QP Code: P25DRIS010

Reg. No : ....
Name : ....

ST MARY'S COLLEGE (AUTONOMOUS), THRISSUR-20

I SEMESTER (CBCSS - PG) DEGREE EXAMINATIONS, NOVEMBER 2025

(Regular/Improvement/Supplementary)

M. Sc. Biology

BIO1C02 : MOLECULAR BIOLOGY

2024 Admission Onwards

Time:3 Hours **Maximum Weightage:30**

Part A

*Short answer type questions. Answer **any four**. Weightage **2** for each.*

(4x2 = 8 Weightage)

1. Describe the organization of the human globin gene family.
2. Differentiate between base excision repair and nucleotide excision repair.
3. Summarize CRISPR and its application.
4. Explain the role of angiogenesis in human body.
5. Describe the characteristic features of RNA polymerase in phage.
6. Examine the mechanism of transposition and differentiate between LTR and non-LTR in retrotransposons.
7. Identify the role of Rifampicin and Actinomycin D in prokaryotic transcription.

Part B

*Short essay-type questions. Answer **any four**. Weightage **3** for each .*

(4x3 = 12 Weightage)

8. What are extrachromosomal replicons? Give one example for the extrachromosomal replicon in bacteria.
9. Explain cohesive end and blunt end.
10. Discuss the role of wobble pairing in tRNA recognition and its affects on the flexibility of the genetic code. What are the evolutionary advantages and disadvantages of wobble-base pairing?
11. Explain how the repetitive DNA of the human genome is useful for identifying individuals by DNA fingerprinting.
12. Is it possible to completely reverse the damage done by cancer cells to the host's DNA? Also, comment on gene therapeutic methods to repair mutated genes and their role in health science.

Turn Over

13. Identify the role of gene expression regulation in the activation and repression of transcription.

14. Explain various mechanisms that evolved in organisms to control transposon activity.

Part C

*Essay-type questions. Answer **any two**. Weightage **5** for each.*
(2x5 = 10 Weightage)

15. Describe the semiconservative mode of DNA replication. Explain how the experiments of Meselson and Stahl or Cairns support this model. Explain the role of major enzymes and accessory proteins involved in the process of DNA replication.

16. Describe oncogenes and tumor suppressor genes. Explain their role in cancer development. Describe one example each of virus-induced cancer and a gene mutation involved in cancer.

17. Apply your understanding of CRISPR-Cas9 to explain its use in knock out a specific gene in a mammalian cell line.

18. Explain the role of the ubiquitin-proteasome system in targeting and degrading proteins. How does this system contribute to cellular quality control and the regulation of protein levels.

****