

**STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI 600 086**  
**(For candidates admitted during the academic year 2019 - 2020 & thereafter)**

**SUBJECT CODE: 19BY/PC/MR14**

**M. Sc. DEGREE EXAMINATION - NOVEMBER 2022**

**BIOTECHNOLOGY**  
**FIRST SEMESTER**

**COURSE : CORE**

**PAPER : MOLECULAR BIOLOGY AND RECOMBINANT DNA  
TECHNOLOGY**

**TIME : 3 HOURS**

**MAX. MARKS: 100**

**SECTION – A**

**ANSWER ALL QUESTIONS:**

**(10 x 2 = 20)**

- Which of the following organelle has single membrane?  
a) Mitochondria      b) Nucleus      c) Lysosomes      d) Chloroplast
- Draw and label the structure of a eukaryotic chromosome.
- Unwinding of DNA is done by  
a) Helicase      b) ligase      c) Hexonuclease      d) Topoisomerase
- What is transcription?
- Write notes on histones.
- Which of the following statements is not correct?  
a) Bacteria possess only one type of RNA polymerase  
b) Attenuation is a regulatory process used by bacteria to control the initiation of transcription  
c) Repressor binds to operator  
d) Bacterial genes are polycistronic
- Which of the following ions are required for the activity of Type II restriction enzymes  
a)  $\text{Ca}^{2+}$       b)  $\text{Mg}^{2+}$       c)  $\text{Cl}^{2+}$       d)  $\text{Mn}^{2+}$
- Write a note on phagemids.
- What is shotgun sequencing?
- Which of the following technique is most suitable for detecting the presence of a gene product  
a) Dot blotting      b) Southern blotting      c) plaque blotting      d) Western blotting

**SECTION – B**

**ANSWER ALL QUESTIONS.**

**(5 x 8 = 40)**

- a. Give a brief overview of the GPCR signalling pathway.  
**(or)**  
b. Describe the ultra-structure of the plasma membrane and add a note on active transport of molecules.
- a. Give a brief account on DNA repair mechanisms.  
**(or)**  
b. Write about protein synthesis in prokaryotes.
- a. Discuss briefly on the regulation of the lac operon.  
**(or)**  
b. Write a note on the molecular events of apoptosis.

14. a. List the properties and features of plasmid vectors with suitable examples.  
(or)  
b. Give an account on the selection and screening methods for recombinants.
15. a. Enumerate the salient features of RFLP and RAPD techniques.  
(or)  
b. Give a brief account on the applications of recombinant DNA technology in medicine.

**SECTION – C**

**ANSWER ANY TWO QUESTIONS.**

**(2x20 = 40)**

16. Give a detailed account on the cytoskeleton.  
17. Discuss the molecular events and the genes involved in the cell cycle.  
18. Write in detail on the construction and applications of genomic and cDNA libraries.  
19. Give an account on the principle, types and applications of the Polymerase Chain Reaction.

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