

## MSc Sem.-1 Examination

401

CE &amp; ART

Time : 2-30 Hours]

February-2025

[Max. Marks : 70

Q.1A	Describe the structural and functional organization of a eukaryotic cell.	7
Q.1B	Discuss the significance of meiosis in evolutionary biology and how errors in meiosis contribute to genetic disorders.	7
OR		
Q.1A	Describe in detail the checkpoints in the cell cycle and their role in preventing oncogenesis.	7
Q.1B	Discuss the significance of the G <sub>0</sub> phase in the cell cycle and its impact on cellular differentiation and aging.	7
Q.2 A	Explain the process of genetic imprinting and discuss its role in human diseases.	7
Q.2 B	Write a detailed note on crossing over and genetic variation in meiosis.	7
OR		
Q.2 A	Analyze the role of enhancers and silencers in gene regulation with reference to long-range chromatin interactions.	7
Q.2 B	Explain gene expression regulation in eukaryotes.	7
Q.3 A	Write a detailed note on Array CGH and its applications in genetic analysis.	7
Q.3 B	Compare and contrast karyotyping and FISH in cytogenetic analysis, highlighting their advantages and disadvantages.	7
OR		
Q.3 A	Discuss the importance of cytogenetics in medical diagnosis.	7
Q.3 B	Analyze the applications of RT-PCR in detecting gene expression levels and diagnosing viral infections.	7
Q.4 A	Discuss the composition of media used for cell culture.	7
Q.4 B	Describe the different types of culture media and their uses.	7
OR		
Q.4 A	Explain the physicochemical parameters in cell culture.	7
Q.4 B	Explain the role of CO <sub>2</sub> incubators in cell culture and their working principle.	7
Q.5	Answer the Following Short Questions (Any 7)	14
1	What is the molecular basis of the spindle assembly checkpoint?	
2	What is the importance of the chiasmata in meiosis?	
3	What is the function of the spindle assembly checkpoint (SAC)?	

(P.T.O)

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4	What is the molecular function of protamine in sperm chromatin packaging?	
5	How does chromatin remodeling affect gene expression?	
6	How does RNA polymerase II differ from RNA polymerase I and III?	
7	What is the significance of the Kozak sequence in translation initiation?	
8	Why is numerical aperture important in microscopy?	
9	What is the principle behind flow cytometry in cell sorting?	
10	How does RT-PCR differ from conventional PCR?	
11	How does osmotic stress influence cellular homeostasis in vitro?	
12	Why is fetal bovine serum (FBS) used in cell culture?	