	ii	What are chromosomal aberrations? Classify them into structural and numerical aberrations. Discuss their implications for human health, using specific examples.	**6**	2	2	4	2
OR	iii	Describe genetic linkage and its importance in inheritance patterns	**6**	2	2	4	2
Q.6		Attempt any two:					
	i.	Explain the concept of maternal effects. How do maternal genes influence the phenotype of offspring independently of the offspring's genotype? .	**5**	3	2	3	2
	ii.	State and explain the Hardy-Weinberg principle. What assumptions must be met for a population to be in Hardy-Weinberg equilibrium?	**5**	2	2	4	2
	iii.	Explain the concept of natural selection and its role in evolutionary genetics.	**5**	3	2	3	2

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Total No. of Questions: 6 *Total No. of Printed Pages:4*

Enrollment No.....

Faculty of Science
End Sem Examination Dec 2024
BT3CO07 Genetics

Programme: B.Sc. Branch/Specialisation: Biotechnology

Duration: 3 Hrs. **Maximum Marks: 60**

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d. Assume suitable data if necessary. Notations and symbols have their usual meaning.

			Marks	**BL**	**PO**	**CO**	**PSO**
Q.1	i.	What is the primary purpose of a test cross? (a) To determine the phenotype of an organism. (b) To determine the genotype of an organism with a dominant phenotype. (c) To observe the effects of a mutation. (d) To predict the genetic outcome of a dihybrid cross.	**1**	1	1	1	1
	ii.	What does Mendel's Law of Segregation state? (a) Alleles segregate independently during gamete formation. (b) Genes located on different chromosomes assort independently. (c) Each individual has two alleles for each gene that segregate during meiosis. (d) Dominant traits always mask recessive traits	**1**	1	1	1	1
	iii.	Which of the following is an example of pleiotropy? (a) Flower colour in snapdragons. (b) ABO blood type in humans. (c) A single gene affecting multiple traits. (d) Traits controlled by multiple genes.	**1**	1	1	1	1

iv.	If a gene interaction produces a 9:7 phenotypic ratio, what type of gene interaction is likely involved? (a) Recessive epistasis (b) Dominant epistasis (c) Complementary genes (d) Duplicate genes	**1**	2	1	1	1
v.	Centromeres are essential for which of the following processes- (a) Protein synthesis (b) Chromosome replication (c) Chromosome segregation during cell division (d) DNA repair	**1**	2	1	1	1
vi.	Heterochromatin is typically- (a) Rich in genes and actively transcribed. (b) Condensed and generally transcriptionally inactive. (c) The same as euchromatin. (d) Only found in prokaryotes.	**1**	2	1	1	1
vii.	What is the Ames test primarily used for? (a) Identifying genetic disorders (b) Testing the mutagenic potential of compounds (c) Mapping chromosomes (d) Analyzing gene expression	**1**	2	1	1	1
viii.	Multiple crossovers can lead to- (a) Increased genetic variation (b) Decreased chromosome number (c) Gene duplication (d) Chromosomal aberrations	**1**	1	1	1	1
ix.	The Hardy-Weinberg principle is used to predict- (a) The evolution of species over time (b) The genetic variation in a population (c) The frequencies of alleles and genotypes in a population (d) The physical traits of individuals	**1**	1	1	1	1

	x.	Allelic frequency refers to- (a) The proportion of a specific genotype in a population (b) The proportion of a specific allele among all alleles at a locus (c) The total number of alleles in a population (d) The number of dominant alleles present in a population	**1**	2	1	1	1
Q.2	i.	What is a monohybrid cross? Illustrate with an example from Mendel's experiments.	**2**	1	1	1	1
	ii.	What are back crosses? and explain their significance in genetics.	**3**	2	1	1	1
	iii.	What is the chromosomal theory of inheritance? Explain how this theory relates to Mendel's laws of inheritance?	**5**	3	2	2	1
OR	iv.	Compare and contrast monohybrid and dihybrid crosses.	**5**	2	1	2	1
Q.3	i.	Describe incomplete dominance and illustrate it with a specific example from plant genetics.	**2**	2	1	2	1
	ii.	Discuss duplicate genes and inhibitory genes. Provide examples to illustrate their roles in phenotypic expression.	**8**	3	2	3	2
OR	iii.	Discuss pleiotropy and its implications for genetics. Provide examples of genes that exhibit pleiotropic effects.	**8**	3	2	3	2
Q.4	i.	What are telomeres? Discuss the consequences of telomere shortening.	**3**	2	2	3	2
	ii.	Explain the concept of repetitive DNA and categorize its different types. Also discuss the biological significance of each type.	**7**	3	2	3	2
OR	iii.	What is noncoding DNA, and what is its importance in the context of genome?	**7**	3	2	3	2
Q.5	i.	Discuss the causes of mutations, distinguishing between spontaneous and induced mutations.	**4**	2	2	4	2

[2]

[3]

P.T.O.

Marking Scheme
BT3CO07 Genetics

Q.1	i)	b) To determine the genotype of an organism with a dominant phenotype.	**1**
	ii)	c) Each individual has two alleles for each gene that segregate during meiosis.	**1**
	iii)	c) A single gene affecting multiple traits.	**1**
	iv)	c) Complementary genes	**1**
	v)	c) Chromosome segregation during cell division	**1**
	vi)	b) Condensed and generally transcriptionally inactive.	**1**
	vii)	b) Testing the mutagenic potential of compounds	**1**
	viii)	a) Increased genetic variation	**1**
	ix)	c) The frequencies of alleles and genotypes in a population	**1**
	x)	c) The total number of alleles in a population	**1**
Q.2	i.	What is a monohybrid cross? Illustrate with an example from Mendel's experiments.	**2**
	ii.	What are back crosses, Explain their significance in genetics?	**3**
	iii.	What is the chromosomal theory of inheritance? Explain how this theory relates to Mendel's laws of inheritance.	**5**
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Q.5	i.	Discuss the causes of mutations, distinguishing between spontaneous and induced mutations.	**4**
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OR	iii.	Describe genetic linkage and its importance in inheritance patterns	**6**
Q.6		Attempt any two:	
	i.	Explain the concept of maternal effects. How do maternal genes influence the phenotype of offspring independently of the offspring's genotype? .	**5**
	ii.	State and explain the Hardy-Weinberg principle. What assumptions must be met for a population to be in Hardy-Weinberg equilibrium?	**5**
	iii.	Explain the concept of natural selection and its role in evolutionary genetics.	**5**

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