Q-12

ENTRANCE EXAMINATION – 2018

M.Sc. Molecular Microbiology

Time: 2 hours Maximum Marks: 100

HALL TICKET NO.

INSTRUCTIONS

Please read carefully before answering the questions:

1. Enter your Hall Ticket number both on the top of this page and on the OMR answer sheet.

2. Answers are to be marked only on the **OMR answer sheet** following instructions provided there upon.

3. Hand over the OMR answer sheet to the Invigilator before leaving the examination hall.

4. The question paper contains **100** questions (**Part-A**: Question Nos. **1-25** and **Part-B**: Questions Nos. **26-100)** of multiple-choice printed in **16** pages, including this page. One OMR answer sheet is provided separately. **Please check**.

5. The marks obtained in **Part-A** will be used for resolving the tie cases.

6. Each question carries one mark.

7. There is **Negative marking** for wrong answers, in **Parts A and B**. For each wrong answer, 0.33 mark will be deducted.

8. Calculators and mobile phones are NOT allowed.

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PART – A

1. Which of the following statements is **not** correct regarding Cyanobacteria?

   A. Cyanobacteria are gram negative prokaryotes
   B. They are autotrophic forms and the photosynthesis is of oxygenic type
   C. *Nostoc* and *Anabaena* possess heterocysts in which atmospheric nitrogen is fixed
   D. Unlike bacteria, cell wall of cyanobacteria lack peptidoglycan

2. Many plant pathogenic fungi produce appressoria prior to penetrating the plant tissue and most of these appressoria contains a layer of dark colored pigment which is very important in the penetration process is called as

   A. L-Micropine
   B. D-Micropine
   C. Macerozyme
   D. Melanine

3. A researcher is using a monoclonal antibody as the primary antibody in his serodiagnosis experiment of western blotting and what will be the secondary antibody he should use to detect the antigen antibody complex through chemiluminescence?

   A. Goat anti rabbit IgG labelled with ALP.
   B. Goat anti rabbit IgG labelled with HRP.
   C. Goat anti mouse IgG labelled with HRP
   D. Goat anti mouse IgG labelled with ALP

4. A simple spherical virus particle is called as an "icosahedron" made up of

   A. 30 edges, 20 faces and 12 vertices
   B. 20 edges, 12 faces and 30 vertices
   C. 12 edges, 30 faces and 12 vertices
   D. 60 edges, 10 faces and 24 vertices

5. A frustule is

   A. Hard and porous cell wall or external layer of diatoms
   B. Cell wall of lichens
   C. Cell wall of bacteria
   D. A sporulating complex in the fungi

6. Which one among the following is an acid buffer

   A. $CH_3COOH + CH_3COOK$
   B. $CH_3COOH + CH_3COONH_4$
   C. $NH_4Cl + NH_4OH$
   D. $(NH_4)_2CO_3 + NH_4OH$

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7. Which among the following belong to the polyketide class of antibiotics

A. Penicillin
B. Tetracycline
C. Rifampicin
D. Streptomycin

8. Roll-tube method is employed to isolate

A. Aerobes
B. Facultative aerobes
C. Anaerobes
D. Thermophiles

9. Which of the following is the most likely order (earliest to latest) in which the eukaryotic organelles have evolved?

A. Mitochondria-nucleus-chloroplast
B. Nucleus-chloroplast-mitochondria
C. Chloroplast-nucleus-mitochondria
D. Nucleus-mitochondria-chloroplast

10. If both the strands of a DNA helix are fully radioactive and allowed to replicate twice in a non-radioactive medium, what will be the correct number of radioactive strands formed?

A. Out of 4 strands, only 2 will have radioactivity
B. Out of 4 strands, only 3 will have radioactivity
C. All four strands will have radioactivity
D. Radioactivity will be lost in all strands

11. When *E. coli* growing on a normal medium with glucose was transferred to a medium with only lactose as the sugar, the following will happen

A. The lac operon is repressed
B. All operons are induced
C. Cells stop dividing
D. The lac operon is induced

12. If Mendel had studied the seven traits using a plant with 12 chromosomes instead of 14, the following would have happened

A. He could have mapped the genes
B. He would have discovered incomplete dominance
C. He would not have discovered the law of independent assortment
D. He would have discovered sex linkage

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13. When the fleshy receptacle forms a hollow cavity with a narrow apical opening guarded by scales and the flowers are borne on the inner wall of the cavity the inflorescence is called

A. Verticillaster
B. Cyathium
C. Hypanthodium
D. Spike

14. Periblem gives rise to

A. Epidermis
B. Cuticle
C. Cortex, hypodermis and endodermis
D. Vascular tissue

15. These are some of the important biomolecules, identify their corresponding match

L. Cytochrome P450	1. Thiol tripeptide
M. Ascorbic acid	2. Superoxide dismutase
N. Glutathione	3. Glycoprotein
O. H_2O_2	4. Antioxidant
	5. Heme-protein complex
	6. Glycolipid

A. L=6; M=5; N=4; O=3
B. L=5; M=4; N=1; O=2
C. L=2; M=3; N=1; O=4
D. L=5; M=3; N=6; O=2

16. Which of the following pairs is **mismatched**?

A. Sulfur granules – energy reserve
B. Matachromatic granules – stored phosphates
C. Lipid inclusions – poly β–hydroxybutyric acid
D. Polysaccharide granules – stored starch

17. Calvin Bridges experimentally produced various combinations of X chromosomes and autosomes in *Drosophila melanogaster*. In his investigations, he observed that *Drosophila* flies having two X chromosomes and 3 sets of autosomes were

A. Males
B. Metamales
C. Females
D. Intersex

18. Hypnotoxin is a poisonous fluid produced by

A. Parasitic protozoa
B. Nematocysts of hydra
C. Sponges
D. Ascaris

19. Match the following using the codes given below

1. Tertian/Benign malaria	(a) *Plasmodium falciparum*
2. Quartan malaria	(b) *Plasmodium malariae*
3. Mild tertian malaria	(c) *Plasmodium vivax*
4. Malignant tertian malaria	(d) *Plasmodium ovale*

A. 1-(c), 2-(b), 3-(d), 4-(a)
B. 1-(d), 2-(c), 3-(a), 4-(b)
C. 1-(b), 2-(c), 3-(d), 4-(a)
D. 1-(a), 2-(c), 3-(b), 4-(d)

20. The degree of hydrolysis of the salt of a weak acid and a strong base is

A. Independent of initial concentration
B. Directly proportional to initial concentration
C. Inversely proportional to initial concentration
D. Inversely proportional to square root of initial concentration

21. Helotism is shown by

A. Lichens B. *Nepenthes* C. *Cuscuta* D. Myxomycetes

22. An idiogram is

A. The electrocardiogram of a patient with Down's syndrome
B. A time-lapse photographic record of cell-type
C. A drawing, or photomicrograph of the chromosomes of a particular cell
D. A linkage map

23. The pair of molecules which form the strongest inter-molecular hydrogen bonds is

A. SiF_4 and SiH_4 B. HCOOH and CH_3COOH
C. CH_3COCH_3 and $CHCl_3$ D. HF and HCl

24. Most commonly used probe for glycoprotein is

A. Antigen B. Interferons C. Lectin D. Antibody

25. Choose the **correct** statement regarding the properties of enzymes

A. Enzymes initiate chemical reaction
B. Enzymes lower the energy of activation needed by the substrate molecules
C. Enzymes usually have lower molecular weight as compared to the substrate molecules
D. Enzymes exists in a cell in the form of a solution

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PART – B

26. Which of the following pigments is **not** characteristic of chloroplasts?

A. Xanthophyll
B. Chlorophyll
C. Anthocyanin
D. Beta-carotene

27. When bacteria are grown on a medium containing ^{35}S as the source of sulphur, ^{35}S gets accumulated in

A. DNA
B. Protein
C. RNA
D. mRNA

28. If a normal woman marries an albino man and the offspring are half albino and half normal, the woman is?

A. Homozygous normal
B. Heterozygous normal
C. Homozygous recessive
D. Homozygous dominant

29. One of the following is a characteristic feature of the phylum, Porifera

A. Circular or disc like body with radial arms
B. Free gills and spiny cap surface
C. Sponge like body with channels to circulate water
D. A well-defined vertebral column derived from notochord

30. Vernalization is induced by

A. Low temperature
B. Low light intensity
C. High temperature
D. High light intensity

31. The phloem elements which consists of living cells but non-nucleated

A. Companion cells
B. Phloem fibres
C. Phloem parenchyma cells
D. Seive tubes

32. During which geological era did *Tyrannosaurus rex* live?

A. Jurassic
B. Triassic
C. Cretaceous
D. Permian

33. Thermophiles have temperature optima between

A. 45-50 °C
B. 55-65 °C
C. 70-85 °C
D. 80-90 °C

34. Phylloquinone is a chemical compound that contains a ring of 2-methyl-1,4-naphthoquinone and an isoprenoid side chain and usually produced by green plants, algae and photosynthetic bacteria. It functions as one of the following vitamins

A. Vitamin-A
B. Vitamin-K1
C. Vitamin-B12
D. Vitamin-K2

35. Which among the following is **not** related to deficiency or illness of eye

A. Otitis
B. Glaucoma
C. Conjunctivitis
D. Astigmatism

36. Ammonia oxidation to nitrate depends on the following two bacteria

A. *Nitrosomonas – Nitrosospira*
B. *Azospirillum – Pseudomonas*
C. *Nitrobacter – Nitrococcus*
D. *Nitrosospira – Nitrococcus*

37. Water transport from roots to leaves is explained by

A. The pressure flow theory
B. Differences in source and sink solute concentrations
C. The pumping force of xylem vessels
D. The cohesion tension theory

38. Ames test is a test that uses

A. A special *Salmonella* strain to test chemicals for mutagenicity and potential carcinogenicity
B. A *Streptococcus* strain to test its pathogenicity on humans
C. A *Caulobacter* strain to test for use in the treatment of mutagens and carcinogens
D. A *Helicobacter* strain to test for curing gut cancer

39. Which of the following statement is **false**?

A. Auxins and gibberellins promote stem elongation
B. Cytokinins promote cell division but retard leaf aging
C. Abscisic acid promotes water loss and retard dormancy
D. Ethylene promotes fruit ripening and abscission

40. "Geosmins" are

A. A group of antibiotics produced by Streptomycetes
B. Streptomycete metabolites that give characteristic earthy odor of soil
C. Polyenes produced by *Streptomyces*
D. A group of *Streptomyces* which are useful for mining

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41. Which of the following acts as a tag to lysosomal enzymes?

A. Pentose-6-phosphate
B. Mannose-6-phosphate
C. Fructose-6-phospate
D. Glucose-6-phosphate

42. To prepare 1L of reaction buffer containing 10 mM Tris pH 7.0, 0.5 mM $MgCl_2$ and 0.01% NaN_3, the given stock solutions should be mixed in the order of _____ and make up the volume to 1L.
Stocks: 2M Tris pH 7.0; 1M $MgCl_2$ and 1% NaN_3

A. 100 mL of Tris pH 7.0; 50 mL of $MgCl_2$ and 10 mL of NaN_3
B. 50 mL of Tris pH 7.0; 5 mL of $MgCl_2$ and 1 mL of NaN_3
C. 50 mL of Tris pH 7.0; 50 mL of $MgCl_2$ and 10 mL of NaN_3
D. 5 mL of Tris pH 7.0; 0.5 mL of $MgCl_2$ and 10 mL of NaN_3

43. Saponification is

A. Hydrolysis of esters under basic conditions
B. Hydrolysis of amines under basic conditions
C. Reduction of alcohols
D. Oxidation of ketones

44. The following is a non-nutritive sweetener

A. Steviol glycoside
B. Glucose
C. Sucrose
D. Adenosine triphosphate

45. Myosin is a protein that converts

A. Mechanical energy to chemical energy
B. Chemical energy to mechanical energy
C. Synthesizes chemical energy using photons
D. ATP synthase

46. Double fertilization results in

A. Pollen tube development
B. Triploid embryos
C. A zygote and an endosperm
D. A zygote and a pollen tube

47. Which among the following is a cofactor for the enzyme hexokinase?

A. Zn^{2+}
B. Mn^{2+}
C. Mg^{2+}
D. Cu^{2+}

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48. Which is the terminal acceptor of electrons in the electron transport pathway in mitochondria

A. O_2 B. HO_2 C. NAD^+ D. NADH

49. Identity the water soluble protein given bellow

A. Coenzyme-Q
B. Cytochrome-c
C. Iron-Sulfur proteins
D. Flavoproteins

50. Lactulose is made of

A. Glucose + Galactose
B. Glucose + Fructose
C. Galactose + Fructose
D. Glucose + Mannose

51. Which of the following amino acids is mostly likely to disrupt an alpha helix?

A. Leucine B. Histidine C. Proline D. Tyrosine

52. Which complex in blue green algae harvest the light and funnels to photosystem-II

A. Chlorophyll B. Phycobilisomes C. LHC-II complex D. Carotenoids

53. A trihybrid plant AaBbCc after self-fertilization forms

A. 4 different gametes and 16 different zygotes
B. 8 different gametes and 64 different zygotes
C. 8 different gametes and 16 different zygotes
D. 8 different gametes and 27 different zygotes

54. Hershey and Chase demonstrated that the genetic material is DNA using the following phage

A. T2 phage B. λ phage C. T4 phage D. M13 phage

55. In contrast to mutations induced by chemical mutagens, transposon induced mutations are more likely

A. Dominant B. Pleiotropic C. Able to revert D. Lethal

56. Successful gene therapy in humans was first reported for

A. Adenosine deaminase
B. Tyrosinase
C. Lipase
D. Glucose-6-phosphatase

57. Scientific name of the insectivorous plant, "Venus flytrap" is

A. *Pinguicula gigantean*
B. *Drosera capensis*
C. *Dionaea muscipula*
D. *Aldrovanda vesiculosa*

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58. Different nomenclatures are used to differentiate various types of epitopes, name the nomenclature given to the "hidden epitopes"?

A. Neotopes
B. Cryptotopes
C. Metatopes
D. Neutralizing epitopes

59. As of today these are the smallest pathogenic microorganisms that have been reported to have naked positive sense RNA molecules as short as 400 nucleotides as their genetic material.

A. Prions
B. Viruses
C. Viroids
D. Spiroplasmas

60. One of the following is **not** naturally occurring cytokinin

A. Kinetin
B. Zeatin
C. Isopentinyladenine
D. Dihydrozeatin

61. Which of the following statements is **incorrect** about plasmids?

A. They are replicons that are stably inherited in an extra chromosomal state
B. They cannot replicate when they are integrated into the main host chromosome
C. They play an essential role under certain environmental conditions
D. They are not required for survival of the cells

62. Which of the following statements about heritability is **incorrect**?

A. Heritability estimates are absolute measurements of the contribution of genetic and environmental factors to a phenotype
B. Heritability measures the fraction of phenotypic variability that can be attributed to genetic variation
C. Heritability increases if the environmental variation decreases
D. Heritability estimates are always relative to the genetic and environmental factors in the population

63. The phenomenon of water droplets observed at the tips of grasses/some herbaceous plant leaves in the morning hours is called as _____ and occurs through _____

A. Transpiration, Stomata
B. Perspiration, Xylem
C. Guttation, Hydathodes
D. Condensation, Xylem

64. *Helicobacter* belongs to the class of

A. Alphaproteobacteria
B. Deltaproteobacteria
C. Gammaproteobacteria
D. Epsilonproteobacteria

65. In angiosperms the ABC model pertains to

A. Root development
B. Leaf development
C. Flower development
D. Shoot development

66. The RNA polymerase holoenzymes specificity factor that mediates promoter recognition in *E. coli* is

A. Delta subunit
B. Alpha subunit
C. Sigma subunit
D. Rho protein

67. Which of the following is **correct** about DNA palindromic sequences

A. Signals for termination of DNA synthesis
B. Primers for DNA replication
C. Signals for attachment of RNA primer
D. Sites for restriction endonucleases

68. Which of the following **do not** occur in chloroplast?

A. Photosynthesis
B. Lipid synthesis
C. Sucrose synthesis
D. Starch synthesis

69. Which of the following enzymes are **not** involved in lysis of plant cell wall to obtain protoplast?

(i) Cellulase (ii) Chitinase (iii) Pectinase (iv) Lysozyme (v) Peptidase

A. (i), (ii), (v)
B. (ii), (iv), (v)
C. (i), (ii), (iv)
D. (iii), (iv), (v)

70. Why plant chlorophyll and leaves are green?

A. Due to absorption of green light with wave length between 480-550 nm
B. Due to reflection of green light with wave length between 480-550 nm
C. Due to absorption of yellow light with wave length between 560-600 nm
D. Due to refraction of green light with wave length between 480-550 nm

71. The toxin produced by *Clostridium botulinum* primary target in the human system is

A. Circulatory system
B. Respiratory system
C. Nervous system
D. Reproductive system

72. Which one of the following is **not** an essential mineral element for plants?

A. Copper
B. Manganese
C. Magnesium
D. Aluminium

73. Which among the following represents 'monosomy' condition

A. [2n+2] B. [2n−2] C. [2n+1] D. [2n−1]

74. Match the following using the codes given below:

1. Nalidixic acid	(a) Translation
2. Rifampicin	(b) Cell wall
3. Penicillin	(c) Transcription
4. Fusidic acid	(d) DNA topoisomerase

A. 1-(b), 2-(a), 3-(c), 4-(d)
B. 1-(c), 2-(a), 3-(b), 4-(d)
C. 1-(a), 2-(d), 3-(b), 4-(c)
D. 1-(d), 2-(c), 3-(b), 4-(a)

75. Which of the following has quaternary structure?

A. Myoglobin B. Haemoglobin C. Both A & B D. None of the above

76. Select the **correct** match from the options given below

1. Initiation of spindle fibers	(a) Anaphase-I
2. Synthesis of RNA & protein	(b) Zygotene
3. Action of endonuclease	(c) G1 Phase
4. Movement of chromatids towards opposite poles	(d) Pachytene
	(e) Anaphase-II

A. 1-(a), 2-(c), 3-(e), 4-(d)
B. 1-(b), 2-(c), 3-(d), 4-(e)
C. 1-(a), 2-(d), 3-(c), 4-(b)
D. 1-(c), 2-(b), 3-(a), 4-(e)

77. When the cap of an average gilled mushroom is cut off and placed on a paper, a spoke-like print eventually appears on the paper under the cap. This powdery material would be

A. Mycelia
B. Hyphae
C. Basidiospores
D. Conidiospores

78. 10^{-2} M HCl solution is 100 times diluted. What is the pH of the resulting solution?

A. 4.0 B. 4.5 C. 5.0 D. 5.5

79. Infection is transmitted when the primary host consumes the secondary host in the case of

A. *Fasciola hepatica*
B. *Taenia solium*
C. *Trypanosoma gambiense*
D. *Wuchereria bancrofti*

80. Which of the following represent **mismatched** pair?

1. Platyhelminthes – Solenocytes
2. Nemathelminthes – Malpighian tubules
3. Annelida – Nephridia
4. Mollusca – Head Kidneys

A. Both 1 & 3
B. Both 2 & 3
C. Only 2
D. Only 1

81. The quiescent centre of the apical meristem consists of

A. Actively dividing cells
B. Slow dividing cells
C. Inactive cells
D. Cells that give rise to the calyptrogen

82. The mechanism of ATP formation both in chloroplast and mitochondria is explained by

A. Relay pump theory of Godlewski
B. Chemiosmotic theory
C. Cholodny – Went's theory
D. Munch's pressure/mass flow model

83. Which of the following must be present if the ecosystem is to be maintained

A. Producers & Consumers
B. Consumers & Decomposers
C. Producers & Decomposers
D. Herbivores & Carnivores

84. Seismonastic movements are found in

A. Rain tree B. Touch-me-not C. Wait-a-bit D. Fern leaf

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85. Find the most appropriate match

1. β-Oxidation	(a) Chloroplast
2. 50s ribosomes	(b) Peroxisomes
3. Light reaction	(c) Smooth ER
4. Steroid biosynthesis	(d) Mitochondria

A. 1-(b), 2-(d), 3-(a), 4-(c)
B. 1-(b), 2-(a), 3-(d), 4-(c)
C. 1-(a), 2-(d), 3-(c), 4-(b)
D. 1-(b), 2-(c), 3-(d), 4-(a)

86. Nucleoside is a

A. Nucleotide minus sugar group
B. Nucleotide minus nitrogenous base
C. Nucleotide minus phosphate group
D. Nucleoside minus sugar and phosphate groups

87. Glycocalyx is a

A. Highly-hydrated fibrous meshwork of carbohydrates that projects out and covers the membrane of endothelial cells, many bacteria and other cells.
B. Calcium deposits on the surface of the cells
C. Carbohydrate coat of vacuoles
D. Thick layer of positively charged material that coats endothelial cells

88. Promoter is

A. Upstream RNA sequence of an mRNA, which recognized by translation initiation factors in order to initiate translation.
B. Upstream DNA sequence of a gene, which is recognized by RNA polymerase in order to initiate transcription.
C. Sequence of amino acids in a protein, which promote catalysis of an enzyme.
D. Sequence of amino acids in a protein, which specifically promote oxidative/reductive reactions.

89. Wharton's jelly, a pure form of mucous connective tissue, is found in

A. Jelly fish
B. Vitreous body in the eye
C. Umbilical cord of mammals
D. Mesoglea of hydra

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90. What are endospores?

A. Endospores are certain fungal spores, enable their species to survive in adverse conditions.
B. Endospores are certain protozoan fruiting bodies, enable them to survive in adverse conditions.
C. Endospores are certain bacterial spores, enable them to survive in adverse conditions.
D. Endospores are non-living viral capsules, capable infecting eukaryotic cells.

91. An example of a biodegradable pollutant is

A. Pesticide B. Carcass C. Smog D. Aluminium cans

92. Red rot of sugarcane is caused by

A. *Cercospora personata* B. *Ustilago sacchari*
C. *Puccinia graminis* D. *Colletotrichum falcatum*

93. A second generation vaccine is one that consists of

A. Killed viruses B. An attenuated virus
C. Only the protein coat of a virus D. Synthetic chemicals

94. 2,4 Dicholorophenoxy acetic acid is generally used as

A. Pesticide B. Fungicide C. Wormicide D. Weedicide

95. The radioactive isotope of hydrogen is

A. Protium B. Deuterium C. Tritium D. o-hydrogen

96. Mesoglea is a characteristic of

A. Poriferans B. Coelenterates
C. Platyhelminthes D. Nemathelminthes

97. The enzyme 'erepsin' acts on

A. Carbohydrates B. Fats C. Proteins D. Mineral salts

98. The oldest living fossil is

A. Archeopteryx B. Peripatus
C. Archaea D. Cyanobacteria

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99. One molecule of CO_2 contains

A. 6.023×10^{23} atoms of Carbon
B. 6.023×10^{23} atoms of Oxygen
C. 18.1×10^{23} molecules of CO_2
D. 3 gm atoms of CO_2

100. Cilia and flagella have

A. Similar internal structure and are of equal size
B. Similar internal structure and are dissimilar in size
C. Dissimilar internal structure and are of equal size
D. Dissimilar internal structure and are of unequal size

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