



Name :

Roll No. :

Invigilator's Signature :

CS/M.Sc.(GE)/SEM-1/MSGEN-105/2012-13

2012

GENETICS OF ORGANELLES

Time Allotted : 3 Hours

Full Marks : 70

The figures in the margin indicate full marks.

*Candidates are required to give their answers in their own words
as far as practicable.*

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for any *ten* of the following :

10 × 1 = 10

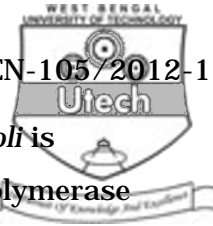
- i) Antibiotic resistance was detected in *Chlamydomonas* as a
 - a) Mendelian trait
 - b) Uniparental inheritance
 - c) Non-Mendelian trait
 - d) both (b) and (c).
- ii) Consider the following :
 - I. Kappa particles in Paramecium
 - II. Shell coiling in Limnaea
 - III. Shape of the ear lobe in human beings.

Which of the above is/are the example(s) of maternal effect ?

- a) I only
- b) II only
- c) both I and II
- d) III only.



- iii) Inheritance of mitochondria is predominantly
- a) Paternal
 - b) Maternal
 - c) Biparental
 - d) None of these.
- iv) Which of the following is not true of a maternal effect gene ?
- a) It is located in the nuclear DNA
 - b) Maternal genotype affects offspring phenotype
 - c) It may control deposition of material into oocytes
 - d) It must be located on the X chromosome.
- v) Petites are essentially incapable of carrying out aerobic respiration due to a defect in
- a) lipid metabolism
 - b) amino acid metabolism
 - c) glucose metabolism
 - d) none of these.
- vi) The simple mitochondrial DNAs of vertebrates are organized into transcription units.
- a) many small
 - b) four
 - c) five
 - d) two large.
- vii) Human mitochondrial DNA contain about
- a) 50 genes
 - b) 110 genes
 - c) 37 genes
 - d) 945 genes.
- viii) The killer phenotype in *Paramecium* must contain a symbiotic
- a) Algae
 - b) Bacteria
 - c) Fungi
 - d) Virus.



- ix) In chloroplasts the enzyme similar to *E.coli* is
- DNA polymerase
 - RNA polymerase
 - all of these.
 - none of these.
- x) Most cpDNAs have a pair of large inverted repeats that is sized of about
- 10-76 kB
 - 50 mb
 - 78 mb
 - none of these.
- xi) The color variegation in plants show
- Mendelian inheritance
 - Maternal inheritance
 - Paternal inheritance
 - none of these.
- xii) Linear mitochondria occurs in
- Mice
 - Drosophila
 - Algae
 - none of these.
- xiii) A pattern of transmission where all offspring have the same phenotype as their mother is consistent with which type of non-Mendelian inheritance ?
- Maternal effect
 - Genomic imprinting
 - Dosage compensation
 - Extranuclear inheritance.
- xiv) The most recent common ancestor of human mtDNA located in Africa about
- 10000 – 20000 years ago
 - 20000 – 40000 years ago
 - 40000 – 50000 years ago
 - 100000 – 200000 years ago.



GROUP - B
(Short Answer Type Questions)

Answer any *three* of the following.

3 × 5 = 15

2. State the basic rules of extranuclear inheritance.
3. Discuss in brief the inheritance of poky mutant of *Neurospora*.
4. Briefly represent one example of inheritance not due to nuclear gene with diagram.
5. What is Pormiscuous DNA ? What do you mean by Homoplasmy and Heteroplasmy ?
6. A right ward coiled snail, when self fertilized has all left ward coiled progeny. What was the genotype of the parent's mother ?

4 + 1

GROUP - C
(Long Answer Type Questions)

Answer *all* of the following.

3 × 15 = 45

7. What are the differences between segregational, neutral and suppressive petit strains of yeast ? How their inheritance pattern differs ? Discuss with proper diagram.
8. What are "slow virus" ? Who invented those infective particles ? What are the keys to the reproductive cycle of these organisms ? Describe why those organisms are of importance in the present scenario with proper example.
9. Briefly describe gene organization of chloroplast genome. Describe the replication, transcription and translation of cp gene.

5 + 10

2 + 1 + 2 + 10

6 + 9