WEST BENGAL STATE UNIVERSITY

B.Sc. Honours 5th Semester Examination, 2021-22

MCBADSE03T-MICROBIOLOGY (DSE1/2)

INHERITANCE BIOLOGY

Time Allotted: 2 Hours | Full Marks: 40

The figures in the margin indicate full marks.
Candidates should answer in their own words and adhere to the word limit as practicable.
All symbols are of usual significance.

Question No. 1 is compulsory and answer any *four* questions from the rest

1. Answer any ***four*** questions from the following: 2×4 = 8

   (a) Differentiate between Karyotype and Idiogram.

   (b) Define heterochromatin. How it differs from euchromatin?

   (c) Draw a lebelled diagram of nucleosome.

   (d) Define epistasis with proper example.

   (e) Mitochondrial DNA codes for 16S rRNA — How this phenomenon co-relates with evolution?

   (f) Define the term 'reciprocal cross' with respect to inheritance biology.

   (g) Distinguish between autopolyploidy and allopolyploidy.

2. (a) Diagrammatically explain how allopolyploid wheat (*Triticum spelta*, hexaploid) is formed. 3

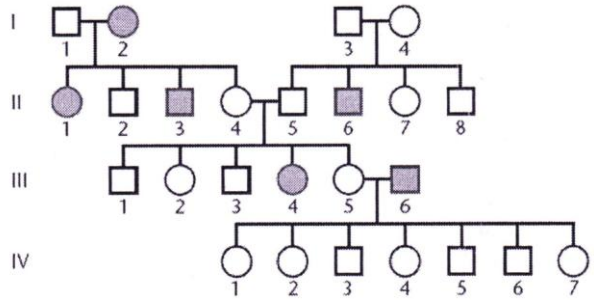
   (b) Diagrammatically explain the way of formation of isochromosomes. 3

   (c) What are the characteristic features of Down's syndrome? 2

3. (a) In the ABO blood system in human beings, alleles I^A and I^B are codominant, and both are dominant to the I^O allele. In a paternity dispute, a type AB woman claimed that one of four men, each with different blood types (A, B, AB, O), was the father of her type A child. Which could be the blood type of the father of the child on the basis of the evidence given? 4

   (b) Define the terms: lod score, synkaryon, heterokaryon, synteny. 1×4

4. (a) Consider the following pedigree: 4



Predict the mode of inheritance of the trait of interest and the most probable genotype of each individual. Assume that the alleles *A* and *a* control the expression.

(b) Why plasmids from same incompatibility group cannot co-exist? Why Col plasmid is named so? 2+2

5. (a) Explain how Tay-Sachs disease can be both a recessive and an incomplete dominant trait. What are the differences between incomplete dominance and codominance? 2+2

(b) Suppose you are studying the Mendel's Law of Independent Assortment using '*n*' number of heterozygous gene pairs (*n* = any positive integer). How many different genotypes and phenotypes would you expect in F2 generation? 2

(c) What are the relationships between mitosis and meiosis and Mendel's rules of segregation and independent assortment? 2

6. (a) With the help of *Neurospora crassa*, diagrammatically explain that crossing over takes place at tetrad stage. 4

(b) How many types of transposable elements are found in mammalian genomes? What are these? What are satellite DNAs? 1+2+1

7. (a) Diagrammatically differentiate between paracentric and pericentric inversion. How ring chromosome is originated? 3+2

(b) What do you mean by translocation? What is its significance? 1+2

8. (a) How can you experimentally determine the length of a nucleosome core? 4

(b) Differentiate between test cross and back cross. 2

(c) What is the significance of test cross? 2

N.B. : *Students have to complete submission of their Answer Scripts through E-mail / Whatsapp to their own respective colleges on the same day / date of examination within 1 hour after end of exam. University / College authorities will not be held responsible for wrong submission (at in proper address). Students are strongly advised not to submit multiple copies of the same answer script.*

——×——