Q.P. Code :20782

[Time: Three Hours] **[Marks:100]**

Please check whether you have got the right question paper.

N.B:
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.

Q.1 **A) State True or False:** **04**

i) Mendel's law were readily accepted.

ii) A recessive trait can be expressed in only heterozygous condition.

iii) The fusion of male gamete of one plant with female gamete from another plant is called selfing.

iv) The F2 offspring of a monohybrid cross would show the genotype (s) AA, aa, Aa.

09

B) Answer the following : (any three)

i) Scientists and geneticists in the 19th century were working on models like *Drosophila*, yeast etc. Mendel chose pea. Justify the use of this plant by Mendel which helped him conclude laws of inheritance.

ii) If dimpled cheeks are dominant over non – dimpled cheeks, what proportion of offspring with dimpled cheeks may one expect if a non – dimpled individual marries a dimple cheek individual? Give reasons for your answer.

iii) Certain traits express incomplete dominance. Explain using a suitable example.

iv) State true or false giving detailed reasons: "Individuals of identical phenotype may have different genotypes and vice – versa"

v) Justify how environment affects the inheritance of traits.

vi) Briefly explain how shell coiling in snail seen in the offspring is controlled by the genotype of mother.

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C) Answer the following: (any two)

i) Elaborate on Epistasis.

ii) Two babies in a maternity ward have lost their identity bands, and there is some confusion about their footprint records. Blood group of baby #1 is type A and of baby #2 is type AB. Mrs. Kamthania is one of the mothers and her blood type is O. Which baby is her baby? Give detailed reason for your answer.

iii) Justify in detail: "Both mitochondrial DNA and chloroplast DNA are overwhelmingly inherited from the maternal side."

iv) State Mendel's second law. In an orchard, some apple trees have long leaves and others have short leaves (recessive). A series of crosses is conducted and the results obtained are given in the table. You are free to choose gene symbols. Give the possible genotypes of the parents of each cross.

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Cross	Progeny	
	Long	**Short**
a) Long X Short	55	60
b) Long X Long	120	45
c) Long X Long	123	0
d) Short X Short	0	102

Q.2 **A) Match the following:** **04**

Column A	**Column B**
a) G_0 phase	i) cyclin A
b) G1 phase	ii) cyclin B
c) G1/S	iii) cyclin C
d) S phase	iv) cyclin E
	v) Cdk
	vi) cyclin D

B) Answer the following: (any three) **09**

i) With the help of a diagram, explain the process of gene transfer in *Hfr* strain.
ii) Write a short note on topoisomerases.
iii) Briefly explain extra – chromosomal genetic material present in prokaryotes.
iv) Explain in brief about telomeres.
v) Differentiate between euchromatin and heterochromatin.
vi) Elaborate on the effect of growth factors on cell cycle regulation.

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

i) Which genetic transfer pathway will be followed if T2 phage infects *E.coli* ? Explain the same in detail.
ii) Compare and contrast: Prokaryotic and eukaryotic genetic material.
iii) Elaborate on role of cyclins in cell cycle regulation.
iv) Write a note on proteins involved in eukaryotic chromosomal structure.

Q.3 **A) State True or False:** **04**

i) Secretion of H^+ by gastric parietal cells occurs by facilitated diffusion.
ii) The energy needed for secondary active transport is provided by the concentration gradient created by Na^+.
iii) Transferrin comprises of Apotransferrin and Fe^{+2}
iv) Bicarbonate (HCO_3^-) and chloride (Cl^-) transport across the membrane of red blood cells (RBCs) is called Chloride shift.

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B) Answer the following: (any three) **09**

i) With the help of a schematic diagram, explain the different steps involved in phagocytosis.
ii) Briefly explain ferittin and its role in human physiology.
iii) State true or false giving detailed reasons: The pO_2 in the pulmonary veins is less than the pO_2 in the alveolar air.
iv) Define and explain the physiological role of the Na – K pump.
v) What is concentration gradient? Citing examples, explain what is meant by moving 'along' and 'against' the concentration gradient.
vi) With the help of examples, explain the different types of coupled transport.

C) Answer the following in detail: (any two) **12**

i) Discuss the different factors affecting oxyhaemoglobin dissociation curve.
ii) Explain the different types of transport.
iii) Compare and contrast: exocytosis and endocytosis.
iv) Write a elaborate note on the different types of lipoproteins.

Q.4 A) Define the following terms: (any five) **10**

i) Kinetochore
ii) Conjugation
iii) Secondary active transport
iv) Coated pits
v) Pure breeding plant
vi) Allele
vii) Phenotype

B) Answer the following: (any three) **15**

i) Differentiate between simple and facilitated diffusion. Explain as to which of the two processes is faster and why?
ii) Explain the transport of calcium in the body.
iii) Give detailed account of the organization of DNA into chromosome.
iv) Elaborate on the contribution of following scientists in genetic studies on *S. pneumoniae.* a) Griffith b) Avery, MacLeod and McCarty.
v) Using example of trait governed by multiple alleles, elaborate on non-Mendelian inheritance.
vi) Write an informative note on rediscovery of Mendel's work.

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