2/21

1311E1124

Candidate's Seat No : _____

M.Sc. Sem.-3 Examination

501

M. L. T.

November-2025

Time : 2-30 Hours] **[Max. Marks : 70**

Q1A	Explain penetrance and expressivity of gene with examples.	7 Marks
Q1B	What is incomplete dominance? Explain it with an example of *Mirabilis jalapa*.	7 Marks
	OR	
Q1A	What is the difference between Pleiotropy & Polygenic Inheritance? Explain with examples.	7 Marks
Q1B	Calculate the probability: In a cross between two heterozygotes AaBbCc X AaBbCc, what is the probability to get AABBCC or aabbcc?	7 Marks
Q2A	Explain the genetic cause and how the defect in chloride ion transport leads to the characteristic clinical symptoms of cystic fibrosis.	7 Marks
Q2B	Explain the chromosomal abnormalities and clinical presentation of Klinefelter syndrome.	7 Marks
	OR	
Q2A	Explain the molecular defect involved in Sickle cell anemia, its impact on hemoglobin structure and function. Enlist its diagnostic techniques.	7 Marks
Q2B	Explain the chromosomal abnormalities and clinical presentation of Turner syndrome.	7 Marks
Q3A	Explain Polymerase Chain Reaction (PCR) it in detail.	7 Marks
Q3B	Explain FISH in detail.	7 Marks
	OR	
Q3A	What is RT-PCR? Explain in detail.	7 Marks
Q3B	Explain sanger sequencing in detail.	7 Marks
Q4A	How does genetic counselling work, and why is it important in understanding hereditary conditions?	7 Marks
Q4B	Describe the various types of prenatal testing. Compare their methods, potential risks, and advantages in identifying genetic abnormalities before birth.	7 Marks
	OR	
Q4A	Discuss the functions of Chorionic Villus Sampling (CVS) and Amniocentesis in prenatal diagnosis.	7 Marks
Q4B	Explain how risk assessment is carried out in genetic counselling. What factors are taken into account when determining an individual's or family's likelihood of inheriting or transmitting genetic conditions?	7 Marks
Q5	**Answer the following questions (Any Seven)**	**14 Marks**
I	What is over dominance? Give one example.	2 Marks

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II	Give any two examples of environmentally affected gene.	2 Marks
III	Why did Mendel use pea plant for genetic study?	2 Marks
IV	How do mutagens such as UV radiation and chemical agents contribute to genetic mutations.	2 Marks
V	Enlist diagnostic techniques used for the detection of diseases with complex trait.	2 Marks
VI	Explain how consanguineous marriages can increase the risk of genetic disorders.	2 Marks
VII	Which enzyme is essential for PCR amplification, and why is it preferred over other DNA polymerases?	2 Marks
VII	How do chain-terminating nucleotides (ddNTPs) function in Sanger sequencing, and what separation technique is used to analyze the results?	2 Marks
IX	Mention two key benefits of using Next-Generation Sequencing (NGS) compared to traditional sequencing methods	2 Marks
X	Define Non-Invasive Prenatal Testing (NIPT) and explain its basic principle.	2 Marks
XI	Why is emotional or psychological support considered an important aspect of genetic counselling?	2 Marks
XII	State the main aim of genetic counselling in the context of hereditary disorders.	2 Marks

BEST OF LUCK