ENTRANCE EXAMINATION FOR ADMISSION, MAY 2011.

M.Sc. (BIOCHEMISTRY AND MOLECULAR BIOLOGY)

COURSE CODE : 368

Register Number :

Signature of the Invigilator
(with date)

COURSE CODE : 368

Time : 2 Hours Max : 400 Marks

Instructions to Candidates :

1. Write your Register Number within the box provided on the top of this page and fill in the page 1 of the answer sheet using pen.
2. Do not write your name anywhere in this booklet or answer sheet. Violation of this entails disqualification.
3. Read each question carefully and shade the relevant answer (A) or (B) or (C) or (D) in the relevant box of the ANSWER SHEET using HB pencil.
4. Avoid blind guessing. A wrong answer will fetch you –1 mark and the correct answer will fetch 4 marks.
5. Do not write anything in the question paper. Use the white sheets attached at the end for rough works.
6. Do not open the question paper until the start signal is given.
7. Do not attempt to answer after stop signal is given. Any such attempt will disqualify your candidature.
8. On stop signal, keep the question paper and the answer sheet on your table and wait for the invigilator to collect them.
9. Use of Calculators, Tables, etc. are prohibited.

1. An endemic species is

(A) A species found uniquely in one place

(B) A species carrying an epidemic disease

(C) A species at an early phase of its evolution

(D) A taxonomist's mistake

2. The physical similarity of body shape in dolphins, sharks, and penguins results from:

(A) Parallel evolution (B) Geographic isolation

(C) Convergent evolution (D) A property of a common ancestor

3. Continental drift is caused by

(A) The dispersal of seeds and spores from one continent to another

(B) The random loss of genes from populations isolated on a continent

(C) The upwelling and subsequent movement of marine sediments

(D) The movement of tectonic plates on the Earth's crust

4. A palm tree was 90 cm high, when it was planted.It grows by an equal number of cm each year and at the end of the seventh year it was one ninth taller than at the end of the twelfth year?

(A) 30 (B) 45 (C) 57 (D) 18

5. According to *Darwin's* theory of evolution, differences between species may be the result of

(A) the disuse of body structures

(B) the transmission of acquired characteristics

(C) natural selection

(D) mutagenic agents

6. Two nucleotide sequences found in two different species are almost exactly the same. This suggests that these species

(A) are evolving into the same species

(B) contain identical DNA

(C) may have similar evolutionary histories

(D) have the same number of mutations

7. Which group of organisms is believed to be among the earliest to evolve on Earth?

(A) Arthropods (B) Coelenterates

(C) Protozoan (D) Reptiles

8. Which concept was not included in Charles Darwin's theory of natural selection?

(A) Survival of the fittest (B) Struggle for existence

(C) Overproduction of offspring (D) Punctuated equilibrium

9. Viruses are exceptions to the cell theory, but they have some characteristics of living things. What is one of these characteristics?

(A) They are made up of many specialized cells

(B) They contain genetic material

(C) They reproduce by mitosis

(D) They contain chlorophyll

10. Which are the four most abundant elements in living cells?

(A) carbon, oxygen, nitrogen, sulfur

(B) carbon, oxygen, hydrogen, nitrogen

(C) carbon, oxygen, sulfur, phosphorus

(D) carbon, sulfur, hydrogen, magnesium

11. Which of the following is not an amino acid?

(A) Glutamic acid (B) Aspartic acid

(C) Glutamine (D) Palmitic acid

12. Plants growing in and around a pond eventually filling in the pond and changing it to terrestrial habitat

(A) Succession (B) Dispersion (C) Fertilization (D) Speciation

13. The pH of human blood is slightly basic. Which of the following is most likely to be the pH of human blood?

(A) 10.6 (B) 7.4 (C) 7.6 (D) 6.4

14. A microscopic unicellular organism is observed to have the following characteristics : A food gullet, a flagellum, chloroplasts, mitochondria, and a nucleus. This organism belongs to which kingdom?

(A) Protista (B) Plantae (C) Fungi (D) Animalia

15. Cellular proteins destined for secretion are sorted and packaged in the

(A) Lysosomes (B) Endosomes

(C) Endoplasmic reticulum (D) Trans golgi network

16. The general cellular genetic information is stored in structures known as

(A) chromosomes (B) mitochondria

(C) vacuoles (D) endoplasmic reticulum

17. Which of the following codon codes for the termination of the translation?

(A) UAC (B) UCA (C) UAG (D) GUA

18. Which of the following initiates and enhances the conditions under which the fruit ripens and ages?

(A) Gibberillins (B) Auxins

(C) Ethylene gas (D) Abscisic acid

19. The most common form of DNA that exists in the physiological state is

(A) A-DNA (B) B-DNA (C) C-DNA (D) Z-DNA

20. Barbara McClintock discovered transposable elements in the late 1940s in which of the species

(A) Rice (B) Maize (C) *C.* elegans (D) E. coil

21. Reverse transcriptase was discovered by

(A) Watson &Crick (B) Temin & Arber

(C) Temin & Baltimore (D) Arber & Baltimore

22. The difference between the molecular weight of sucrose and that of the sum of the molecular weights of its components (glucose and fructose) is

(A) 0 (B) 1 (C) 16 (D) 18

23. Proline disrupts -helical structure in proteins because it is

(A) An acidic amino acid (B) An aromatic amino acid

(C) An amino acid (D) A basic amino acid

24. The microscope usually used for viewing living tissues is known as

(A) electron microscope (B) phase contrast microscope

(C) oil immersion microscope (D) compound microscope

25. X-ray crystallography is used to study

(A) structure of lipids

(B) composition of proteins and nucleic acids

(C) arrangement of proteins

(D) three dimensional structure of proteins

26. The isolation of individual organelles from homogenates is achieved through

(A) Differential centrifugation (B) Chromatography

(C) X-ray diffraction (D) Employment of different solvents

27. What is the primary objective of cell fractionation?

(A) to view the structure of cell fractionation

(B) to identify the enzymes outside the organelles

(C) to determine the size of various organelles

(D) to separate the organelles

28. High wavelength UN rays are used in a

(A) fluorescent microscope (B) polarizing microscope

(C) ultraviolet microscope (D) phase-contrast microscope

29. Lipids, proteins and carbohydrates mainly constitute cell membrane. With respect to their mutual proportions, which of the following statements is correct?

(A) all the three are in equal proportions

(B) lipids are in least proportion

(C) carbohydrates are in least proportion

(D) proteins are in least proportion

30. Basic unit of plasma membrane is

(A) protein and phospholipids (B) cellulose and carbohydrate

(C) protein and cellulose (D) protein and carbohydrate

31. Carbohydrates are present in the plasmalemma in the form of

(A) cellulose (B) hemicellulose

(C) starch (D) glycolipids and glycoproteins

32. In Singer-Nicholson fluid-mosaic model, extrinsic proteins are

(A) superficially arranged and cannot be separated easily

(B) superficially arranged and can be separated easily

(C) tightly attached to intrinsic proteins and can be separated easily

(D) tightly attached to intrinsic proteins and cannot be separated easily

33. The enzyme that facilitate the transport through cell membrane is

(A) permease (B) lipase (C) endonuclease (D) ligase

34. RNA is absent in

(A) plasmalemma (B) cytoplasm (C) ribosomes (D) chromosomes

35. Carrier molecules in the plasma membrane are required for

(A) facilitated diffusion only

(B) osmosis

(C) active transport only

(D) both facilitated diffusion and active transport

36. Tonoplast is a differentially permeable membrane surrounding the

(A) cytoplasm (B) vacuole (C) nucleus (D) mitochondria

37. Most plant cells are surrounded by cell wall. There are some exceptions, for example

(A) bacteria (B) stem hairs

(C) gametes (D) root hairs

38. Cell theory was propounded by

(A) Schleiden and Schwann (B) Watson and Crick

(C) Mendel and Morgan (D) Wallace and Darwin

39. Prokaryotic genetic system contains

(A) DNA and histones (B) DNA but no histones

(C) Neither DNA nor histones (D) Either DNA or histones

40. The cytoplasmic connections from cell to cell are known as

(A) middle lamella (B) plasmodesmata

(C) cell membrane system (D) endoplasmic reticulum

41. Chemical nature of ribosomes is

(A) beta galactosidase (B) proteins and lipids

(C) glucose and sucrose (D) proteins and RNA

42. The process of oxidative phosphorylation is explained by

(A) Chemical coupling hypothesis (B) Chemi-osmotic coupling hypothesis

(C) Both (A) and (B) (D) The design of the TCA cycle

43. The first step in the degradation of all amino acids is a

(A) Oxidation (B) Reduction

(C) Transamination (D) Decarboxylation

44. Disulfile bonds are broken by ———— with reagents such as beta-mercaptoethanol

(A) Alkylation (B) Reduction

(C) Oxidation (D) Proteolysis

45. Organic solvents denature proteins primarily by

(A) Increasing the free energy of hydrophilic residues

(B) Lowering the free energy of hydrophobic residues

(C) Aggregation of hydrophobic regions of the protein

(D) Dissociation of the disulphide bonds

46. Cyclins are proteins involved in regulation of

(A) Cell cycle

(B) Circadian Rhythm

(C) Membrane transport

(D) Synthesis of Cyclic AMP

47. Sickle cell anemia is

(A) X-linked recessive

(B) Autosomal dominant

(C) Autosomal recessive

(D) None of the above

48. The pH activity profile of lysozyme drop sharply on either side of the optimum at pH 5 because

(A) Asp 52 carboxyl becomes protonated

(B) Glu 35 carboxyl becomes ionised

(C) Both (A) and (B)

(D) Asp 52 and Glu 35 remain in unionized form

49. Enzyme catalysis can be explained by a lock and key concept of

(A) enzyme fit on substrate

(B) substrate fit on active site

(C) cofactor fit on enzyme

(D) substrate fit on charged residues on the enzyme

50. Gel filtration is a method for separating proteins on the basis of their

(A) stokes radii

(B) solubility

(C) hydrophobicity

(D) surface charge

51. Two general classes of enzymatic catalysis are

(A) anion, cation

(B) donor, acceptor

(C) acid-base, covalent

(D) Ionic, van derWaals

52. Equilibrium constant of a reaction is defined as the

(A) ratio of reactant concentration to product conc.

(B) ratio of product conc. to reactant conc.

(C) product of reactant and product concentration

(D) inverse product of reactant and product conc.

53. The technique of affinity labelling is employed to identify amino acid residues at

(A) active site (B) amino terminus

(C) carboxy terminus (D) membrane interface

54. The principal fuel molecule of most cells is

(A) carbohydrate (B) vitamins

(C) alcohol (D) nucleic acids

55. Production of ATP in the absence of oxygen is designated as

(A) glycolysis (B) fermentation

(C) TCA cycle (D) none of the above

56. Two important principal commodities provided to a cell by catabolic pathways are

(A) ATP and intermediates (B) ATP and NADPH

(C) NAD and intermediates (D) Substrates and intermediates

57. The cofactor in the glycogen phosphorylase reaction is

(A) NADP (B) Cyclic AMP

(C) Glucose phosphate (D) ATP

58. A nitrogenous base linked to sugar is called

(A) Nucleoside (B) Nucleotide

(C) Nucleic acid (D) None of the above

59. All carboxylation reactions involving CO2 fixation in animal cells require

(A) thiamine pyrophosphate (B) biotin
(C) alpha-keto carboxylic acids (D) coenzyme-A

60. Oxidative phosphorylation is blocked by

(A) inhibitors of electron transport (B) inhibitors of phosphorylation
(C) uncoupling agents (D) all of the above

61. In the absence of an energy source, most active transport systems promote

(A) active diffusion (B) passive diffusion
(C) facilitated diffusion (D) no diffusion at all

62. The coenzyme required for two steps in purine synthesis as well as the thymidylate synthase reaction during pyrimidine synthesis is

(A) cyanocobalamin (B) pyridoxal phosphate
(C) pantothenic acid (D) tetrahydrofolate

63. In the prokaryotes, all polypeptide chain synthesis probably are initiated with the amino acid

(A) arginine (B) f-methionine (C) acetyl lysinc (D) glycine

64. Which one of the following elements is essential for the formation of the hormone thyroxin?

(A) Calcium (B) Potassium (C) Sodium (D) Iodine

65. How are impulses transmitted across synapses by?

(A) electrical means (B) chemical means
(C) mechanical means (D) thermal means

66. Rericulocytes refer to

(A) white blood cells (B) blood platelets
(C) lymphocytes (D) immature erythrocytes

67. Follicle stimulating Hormone (FSH) is produced by

(A) posterior pituitary (B) adrenal
(C) thyroid (D) anterior pituitary

68. Which of the following glands have both an endocrine and an exocrine functions?

(A) mammary gland (B) pancreas
(C) pituitary gland (D) adrenal gland

69. Blood of insects has

(A) blue colour (B) red colour

(C) green colour (D) none of the above

70. Difference between a sponge and the metazoa is

(A) cell division (B) cell organization

(C) division of labour (D) presence of blood

71. The hydrophobic tails of a phospholipids bilayer are oriented towards the

(A) Interior of the plasma membrane

(B) Extra cellular fluid surrounding the cell

(C) Cytoplasm of the cell

(D) Nucleus of the cell.

72. During the metamorphosis of a tadpole into a frog, there is a change in nitrogen metabolism from ammonotelism to ureotelism. This would be reflected in

(A) An increase in ornithine transcarbamylase (OTCase) activity in liver.

(B) An increase in ammonia in the blood.

(C) An increase arginase activity in the heart.

(D) A decrease in cabamoylphosphate synthetase in kidney.

73. Certain amino sugars may be components of

(A) DNA (B) Glycogen

(C) ABO blood group antigens (D) Vit. C

74. Gas with in the colon is primarily derived from which one of the following sources?

(A) CO_2 liberated by the interaction of HCO_3^- & H^+

(B) Diffusion from the blood

(C) Fermentation of undigested oligosaccharides by bacteria

(D) Swallowed atmospheric air

75. Which of the following is not a similarity of mitochondria and chloroplast?

(A) Both make ATP

(B) Both have an envelop of double unit membrane

(C) Both possess their own DNA

(D) Both capture solar energy and convert it into chemical energy

76. Mitosis and meiosis accomplish segregation of the replicated DNA to two or more daughter cells. Which of the following is the characteristic of both mitosis and meiosis

(A) Chromosomes attach to actin

(B) The resulting cells are diploid (2n)

(C) The resulting cells are haploid (n)

(D) Spindle fibers attach to chromosomes at their kinetochores

77. Macrophages are directly involved in immune responses in which of the following ways.

(A) Production of IL-2 (B) Presentation of antigens

(C) Specific killing of tumor cells (D) Production of antibodies

78. Okazaki segments are

(A) segment of DNA capable of replication

(B) segment of chain nucleotides

(C) segments of chain of nucleotides formed during replication of DNA

(D) segment of gene which under recombination

79. Substrate level phosphorylation occurs when

(A) Succinic acid changes to fumeric acid

(B) Fumeric acid changes to malic acid

(C) Succinyl coA changes to succinic acid

(D) Oxaloacetic acid changes to OL-keto glutaric acid

80. Functions of hepatocytes include which of the following

(A) Synthesis of immunoglobulin (B) Concentration of bile

(C) Storage of vitamin A (D) Synthesis of albumin & fibrinogen

81. This protein of saliva as a role in taste

(A) Amylase (B) R protein (C) Gusten (D) None

82. The rate limiting step in fatty acid synthesis is catalyzed by

(A) Acetyl Co A carboxylase (B) ATP- citrate lyase

(C) Malic enzymes (D) Pyruvate dehydrogenase

83. Common lesions found in DNA after exposure of Ultraviolet rays are

(A) Pyrimidine dimers (B) Single strand breaks

(C) Base deletion (D) Purines dimers

84. In the classical model of transcriptional control described by Jacob and monad, a repressor protein binds to

(A) An enhancer (B) An AUG sequence

(C) An operator (D) ATATAbox

85. Which of the following does not make direct use of pH or proton gradient?

(A) Mitochondrion (B) Cyanobacteria

(C) Protozoan cilium (D) Bacterial flagellum

86. Which of following six member ring compounds has most planar structure?

(A) Glucose (B) Cytosine (C) Cyclohexane (D) Inositol

87. Which of the following is most likely to mechanism for origin of multigene families?

(A) Gene duplication

(B) Convergent evolution of dissimilar genes

(C) Horizontal gene transfer

(D) Viral infection

88. Which of the following found only in the organisms containing polycistronic mRNA

(A) Missense mutation (B) Polar mutation

(C) Temperature sensitive mutation (D) Alternate splicing mutation

89. An E.coli strain lacking DNA polymerase I would be deficient in DNA

(A) Repair (B) Methyalation

(C) Splicing (D) Degradation

90. How much energy will be released if 1 mole of ATP to ADP on hydrolysis?

(A) 17 kCal (B) 7 kCal (C) 20 kCal (D) 25 KCal

91. Which among the following is free radical scavenging enzyme?

(A) Amylase (B) Catalase (C) Peptidase (D) Polymerase

92. Albumin globulin ratio is reversed in which conditions?

(A) Metabolic acidosis
(B) Diabetes Type II
(C) Cirrhosis
(D) Chronic lung infections

93. Which immunoglobulin is secreted as a primary response to antigen?

(A) IgG (B) IgM (C) IgE (D) IgA

94. What is the function of Troponin-C?

(A) ATPase inhibition
(B) ATPase generation
(C) Binding of calcium
(D) Binding of copper

95. What are the substituent groups of heme?

(A) Methyl
(B) Propionyl
(C) Vinyl
(D) All of the above

96. What is calcitriol?

(A) 1, 25-dihydroxy cholecalciferol
(B) 7-dehydro cholesterol
(C) 25-hydroxy cholecalciferol
(D) 1-hydToxy cholecalciferol

97. Transamination reaction requires which Vitamin?

(A) Thiamine pyrophosphate
(B) Inositol triphosphate
(C) Pyridoxal phosphate
(D) Niacin

98. What is the important extracellular cation?

(A) Potassium (B) Calcium (C) Both (A) & (B) (D) Sodium

99. Which among the following is an essential fatty acid?

(A) Oleic acid
(B) Palmitic acid
(C) Linoleic acid
(D) Decanoic acid

100. When pH falls by 1 unit, what is the change in the hydrogen ion concentration?

(A) Increases by 10 times
(B) Decreases by 10 times
(C) Increases by 100 times
(D) Decreases by 100 times
