



MEDICAL UNIVERSITY OF VARNA
SAMPLE ENTRANCE TEST BIOLOGY

Section A. Multiple choice questions

- 1. Which of the following is not a polymer?**
 - a. glucose
 - b. starch
 - c. cellulose
 - d. DNA
- 2. Polypeptides are assembled from:**
 - a. hexoses
 - b. glycerol
 - c. nucleotides
 - d. amino acids
- 3. Which type of interaction stabilizes the alpha (α) helix and the beta (β) sheet?**
 - a. nonpolar covalent bonds
 - b. ionic bonds
 - c. hydrogen bonds
 - d. peptide bonds
- 4. Which of the following store and transmit hereditary information?**
 - a. carbohydrates
 - b. lipids
 - c. proteins
 - d. nucleic acids
- 5. In an analysis of the nucleotide composition of DNA, which of the following will be found?**
 - a. $A = C$
 - b. $A = G$ and $C = T$
 - c. $A + C = G + T$
 - d. $G + C = T + A$
- 6. A particular triplet of bases in the template strand of DNA is 5' AGT 3'. The corresponding codon for the mRNA transcribed is:**
 - a. 3' UCA 5'
 - b. 3' UGA 5'
 - c. 5' TCA 3'
 - d. 3'ACU 5'
- 7. The anticodon of a particular tRNA molecule is:**
 - a. complementary to the corresponding mRNA codon
 - b. complementary to the corresponding triplet in rRNA
 - c. the part of tRNA that bonds to a specific amino acid
 - d. changeable, depending on the amino acid that attaches to the tRNA
- 8. Which of the following types of nucleic acids is a carrier of anticodon?**
 - a. mtDNA
 - b. mRNA
 - c. tRNA
 - d. rRNA



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- 9. Which of these statements about the polypeptides in cells is wrong?**
- they are a polymer of γ -amino acids linked by peptide bonds
 - the sequence of amino acids is determined by instructions on the cell's DNA
 - they have an amino group at one end of the polymer
 - they are called proteins if they fold into a specific shape
- 10. Which of the statements concerning viruses is true?**
- viruses include only one kind of nucleic acid, either DNA or RNA
 - viruses usually contain all known types of nucleic acids (DNA, mRNA, rRNA, tRNA)
 - viral particles are capable of ATP synthesis
 - synthesis of viral proteins takes place on specific viral ribosomes
- 11. Basic structural and functional unit of organisms is:**
- cell
 - tissue
 - organ
 - body system
- 12. Homologous chromosomes:**
- are identical in shape and have different loci
 - differ in shape and size and have identical loci
 - pair during meiosis
 - pair during mitosis
- 13. Starting with a fertilized egg (zygote), a series of five cell divisions would produce an early embryo with how many cells?**
- 8
 - 16
 - 32
 - 64
- 14. By which process the somatic cells derived from a single-celled zygote divide?**
- meiosis
 - mitosis
 - cytokinesis alone
 - binary fission
- 15. At which stage of mitosis are chromosomes usually photographed in the preparation of a karyotype?**
- prophase
 - metaphase
 - anaphase
 - telophase
- 16. Which process in eukaryotic cells will proceed normally whether oxygen is present or absent?**
- electron transport
 - glycolysis
 - the citric acid cycle
 - oxidative phosphorylation



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- 17. Energy released by the electron transport chain is used to pump H^+ ions into which location?**
- cytosol
 - mitochondrial inner membrane
 - mitochondrial intermembrane space
 - mitochondrial matrix
- 18. The final electron acceptor of the electron transport chain that functions in aerobic oxidative phosphorylation is:**
- oxygen
 - water
 - pyruvate
 - ADP
- 19. A sexually reproducing animal has two unlinked genes, one for head shape (H) and one for tail length (T). Its genotype is HhTt. Which of the following genotypes is possible in a gamete from this organism?**
- HT
 - Hh
 - HhTt
 - tt
- 20. Muscle cells differ from nerve cells mainly because they:**
- contain different genes
 - have unique ribosomes
 - have different chromosomes
 - express different genes
- 21. All offspring of a white hen and a black rooster are gray. The simplest explanation of this pattern of inheritance is:**
- pleiotropy
 - sex linkage
 - incomplete dominance
 - independent assortment
- 22. In some plants pink colored flowers occurs in the heterozygous (Rr) offspring of red (RR) and white (rr) homozygotes. Which of the following crosses would produce offspring in the ratio of 1 red : 2 pink : 1 white?**
- red × white
 - pink × pink
 - white × pink
 - red × pink
- 23. The human X and Y chromosomes:**
- are both present in every somatic cell of males and females alike
 - are of approximately equal size and number of genes
 - include genes that determine an individual's sex
 - include only genes that govern sex determination



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- 24. New combinations of linked genes are due to which of the following?**
- a. nondisjunction
 - b. crossing over
 - c. independent assortment
 - d. mixing of sperm and egg
- 25. The karyotype in Down syndrome is characterized by the presence of an extra copy of genetic material on the:**
- a. chromosome 21
 - b. chromosome 22
 - c. chromosome 12
 - d. chromosome 18
- 26. Which of the following is true for a species that has a chromosome number of $2n = 16$?**
- a. the species is diploid with 32 chromosomes per cell
 - b. the species has 16 sets of chromosomes per cell
 - c. each cell has 8 homologous pairs
 - d. a gamete from this species has 4 chromosomes
- 27. Independent assortment of chromosomes occurs:**
- a. the statement is true for mitosis only
 - b. the statement is true for meiosis I only
 - c. the statement is true for meiosis II only
 - d. the statement is true for mitosis and meiosis
- 28. What are antigens?**
- a. proteins found in the blood that cause foreign blood cells to clump
 - b. proteins that consist of two light and two heavy polypeptide chains
 - c. foreign molecules that trigger the generation of antibodies
 - d. proteins released during an inflammatory response
- 29. With its abundance of collagenous fibers, cartilage is an example of:**
- a. connective tissue
 - b. reproductive tissue
 - c. nervous tissue
 - d. epithelial tissue
- 30. The human spinal column consists of the following vertebrae:**
- a. 5 cervical 12 thoracic 7 lumbar sacrum and coccyx
 - b. 7 cervical 10 thoracic 7 lumbar sacrum and coccyx
 - c. 7 cervical 12 thoracic 5 lumbar sacrum and coccyx
 - d. 7 cervical 12 thoracic 7 lumbar sacrum and coccyx
- 31. Human plasma proteins do not include which of the following?**
- a. fibrinogen
 - b. hemoglobin
 - c. immunoglobulin
 - d. albumin



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32. In the pulmonary artery flows:

- a. arterial blood
- b. venous blood
- c. blood rich in oxygen
- d. lymph

33. Bile is produced in:

- a. liver
- b. pancreas
- c. gall bladder
- d. duodenum

34. In the center of the elastic membrane called hymen there are openings:

- a. of the urethra
- b. of the anus
- c. of the uterus
- d. for the menstrual blood

35. The spinal cord contains:

- a. white and red matter
- b. white and grey matter
- c. red and yellow matter
- d. white and yellow matter



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Section B. *Fill the gaps*

1. All skeletal muscle fibers are striated and _____. Cardiac muscle is striated and _____. Skeletal muscle cells contain contractile filaments made of _____ and _____.
2. Ribosomes consist of two major components: the _____ ribosomal subunit, which reads the RNA, and the _____ subunit, which joins amino acids to form a polypeptide chain. Each subunit is composed of one or more _____ molecules and a variety of _____.

Section C. *Match the terms*

Column I

1. cell membrane
2. ribosome
3. lysosome
4. nucleus
5. mitochondrion

Column II

- a. intracellular digestion
- b. hereditary information
- c. selective permeability
- d. cellular respiration
- e. protein synthesis

Column I

1. metaphase
2. anaphase
3. telophase
4. cytokinesis
5. prophase

Column II

- a. first
- b. second
- c. third
- d. fourth
- e. fifth

Section D. *True or false*

1. Sex-linked traits may be defined as those traits that affect the development of sex organs.
2. The nerve tube derives from the ectoderm.

Section E. *Open questions*

1. Explain the different structural levels of organization of proteins.
2. Which are the main types of numerical disorders (mutations) in the human genome? Give the genotypes.