



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 an 'A++' Grade by NAAC CGPA 3.65/4, Category I by UGC

Coimbatore - 641 043, Tamil Nadu, India

Continuous Internal Assessment Test I – August 2025

Semester V

Class : III UG

Major: Biochemistry & Biotechnology

23BBC05 Genetics and Molecular Biology

Time: 2 hours

Max. marks: 60

Course Outcomes:

CO1: Understand the key concepts of Classical Mendelian genetics, its deviations and relationship between genotype and phenotype

CO2: Comprehend the knowledge on mutations, variations in chromosomes, concepts of genetic recombination and population genetics

CO3: Appreciate the intricate molecular mechanisms of the various steps in replication, transcription and translation

CO4: Gain insight into the molecular mechanism of DNA damage, repair and recombination

CO5: Acquire knowledge on the regulation of gene expression

Part A

6 x 1 = 6

Choose the correct answer

1. In a monohybrid cross, If both genotype and phenotype shows the same ratios of 1:2:1 in the F₂ generation, it shows CO1K2
 - a. incomplete dominance
 - b. co-dominance
 - c. complete dominance
 - d. dihybrid cross
2. The genotype of blood group 'O' is CO1K3
 - a. I^AI^B
 - b. I^BI^B
 - c. Iⁱi
 - d. I^AI^A
3. Which of the following histone is responsible for stability of chromosomes? CO1K3
 - a) H2A
 - b) H3
 - c) H4
 - d) H1
4. In prokaryotes, the RNA primer from the lagging strand is removed and replaced by the DNA sequence. This process is catalyzed by CO3:K3
 - a. DNA Polymerase I
 - b. DNA Polymerase II
 - c. DNA Polymerase III
 - d. DNA polymerase IV
5. If Meselson and Stahl's experiment is continued for sixth generations in bacteria, the ratio of Heavy strands ¹⁵N/¹⁵N: Hybrid ¹⁵N/¹⁴N : light ¹⁴N/¹⁴N containing DNA in the sixth generation would be CO3:K5
 - a. 1:1:1
 - b. 0:1:7
 - c. 0:1:15
 - d. 0:1:31
6. Which direction does DNA polymerase read the template strand during replication? CO3:K2
 - a. 3' to 5' direction
 - b. 5' to 3' direction
 - c. Bidirectional
 - d. Unidirectional

Part B

3 x 6 = 18

Answer the following.

Answers should not exceed 200 words or one page

7. (a). How is Mendelian genetics applied in Humans? Explain CO1K2

(Or)
7. (b) In jimsonweed, purple flowers are dominant to white. Suppose a jimsonweed plant homozygous for purple is crossed with one homozygous for white. Determine the appearance of CO1K3
 - i) the F₁ flowers,
 - ii) the F₂ flowers
 - iii) the offspring of a cross of the F₁ plants back to the purple parent
 - iv) the offspring of a cross of the F₁ weed plants back to the white parent.

8. (a) Give a short account on lethal genes, pleiotropy and penetrance **CO1K3**
(Or)
8. (b) How did Hershey and Chase differentiate between DNA and protein in their experiment while proving that DNA is the genetic material? Explain **CO3: K4**
9. (a) Illustrate the Meselson and Stahl Experiment. What did this experiment prove? **CO3: K4**
(Or)
9. (b) Discuss the unique feature of eukaryotic chromosome replication. **CO3:K2**

Part C

3 x 12 = 36

Answer the following not exceeding 700 words or four pages

10. (a) Explain the Mendelian law of dominance and independent assortment with suitable examples **CO1K2**
(Or)
10. (b) Elaborate the structure of chromosomes with solenoid model **CO2K3**
11. (a) Discuss the following with suitable examples and punnet squares
i) incomplete dominance ii) codominance iii) Multiple genes **CO1:K3**
(Or)
11. (b) Describe the structure of nucleotide and nucleoside. Explain the different forms of DNA with a neat diagram. **CO3:K3**
12. (a) Explain the various stages involved in DNA replication in prokaryotes with specific reference to the primosome and replisome complex. **CO3:K2**
(Or)
12. (b) Discuss the different models of DNA repair mechanism with a neat diagram **CO4:K3**