

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MSc DEGREE EXAMINATION MAY 2023
(First Semester)

Branch – APPLIED MICROBIOLOGY

CELL BIOLOGY & MOLECULAR DYNAMICS

Time: Three Hours

Maximum: 50 Marks

SECTION-A (5 Marks)

Answer ALL questions

ALL questions carry EQUAL marks (5 x 1 = 5)

1. During gamete formation, the enzyme recombinase participates during,
(i) Prophase I (ii) Prophase II
(iii) Anaphase II (iv) Metaphase I
2. Negatively charged phosphate groups in the DNA backbone must be neutralized in order for folding of DNA to occur. In bacterial DNA, this charge neutralization is carried out by small positively charged molecules called polyamines. What proteins carry out this same function in eukaryotic cells?
(i) Transcription factors
(ii) High mobility group proteins (HMG-1)
(iii) Histones
(iv) Scaffold proteins
3. The mechanism by which CBP activates transcription is?
(i) CBP has DNA methyl transferase activity
(ii) CBP has histone acetyl transferase activity
(iii) CBP interacts with the basal transcription complex
(iv) CBP interacts with the basal transcription complex and has histone acetyl transferase activity
4. Name the drug inhibits the initiation step of translation.
(i) Penicillin G. (ii) Chloramphenicol.
(iii) Streptomycin. (iv) All the above
5. A Lac repressor is a tetramer repressed when bound to the inducer. The trp repressor is a
(i) Dimer inactivated when bound to the inducer
(ii) Dimer activated on inducer binding
(iii) Tetramer inactivated on inducer binding
(iv) Tetramer activated on inducer binding

SECTION - B (15 Marks)

Answer ALL Questions

ALL Questions Carry EQUAL Marks (5 x 3 = 15)

- 6 a Explain the mechanism of Ras-independent RTK pathway.
OR
b "Binding of a ligand triggers activation of G-protein, to activates the enzymes for the synthesis of secondary messengers" – justify.
- 7 a Discuss the importance of C-value and $C_{0.1/2}$.
OR
b Explain the mechanism of CCC DNA replication.
- 8 a Differentiate eukaryotic promoter from prokaryotic promoter.
OR
b How do you confirm the transcription of mRNA is always 5' → 3' direction?

Cont...

- 9 a Distinguish between the class-I and class-II aminoacyl-tRNA synthetase.
OR
b Prepare a list of prokaryotic and eukaryotic translation factors.
- 10 a Illustrate the genetics of *lac* operon.
OR
b Explain the structure of arabinose operon.

SECTION -C (30 Marks)

Answer ALL questions

ALL questions carry EQUAL Marks

(5 x 6 = 30)

- 11 a Explain the forms of intracellular signaling.
OR
b Illustrate the molecular events of meiosis.
- 12 a "DNA methylation is a well-known epigenetic change that is important in cancer formation" – justify.
OR
b "The origin recognition complex (ORC), is a central component for eukaryotic DNA replication" – justify.
- 13 a Demonstrate the structural complexity of mRNA for effective translation of protein.
OR
b Devise the mechanism of tRNA and rRNA processing in yeast.
- 14 a "Molecular chaperons are double edged sword" – explain with suitable example.
OR
b What are release factors (RF)? How they function in protein synthesis?
- 15 a Resolve the condition of the nucleotide region of the *trp* leader sequence, pairing of segment 3 with 4. Explain the molecular mechanism.
OR
b Explain the role of histone proteins on chromosome remodeling during gene activation.

Z-Z-Z

END