RAMAKRISHNA MISSION VIDYAMANDIRA

Belur Math, Howrah – 711 202

ADMISSION TEST – 2018

MICROBIOLOGY (Honours)

Date : 19-06-2018 **Full Marks : 50** Time: 1·00 p.m – 2·00 p.m

Instructions for the candidate

*Answer all the questions given below. Each MCQ type question carries **1 mark** and each Assertion and Reason type question carries **2 marks**. **½ mark** will be deducted for a wrong answer. Shade or darken the correct option in the given **OMR SHEET** using either Black or Blue ink . The shades must be very clear and non-overlapping and if it is smudgy or not clear, no marks will be awarded.*

A. MCQ type questions

1. What would be the base sequence of RNA transcript obtained from the given DNA segment

   5´--- GCATTCGGCTAGTAAC---- 3´ → Coding strand of DNA

   3´----CGTAAGCCGATCATTG----5´ → Non -coding strand of DNA

   a) 5´--- GCAUUCGGCUAGUAAC----3´ b) 5´--- CGUAAGCCGAUCAUUG----3´

   c) 5´--- GCATTCGGCTAGTAAC----3´ d) 3´--- CGTAAGCCGATCATTG----5´

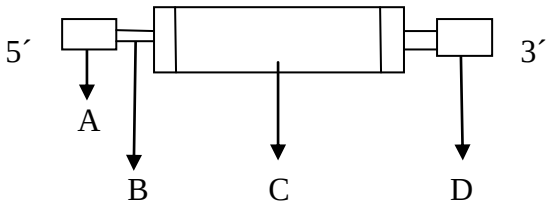
2. Match the Column-I with Column-II and select the correct option from the codes given below

Column-I	**Column-II**
A. Dihybrid test cross	i) 9:3:3:1
B. Law of segregation	ii) Dihybrid cross
C. Law of independent assortment	iii) 1:1:1:1
D. ABO blood group in man	iv) Purity of gametes
	v) Multiple allelism

   a) A—iii), B---iv), C---ii), D---v) b) A---i), B---iv), C---ii), D---v)

   c) A---iii), B---ii), C---iv), D---v) d) A---ii), B---v), C---iii), D--- i)

3. Identify A,B,C, and D in the schematic diagram of mRNA



   a) A—methylated cap, B—initiation codon, C—termination codon, D—poly A tail

   b) A—poly A tail, B—termination codon, C—initiation codon, D—methylated cap

   c) A—methylated cap, B—non coding region region, C—coding region, D—poly A tail

   d) A—methylated cap, B—coding region, C—non coding region, D—poly A tail

4. Match Column-I with Column-II and select the correct option from the codes below

Column-I	**Column-II**
A. Mutation	i) changes in population's allele frequencies due to chance alone
B. Gene flow	ii) differences in survival and reproduction among variant individuals
C. Natural selection	iii) immigration, emigration change allele frequencies
D. Genetic drift	iv) source of new alleles

a) A—i), B—ii), C—iii), D—iv) b) A—iv), B—ii), C—iii), D—i)

c) A—v), B—i), C—iv), D—ii) d) A—iv), B—iii), C—ii), D—i)

5. A toxic substance responsible for the chill and high fever recurring every two to three days in malaria is

a) Haematin b) Haemozoin c) Hirudin d) Myoglobin

6. Which one of the following cells does not participate in innate immunity?

a) Neutrophils b) Macrophages c) B-lymphocytes d) Natural killer cells

7. Which of the following is incorrectly matched?

Disease	**Causative organism**
a) Canker disease of Citrus	bacteria
b) Stem rust of wheat	fungi
c) Late blight of potato	fungi
d) Red rot of sugarcane	virus

8. Single cell protein can be obtained from

a) Bacteria b) Algae c) Fungi d) All of these

9. Which one of the following is correct for the endosperm?

a) The cells of this tissue are filled with reverse food material

b) Used for nutrition of developing embryo

c) Primary endosperm nucleus undergoes free nuclear division followed by cytokinesis

d) All of the above

10. The phenomenon of 'Industrial Melanism' demonstrates

a) Natural selection b) Induced mutation

c) Reproductive isolation d) Geographical isolation

11. A restriction endonuclease breaks the bonds between the

a) Base pairs of a DNA molecule b) Base pairs of a DNA-RNA hybrid molecule

c) Sugar and phosphate components of a nucleic acid molecule

d) Exons and introns of a DNA molecule

12. Bt toxin- a protein crystal present in bacterium *Bacillus thuringiensis*, does not kill the bacateria themselves because

a) Bacteria are resistant to the toxin b) Toxins occur as inactive prototoxins in bacteria

c) Bacteria enclose toxins in a special sac

d) Bacteria digest it as soon as it is liberated from the cell

13. Golden rice is yellow in colour due to presence of

a) Riboflavin b) β-carotene c) Vitamin B_1 d) Complex genetic material

14. Species interaction with negative influence on both is referred to as

a) Amensalism b) Mutualism c) Commensalism d) Competition

15. Which one of the following statements is correct with reference to enzymes?

a) Apoenzyme = holoenzyme + coenzyme b) Holoenzyme = apoenzyme + coenzyme

c) Coenzyme = apoenzyme + holoenzyme d) Holoenzyme = coenzyme + cofactor

16. The method of DNA fingerprinting involves the use of

a) Restriction enzyme b) *Taq* polymerase c) Oligonucleotide primers d) All of these

17. A gene whose expression helps to identify a transformed cell is known as

a) Structural gene b) Vector c) Plasmid d) Selectable marker

18. Carl Woese's three-domain system of classification was based on the structure of

a) 23S rRNA b) 16S rRNA c) 70S rRNA d) 50S rRNA

19. If there are 999 bases in an RNA that codes for a protein with 333 amino acids, and the base at position 901 is deleted such that the length of the RNA becomes 998 bases, how many codons will be altered?

a) 1 b) 11 c) 33 d) 333

20. Which statement is wrong for Krebs' cycle?

a) There are three steps in the cycle where NAD^+ is reduced to NADH + H^+

b) There is one step in the cycle where FAD is reduced to $FADH_2$

c) During the conversion of succinyl CoA to succinic acid, one molecule of GTP is synthesised

d) The number of ATP synthesized per actyl CoA oxidised is 15

21. During replication of double stranded DNA, Okazaki fragments are used to elongate

a) The leading strand towards replication fork b) The lagging strand towards replication fork

c) The leading strand away from replication fork d) The lagging strand away from the replication fork

22. Which of the following components provides sticky character to the bacterial cell?

a) Cell wall b) Nuclear membrane c) Plasma membrane d) Glycocalyx

23. Which of the following options gives the correct sequence of events during mitosis?

a) Condensation, nuclear membrane disassembly, crossing over, segregation, telophase

b) Condensation, nuclear membrane disassembly, chromosomal arrangement at equator, centromere division, segregation, telophase

c) Condensation, crossing over, nuclear membrane disassembly, segregation, telophase

d) Condensation, chromosomal arrangement at equator, centromere division, segregation, telophase

24. Which one of the following degradative processes release offensive odour?

a) Decomposition b) Fermentation c) Putrefaction d) Respiration

25. Probiotics are

a) Cancer inducing microbes b) New kind of food allergens

c) Live microbial food supplement d) Safe antibiotics

26. Four respiratory enzymes are given below

(I) Enolase (II) Aconitase

(III) Fumarase (IV) Alcohol dehydrogenase

Arrange them in increasing order of the carbon number of the substrates on which they act.

a) II, IV, III, I b) IV, I, II, III c) I, IV, III, II d) IV, I, III, II

27. An example of gene therapy is

a) Production of injectable hepatitis B vaccine

b) Production of vaccines in food crops like potatoes which can be eaten

c) Introduction of gene for adenosine deaminase in persons suffering from Severe Combined Immuno Deficiency (SCID)

d) Production of test tube babies by artificial insemination and implantation of fertilized eggs

28. Oncogenic character is seen in

a) *E.coli* b) pBR^{322} c) T_i plasmid d) R_i plasmid

29. The distance between the genes A and B is 5 cM. A test cross of a dihybrid with the genotype AaBb, the percentage of Ab gamete will be produced by the dihybrid is

a) Less than 25% b) 50% c) 25% d) More than 50%

30. Match the following sexually transmitted diseases

(Column - I) with their causative agent (Column - II) and select the correct option.

Column - I	**Column- II**
(A) Gonorrhea	(i) HIV
(B) Syphilis	(ii) Neisseria
(C) Genital Warts	(iii) Treponema
(D) AIDS	(iv) HumanPapilloma Virus

	(A)	(B)	(C)	(D)
a)	(ii)	(iii)	(iv)	(i)
b)	(iii)	(iv)	(i)	(ii)
c)	(iv)	(ii)	(iii)	(i)
d)	(iv)	(iii)	(ii)	(i)

31. Cytochromes are present in

a) Mitochondria and lysosomes b) Mitochondria and chloroplasts

c) Mitochondria and ribosomes d) Ribosomes and lysosomes

32. In Singer and Nicholson's model, the fluidity of the biological membrane is due to the restricted movement of

a) Phospholipid molecules b) Extrinsic proteins c) Intrinsic proteins d) All of these

33. Which of the following is used as a counter stain in Gram staining?

a) Crystal violet b) Lugol's iodine c) Acetone d) Safranin

34. By which method is rDNA directly placed in nucleus of animal cell?

a) Gene gun b) Heat shock c) $CaCl_2$ transformation d) Microinjection

35. If in an ecosystem, 20 cal energy is available at producer level, then how much energy will be transferred to the lion by means of the food chain : producer→ deer→ lion?

a) 83.6 J b) 8.36 J c) 0.836 J d) 0.0836J

36. Which one of the following is known as Kornberg's enzyme?

a) RNA polymerase b) Reverse transcriptase c) DNA polymerase III d) DNA polymerase I

37. The major components of thylakoid membrane which are associated with the light reaction of photosynthesis are

a) PS I, PS II, ATP synthetase, and Cytochrome b_6f complex

b) PS I, PS II, plastocyanine, Plastoquinone, ATP synthase, Phaeophytin, water and Cytochrome b_6f complex

c) LHC, RC, PS I ,PS II, ATPsynthase, and Cytochrome b_6f complex

d) PS I, PS II, Cytochrome b_6f complex, and ATPsynthase

38. The term "microsome" is related to

a) Plasma membrane b) Golgi complex c) Endoplasmic reticulum d) Lysosome

39. To avoid spoilage by microorganisms, foods are stored in refrigerator, because low temperature in the refrigerator causes

a) Killing of the vegetative cells b) Killing of resistant structures

c) Growth stoppage d) Growth reduction

40. A number of bacteria release Bacteriocins in their environment which can kill closely related bacteria. Chemically Bacteriocins are

a) Carbohydrates b) Lipids c) Proteins d) Nucleic acid

B. Assertion and Reason type questions

The following questions consist of two statements one labelled **ASSERTION (A)** and the another labelled **REASON (R)**. Select the correct answers to these questions from the codes given below :

a) Both **A** and **R** are true and **R** is the correct explanation of **A**

b) Both **A** and **R** are true but **R** is not correct explanation of **A**

c) **A** is true but **R** is false

d) **A** and **R** are false

41. **Assertion**: In ETS of respiration, oxidation of one carrier and reduction of another carrier is essential.
Reason: In respiratory ETS, energy of oxidation- reduction is utilised for production of proton gradient.

42. **Assertion**: Yeast, *Saccharomyces cerevisiae*, are used in baking industry.
Reason: Carbon dioxide produced during fermentation causes bread dough to rise by thermal expansion.

43. **Assertion**: Diabetes insipidus is marked by excessive urination and too much thirst of water.
Reason: Anti-diuretic hormone (ADH) is secreted by the posterior lobe of pituitary gland

44. **Assertion**: Cyclic pathway of electron transport in photosynthesis first appeared in some eubacterial species
Reason: Oxygen started accumulating in the atmosphere after the non-cyclic pathway of photosynthesis evolved.

45. **Assertion**: Nitrogen fixing bacteria in legume root nodules survive in oxygen depleted cells of nodules.
Reason: Leghaemoglobin completely removes oxygen from the nodule cells.

———— × ————