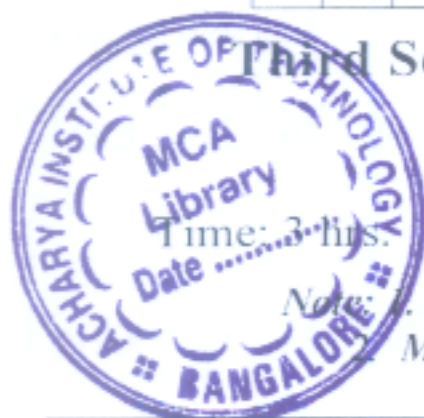


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BBT301



**Third Semester B.E./B.Tech. Degree Examination, June/July 2025**

## Cell Biology and Genetics

Max. Marks: 100

*Note: Answer any FIVE full questions, choosing ONE full question from each module.*

*M : Marks , L: Bloom's level , C: Course outcomes.*

Module – 1			M	L	C
Q.1	a.	Differentiate between Prokaryotic and Eukaryotic cells in terms of their structure and organization.	10	L2	CO1
	b.	Explain the Physio – Chemical nature of the plasma membrane and its role in physiology.	10	L1	CO1
<b>OR</b>					
Q.2	a.	Describe the structure and functions of cytoskeleton elements.	10	L3	CO1
	b.	Discuss the covalent – modifications of cytoskeleton elements and their implications for cellular dynamics.	10	L2	CO1
Module – 2					
Q.3	a.	Compare Mitosis and Meiosis in terms of their stages, outcomes and biological significances.	10	L2	CO2
	b.	Explain the role of cellular senescence in aging and age-related disease, highlighting the Hay flick phenomenon.	10	L1	CO2
<b>OR</b>					
Q.4	a.	Describe the mechanism of G-Protein Coupled Receptor (GPCR) Signaling and its role in intracellular signal transduction.	10	L3	CO2
	b.	Discuss Quorum Sensing and its role in biofilm formation in prokaryotic cell.	10	L2	CO2
Module – 3					
Q.5	a.	Differentiate between Passive and Active transport across the plasma membrane, provide examples for each.	10	L2	CO3
	b.	Describe the role of the Golgi-apparatus in protein modification and varicular trafficking.	10	L3	CO3
<b>OR</b>					
Q.6	a.	Explain the mechanism of endocytosis and exocytosis and their importance in cellular physiology.	10	L1	CO3
	b.	Discuss the translocation of secretory proteins across the ER membrane and their sorting to organelles.	10	L2	CO3

Module – 4					
Q.7	a.	Explain Mendel's Law of segregation with suitable example.	10	L1	CO4
	b.	Describe the Hershey-Chase experiment and its significance in identifying DNA as the genetic material.	10	L3	CO4
OR					
Q.8	a.	In a dihybrid cross between two heterozygous plants. What is the phenotypic ratio of the off spring, solve the problem.	12	L4	CO4
	b.	Compare the structure and function of polytene chromosome and Lamp-brush chromosomes.	8	L2	CO4
Module – 5					
Q.9	a.	Differentiate between XX-XY and ZW-ZZ sex determination system with examples.	10	L3	CO5
	b.	Explain how non-dis junction provides evidence for the chromosomal theory of inheritance.	10	L1	CO5
OR					
Q.10	a.	A population has the following genotype frequencies $AA = 0.36$ , $Aa = 0.48$ , $aa = 0.16$ . Calculate the allele frequencies and check if the population is in Hardy-Weinberg equilibrium.	10	L4	CO5
	b.	Solve the pedigree analysis problem: if a trait is X-linked recursive, predict the probability that a son inherits the disease if the mother is a carrier and the father is normal.	10	L4	CO5

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