K-13

ENTRANCE EXAMINATION – 2016

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 the 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.
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.

PART - A

1. The genus '*Vanilla*' belongs to

   a. Orchidaceae b. Liliaceae c. Poaceae d. Cyperaceae

2. The family known to be very rich in alkaloids

   a. Poaceae b. Solanaceae c. Amaranthaceae d. Rananculaceae

3. Petrification is a complex process of protein degradation and results in the production of noxious odours due to amino acid

   a. Deamination
   b. Transamination
   c. Decarboxylation
   d. Deamination followed by decarboxylation

4. Identify the mismatch

   a. Quorum sensing – Population density
   b. Siderophores – Acquires iron
   c. Enterobactin – Acquires magnesium
   d. Idophase – Secondary metabolite production

5. Greenhouse gases in the atmosphere absorb

   a. More visible radiation than infrared
   b. Visible and infrared equally
   c. More infrared radiation than visible
   d. Neither visible nor infrared radiation

6. 16S rRNA is a component of _____ subunit of ribosome

   a. 30S b. 50S c. 80S d. 40S

7. Which of the following is not a characteristic of Phylum Annelida?

   a. Parapodia b. Notochord c. Trochophore larva d. Metamerism

8. Oxidation of which substance in the body yields the most calories

   a. Glucose b. Glycogen c. Protein d. Lipids

9. If the calculated chi-square value is larger than the critical chi-square value, then the researcher should

   a. Accept the null hypothesis
   b. Reject the null hypothesis
   c. Check for a mathematical error
   d. Multiply by n, the sample size

10. How many carbons an isoprenoid unit has

    a. C3 b. C5 c. C6 d. C8

11. Which of the following permits only selective uptake of minerals in the root?

    a. Pericycle b. Epidermis c. Endodermis d. Root cap

12. Mixotrophic refer to

    a. Microorganisms that combine autotrophic and heterotrophic metabolic processes
    b. Microorganisms that either have autotrophic or heterotrophic metabolic processes
    c. Microorganisms that have photo- and chemo-autotrophic metabolic processes
    d. Microorganisms that combine carbon and nitrogen metabolic processes

13. One among the following is **NOT** an electron acceptor for anaerobic respiration

    a. NO_3^- b. SO_4^{2-} c. Fumarate d. Malate

14. Plants that flower only once in their lifetime are known as___.

    a. Monoecious b. Monocarpic c. Dioecious d. Polycarpic

15. Hershey and Chase's experiments

    a. Involved finding radioactivity inside bacteria infected with T_2 phage having DNA labeled with ^{32}P.
    b. Involved finding radioactivity inside bacteria infected with T_2 phage having DNA labeled with ^{35}S.
    c. Involved finding radioactivity inside bacteria infected with T_2 phage having protein labeled with ^{32}P.
    d. Involved finding radioactivity inside bacteria infected with T_2 phage having protein labeled with ^{35}S.

16. Which of the following dyes are used for negative staining

a. India ink/Nigrosin dye
b. Nigrosin dye/Basic fuchsin
c. Basic fuchsin/Crystal violet
d. Crystal violet/Malachite green

17. Identify the mismatch

a. Peptone media – Complex media
b. Crystal violet media – Characteristic media
c. MacConkey media – Selective and differential media
d. Chocolate agar media – Enrichment media

18. An example for an amphibolic pathway is

a. Glycolysis
b. Calvin pathway
c. Embden-Meyerhof-Parnas pathway
d. Entner-Doudoroff pathway

19. Catalytic dehydrogenation of a primary alcohol gives _____

a. Ketone
b. Aldehyde
c. Secondary alcohol
d. Ester

20. Which one among the following is correct for IMViC (Indole; Methyl red; Voges-Proskauer; Citrate) test for *Escherichia coli*

a. MR +ve; VP +ve; Indole –ve
b. MR –ve; VP –ve; Indole +ve
c. MR +ve; VP –ve; Indole +ve
d. MR –ve; VP +ve; Indole -ve

21. The enzyme activity associated with reverse transcriptase that digests the RNA template after DNA has been synthesized

a. Reverse discriminase
b. Lipase-H
c. RNAse-H
d. DNAse-H

22. Which among the following statements is **TRUE** for pili and fimbriae which are very commonly found in many bacteria

    a. These are proteinaceous cell surface appendages which are helpful in attachment, while pili help in cell-cell attachment and useful in genetic exchange, fimbriae help in confinement of cells.
    b. These are proteinaceous cell surface appendages which are helpful in attachment, while pili help in confinement of cells to the surface, fimbriae help in genetic exchange.
    c. These are non-proteinaceous cell surface appendages which are helpful in motility of the bacteria
    d. These are very specialized lipo-protein structures of bacteria which are useful in cell-to-cell signalling.

23. The list of events that occur during meiosis 1 are listed below

    A. Homologous chromosomes are roughly aligned but not physically linked
    B. Homologous chromosomes segregate to opposite poles
    C. Homologous chromosomes are linked by synaptonemal complexes
    D. Homologous chromosomes are linked by chiasmata
    E. Chromosomes replicate

    The correct order of these events is

    a. ACDBE
    b. AECDB
    c. EACDB
    d. EADCB

24. N-linked polysaccharides are attached to

    a. Serine
    b. Glycine
    c. Tryptophan
    d. Asparagine

25. Penicillin acts as an antibiotic in susceptible bacteria by interfering with

    a. Cell wall formation
    b. Protein synthesis
    c. Krebs cycle
    d. Electron transport chain

PART - B

26. In which photosynthetic organism H_2S as a donor

    a. Purple sulfur bacteria
    b. Blue sulfur bacteria
    c. Cyanobacteria
    d. *Chlamydomonas*

27. Bacteria which are commonly associated with the methanogenic bacteria are

    a. Acetogenic bacteria
    b. Methylotrophic bacteria
    c. Iron reducng bacteria
    d. Sulfur reducing bacteria

28. Antibiotic tetracycline binds to _____ subunit of ribosome

    a. 50S b. 30S c. 32S d. 80S

29. Lactose is composed of galactose and glucose and which forms a

    a. β-1→4 glycosidic
    b. α-1→4 glycosidic
    c. β-1→6 glycosidic
    d. α-1→6 glycosidic

30. The substance that is general biosynthetic precursor of sex harmones and harmones of adrenal cortex is

    a. Inositol b. Sphingomyelin c. Lecithin d. Cholestrol

31. Carbon sequestration refers to:

    a. The sale of carbon credits in the international market
    b. The process of capture and long-term storage of atmospheric CO_2
    c. The release of carbon, as CO_2, into the atmosphere
    d. The accumulation of carbon in the atmosphere

32. Which of the following statement about mitochondria is **NOT** true?

    a. Size and shape of mitochondria varies in a cell
    b. Mitochondria in the cell can fuse with one another
    c. Large mitochondria in the call can split into two
    d. In all cells, one mitochondria will be exceptionally larger than others

33. Which of the following statement is **NOT** true for a plant cell?

    a. Ribosomes are smaller than vacuole.
    b. Plant cells have centriole.
    c. Plant cells contain mitochondria.
    d. Plant cells are surrounded by a cell wall.

34. In the tall trees water move from the soil to the top of tree by using following property of water?

    a. Osmosis
    b. Capillary rise
    c. Ionization
    d. Adhesion and cohesion of water molecules

35. If two AaBb individuals are crossed, what is the probability that a particular offspring will show one or both of the dominant traits? (A and B are dominant to a and b, respectively, and are unlinked.)

    a. 3/16 b. 9/16 c. 12/16 d. 15/16

36. Multiple sclerosis is a disease related to

    a. Heart b. Bones c. Nerve cells d. Teeth

37. If a Punnett square is made showing Gregor Mendel's cross between true-breeding tall plants and true-breeding short plants, the square would show that the offspring had

    a. The genotype of one of the parents
    b. A phenotype that was different from that of both parents
    c. Genotype that was different from that of both parents
    d. The genotype of both parents

38. The two strands of the DNA double helix are held together by:

    a. Hydrogen bonds.
    b. C=C double bonds.
    c. Hydrophobic bonds.
    d. Peptide bonds.

39. The fluctuation test of Luria and Delbruck (studying resistance of *Escherichia coli* to bacteriophage T_1 infection) showed all of the following **except**

    a. Mutations are present in the cells before selection
    b. The number of resistant colonies per clone was similar on **all** plates
    c. The variance in resistant colony number was very much greater between cultures than within them.
    d. The production of mutations is non-random with respect to their effects on the phenotype

40. Which one of the following are collectively called the calyx.

    a. Sepals b. Petals c. Tepals d. Stamens

41. A light receptor in certain bacteria resembles that found in the eyes of animals and they are referred as

    a. Photochrome b. Rhodopsin
    c. Bacteriolysin d. Bacteriorhodopsin

42. Benzaldehyde and acetone be best distinguished using

    a. Hydroazine
    b. Tollen's reagent
    c. Sodium hydroxide solution
    d. 2,4-DNP

43. Cyanobacteria contains a special pigment complex called

    a. Light harvesting complex
    b. Phycobilisome
    c. Phycoerythrobiline
    d. Bacterial Pigment complex

44. Amino acids are synthesized from

    a. Fatty acids b. Carbohydrates
    c. α-keto acids d. Proteins

45. Spore formation is absent in

    a. Archaea
    b. Bacteria
    c. Plants
    d. Archaea and Bacteria

46. Which of the following statements is **TRUE** regarding the ABO blood system?

    a. People of type A normally would not produce the anti-A antibody
    b. People of type B normally would produce the anti-B antibody
    c. People who are type AB normally produce both anti-A and anti-B antibodies
    d. people of O blood group do not produce anti-A and anti-B antibodies

47. Eukaryotic and multicellular body forms are not observed in one of the following:

    a. Monera b. Fungi c. Plantae d. Animalia

48. Which of the following is a correct statement about biological nitrogen fixation carried out by legumes?

    a. Plants convert nitrogen to ammonia.
    b. Plants convert ammonia to nitrate.
    c. Fungus growing on plants produce ammonia.
    d. Bacteria convert nitrogen to ammonia.

49. Satity center regulating food intake is in

    a. Liver b. Hypothalamus
    c. Medulla oblongata d. Stomach

50. What is difference between Phosphene and Phosphine?

    a. Phosphene is a phenomenan characterized by the experience of seeing light without light actually entering the eye whereas phosphine is the name of flammable toxic gas which is a group of organophosphorous compound
    b. Phosphine is a phenomenan characterized by the experience of seeing light without light actually entering the eye whereas phosphene is the name of flammable toxic gas which is a group of organophosphorous coumpond
    c. Phosphene is the name of organic compound which posses two alkenes group combined with phosphoric acid whereas phosphine is the name of flammable toxic gas which is a group of organophosphorous coumpond
    d. Phosphene is the name of plant disease which occur due to high phosphorous toxicity in plants whereas phosphine is the phenomena of deficiency of phosphorous in human bone.

51. In competitive inhibition, an inhibitor:

    a. Binds at several different sites on an enzyme
    b. Binds reversibly at the active site
    c. Binds only to the ES complex
    d. lowers the characteristic Vmax of the enzyme

52. The process by which proteins are synthesized in cell is known as:

a. Replication
b. Transcription
c. Transformation
d. Translation

53. A characteristic feature for saturated fatty acid is

a. Low melting point
b. High melting points
c. Short hydro carbon chain
d. Nonlinear side chain

54. DNA microarrays have been widely used in genomic studies because they can

a. Eliminate the function of any gene in the genome
b. Help in analyzing the expression of many genes in the genome to be compared at once
c. Help in introducing entire genomes into bacterial cells
d. Dramatically enhance the efficiency of *in vitro* mutagenesis

55. The stage of cell division in which DNA replicates is called

a. Interphase b. Metaphase c. Anaphase d. Telophase

56. In humans, drug detoxification majorly occurs in

a. Heart b. Bone marrow c. Liver d. Lungs

57. A person with Klinefelter's syndrome exhibits one of the following conditions

a. Triploid b. Haploid c. Monosomic d. Trisomic

58. For the flower induction, the vernalization signal in plants is perceived mainly by:

a. Young leaves subtending the apical meristem
b. Mature leaves near the root shoot junction
c. All vegetative parts
d. Shoot apical meristem

59. Alkaloid production in plants is regulated by change in the endogenous pool of:

a. Gibberellins
b. Jasmonates
c. Brassinosteroids
d. Abscisic acid

60. An organism with two identical alleles for a given trait is

a. Homozygous
b. Segregating
c. Dominant
d. Unusually rare

61. A chemical called Polyethylene glycol (PEG) is commonly used as precipitant for plasmid DNA isolation and to concentrate viruses. PEG is also used in complete fusion of biomolecule. How PEG is prepared commercially?

a. By heating ethanol with excess of concentrated sulphuric acid at 170 °C
b. By hydrolysis of ethylene oxide with water at 200 °C under pressure. Polymerization depends upon the ratio of reactants.
c. When ethylene glycol reacts with PCl_5 first to form ethylene chlorohydrin and then polymerization occurs to form PEG
d. When ethylene reacts with HOCl, it form ethylene chlorohydrin. This is followed by reaction with carboxylic acid in the presence of mineral acid to form PEG

62. Malaria fever is caused by .....

a. *Plasmodium falciparum*
b. *Trypanosoma brucei*
c. Cockroach
d. House fly

63. Removal of outer exoskeleton is the process called

a. Metamorphosis
b. Ecdysis
c. Paedogenesis
d. Gametogenesis

64. If the amino acid net charge is zero is called _____

a. Ionizable
b. Isoelectric point
c. Stereochemistry
d. Chiral center

65. Dark-grown seedling display 'triple response' when exposed to ethylene. Which one of the following is not a part of 'triple response'?

a. Decrease in epicotyl elongation
b. Rapid unfolding and expansion of leaves
c. Thickening of shoot
d. Horizontal growth of epicotyl

66. Which one of the following is part of carbohydrates, proteins and nucleic acids?

a. Nitrogen
b. Carbon
c. Magnesium
d. Iron

67. The function of contractile vacuole

a. Nutrition
b. Reproduction
c. Osmoregulation
d. Locomotion

68. High Density Lipoprotein (HDL) is synthesized and secreted from

a. Pancreas b. Liver c. Kidney d. Muscle

69. What is the term for the symbiotic association between fungi and cyanobacteria?

a. Lichen
b. Mycorrhizae
c. Epiphyte
d. Nitrogen-fixing nodule

70. The biochemical reaction involving adding sugars to proteins is called as

a. Glucogenesis
b. Glycolysis
c. Glycosylation
d. Glalactolation

71. Two different restriction enzymes digesting within the same recognition sequence are called as

a. Endo restriction enzymes
b. Isoschizomers
c. Exo restriction enzymes
d. Palindromes

72. The filamentous DNA and protein that can be stained in Interphase nuclei is called

a. Solenoid b. Nucleosome c. Chromatin d. Polytene

73. A mature fruiting body of an ascomycete fungal organism is referred as

a. Peritheicum b. Epithecium c. Apotheicum d. Trichogyne

74. Enterokinase is involved in the conversion of

a. Pepsinogen to pepsin
b. Trypsinogen to trypsin
c. Caseinogen to casein
d. Glycogen to glucose

75. Ephyra larva is found in the life cycle of

a. *Fasciola* b. *Obelia* c. *Sycon* d. *Aurelia*

76. Why do glycolipids exist almost exclusively on the exterior side, bit not on the cytoplasmid side of the cell membrane?

a. The inner layer of the membrane is not thick enough to accommodate carbohydrates
b. Carbohydrates are added only to lipids on the luminal side of the ER and Golgi
c. Flippases more the glycolipids to the exterior side of the membrane
d. Carbohydrates are enzymatically removed from the cytoplasmic side of the membrane

77. Which era is called the "Age of Reptiles"?

a. Coenozoic Era
b. Mesozoic Era
c. Palaeozic Era
d. Archeozoic Era

78. Binomial nomenclature was proposed by

a. Linnaeus
b. Mendel
c. Koch
d. Lamarck

79. Natural rubber is extracted from the plant that belongs to the family

a. *Boraginaceae*
b. *Apocynaceae*
c. *Asteraceae*
d. *Euphorbiaceae*

80. Finger millet is

a. *Setaria italica*
b. *Eleusine coracana*
c. *Pennesetum glaucum*
d. *Sorghum bicolor*

81. In which system the stone canal is found

a. Circulatory system of Earthworm
b. Respiratory system of Unio
c. Water vascular system of Starfish
d. Excretory system of Peripatus

82. Statocyst of prawn is an organ which is associated with

a. Locomotion
b. Equilibrium and orientation
c. Excretion
d. Chemoreception

83. Gigantism are rare condition that causes abnormal growth in children. Acromegaly is one of the hormonal disorder. Both gigantism and acromegaly occurs due to

a. Hyperpituitarism
b. Hypothyroidism
c. Hypopituitarism
d. Hyperthyroidism

84. The property of a living organism to emit light called "Bioluminescence". This is well marked phenomena of the animals belong to which of the following phylum or class?

a. Cnidaria
b. Echinodermata
c. Chondrichthyes
d. Ctenophora

85. Some of the distinctive cell line in the interior body walls of sponges have a central flagellum that is surrounded by a collar of microvilli. These cells are called

a. Pinacocytes
b. Chaonocytes
c. Archaeocytes
d. Sclerocytes

86. In the presence of $AlCl_3$, benzene reacts with methyl chloride in Friedel-Craft's reaction to form

a. n-Propyl benzene
b. Xylene
c. Benzene hexachloride
d. Tuluene

87. "Toddy palm" is

a. *Phoenix sylvestris*
b. *Caryota urens*
c. *Borassus flabellifera*
d. *Cocas nucifera*

88. Botulism is

a. Bacterial disease in man
b. Bacterial toxin produced in milk
c. Bacterial disease in plants
d. A type of bacterial food poisoning

89. In humans, inactivation of X-chromosomes in a given cell of female embryos involve

a. Only maternal X-chromosome
b. Only paternal X-chromosome
c. Either maternal or paternal X-chromosome
d. Both maternal and paternal X-chromosomes

90. Offspring of heterozygous parents (Aa at a single locus) are 25 percent AA, 50 percent Aa and 25 percent aa, then all of the following are true except:

a. The parents are diploid organisms
b. The allele is recessive lethal
c. The alleles assort independently
d. The gametes combine at random

91. The association between cattle and rumen bacteria is a well known example of

a. Antibiosis
b. Parasitism
c. Obligate symbiosis
d. Neutralization

92. Muscle of heart walls called as

a. Myocardium
b. Myonemes
c. Myocyte
d. Columnae camae

93. Insulin is a

a. Peptide enzyme
b. Peptide hormone
c. Nucleotidyl molecule
d. Carbohydrate

94. Conversion of nitrite to nitrate in soil is done by the bacteria

a. *Azotobacter*
b. *Nitrosomonas*
c. *Nitrobacter*
d. *Pseudomonas*

95. A messenger RNA is 336 bases long including the initiation and termination codon. The number of amino acids in the polypeptide translated from this is

a. 110 b. 333 c. 111 d. 600

96. Charles Darwin discussed all of the following except

a. Natural selection removes organisms that are poorly adapted to their environment
b. Individual within a species exhibit variability in form and function
c. Organisms produce more offspring than can survive
d. Gene mutations are the sources of variation for evolution

97. Which Co-enzyme is involved in transaminase reaction?

a. TPP b. NAD^+ c. Biotin d. Mg^+

98. Which one of the following viruses cause acute gastrointestinal illness due to contamination of drinking water?

a. Norovirus
b. Poliovirus
c. Rotavirus
d. Filoviruses

99. The vitamin which is essential for blood clotting is

a. Vitamin-A
b. Vitamin-B
c. Vitamin-C
d. Vitamin-K

100. Genes A, B and C control three phenotypes which assort independently. A plant with the genotype Aa Bb Cc is selfed. What is the probability for progeny which shows the dominant phenotype for AT LEAST ONE of the phenotypes controlled by genes A, B and C?

a. 1/64 b. 27/64 c. 63/64 d. 3/64

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