

**UNIVERSITY OF MADRAS
DEPARTMENT OF GENETICS**

Entrance Examination

For Admission to

M.Sc. Biomedical Genetics, Model Question Paper

Time: Two hours

Maximum: 100 Marks

1. Lithophytes are plants grown on
a) sand b) rocks c) wastelands d) tree bark
2. The rust fungus *Puccinia* causes damage to
a) potato b) wheat c) cabbage d) groundnut
3. Vacuoles in plant are bounded by a definite membrane called
a) Plasma membrane b) tonoplast c) cell wall d) none of the above
4. Sterilization of culture media containing blood serum or eggs (which break down at slightly more than 100°C) may be accomplished using
a) pasteurization b) a dry oven c) UV irradiation d) intermittent sterilization
5. Alteration of the 50S ribosomal subunit is responsible for resistance to
a) penicillin b) chloramphenicol c) rifampin d) erythromycin
6. A great number of antibiotics are derived from members of the genus
a) *Bacillus* b) *Pseudomonas* c) *Streptococci* d) *Escherichia*
7. HIV virus primarily infects
a) B cells b) T cells c) Glial cells d) Pancreatic cells
8. Which of the following class of antibodies is present in milk
a) IgA b) IgE c) IgD d) IgM
9. The major function of CD8⁺ T cells are
a) Secretion of Cytokines b) Cytotoxicity c) Phagocytosis d) Opsonization
10. Which one of the following is not a blue green alga?
a) *Anabaena* b) *Nostoc* c) *Oscillatoria* d) *Chorella*
11. The human placenta is classified as:
a) Endotheliochorial b) Haemochorial c) Epiheliochoria d) Mesoeliochorial
12. Parathormone is responsible for:
a) Controlling calcium level in blood b) Decreasing calcium level in blood
c) Filtration in nephron d) Increasing absorption of water
13. The function of Henle's loop is:
a) Passage of urine b) Formation of urine
c) Conservation of water d) Filtration of water

14. Nematodes lack respiratory system and
 a) Digestive system b) Nervous system c) Circulatory system d) All of these
15. Fluid mosaic model of cell membrane was given by:
 a) Singer and Tatum b) Watson c) Robertson d) Singer and Nicolson
16. The class of coelenterate which exhibits polymorphism?
 a) Hydrozoa b) Scyphozoa c) Anthozoa d) All of these
17. Contractile vacuole in protozoan Amoeba is meant for:
 a) Respiration b) Excretion c) Locomotion d) Osmoregulation
18. Among the following, colonial insects are:
 a) Locusts b) Mosquitoes c) White ants d) Bed bug
19. The Molluscs which are considered as living fossils are
 a) Neoplina and Solon b) Neoplina and Monoplacophora
 c) Pila and Unio d) Chiton and Teredo
20. Most widely used bioweapon is:
 a) *Bacillus subtilis* b) *Pseudomonas putida*
 c) *Bacillus anthracis* d) None of the above
21. Among the following which compound can induce seed dormancy?
 a) ABA b) Potassium nitrate c) Gibberellins d) Ethylene
22. Planaria possess high capacity of
 a) Metamorphosis b) Regeneration
 c) Alternation of generation d) Bioluminescence
23. Losing water is a major problem for land vertebrates. Which of the following are adaptations to prevent water loss?
 a) Modified kidneys and salt glands b) Having a layer of blubber
 c) Having gizzards d) Having elongated cecums
24. Mixed inhibitors have the following effects on K_M and V_{max} :
 a) They alter the value of K_M but not V_{max}
 b) They alter the value of V_{max} but not K_M
 c) They alter the value of K_M and V_{max}
 d) all of the above
25. Acetyl CoA is an important metabolic intersection leading to the formation of all of the following substances except
 a) prostaglandin molecules b) cholesterol and steroid molecules
 c) ketone bodies d) fatty acids and triglyceride molecules
26. Life originated first in the primitive oceans. The evidences supporting this view
 a) Protoplasm and body fluids of all animals contain salt

- b) Moist simpler and lower animals are aquatic and marine
 c) Fossils of earliest animals obtained from rocks of marine origin
 d) All the above
27. The most important set of characteristics of the deep sea include:
 a) low temperature, low pressure and oxygen level
 b) high temperature, high pressure and high oxygen level
 c) low temperature, high pressure and low oxygen level
 d) high temperature, low pressure and high oxygen level
28. The number of links in a food chain depends upon the
 a) number of organisms in an ecosystem b) number of producers in an ecosystem
 c) length of food chain in an ecosystem d) length of day
29. How many different genotypes would there be resulting from a dihybrid cross?
 a) 4 b) 8 c) 9 d) 16
30. Assuming Hardy-Weinberg equilibrium, the genotype frequency of heterozygotes, if the frequency of the two alleles at the gene being studied are 0.6 and 0.4, will be:
 a) 0.80 b) 0.64 c) 0.48 d) 0.32
31. In a cross between AABB x aabb, the ratio of F₂ genotypes between AABB, AaBB, Aabb and aabb would be:
 a) 9 : 3 : 3 : 1 b) 2 : 1 : 1 : 2 c) 1 : 2 : 2 : 1 d) 7 : 5 : 3 : 1
32. Which of the following was a conclusion from the experiments of Spemann and Mangold?
 a) Cytoplasmic determinants of development are homogeneously distributed in the amphibian zygote
 b) In the late blastula, certain regions of cells are determined to form skin or nervous tissue
 c) The dorsal lip of the blastopore can be isolated and will form a complete embryo
 d) The dorsal lip of the blastopore can initiate gastrulation
33. A statistical test used to compare 2 or more group means is known as _____.
 a) One-way analysis of variance b) Post hoc test
 c) t-test for correlation coefficients d) Simple regression
34. An organism that carries extra sets of chromosomes is termed:
 a) Aneuploid b) Diploid c) Polyploid d) Haploid
35. Cell fractionation is the most appropriate procedure for preparing ____ for study.
 a) isolated cells which are normally found tightly attached to neighbouring cells
 b) cells without a functional cytoskeleton
 c) isolated organelles
 d) the basic macromolecules
36. The phenomenon known as "RNAi" (RNA interference) is used experimentally to
 a) reduce expression of a specific target gene.
 b) enhance gene expression.

- c) reduce transcription rate from a specific gene promoter
- d) interfere with replication.

37. A type of DNA sequence in eukaryotes that helps to regulate transcription, may be tissue specific, and may exert control over a gene that is a great distance away is called
- a) a promoter
 - b) a Shine-Dalgarno sequence
 - c) a TATA box
 - d) an enhancer.
38. If a triplet in the coding strand of DNA was 5'-GAC-3', what would the RNA guide be when trying to target it using CRISPR/CAS9?
- a) 3'-CTG-5'
 - b) 3'-GUC-5'
 - c) 3'-CUG-5'
 - d) 3'-GUU-5'
39. The CRISPR-Cas9 system in bacteria is akin to ourbody's
- a) Digestive system
 - b) Immune system
 - c) Circulatory system
 - d) Respiratory system
40. The percentage composition of a nucleic acid molecule found in bacterial cells is 32.3% adenine 30.7% thymine 19.1% cytosine 17.9% guanine
The molecule is most likely to be
- a) double-stranded DNA
 - b) double-stranded RNA
 - c) mitochondrial DNA
 - d) messenger RNA