CELL BIOLOGY

1. The biological discipline dealing with the study of cell organization is called:
   a) histology
   b) genetics
   c) cytology
   d) ornithology

2. For living systems we can say that they are:
   a) dynamic and closed
   b) in material and energy isolation from the environment in which they live
   c) static and stable
   d) dynamic, stable and open

3. The basic morphological and functional unit of living matter is:
   a) cell
   b) tissue
   c) individual
   d) population

4. Which of these elements is of great importance in the construction of nucleic acids:
   a) sulfur
   b) calcium
   c) nitrogen
   d) potassium

5. Element sulfur:
   a) participates in nucleic acid composition
   b) represents the main constituent of hemoglobin
   c) is an important constituent of some amino acids
   d) participates in the chlorophyll composition

6. Which of these elements is of particular importance for the living world and its origin:
   a) carbon
   b) oxygen
   c) hydrogen
   d) nitrogen

7. Which of the following simple sugars is pentose:
   a) glucose
   b) fructose
   c) galactose
   d) ribose

8. The reserve form of sugar in plants is:
   a) glycogen
   b) chitin
   c) starch
   d) cellulose

9. An important component of hemoglobin is:
   a) magnesium
   b) potassium
   c) calcium
   d) iron

10. Which chemical bonds will the amino acids bind to form the polymer:
   a) phosphodiester
   b) peptide
   c) glycosidic
   d) hydrogen

11. Complex proteins:
   a) consist of multiple polypeptide chains
   b) are formed by fusing simple proteins with other non-protein molecules
   c) are albumins
   d) are globulins

12. In addition to its many roles, proteins are also:
   a) carriers of hereditary information
   b) the main energy source for the cell and organism
   c) body protectors from foreign matter and cells
   d) building components of the cell wall of plants

13. Glycolipid composition includes:
   a) fats and sugars
   b) protein and sugars
   c) fats and proteins
   d) polysaccharides

14. Oxalacetic acid is essential for the process of:
    a) photosynthesis
    b) glycolysis
    c) Krebs's cycle
    d) Calvin's cycle

15. Enzymes are by their chemical nature:
    a) proteins
    b) sugars
    c) fats
    d) nucleic acids

16. The enzymes that decompose fats are called:
    a) nucleases
    b) proteinases
    c) lipases
    d) ligase

17. The enzymes that decompose proteins are called:
    a) lipases
    b) polymerases
    c) glycosidases
    d) proteinases

18. The most important class of enzymes for cellular respiration are:
    a) nucleases
    b) hydrolases
    c) oxide-reductases
    d) lipases

19. Mitochondria are centers of synthesis:
    a) adenosine triphosphate
    b) lipids and carbohydrates
    c) lipids and proteins
    d) proteins and carbohydrates

20. Based on which properties the organisms are divided into Prokaryotes and Eukaryotes:
    a) whether they are unicellular or multicellular
    b) based on the type of cellular organization
    c) whether they are plant or animal organisms
    d) whether the hereditary basis is DNA or RNA

21. Nitrifying bacteria are:
    a) anaerobic organisms
    b) aerobic organisms
    c) facultative aerobic organisms
    d) aerobic and anaerobic organisms

22. Viruses consist of:
    a) DNK, RNK and proteins
    b) DNK or RNK and proteins
    c) DNK, ribosomes and proteins
    d) RNK, ribosomes and proteins

23. Which cell membranes have a lipoprotein structure:
    a) cell membrane - plasmalemma
    b) nucleus membrane
    c) membranes of the endoplasmic reticulum
    d) all the membranes listed

24. Which of the following organelles does NOT have a membrane:
    a) Golgi apparatus
    a) mitochondria
    b) endoplasmic reticulum

c) centrioles

25. The process of synthesis of complex organic compounds is simpler form of:
    a) basal metabolism
    b) catabolism
    c) energy transport
    d) anabolism

26. DNA molecules in the cell are located in:
    a) peroxisomes
    b) Golgi apparatus
    c) mitochondria
    d) all organelles listed

27. During anabolic biochemical reactions, energy is provided by the molecules:
    a) AMP
    b) FAD
    c) ATP
    d) NADP

28. Part of ATP is:
    a) adenine
    b) ribose
    c) three phosphate groups
    d) all the above components

29. All body cells of one multicellular organism have the same:
    a) genes
    b) hormones
    c) enzymes
    d) all of the above

30. The ability of cells to secrete their products is called:
    a) respiration
    b) absorption
    c) proliferation
    d) secretion

31. The specialized cells in the body receiving stimuli are:
    a) effectors
    b) receptors
    c) muscular cells
    d) glandular cells

32. The ability of a cell to respond to a stimulus by shortening the cell or part of it is called:
    a) conductivity

b) proliferation
c) contactability
d) polarity

33. Catabolism is:
    a) uptake of substances into the cytoplasm
    b) the process of synthesis of complex compounds with the action of enzymes and energy consumption
    c) decomposition of complex compounds into simple ingredients with energy release
    d) the sum of all biochemical processes in the organism

34. Cell growth is:
    a) the process of forming two equal cells out of one
    b) process of proliferation
    c) an increase in its size and volume
    d) all the above processes

35. Some cells lose the ability to divide after birth, for example the cells of:
    a) epidermis
    b) intestinal epithelium
    c) endocrine glands
    d) nerve (cells)

36. Prokaryotic hereditary material is concentrated in the part of the cell that is called:
    a) nucleolus
    b) nucleus
    c) nucleoid
    d) genome

37. Circle the correct sentence:
    a) Nucleolus in prokaryotic cells is formed in the region of secondary chromosome narrowing.
    b) The nucleolus is coated with two membranes.
    c) Ribosomal subunits are formed in the nucleolus.
    d) The size, number and shape of the nucleolus does not depend on the activity of the cell.

38. Membranes in the cytoplasm building the canal network create:
    e) lysosomes
    f) mitochondria
    g) peroxisomes
    h) endoplasmic reticulum

39. The role of the endoplasmic reticulum is in:
    i) decomposition of carbohydrates
    j) creating a spindle
    k) generating large amounts of energy
    l) synthesis and transport of matter within the cell

40. The lysosome enzymes are:
   a) RNA polymerases
   b) nucleases
   c) DNA polymerases
   d) d) all the enzymes listed

41. In addition to phospholipids, cell membrane composition of Eukaryotes contains:
   a) histones
   b) Oxalacetic acid
   c) RNA
   d) cholesterol

42. The nucleus is present in all mammalian cells EXCEPT:
   a) nerve cells
   b) mature red blood cells
   c) spermatozoa
   d) certain embryonic cells

43. For muscle contraction essential are:
   a) actin, myosin and tubulin
   b) actin, tubulin and ATP
   c) myosin and tubulin
   d) actin, myosin and ATP

44. Membrane proteins are for the most part:
   a) hormones
   b) enzymes
   c) tubulins
   d) actin and myosin

45. Which form of transport through the membrane requires energy:
   a) free diffusion
   b) facilitated diffusion
   c) active transport
   d) the answers under b) and c) are correct

46. The cells of which organisms most rapidly divide:
   a) mammals
   b) poikilothermic organisms
   c) plants
   d) bacteria

47. Carbon dioxide and water are the final decomposition products:
   a) fat
   b) carbohydrates
   c) protein

d) all said organic molecule

BIOLOGY OF DEVELOPMENT

48. The fringes, distributed throughout the surface of the chorion, are characteristic of:
    a) diffuse placenta
    b) cotyledonary placenta
    c) zonal placenta
    d) discoidal placenta
    e) bidiscoids

49. The X chromosome is separated from the Y chromosome:
    a) in mitosis of spermatogonia
    b) in the I meiotic division
    c) in the II meiotic division
    d) in the formation of primary spermatocytes
    e) in the formation of sperm

50. Genetic diversity is affected with:
    a) crossing over
    b) pairing of homologous chromosomes
    c) crossing over and pairing of homologous chromosomes
    d) chromatid separation

51. During mitosis, the following does NOT occur:
    a) enzyme synthesis
    b) chromosome condensation
    c) separation of centrosome
    d) disintegration of the nucleus membrane

52. Meiosis is a process characteristic of:
    a) bacteria
    b) formation of gametes
    c) virus replication
    d) some Protozoa

53. Genetic diversity is affected with:
    a) crossing over
    b) pairing of homologous chromosomes
    c) crossing over and pairing of homologous chromosomes
    d) chromatid separation

54. Upon completion of I meiotic division, the human cell contains:
    a) 23 pairs of homologous chromosomes
    b) 46 chromosomes
    c) 23 DNA molecules
    d) 46 DNA molecules

55. Upon completion of II meiotic division, the human cell contains:

a) 43 pairs of homologous chromosomes
b) 46 chromosomes
c) 46 DNA molecules
d) the same number of chromosomes and DNA molecules

56. During mitosis, the following occurs:
a) duplication of the number of chromosomes
b) duplication of the amount of DNA
c) duplication of centrioles
d) synthesis of histones

57. Circle the correct statement:
a) the number of chromosomes in a mature human sex cell is 46
b) the number of chromosomes in a mature human sex cell is 23
c) the number of chromosomes in a human somatic cell is 23
d) the number of chromosomes in somatic cells is haploid

58. Asexual reproduction includes:
a) simple division
b) splicing of gametes
c) exchange of DNA parts
d) formation of izogametes

59. Sexual reproduction includes:
a) budding
b) division
c) gemule formation
d) gamete propagation

60. The seminal ducts of the testis do NOT contain:
a) Sertoli cells
b) spermatogonia
c) spermatocytes
d) follicular cells

61. Transformation of spermatids into spermatozoa occurs during:
a) spermiogenesis
b) mitotic divisions
c) I meiotic division
d) II meiotic division

62. Circle the correct sentence:
a) upon fertilization, DNA synthesis occurs
b) DNA synthesis occurs after the first mitotic division of the zygote
c) the number of chromosomes in the zygote is haploid
d) ovum is diploid

63. The growth of follicles in the ovary is affected by:
    a) luteinizing hormone
    b) yellow body hormone
    c) prolactin
    d) folliculostimulating hormone

64. Cyclic maturation of gametes is in:
    a) female
    b) male
    c) both female and male
    d) in neither sex

65. Germ leyers are formed at the following level:
    a) morule
    b) blastule
    c) gastrule
    d) neurule

66. Ectoderm forms:
    a) nervous system
    b) blood vessel system
    c) heart
    d) skeleton

67. Eggs with a small amount of yolk are called:
    a) telolecithal
    b) oligolecithal
    c) centrolecithal
    d) isolecithal

68. In telolecitic egg cells, yolk is:
    a) in the center of the egg
    b) evenly distributed in the egg
    c) on one pole of an egg
    d) absent

69. The first embryonic bandage around an embryo is:
    a) chorion
    b) amnion
    c) allantois
    d) yolk sac

70. Amnion consists of:
    a) ectoderm and mesoderm
    b) ectoderm
    c) endoderm
    d) mesoderm and endoderm

71. Amnion contains:
    a) endoderm on the inside and mesoderm on the outside
    b) mesoderm on the inside and ectoderm on the outside
    c) ectoderm on the inside and mesoderm on the outside
    d) endoderm on the inside and ectoderm on the outside

72. Horion consists of:
    a) endoderm
    b) mesoderma
    c) ectoderm and mesoderma
    d) mesoderm and endoderm

73. Ovum CANNOT be:
    a) oligolecite
    b) centrolecite
    c) radial
    d) meroblastic

74. Ovum can be:
    a) holoblastic
    b) radial
    c) spiral
    d) bilateral

75. The following develops from the epidermis:
    a) spinal cord
    b) parts of the brain
    c) cornea
    d) liver

76. The following develops from the endoderm:
    a) senses
    b) pancreas and liver
    c) skin glands
    d) muscles

77. The following develops from the mesoderm:
    a) intestines
    b) skin glands
    c) lungs
    d) testicles

78. In an adult organism, ability to proliferate is lost in cells of:
    a) heart
    b) brain
    c) kidney
    d) liver

79. Estrogen is a hormone:
    a) of oocytes
    b) of ovarian membrane
    c) of ovarian follicle cell
    d) secreted by all the ovarian cellular elements

80. The early gastrula contains:
    a) endoderm cells
    b) ectoderm cells
    c) cells from which the mesoderm is formed
    d) all the cells listed

81. Embryonic inductions begin in:
    a) morula
    b) blastula
    c) gastrula
    d) neurula

82. Gastrula:
    a) has a single germ layers
    b) has not germ layers
    c) has three germ layers
    d) has four germ layers

83. Blastodisc is:
    a) blastula in birds
    b) part of the blastula around the blastopore
    c) one of the germ layers
    d) blastula in insects

84. Maturation of spermatozoa takes place in:
    a) the epididymis ducts and the female reproductive tract
    b) seminal ducts
    c) testicle
    d) during spermiogenesis

85. From mesoderm the following is formed:
    a) nervous system
    b) intestinal system
    c) muscular system

d) liver

86. Placenta can be found in:
    a) amphibians
    b) reptiles
    c) tunicate
    d) birds

87. Placenta CANNOT be found in:
    e) some fish
    f) tunicate
    g) placental mammals
    h) reptiles

BASICS OF MOLECULAR BIOLOGY

88. Only one of the listed properties of DNA molecules is NOT exactly stated:
    a) DNA lacks the ability to change structure and function
    b) DNA transmits genetic information
    c) DNA has the ability to self-reproduce
    d) DNA molecule has a helicoid structure

89. Genetic information consists of:
    a) amino acid sequence
    b) ribonucleotide sequence
    c) deoxyribonucleotide sequence
    d) pentose sequence

90. The primary products of genes are:
    a) amino acids
    b) ribonucleotides
    c) polypeptides
    d) ribonucleic acids

91. In the process of transcription the following is developed:
    a) mRNA
    b) tRNA
    c) rRNA
    d) all three types of RNA

92. The codons are found in:
    a) mRNA
    b) rRNA
    c) tRNA
    d) all types of RNA

93. A genetic code or genetic password is carried by:
    a) DNA
    b) mRNA
    c) rRNA
    d) tRNA

94. Changes in the genetic basis at the nucleotide level are called:
    a) modifications
    b) pleiotropies
    c) gene mutations
    d) epistasis

95. During development, genetic activity is affected by:
    a) humidity

b) nutrition
c) acidity of the environment
d) all of the above factors

96. The genetic code consists of:
    a) single nucleotides in DNA
    b) combinations of two nucleotides in DNA
    c) combinations of different number of nucleotides in DNA
    d) the set of all combinations of three nucleotides in DNA

97. Which of the following properties are significantly influenced by environmental factors?:
    a) body size
    b) number of teeth
    c) eye colour
    d) number of vertebrae

98. Which of the following properties are little affected by environmental factors?
    a) shape of some part of the body
    b) body size
    c) eye colour
    d) speed of development

99. Replication of DNA molecules in prokaryotes:
    a) starts at multiple sites in a DNA molecule
    b) goes in one direction
    c) is performed in interphase
    d) is always bidirectional

100. Which of the following is a qualitative characteristic?
    a) number of fingers
    b) number of teeth
    c) number of vertebrae
    d) shape of some part of the body

101. Which of the following is a quantitative characteristic?
    a) body size
    b) speed of development
    c) number of teeth
    d) skin colour

102. What is the difference between the DNA chain and the RNA chain:
    a) in sugar
    b) in the base
    c) in length
    d) in all three components

103. Which process is based on the principle of complementarity:
    a) replication
    b) transcription
    c) translation
    d) all statements are correct

104. Protein composition includes:
    a) amino acids
    b) phosphoric acid
    c) nitric acid
    d) fatty acids

105. The complementarity of chains in a DNA molecule is present:
    a) only in eukaryotes
    b) only in single-celled eukaryotic and prokaryotic organisms

c) in all living organisms
d) in a large number of segments of DNA molecules

106. How many basic types of nucleic acids exist in the living world?
a) two
b) three
c) four
d) five

107. Genetic code:
a) varies from organism to organism
b) is the same for all individuals within one species
c) is the same for all eukaryotes and prokaryotes

d) it is the same for all eukaryotes, prokaryotes and viruses

108. Replication of DNA molecules in prokaryotes:
   a) starts at multiple sites in a DNA molecule
   b) goes in one direction
   c) is performed in interphase
   d) is always bidirectional

109. What does regulatory gene mean?
   a) It is the gene regulating the activity of all genes in one cell
   b) It is the gene regulating the activity of a structural gene
   c) It is the gene regulating translation
   d) It is the gene controlling cell cycle

110. Phenotype means:
   a) the visible characteristics of an organism
   b) the molecular structure of the cell
   c) the ability of an organism to perform certain biological functions
   d) All statements are correct

111. The phenotype results from:
   a) the cooperation of all the genes in one cell
   b) genotype-environment interaction
   c) inheritance of the parental phenotype
   d) All statements are correct

112. What is a structural gene?
   a) It is the gene that provides a double-chain DNA structure
   b) It is a portion of DNA that allows the activity of other genes
   c) It is a portion of DNA that contains instructions for the synthesis of one polypeptide
   d) All of the above is true

113. What determines the order of amino acids in a polypeptide?
   a) the sequence of groups of 4 nucleotides in DNA molecule
   b) the sequence of the dinucleotides in DNA
   c) the sequence of the nucleotide triplet in DNA
   d) all answers are correct

114. The DNA structure model was explained by:
   a) Jacob and Monod
   b) Watson and Crick
   c) McLeod and McCarty

d) Avery and Chargaff

115. A peptide bond is formed between:
a) two polypeptide chains
b) two amino acids
c) polypeptides and oligosaccharides
d) lipid and protein

116. Each tRNA recognizes:
a) only a specific amino acid
b) two similar amino acids
c) at least three amino acids
d) several different amino acids

117. Among the following references only one is correct:
a) DNA chains separate at a temperature of about 5O C
b) DNA chains reconnect at a temperature of about 100 C
c) DNA chains of different types of organisms can hybridize
d) even in distant species DNA chains largely hybridize

INHERITANCE MECHANISMS

118. Genome is a term meaning:
   a) set of genes in gametes
   b) set of genes that form all the chromosomes in the nucleus
   c) set of genes on one chromosome
   d) set of regulatory genes in eukaryotes

119. The weakest mutagenic effect is caused by:
   a) ultraviolet radiation
   b) X-radiation
   c) electron radiation
   d) all the above-mentioned radiation exhibits an equal mutagenic effect

120. In which organisms the female sex is NOT homogametic:
   a) in human
   b) in all mammals
   c) n all mammals except birds
   d) in birds

121. Deviant behaviors:
   a) are always conditioned by chromosome aberrations
   b) depend solely on the environmental factors
   c) are under polygenic control
   d) all answers are correct

122. Circle the correct statement:
   a) all eukaryotic genes mutate spontaneously at the same rate
   b) Turner's syndrome results from a defective DNA repair mechanism
   c) car exhaust gases are very harmful mutagens
   d) in some people, the light of the visible spectrum leads to mutations

123. Human chromosomes differ in:
   a) size
   b) centromere position and size
   c) gene, size and content
   d) size, centromere position and gene content

124. Two more X-chromosomes in a man:
   a) have lethal effect
   b) cause infertility
   c) lead to mental retardation
   d) cause infertility and leads to mental retardation

125. The methods of prenatal diagnosis in the fetus allow the detection of:

a) chromosomopathy and biochemical disorders
b) chromosomopathy and disorders of nerve tube development
c) chromosomopathy
d) chromosomopathy, biochemical disorders and nerve tube development disorders

126. Which of the following disorders is the result of an unbalanced translocation:
a) Down's syndrome
b) astigmatism
c) alkaptonuria
d) Turner's syndrome

127. The following is autosomal dominantly inherited:
a) albinism
b) alkaptonuria
c) syndactylia
d) daltonism

128. Klinefelter syndrome is a consequence of:
a) mutations on the X-chromosome
b) excess of autosomes
c) X-chromosome aneuploidy
d) excess of X or Y chromosomes

129. Which of the following factors can transform a normal cell into a malignant:
a) chemical substances
b) ionizing radiation
c) viruses
d) all of the above factors

130. Which of the following hereditary disorders is NOT related to sex chromosomes:
a) Turner's syndrome
b) hemophilia
c) hairy ears
d) dwarfism

131. The first cousins are in:
a) the first degree of kinship
b) the second degree of kinship
c) the fourth degree of kinship
d) the third degree of kinship

132. At the birth of a female child with daltonism, it can be surely stated that:
a) the mother is the daltonist, the father is of normal vision
b) the father is the daltonist, the mother is of normal vision
c) the mother is the carrier, the father is the daltonist
d) both mother and father are normal

133. Hemophilia is a disease:
a) related to mutation on 21th chromosome
b) predominantly inherited
c) which sons always inherit from their father
d) linked to the X chromosome

134. As a result of a gene mutation, the following occurs:
a) sickle cell anemia
b) cystic fibrosis
c) both of the mentioned diseases
d) none of the mentioned diseases

135. Barr's body is:

a) type of antibody
b) organelle for movement in protozoa
c) inactive X-chromosome
d) part of the chromosome near the centromere

136. In what hereditary disorder can the cause be either structural or numerical chromosome aberration?
a) in the case of manic-depressive psychosis
b) dwarfism
c) Down's syndrome
d) Edwards' syndrome

137. The highest sensitivity to ionizing radiation is recorded in:
   a) bacteria
   b) protozoa
   c) insects
   d) mammals

138. Mental illnesses can be:
   a) conditioned by numerical and structural aberrations of chromosomes
   b) under polygenic control
   c) conditioned by gene mutations
   d) all statements are correct

139. The appearance of mosaicism in the phenotypic appearance of an organism is related to:
   a) micromutations
   b) macromutations
   c) somatic mutations
   d) reversible mutations

140. It can certainly be expected that the son will inherit from his father the following:
   a) hemophilia
   b) hairy ears
   c) hemophilia and hairy ears
   d) no answer is correct

141. Anti-A antibodies in serum exist in persons with:
   a) A and AB blood types
   b) B and O blood types
   c) B, O and AB blood types
   d) only A blood type

142. B blood type woman received a child of 0 blood type. The child's father may have:
   a) any blood type
   b) only the same blood type as the child
   c) B, 0 or A blood types
   d) B or 0 blood types

143. When parents have children with AB and 0 blood types, it can be concluded that they are:
   a) heterozygotes with different blood types
   b) any blood type
   c) homozygotes with different blood types
   d) one homozygote, another heterozygote with different blood types

144. Aneuploidies of acrocentric chromosomes cause:
   a) Edwards' syndrome

b) Down's and Patau's syndromes
c) Down's and Edwards' syndromes
d) Down's syndrome

145. When a daltonist son is born from the marriage of normal parents, it can beconcluded that the disorder is inherited:
a) from the mother's or father's father
b) from one of father's parents
c) from father's father
d) from one of mother's parents

146. Which of the following hereditary diseases are polygenically inherited:
a) rheumatoid arthritis
b) schizophrenia
c) both of these diseases
d) none of the aforementioned diseases

147. Common causes of miscarriage during pregnancy are:
a) autosome trisomy, X-chromosome monosomy and polyplodia
b) trisomies of autosomes, sex chromosomes and polyplodia
c) all aneuploids of autosomes and sex chromosomes
d) all aneuploids of autosomes or sex chromosomes and polyploidy

148. Amniocentesis is used to detect hereditary disorders in:
a) embryos up to three months old
b) blastocysts
c) a fetus about 16 weeks old
d) newborns

149. Which of the following nucleic acids is included in the composition of ribosomes:
a) mRNA
b) tRNA
c) rRNA
d) DNA

150. RNA does NOTdiffer from DNA:
e) in the number of chains in the molecule
f) in sugar
g) In pyrimidine bases
h) in purine bases

151. RNAs play a key role in the synthesis process of:
i) lipids
j) proteins
k) carbohydrates
l) all of the above macromolecules