



Avinashilingam Institute for Home Science and Higher Education for Women

Deemed to be University Estd. u/s 3 of UGC Act 1956, Category A by MHRD (now MoE)

Re-accredited with A++ Grade by NAAC. CGPA 3.65/4, Category I by UGC

Coimbatore - 641 043, Tamil Nadu, India

Bachelor's Degree Examination – November 2025

V Semester

Class : III UG

Major : Biochemistry and Biotechnology

Time: 3 Hours

Max. Marks: 100

23BBCC05 Genetics and Molecular Biology

Course Outcomes:

1. Understand the key concepts of Classical Mendelian genetics, its deviations and relationship between genotype and phenotype
2. Comprehend the knowledge on mutations, variations in chromosomes, concepts of genetic recombination and population genetics
3. Appreciate the intricate molecular mechanisms of the various steps in replication, transcription and translation
4. Gain insight into the molecular mechanism of DNA damage, repair and recombination
5. Acquire knowledge on the regulation of gene expression

Part A

10 x 1 = 10

Choose the Correct Answer

1. Select the technique used by Gregor Mendel to derive the patterns of inheritance?
a. Hybridization
b. Mutagenesis
c. Exportation
d. Importation
CO1 K1
2. Which of the following is NOT Mendel's law of inheritance?
a. Law of dominance
b. Law of segregation
c. Law of heterogeneity
d. Law of independent assortment
CO1 K2
3. All the following dinucleotide sequence are microsatellites expect
a. (CA)₁₀
b. (AT)₂₀
c. (CC)₁₀
d. (GC)₁₅
CO2 K1
4. The diagram which shows the arrangement of metaphasic chromosomes according to their position of centromere is called _____
a. Histogram
b. Karyogram
c. Dendrogram
d. Ideogram
CO2 K2
5. Which of the following rRNA molecules have peptidyl transferase activity in prokaryotes?
a. 23S rRNA
b. 28S rRNA
c. 5S rRNA
d. 18S rRNA
CO3 K2
6. Which of the following is not involved in the post transcriptional processing of t-RNA?
a. Base modulation
b. Attachment of CCA arm
c. Splicing
d. Attachment of poly-A tail
CO3 K2
7. Watson and Crick's suggestion of the complementary strand synthesis taking one of the parent strand as template was proposed in _____
a. 1869
b. 1909
c. 1953
d. 1952
CO4 K2
8. The enzyme photolyase is used in which of the following repair mechanism?
a. Base excision
b. Photo reactivation
c. Nucleotide excision
d. None of the mentioned
CO4 K2
9. Which of the following is not a post-translational modification?
a. Lipidation
b. Protein phosphorylation
c. Proteolytic processing
d. DNA methylation
CO5 K2
10. The direct repeat within the IS element has a length of _____
a. 5-11 bp
b. 11-15 bp
c. 20 bp
d. 3-7 bp
CO5 K2

Part B
Answer ALL questions
Each answer should not exceed 400 words or two pages

5 x 6 = 30

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|---|--------|
| 11.a. Explain monohybrid and dihybrid crosses
(or) | CO1 K2 |
| 11.b. Discuss the concept of dominance. | CO1 K2 |
| 12.a. Write short note on Ames test for mutagenic agents.
(or) | CO2 K3 |
| 12.b. Explain linkage and crossing over briefly. | CO2 K3 |
| 13.a. Discuss the types of DNA briefly.
(or) | CO3 K2 |
| 13.b. Write short note on semiconservative DNA replication. | CO3 K3 |
| 14.a. Describe transcription factors briefly
(or) | CO4 K2 |
| 14.b. Write shortly about RNA splicing | CO4 K3 |
| 15.a. Discuss genetic codes
(or) | CO5 K2 |
| 15.b. Summarize protein degradation briefly | CO5 K2 |

Part C
Answer ALL questions
Each answer should not exceed 800 words or four pages

5 x 12 = 60

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| 16.a. Outline the chromosomal theory of inheritance.
(or) | CO1 K4 |
| 16.b. Discuss the concept of allelic interaction in detail. | CO1 K2 |
| 17.a. Explain Karyotyping in detail.
(or) | CO2 K2 |
| 17.b. Explain specialized chromosomes in detail. | CO2 K2 |
| 18.a. Compare DNA replication in prokaryotes and eukaryotes
(or) | CO3 K4 |
| 18.b. Explain DNA damage and its repair mechanism with a neat sketch. | CO3 K2 |
| 19.a. Explain the various transcription factors in eukaryotes.
(or) | CO4 K2 |
| 19.b. Discuss in detail about the structure and types of RNA. | CO4 K2 |
| 20.a. Discuss in detail the process of protein biosynthesis and
post translational modifications.
(or) | CO5 K4 |
| 20.b. Explain the concept of gene regulation using Lac operon model. | CO5 K2 |
