.

Date:5-03-2022

Registration number:

**ST. JOSEPH’S COLLEGE (AUTONOMOUS), BENGALURU-27**

**B.Sc. BIOTECHNOLOGY - III SEMESTER**

**SEMESTER EXAMINATION: OCTOBER 2021**

(Examination conducted in March 2022)

**BT 318 – Molecular Biology and Biophysics**

Time- 2 ½ hrs Max Marks-70

This question paper contains **two** printed pages and **three** parts

**Part A**

**Answer any TEN questions 10 X 2 = 20 marks**

1. Describe regulation of the Tryptophan operon via the repressor-operator system.
2. How are Pyrimidine dimers repaired in prokaryotes?
3. Briefly describe the different types of point mutations that occur in DNA.
4. Describe the origin of replication in *E. coli.*
5. What are the functions of the 7-Methyl Guanosine cap added to the 5’ end of eukaryotic mRNAs?
6. Briefly describe Griffith’s experiments that lead to discovery of the ‘transforming principle’.
7. Briefly describe the SOS response of DNA repair.
8. Draw a neatly labelled diagram of a replication fork.
9. Write a brief note on nucleosomes.
10. Why do electron microscopes have a better resolution than light microscopes?
11. What do you understand by isocratic and gradient elution?
12. You are given 3 tubes A, B and C which contains one sample of either protein or DNA or RNA. Using UV-Visible absorption spectroscopy, how do you distinguish which tube contains what?

**Part B**

**Answer any FIVE of the following questions** **5 X 6 = 30 marks**

13. Briefly describe the different types of excision repair systems that operate in cells.

14. What are the different types of mutagens? Give examples for each.

15. How is the trp operon regulated by the process of Attenuation?

16. What is the basis for the detection of the particles from any radioactive decay? Apply this principle to explain how the G-M tube works.

17. a) State the relationship between centrifugal force and gravitational force.

b) A centrifuge rotor is spinning at 25,000 r.p.m. The ‘top’ of the cell is 5.5 cm from the rotor’s central axis, and the ‘bottom’ of the cell is 9.5 cm from the central axis. What is the g-forces on a particle at the top and at the bottom of the tube?

c) Differentiate between preparative and analytical ultracentrifugation?

18. a) Write the principle behind X-ray crystallography and its applications.

b) What is Braggs law?

19. Explain the working principle and design of the phase contrast microscope with illustration?

**Part C**

**Answer any TWO of the following questions** **2 X 10 = 20 marks**

20. A. Explain the molecular events of eukaryotic transcription initiation.

**OR**

B. Compare and contrast the molecular mechanisms of prokaryotic and eukaryotic translation initiation and termination.

21. A. Describe the structure of the prokaryotic DNA polymerase. Add a note on the different types and roles of prokaryotic and eukaryotic DNA polymerases.

**OR**

B. Describe the structure of the prokaryotic RNA polymerase. Explain how transcription initiation occurs in prokaryotes