LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

M.Sc. DEGREE EXAMINATION – **BIOTECHNOLOGY**

FIRST SEMESTER – **APRIL 2023**

PBT1MC01 – CELL BIOLOGY AND MOLECULAR GENETICS

Date: 29-04-2023 Dept. No. Max. : 100 Marks

Time: 09:00 AM - 12:00 NOON

	SECTION A		
	Answer ALL the questions		
1	**Choose the best option**		**(5 x 1 = 5)**
a)	Stromatolites are preserved only in a) Shale b) Sandstone c) Carbonate d) Coal	K1	CO1
b)	Multifaceted kinase in Wnt signalling is a) G3K3 b) G1K2 c) GK3 d) G3K1	K1	CO1
c)	Proteins selected by COPII-coated vesicles include a) Glycosyl transferase b) Cysteine c) Glycine d) Glutamine	K1	CO1
d)	Importance of sno RNA is: a) t-RNA processing b) r-RNA processing c) m-RNA processing d) None of the above	K1	CO1
e)	Condition where one copy of a gene in a diploid organism is sufficient to give a normal phenotype. a) Haplosuffcient b) Diplosufficient c) Haploinsufficient d) Haploefficient	K1	CO1
2	**Answer in one or two sentences**		**(5 x 1 = 5)**
a)	State the functions of microtubules.	K2	CO1
b)	Why are Lux1 protein important in cell signaling?	K2	CO1
c)	Mention the role of clathrin-coated vesicles.	K2	CO1
d)	Define ribozyme.	K2	CO1
e)	Give an example of autosomal recessive disorder with its genotype.	K2	CO1
	SECTION B		
	Answer any THREE of the following in 500 words		**(3 x 10 = 30)**
3	Differentiate between meiosis I and meiosisII in plants.	K3	CO2
4	Outline the role of cell junctions in animals.	K3	CO2
5	Discuss the mechanism involved in mitochondrial protein import.	K3	CO2
6	Illustrate the spliceosome assembly and explain.	K3	CO2
7	Sketch a flow labelled diagram and explain the segregation of two genes with an example.	K3	CO2
	SECTION C		
	Answer any TWO of the following in 500 words		**(2 x 12.5 = 25)**
8	Justify the statement - Prokaryotes to Eukaryotes is a major transition in evolution.	K4	CO3
9	a) Illustrate bacterial chemotaxis. b) Summarize the role of membrane channels.	K4	CO3
10	Suggest and explain an appropriate repair mechanism to remove chemical adducts.	K4	CO3
11	Consider three gene pairs *Aa*, *Bb*, and *Cc*, each of which affects a different character. These three gene pairs assort independently of each other. Calculate the probability of obtaining the following:	K4	CO3

	a. an Aa BB Cc zygote from a cross of Aa Bb Cc × Aa Bb Cc b. an Aa BB cc zygote from a cross of aa BB cc × AA bb CC c. Dominant phenotypes for each of the three genes from a cross of individuals that are Aa Bb CC × Aa Bb cc d. Recessive phenotype for each of the three genes from a cross of Aa Bb Cc × aa Bb cc		
	SECTION D		
	Answer any ONE of the following in 1000 words (1 x 15 = 15)		
12	Justify the statement "Mitochondria are known as power house of the cell"	K5	CO4
13	Argue the fact that the bacterial cells play a major role in cell-cell communication	K5	CO4
	SECTION E		
	Answer any ONE of the following in 1000 words (1 x 20 = 20)		
14	Illustrate and explain the concept of SNARE hypothesis	K6	CO5
15	DNA replication is bidirectional, following 5'-3' synthesis in leading and lagging strand. Explain the events with a schematic sketch and justify. or Summarise and explain about multiple allelism in humans. Compare and contrast it with Mendelian genetics.	K6	CO5

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