KATHMANDU UNIVERSITY
End Semester Examination
March, 2025

Marks Scored:

Level : B.Sc./B.Tech.
Year : II
Course : BIOT 205
Semester : I

Exam Roll No. :
Time: 30 mins.
F. M. : 20

Registration No.:
Date : 11 MAR 2025

SECTION "A"
[10 Q. × 0.5 = 5 marks]

Choose and mark [X] encircle the most appropriate option from each set of choices

1. The Lampbrush chromosome are seen during
   [ ] mitotic prophase [ ] mitotic metaphase
   [ ] meiotic prophase [ ] meiotic metaphase

2. Chiasma represents the site of
   [ ] synapsis [ ] disjunction [ ] crossing over [ ] terminalization

3. An octomer of four types of histone molecules, complexed with DNA is called
   [ ] chromosome [ ] centrosome [ ] nucleosome [ ] endosome

4. Proto- oncogenes can be converted into oncogenes by
   [ ] mutation [ ] polyploidy
   [ ] evolution [ ] expression of downstream genes

5. Which of the following cell organelle is considered to be rich in hydrolytic enzyme?
   [ ] Endoplasmic reticulum [ ] Lysosomes
   [ ] Golgicomplex [ ] Mitochondria.

6. The inner membrane of mitochondria is folded into structures called
   [ ] cristae [ ] thylakoids [ ] grana [ ] cisternae

7. Which of the following is a second messenger in signal transduction?
   [ ] ATP [ ] cAMP [ ] Glucose [ ] ssDNA

8. In plants, which hormone is primarily involved in signaling during drought stress?
   [ ] Auxin [ ] Gibberellin [ ] Ethylene [ ] Abscisic acid

9. The free radical theory of aging suggests that aging is caused by
   [ ] decrease in immune function [ ] an increase in telomerase activity
   [ ] excessive protein synthesis [ ] accumulation of oxidative damage

10. Which cytoskeletal element is primarily involved in maintaining cell shape and enabling cell movement?
    [ ] Microtubules [ ] Microfilaments
    [ ] Intermediate filaments [ ] Microtrabecular system

SECTION "B"

[5 Q. × 1 = 5 marks]

Fill in the blanks with appropriate answer.

11. In Meiosis, haploid condition is reached by _____ stage.

12. Calmodulin is a protein containing _____ residues.

13. The shortening of _____ is linked to aging.

14. Anaphase-promoting complex (APC) helps in _____.

15. Checkpoint in M phase, arrests mitosis if the daughter chromosomes are not properly aligned on _____.

SECTION "C"

[5 Q. × 2 = 10 marks]

Explain ***WHY/HOW*** for the following

16. Ribosomes that synthesize secretory proteins are bound to the endoplasmic reticulum.

17. Cell membrane is regarded as "protein icebergs in a sea of lipids".

18. Endocytosis is not shown by plant cell.

19. Mitochondria and chloroplasts are semiautonomous.

20. *p53* stops the cell cycle.

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SECTION "D"
[3 Q. × 8 = 24 marks]

Attempt *ANY THREE* questions.

1. Describe the different types of cell signaling. How do the secondary messengers relay the messages into the target cell within the cytoplasm?

2. Describe the most popular model of plasma membrane. Give the detail account of functional activities of plasma membrane with the help of suitable diagrams.

3. What is cell cycle? Give the detail account of molecular control of cell cycle.

4. Why meiotic cell division is necessary? Discuss the different stages and significance of meiosis.

SECTION "E"
[31 marks]

Attempt *ANY SIX* questions (**Q.N. 5 is compulsory**)

5. Describe the structure and function of the nuclear pore complex. [3+3=6]

6. What are lysosomes and how do they contribute to cellular digestion? [1+4=5]

7. How do the microtubules and microfilaments structurally and functionally differ in the cell? [5]

8. Explain the structure of the nucleosome and its significance in DNA packaging. [3+2=5]

9. Explain how the APC facilitates the transition from metaphase to anaphase, ensuring proper separation of chromosomes during mitotic cell division. [5]

10. Explain how mutations in protooncogenes and tumor suppressor genes can lead to cancer. [5]

11. Describe the signs of cell aging and how they appear at the cellular and molecular levels. [2+3=5]

12. Describe the structure and function of Lampbrush chromosomes and their role in gene expression. [3+1+1=5]