

**M.Sc. BOTANY
FOURTH SEMESTER
CYTOLOGY, GENETICS AND PLANT BREEDING
MSB-402 A**

**SET
A**

Duration: 3 hrs.

Full Marks: 70

(Objective)

Time: 30 mins.

Marks: 20

Choose the correct answer from the following:

1 × 20 = 20

- Which of this event is not a part of karyokinesis?
 - Metaphase
 - Prophase
 - Interphase
 - Anaphase
- Which of the following mechanisms will remove Uracil and incorporate the correct base?
 - Direct repair
 - Base excision repair
 - Mismatch repair
 - Nucleotide excision repair
- Lac operon is an example of:
 - Only positive regulation
 - Both positive and negative regulation
 - Only negative regulation
 - Sometimes positive sometimes negative
- What is the phenomenon of nuclear division known as?
 - Telekinesis
 - Karyokinesis
 - Autokinesis
 - Cytokinesis
- Which of the following has the self-repairing mechanisms?
 - DNA and RNA
 - DNA, RNA and protein
 - Only DNA
 - DNA and proteins
- Which of the following statements regarding cyclin-dependent protein kinase is not correct?
 - Their activity is regulated by cyclins
 - They can alter the activity of proteins involve in the progression of cells through cell cycle
 - Their activity fluctuates during cell cycle
 - Each type of cell contains one specific form
- Chain-termination is a type of.....
 - Sequencing
 - Vector generation
 - DNA finger printing
 - Gene manipulation
- What is the main enzyme component of Sanger sequencing?
 - Helicase
 - Polymerase
 - Nuclease
 - Gyrase
- Which of these structures is the site of attachment of chromatids?
 - Aster
 - Kinetochores
 - Centrosome
 - Centromere

10. A point mutation that replaces a purine with another purine, or a pyrimidine with another pyrimidine:
- Nonsense mutation
 - Silent mutation
 - Transition
 - Transversion
11. Transcriptionally active chromatin is termed as:
- Heterochromatin
 - Euchromatin
 - Prechromatin
 - Prochromatin
12. A sampled "a" population has 36% of homozygous recessive genotype (aa). Then the frequency of allele "a" is:
- 0%
 - 20%
 - 60%
 - 70%
13. Protooncogenes are seen in:
- Normal cells
 - Malignant cells
 - Virus infected cells
 - Cells exposed to X-rays
14. The enzyme used in formation of cDNA from mRNA is:
- Helicase
 - Polymerase
 - Gyrase
 - Reverse transcriptase
15. Cdk2/cyclinE functions in.....
- G₂/M transition phase
 - G₂ phase
 - M phase
 - G₁/S transition phase
16. The short DNA fragments that are placed onto a microarray are called.....
- Probes
 - Markers
 - mRNA
 - cDNA
17. Which of these systems give the best mode for turning trp operon off?
- Repressor
 - Attenuator
 - Repressor with a downstream poly A tail
 - Repressor with an attenuator
18. Which statement best describes the main distinction between the origin of the two classes of small regulatory RNAs: siRNA and miRNA?
- siRNAs originate within the cell cytoplasm; miRNAs originate from the cell genome
 - siRNAs originate from predominantly exogenous dsRNA; miRNAs originate from the cell genome
 - miRNAs are expressed whenever siRNAs are unable to appropriately degrade RNA sequences
 - miRNAs are processed from dsRNA viruses, siRNAs are processed from ssRNA viruses
19. Which of the following is not an ionizing radiation?
- X rays
 - UV rays
 - Cosmic rays
 - Alpha rays
20. Gene mutation occurs at the time of:
- DNA repair
 - DNA replication
 - Cell division
 - RNA transcription

(Descriptive)

Time : 2 hr. 30 mins.

Marks : 50

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

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| 1. What is Ploidy? Mention the types of ploidy. Explain the role of polyploidy in crop improvement with special reference to evolution of <i>Triticum aestivum</i> . | 1+2+7=10 |
| 2. Write short notes on <i>any two</i> :
a) Oncogenes and protooncogenes
b) Lac operon
c) Factors affecting Hardy Weinburg Equilibrium | 5+5=10 |
| 3. What is cDNA? Mention the steps in the construction of a cDNA library with diagrams. | 2+8=10 |
| 4. What is an operon? What are the components of an operon? Describe arabinose operon system with necessary diagrams. | 1+2+7=10 |
| 5. Define DNA sequencing. Explain Sanger Sequencing techniques with illustrations. | 2+8=10 |
| 6. Explain Mismatch repair and base excision repair. | 5+5=10 |
| 7. Explain spontaneous and induced mutation? Mention the various types of point mutation. | 2+8=10 |
| 8. What is the principle DNA microarray? Discuss the steps involved in DNA microarray. Mention its applications. | 2+6+2=10 |

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