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( February )

BIOTECHNOLOGY

( Honours )

( Cell Biology and Genetics )

Marks : 56

Time : 3 hours

*The figures in the margin indicate full marks  
for the questions*

Answer Question No. **1** which is compulsory  
and *any four* from the rest

1. Differentiate between the following : 3×4=12

(a) Primary and secondary lysosomes

(b) Membrane-bound ribosomes and free  
ribosomes

(c) Heteroplasmy and homoplasmy

(d) Maternal effect and maternal  
inheritance

2. (a) Give a comparison of the characteristics  
between prokaryotes and eukaryotes  
(with diagrams). 6

(b) What is cell theory? 'There are  
exceptions to the cell theory.' Explain.  
2+3=5

3. (a) Explain genic-balance theory of sex  
determination. 6

(b) Write a note on cell cycle checkpoints. 5

4. (a) What are centrioles? Explain their roles  
in a cell. 1+3=4

(b) Explain with diagrams the 'cis' face and  
'trans' face of the Golgi apparatus. 4

(c) Differentiate between mitochondrial  
DNA and nuclear DNA. 3

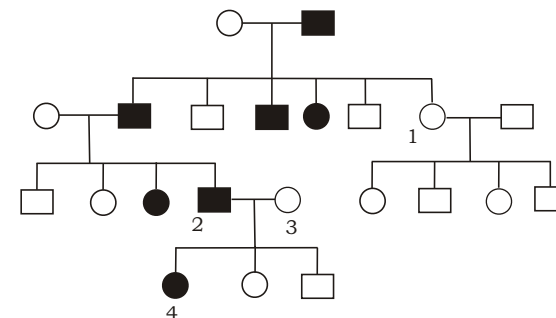
5. What is the role of the ClB balancer  
chromosome in the detection of recessive  
mutations on the X-chromosome in  
*Drosophila*? Compare and contrast between  
Muller's ClB method and Muller-5 method.  
3+8=11

( 3 )

6. (a) What is pseudodominance? How is it produced? 1+1=2
- (b) Differentiate between the following : 3×3=9
- (i) Aneuploidy and euploidy
- (ii) Paracentric inversion and pericentric inversion
- (iii) Silent mutation and neutral mutation
7. Write short notes on the following :  $5\frac{1}{2}+5\frac{1}{2}=11$
- (a) Polytene chromosome
- (b) Dosage compensation
8. (a) If the recombinant frequencies between the gene loci mn is 38%, mo is 6% and no is 28%, find the order of the genes. 2
- (b) Write on multifactorial inheritance giving a suitable example. 4

( 4 )

- (c) In the following human pedigree, the filled symbols represent the affected individuals. You may assume that the disease allele is rare and therefore individuals marrying into the family are unlikely to have defective allele :



- (i) What is the most likely mode of inheritance for this pedigree? 1
- (ii) State the genotypes of individuals numbered 1–4 using the letter A. Use the uppercase letter to represent the dominant allele and lowercase letter to represent the recessive allele. 4

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