

M.Sc. BOTANY  
SECOND SEMESTER  
MOLECULAR CELL BIOLOGY  
MSB – 201

( Use Separate Answer Scripts for Objective & Descriptive )

Duration: 3 hrs.

Full Marks: 70

( PART-A: Objective )

Time: 20 min.

Marks: 20

*Choose the correct answer from the following:*

**1X20=20**

- Which of the following is not a mechanism that can generate different mRNA transcripts from a single gene?
  - Alternative splicing
  - Transcription initiation at alternative promoters
  - Genetic recombination
  - Recombinant DNA technology
- Which of the following is not a post-translational modification?
  - Lipidation
  - Proteolytic processing
  - Protein phosphorylation
  - DNA methylation
- In O-linked glycosylation, monosaccharides bind to the hydroxyl group of which of the following amino acids?
  - Serine or threonine
  - Alanine or tryptophan
  - Aspartic acid or glutamic acid
  - Histidines or glycine
- Which part of the compound microscope helps in gathering and focusing light rays on the specimen to be viewed?
  - Objective lens
  - Magnifying lens
  - Condenser lens
  - Eyepiece lens
- The poly a tail protects the 3' end from \_\_\_\_\_
  - 5' -> 3' exonuclease
  - 3' -> 5' exonuclease
  - Translation
  - Export
- PAP has a processivity of \_\_\_\_\_
  - 5-10 bases
  - 10-20 bases
  - 50-100 bases
  - 100-250 bases
- CPSF and CstF bind to \_\_\_\_\_
  - AAUAAA and G/U box respectively and bind is very strong
  - G/U box and AAUAAA respectively and bind is very strong
  - G/U box strongly but weakly AAUAAA
  - AAUAAA weakly but stabilization occurs after G/U binding

8. According to Neo-Darwinism which one of the following is responsible for organic evolution?
  - a. Mutation and Natural selection
  - b. Mutation
  - c. Hybridization
  - d. Beneficial differentiations
9. Who proposed for the first time the "Germplasm Theory"?
  - a. Leeuwenhock
  - b. Spallanzani
  - c. Weismann
  - d. A.I.Oparin
10. Darwin's Theory of Natural Selection was based on
  - a. Inheritance of acquired characters
  - b. Mutation
  - c. Enormous rate of reproduction in organisms, struggle for existence and survival of the fittest
  - d. Changes due to the use and disuse of organ
11. The greatest resolution in light microscopy can be obtained with
  - a. Shortest wavelength of visible light used
  - b. Shortest wavelength of visible light used
  - c. An objective with minimum numerical aperture
  - d. Longest wavelength of visible light used
12. Which type of microscope would be the best choice for viewing very small surface structures of a cell?
  - a. A transmission electron microscope
  - b. A scanning electron microscope
  - c. A brightfield microscope
  - d. A darkfield microscope
13. Resolving power of a microscope depends upon
  - a. The focal length and aperture of the eye lens
  - b. The focal length and objective of the eye lens
  - c. The apertures of the objective and eye lens
  - d. The wavelength of light illuminating the object
14. The enzyme of E.coli is a nuclease that initiates the repair of double stranded DNA breaks by homologous recombination is?
  - a. glycosylase
  - b. Rec A
  - b. Phosphodiesterase
  - d. Mut S
15. Which two Uvr component molecules scan the DNA during nucleotide excision repair?
  - a. UvrC, UvrA
  - b. UvrA, UvrB
  - c. UvrB, UvrC
  - d. UvrD, UvrA
16. In SOS repair system cleavage of LexA and UmuD is mediated by \_\_\_\_\_
  - a. RecB
  - b. RecA
  - c. RecC
  - d. UvrA

17. In eukaryotes the other name of PCNA is \_\_\_\_\_
- a. Sliding clamp
  - b. Sliding clamp loader
  - c. Replicative DNA polymerase
  - d. Translesional DNA polymerase
18. Here are names of some factors necessary for prokaryotic replication. Which of these or their homologue is unnecessary for eukaryotes?
- a. Dna G
  - b. Dna B
  - c. Beta clamp
  - d. SSB
19. What is the function of RFC in eukaryotic replication?
- a. Catalytic subunit
  - b. SSB
  - c. Clamp loader
  - d. Primase
20. Giant polytene chromosomes are found in \_\_\_\_\_
- a. Egg of fruit fly
  - b. Salivary gland of larvae of fruit fly
  - c. Salivary gland of adult fruit fly
  - d. All of the mentioned
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**( PART-B : Descriptive )**

Time : 2 hrs. 40 min.

Marks : 50

***[ Answer question no.1 & any four (4) from the rest ]***

1. Describe the process of replication of DNA in eukaryotes. 10
2. Describe the various processes of DNA repair 10
3. a. List the factors, which disturb the Hardy-Weinberg equilibrium in a Mendelian population and briefly describe their effects. 5+5=10  
b. How many A and a alleles are present in a sample of organisms consisting of 100 AA, 150 Aa, and 40 aa individual? What are the allele frequencies in this sample?
4. What is gene therapy? Describe the procedure of gene therapy in treatment of adenosine deaminase (ADA) deficiency. 2+8=10
5. Describe post-transcriptional modification by spliceosome. 10
6. Describe the working principle of compound microscope. Write the difference between light field and dark field microscopy 5+5=10
7. Write short notes 5+5=10
  - a. Numerical aperture
  - b. Phase contrast microscopy
8. Write short note on 10
  - a. Mitochondria
  - b. endoplasmic reticulum
  - c. chloroplast

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