



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.