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 **Time: 2 hours**
Major: Biochemistry & Biotechnology **Max. marks: 60**

~~23BBG05~~ Genetics and Molecular Biology

Course Outcomes: 23BBCC05

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) I^iI^i 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 $^{15}N/^{15}N$: Hybrid $^{15}N/^{14}N$: light $^{14}N/^{14}N$ 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**

Staff-in-charge: Dr.D.Kavitha and Dr.M. Rajeswari + Dr.J.Priyanka (SF)

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