

**M.Sc. ZOOLOGY**  
**THIRD SEMESTER (SPECIAL REPEAT)**  
**GENETICS & EVOLUTION**  
**MSZ-301**

(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*

1. Klinefelter syndrome results due to \_\_\_\_\_  
a. Non-disjunction in the male gamete      b. Non-disjunction in the female gamete  
c. Gradual loss of chromosome              d. Non-disjunction in any of the gametes
2. Name the sequences which are present in more than one copy in a haploid genome.  
a. Nonrepetitive DNA                          b. Highly repetitive DNA  
c. Repetitive DNA                              d. Minisatellite
3. The movement of new genes into a population as a result of migration or hybridization is called:  
a. Selection                                      b. Bottleneck effect  
c. Founder principle                          d. Gene flow
4. The small population that gets separated from the main population is known as a:  
a. Bottleneck effect                          b. Random population  
c. Splinter population                      d. Shift Population
5. Name the man behind Neural evolutionary hypothesis.  
a. Changeux                                      b. Kimura  
c. Edelman                                        d. Both a and c
6. Evolution from a common ancestor that results in diverse species adapted to different environments is called:  
a. Micro evolution                          b. Gradualism  
c. Adaptive radiation                        d. None
7. Motoo Kimura, Allan Wilson and others used the neutral theory of molecular evolution to explain the mechanism of:  
a. Mutation                                      b. Molecular Clock  
c. Neutrality                                      d. Substitution of amino acid
8. In which of the following continents Prosomians has not evolved?  
a. Europe                                        b. South America  
c. Asia    d. Africa
9. The Hardy-Weinberg equilibrium model can be applied:  
a. To gradualist evolutionary change only      b. When there is no selective pressure on a trait  
c. When evolution occurs over short periods of time      d. When there is strong directional pressure on a trait

10. Which of the following is the scientific name of an old-world monkey?
- Hylobates muelleri*
  - Pongo pygmaeus*
  - Pan troglodytes*
  - Papio anubis*
11. How does a somatic cell that has just completed the S phase of its cell cycle compare in respect to its number of chromosomes and amount of DNA with a gamete of the same species?
- It has twice the number of chromosomes and twice the amount of DNA
  - It has the same number of chromosomes but twice the amount of DNA
  - It has twice the number of chromosomes and four times the amount of DNA
  - It has four times the number of chromosomes and twice the amount of DNA
12. It is difficult to observe individual chromosomes with a light microscope during interphase because:
- They have uncoiled to form long, thin strands
  - They leave the nucleus and are dispersed to other parts of the cell
  - The DNA has not been replicated yet
  - The spindle must move them to the metaphase plate before they become
13. Sister chromatids:
- Are created when DNA is replicated
  - Are separated during mitosis
  - Are attached at the centromere prior to division
  - All of the above
14. The p53 gene:
- Is the most frequently mutated gene in human cancer
  - Can lead to cell cycle arrest at the G1 checkpoint
  - Can trigger apoptosis
  - All of the above
15. The microevolution is associated with the process of:
- Mutation, Gene flow, Genetic Drift and natural selection
  - Genetic drift, recombination and natural selection
  - Recombination, allele frequency suffling and natural selection
  - Recombination, allele frequency suffling and natural selection
16. Barr bodies are found\_\_\_\_\_.
- In the cytoplasm of female
  - In the nuclei of female
  - In the cytoplasm of male
  - In the nuclei of male
17. XIST mRNA coats the inactive X and calls in\_\_\_\_\_.
- tRNA and ribosome
  - Other mRNA
  - Deacetylase and specific methylase
  - Acetylase and demethylase
18. Which one of the following is true for *Drosophila*?
- They don't have X chromosome
  - One of the female X chromosome is inactivated
  - The male Y chromosome is inactivated
  - The male X chromosome is hyper active
19. C-value in genome represents\_\_\_\_\_.
- Genetic disorders
  - Phenotypic variation

c. Amount of DNA present in the genome    d. Qualitative traits

20. The random loss of allele in a population is called:

- a. Genetic drift
- b. Selection
- c. Mutation
- d. None

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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. Discuss about the Neutral theory of evolution. 10
2. What are histones? Discuss the role of histones in genome organization in eukaryotes. 3+7=10
3. What is molecular clock? Mention elaborately the history of molecular clock. 4+6=10
4. What are Stromatolites? Define Endosymbiotic theory. Also, explain the origin of life on the basis of Oparin and Haldane's theory. 2+3+5=10
5. About 70 percent of all white North Americans can taste the chemical phenylthiocarbamide, and the remainder cannot. The ability to taste is determined by the dominant allele *T*, and the inability to taste is determined by the recessive allele *t*. If the population is assumed to be in Hardy-Weinberg equilibrium, what are the genotypic and allelic frequencies in this population? 10
6. What is meant by a cell cycle checkpoint? What is its importance? Explain with proper illustration how does a cell stop its progress when it's DNA got damaged. 2+2+6=10
7. What are Barr Bodies? How many Barr Bodies does a person with Klinefelter syndrome will carry? Explain the role of XIST and XIC genes in inactivating X chromosome in human female. 2+1+7=10
8. What is meant by CpG Island? Write in detail about the genetic imprinting and DNA methylation. 2+8=10

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