

The figures in the margin indicate full marks for the questions.

1. Choose the correct option from the following questions : $1 \times 7 = 7$

(i) A population has 36% of homozygous recessive genotype 'pp'. The frequency of allele 'p' is

- (a) 40%
- (b) 50%
- (c) 60%
- (d) 70%

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- (ii) Which of the following is the first genetic material ?

- (a) RNA
- (b) DNA
- (c) Amino acid
- (d) Nucleic acid

- (iii) Kimura suggested that most evolutionary changes at the molecular level are due to random genetic drift. This is known as

- (a) Theory of natural selection
- (b) Neutral theory of molecular evolution
- (c) Theory of equilibrium
- (d) Theory of germplasm

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- (iv) The reduction in a population's average fitness due to the presence of deleterious alleles or genotypes in the gene pool is known as

- (a) Genetic drift
- (b) Mutation
- (c) Genetic load
- (d) Relative fitness

- (v) The ancient primates, believed to be the common ancestors of both apes and humans, who lived during the middle to late Miocene period are

- (a) Dryopithecus
- (b) Ramapithecus
- (c) Australopithecus
- (d) Sivapithecus

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(vi) Choose the incorrect statement regarding the terminologies of a phylogenetic tree.

- (a) Branches are the lines in the tree.
- (b) Tips of the branches have long lost species.
- (c) Nodes indicate common ancestors where lineages diverge.
- (d) The root represents the common ancestor of all the taxa.

(vii) A small group of individuals from a larger population migrates to a new location and establishes a new population. This is known as

- (a) Bottleneck effect
- (b) Founder effect
- (c) Natural selection
- (d) Adaptation

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2. Answer the following questions : $2 \times 4 = 8$

- (i) What is the basic difference between Lamarckism and Darwinism?
- (ii) What is the difference between connecting link and missing link?
- (iii) What is the advantage of Heterozygous superiority?
- (iv) What do you mean by 'root' and 'branch' in a phylogenetic tree?

3. Write short notes on : (**any three**) $5 \times 3 = 15$

- (i) Theory of Endosymbiosis
- (ii) Convergent and divergent evolution
- (iii) Adaptive radiation
- (iv) K-T extinction
- (v) Natural selection and its types

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4. Answer **any three** of the following questions : $10 \times 3 = 30$

- (i) Describe the key concepts of Darwin's theory of evolution. What are the differences between Darwinism and Neo-Darwinism? $7+3=10$
- (ii) What are fossils? Describe different types of fossils with examples. $1+9=10$
- (iii) What are the sources of hereditary variation and their role in evolution? Elaborate it. $5+5=10$
- (iv) (a) State the Hardy-Weinberg principle of equilibrium. Mention the conditions required for a population to be in Hardy-Weinberg equilibrium. $1+5=6$

(b) In a population of 1000 individuals, 36% of the individuals are recessive homozygotes for a certain trait. Calculate the number of homozygous dominant individuals and heterozygous individuals. (Assume that the population is in Hardy-Weinberg equilibrium)

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(v) What do you mean by speciation? Describe the different modes of speciation with suitable examples. $1+9=10$

(vi) What are hominin characteristics? Describe the evolution of man from *Australopithecus* to *Homo sapiens*. $3+7=10$

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