase: Catalyzes transacetylation of lactose into active form

(ii) on the basis of centrifugation-caesium chloride density gradient centrifugation.

(iii) ESTs: Expressed sequence tags. EST focused on identifying all the genes that re expressed as RNA. It is one of the important approaches for analyzing the genome.





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