HISTOLOGY, CYTOLOGY, AND EMBRYOLOGY: TESTS WITH ANSWERS

1.CYTOLOGY

Directions: each of the following statements contains five suggested completions. Choose the one that is best in each case.

1. Each of the following statements concerning the plasmalemma is true, EXCEPT:
A – includes elementary cell membrane; B – its supermembranous layer consists of glycolipids and glycoproteins; C – its submembranous layer contains filaments and microtubules; D – is a semi-permeable cell boundary; E – is not an obligatory cell component.
2. The plasma membrane functions are as follows, EXCEPT:
A – is a selectively permeable barrier; B – is the site for hormone receptors; C – provides cell-to-cell interaction; D – is the primary protein synthesis site; E – takes part in the active and passive transport.
3. Each of the following statements concerning the microvilli is true, EXCEPT:
A – are plasmalemma projections; B – contain microtubules; C – amplify cell surface area; D – form the brush border of intestinal epithelium; E – contain microfilaments.
4. Each of the following statements concerning the cilia is true, EXCEPT:
A – are plasmalemma projections; B – contain nine peripheral doublets and the central pair of microtubules; C – are not visible in light microscope; D – their basal bodies are similar to centrioles; E – are movable organelles.
5. The intercellular junction where ionic channels pierce the adjacent membranes is called:
A – desmosome; B – nexus; C – tight junction; D – synapse; E – lateral interdigitations.
6. The disk-shaped intercellular junction where a dense plaque with filaments is present on the cytoplasmic surface of each opposing plasma membrane is called:
A – desmosome; B – nexus; C – tight junction; D – synapse; E – lateral interdigitations.
7. The intercellular junction that blocks the substance access to the intercellular space is called:
A – desmosome; B – nexus; C – tight junction; D – synapse; E – lateral interdigitations.
8. Each of the following statements concerning the mitochondria is true, EXCEPT:
A – have a double-membrane structure; B – its inner membrane infolds to form cristae; C – its matrix contains enzymes of Krebs' cycle; D – its cristae contain enzymes of the electron-transport chain; E – are not able to produce ATP.
9. The cytoplasm basophilia is inherent in cells that:
A – have cilia; B – accumulate lipids; C – actively synthesize proteins; D – accumulate glycogen; E – synthesize mucus.
10. The microfilaments are composed of the following proteins:
A – actin; B – desmin; C – keratin; D – vimentin; E – integrin.
11. These filaments belong to the population of intermediate filaments, EXCEPT:
A – tonofilaments; B – neurofilaments; C – actin filaments; D – glial filaments; E – desmin filaments.
12. Each of the following statements concerning the nuclear envelope structure is true, EXCEPT:
A – consists of two membranes separated by the perinuclear space; B – contains nuclear pores providing communication between the nucleus and cytoplasm; C – its outer membrane is studded with ribosomes; D – its inner membrane has a fibrous lamina anchoring chromatin; E – its outer membrane is continuous with Golgi apparatus.
13. Each of the following statements concerning chromatin is true, EXCEPT:
A – euchromatin is a lightly stained and dispersed; B – heterochromatin is a densely stained and condensed; C – heterochromatin takes part in transcription; D – two types of

chromatin may be transformed one into another; E – the abundance of euchromatin gives evidence of intense protein synthesis.

14. Each of the following statements concerning the nucleolus functions is true, EXCEPT:

A – the nucleolar organizer region contains genes encoding mRNA; B – rRNA is synthesized and assembled into ribosome subunits; C – ribosome subunits leave the nucleus through nuclear pores; D – in the cytoplasm, ribosomes either assemble into polysomes or bind to rER; E – the number and size of nucleoli give evidence of intense protein synthesis.

15. Each of the following statements concerning mitosis is true, EXCEPT:

A – results in the production of two identical daughter cells; B – is direct cell division; C – equally divides chromosomes between daughter cells; D – maintains the diploid number of chromosomes; E – consists of four phases.

16. Each of the following statements concerning the mitotic spindle is true, EXCEPT:

A – contains microtubules; B – its components are attached to a chromosome at the kinetochore; C – is responsible for chromosome movement in the anaphase; D – is formed before chromosome condensation; E – centrioles take part in its formation.

17. The following cytoplasmic components are inclusions, EXCEPT:

A – lipid droplets; B – glycogen clumps; C – lysosomes; D – mucous granules; E – protein granules.

Directions: one or more of the given statements or completions is/are correct. Choose the answer: A – if only 1,2, and 3 are correct; B – if only 1 and 3 are correct; C – if only 2 and 4 are correct; D – if only 4 is correct; E – if all are correct.

18. The glycocalyx is composed of:

(1) glycoproteins (2) cholesterol (3) glycolipids (4) glycogen

19. The rER synthesizes:

(1) secretory proteins (2) cell membrane proteins (3) lysosome enzymes (4) cytosol proteins

20. The abundance of rER in the cytoplasm can be identified by:

(1) diffuse basophilia (2) acidophilia (3) absence of staining (4) local basophilia

21. The functions of sER are as follows:

(1) lipid metabolism (2) carbohydrate metabolism (3) detoxification (4) release and recapture of calcium ions in muscles

22. The following statements regarding the Golgi apparatus are true:

(1) consists of several disk-shaped saccules arranged in a stack (2) its *cis* (convex) face is associated with small vesicles from ER (3) its *trans* (concave) face is associated with vacuoles (4) it is abundant in secretory cells

23. The following statements regarding the Golgi apparatus functions are true:

(1) accumulates, modifies, and packs secretory products (2) forms primary lysosomes (3) takes part in the synthesis of lipoproteins, glycoproteins, and glycolipids (4) manufactures membrane proteins

24. The lysosome membranes and lysosome enzymes are formed in:

(1) rER (2) sER (3) Golgi apparatus (4) free ribosomes

25. The following statements regarding the lysosome functions are true:

(1) protect cells from waste products accumulation (2) degrade aged organelles (3) take part in phagocytosis (4) provide autolysis

26. The following statements regarding the peroxisome are true:

(1) is a spherical structure surrounded by unit membrane (2) its matrix contains the enzyme *catalase* (3) its catalase converts hydrogen peroxide to water and oxygen (4) is derived from rER

27. The following statements regarding the centrioles are true:
(1) exist as a pair of cylinder-like structures oriented at right angle to one another (2) each centriole has nine peripheral microtubule triplets but lacks the central pair (3) before cell division they replicate themselves by forming procentrioles (4) during cell division, separate and migrate to the cell poles
28. The cytoskeleton includes:
(1) actin filaments (2) intermediate filaments (3) microtubules (4) centrioles
29. The following statements regarding the microtubule functions are true:
(1) are parts of the cytoskeleton (2) form the mitotic spindle (3) take part in intracellular transport and cell movement (4) constitute cilia, flagella, and centrioles
30. The cells containing a lot of free ribosomes synthesize:
(1) secretory proteins (2) cytosol proteins (3) cell membrane proteins (4) proteins for cell growth and differentiation
31. The following events take place in the G1 period of the mitotic interphase:
(1) intense protein synthesis (2) DNA reduplication (3) daughter cell growth (4) self-replication of centrioles
32. The following events take place in the S period of the mitotic interphase:
(1) DNA reduplication (2) daughter cell growth (3) self-replication of centrioles (4) intense energy production
33. The following events take place in the G2 period of the mitotic interphase:
(1) intense energy production (2) ATP accumulation (3) intense tubulin synthesis (4) DNA reduplication
34. The following events take place in the mitotic prophase:
(1) chromosome condensation (2) nucleolus disappearance (3) nuclear envelope disorganization (4) centriole migration to the opposite cell poles
35. The following events take place in the mitotic metaphase:
(1) chromosome condensation (2) chromosome assembling on the equatorial plate (3) nucleolus disappearance (4) the mitotic spindle formation
36. The following events take place in the mitotic anaphase:
(1) chromosome condensation (2) nucleolus disappearance (3) the mitotic spindle formation (4) movement of chromosomes to the opposite cell poles
37. The following events take place in the mitotic telophase:
(1) chromosome decondensation (2) nuclear envelope restoration (3) nucleolus re-appearance (4) cytoplasm division
38.The absence of cytoplasmic division (cytokinesis) in mitosis results in:
(1) cell death (2) generation of a subsequent mitosis (3) formation of haploid cell (4) formation of multinuclear cell

2. EPITHELIAL TISSUE

Directions: each of the following statements contains five suggested completions. Choose the one that is best in each case.

1. Each of the following statements concerning the mesothelium is true, EXCEPT:
A – is derived from mesoderm; B – is simple; C – its cells are squamous; D – not each of its cells reaches the lumen; E – lines the peritoneal cavity.
2. Each of the following statements concerning the pseudostratified epithelium is true, EXCEPT:
A – all its cells rest on the basement membrane; B – all its cells reach the apical surface; C – contains goblet cells; D – is ciliated; E – contains short (basal) cells.

3. Each of the following statements concerning the basement membrane is true, EXCEPT:
A – separates epithelium from the underlying connective tissue; B – is absent in some epithelia; C – contains type IV collagen and laminin; D – serves for epithelial cell attachment; E – takes part in nutrition of epithelium.
4. The cardinal features of the epithelia are as follows, EXCEPT:
A – form the stroma of organs; B – look like sheets; C – are derived from all germ layers; D – regenerate intensively; E– their cells are polarized.
5. The epithelia are simple if:
A – their cells are polarized; B – their cells form sheets; C – all their cells rest on the basement membrane; D – not all their cells reach the apical surface; E – their cells are continuously sloughed.
6. The epithelia are stratified if:
A – their cells are continuously sloughed; B – their cells form sheets; C – their cells are polarized; D – all their cells can divide; E – not all their cells are in contact with the basement membrane.
7. Each of the following statements concerning the stratified squamous nonkeratinized epithelium is true, EXCEPT:
A – contains the spinulate cell layer; B – contains the basal layer with stem cells; C – contains the superficial layer of flat anucleate cells; D – its superficial cells are continuously sloughed; E – lines the oral cavity, the esophagus, the rectum, and the vagina.
8. Each of the following statements concerning the stratified transitional epithelium is true, EXCEPT:
A – is capable of keratinization; B – consists of the basal, intermediate, and superficial layers; C – changes the number of its layers, depending on the degree of stretching; D – its superficial cells are dome-shaped; E – lines the urinary system organs.
9. The criteria of the exocrine gland classification are as follows, EXCEPT:
A – branching of the duct; B – the number of secretory portions; C – the shape of secretory portions; D – contact of cells with the basement membrane; E – the mode of secretion.
10. Each of the following statements concerning a compound branched tubuloalveolar gland is true, EXCEPT:
A – its duct branches; B – its secretory portions are numerous; C – it has one secretory portion; D – its secretory portions may be flask-like; E – its secretory portions may be tube-like.

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11. The following characteristics of the epithelia are true:
(1) line internal and cover external body surfaces (2) are avascular (3) rest on the basement membrane (4) abound in the extracellular substance
12. The following statements regarding the stratified squamous keratinized epithelium are true:
(1) its basement membrane is sinuous (2) covers the skin (3) its basal layer contains stem cells (4) its superficial cells are flat and anucleate
13. The stratified squamous keratinized epithelium from the thin skin in comparison with the same epithelium from the thick skin is characterized by the following:
(1) lacks the stratum lucidum (2) contains the poor-developed stratum granulosum (3) contains the thin stratum corneum (4) lacks the stratum spinosum
14. The epithelia are specialized for the following functions:

(1) mechanical and chemical protection (2) outer exchange (3) secretion (4) maintenance of homeostasis

15. The epithelium lining the intestine is characterized by the following features:
(1) contains goblet cells (2) is simple columnar (3) has the brush border (4) is specialized for absorption

16. The specializations of epithelial cells on the apical surface are as follows:
(1) hemidesmosomes (2) microvilli (3) nexuses (4) cilia

17. The specializations of epithelial cells on the basal surface are as follows:
(1) hemidesmosomes (2) desmosomes (3) plasma membrane infoldings (4) nexuses

18. The specializations of epithelial cells on the lateral surface are as follows:
(1) tight junctions (2) desmosomes (3) nexuses (4) hemidesmosomes

19. The following statements regarding the apocrine mode of secretion are true:
(1) inheres in some sweat glands (2) inheres in the mammary gland (3) is characterized by releasing the apical cell cytoplasm with secretory material (4) its mechanism is exocytosis

20. The following statements regarding the merocrine mode of secretion are true:
(1) is characterized by releasing the apical cell cytoplasm with secretory material (2) inheres in sebaceous glands (3) is characterized by releasing the entire cell with secretory material (4) its mechanism is exocytosis

21. The following statements regarding the holocrine mode of secretion are true:
(1) inheres in sebaceous glands (2) its mechanism is exocytosis (3) is characterized by releasing the entire cell with secretory material (4) inheres in sweat glands

22. In embryogenesis the epithelia are derived from:
(1) mesoderm (2) ectoderm (3) endoderm (4) mesenchyme

3. BLOOD

Directions: each of the following statements contains five suggested completions. Choose the one that is best in each case.

1. Each of the following statements concerning the erythrocytes is true, EXCEPT:
A – are 7-8μm biconcave discs; B – contain cytoskeletal microfilaments; C – lack nuclei and organelles; D – are cell fragments; E – contain hemoglobin.

2. Each of the following statements concerning the platelets is true, EXCEPT:
A – contain small dense nuclei; B – are megakaryocyte fragments; C – are surrounded by the plasma membrane; D – exhibit hyalomere and granulomere; E – contain serotonin and thromboplastin.

3. Each of the following statements concerning the leukocytes is true, EXCEPT:
A – are motile; B – function in loose connective tissue; C – have nuclei and cytoplasm; D – all of them are capable of phagocytosis; E – take part in defence reactions.

4. Each of the following statements concerning the neutrophils is true, EXCEPT:
A – their nuclei consist of 3-5 lobes; B – contain azurophilic granules; C – contain specific granules; D – comprise 6-8% of all leukocytes; E – are microphagocytes.

5. The azurophilic (primary) granules occurring in all kinds of leukocytes contain:
A – histamine; B – hydrolytic enzymes; C – heparin; D – bactericidal substances; E – thromboplastin.

6. Each of the following statements concerning the band neutrophils is true, EXCEPT:
A – are mature neutrophils; B – have horseshoe-shaped nuclei; C – comprise about 5% of all neutrophils; D – their increase in number is called “a shift of the leukocytic formula to left”; E – they increase in number in inflammatory conditions.

7. Each of the following statements concerning the basophils is true, EXCEPT:

A – comprise 0.5-1% of all leukocytes; B – their nuclei are masked by granules; C – their specific granules stain metachromatically; D – their granules contain heparin and histamine; E – they are macrophage precursors.

8. Each of the following statements concerning the monocytes is true, EXCEPT:

A – are the largest circulating blood cells; B – have kidney-shaped nuclei; C – contain specific granules; D – contain azurophilic granules; E – comprise 6-8% of all leukocytes.

9. The following blood cells are direct macrophage precursors:

A – lymphocytes; B – basophils; C – eosinophils; D – monocytes; E – neutrophils.

10. Each of the following statements concerning the lymphocytes is true, EXCEPT:

A – are small, medium-sized, and large; B – comprise 60-70% of all leukocytes; C – have large round nuclei; D – have narrow rims of the light blue cytoplasm; E – are divided into T and B lymphocytes.

11. The blood cells responsible for humoral immunity and converting to plasma cells are as follows:

A – T lymphocytes; B – basophils; C – monocytes; D – neutrophils; E – B lymphocytes.

12. The blood cells primarily responsible for cell-mediated immunity are as follows:

A – T lymphocytes; B – eosinophils; C – B lymphocytes; D – basophils; E – neutrophils.

Directions: one or more of the given statements or completions is/are correct. Choose the answer: A – if only 1,2, and 3 are correct; B – if only 1 and 3 are correct; C – if only 2 and 4 are correct; D – if only 4 is correct; E – if all are correct.

13. The following statements regarding the reticulocytes are true:

(1) are immature red blood cells (2) contain reticular clusters of ribosomes (3) comprise about 1% of all erythrocytes (4) increase in number in cases of bleeding or hemolysis

14. The erythrocyte functions are as follows:

(1) oxygen transport (2) blood coagulation (3) carbon dioxide transport (4) phagocytosis of bacteria

15. The platelet functions are as follows:

(1) gas transport (2) blood coagulation (3) phagocytosis of bacteria (4) clotting

16. In embryogenesis blood originates from:

(1) mesoderm (2) ectoderm (3) endoderm (4) mesenchyme

17. The neutrophil functions are as follows:

(1) histamine inactivation (2) release of histamine (3) macrophagocytosis (4) phagocytosis and destruction of bacteria

18. The eosinophil functions are as follows:

1) histamine inactivation (2) release of histamine (3) inactivation and killing of parasitic agents (4) secretion of immunoglobulins

19. The following statements regarding the eosinophils are true:

(1) their nuclei have 2-3 lobes (2) lack primary granules (3) their specific granules contain the crystalline core (4) comprise 20-30% of all leukocytes

20. The pathological processes causing an increase in the number of blood eosinophils are as follows:

(1) bleeding (2) allergic reactions (3) hemolytic diseases (4) parasite invasion

21. Agranulocytes include the following leukocytes:

(1) lymphocytes (2) basophils (3) monocytes (4) eosinophils

22. Granulocytes include the following leukocytes:

(1) neutrophils (2) basophils (3) eosinophils (4) monocytes

23. The key cells of the immune system are the following blood formed elements:

(1) T lymphocytes (2) neutrophils (3) B lymphocytes (4) basophils

24. Lymphocytes are classified into T and B types according to:

(1) surface determinants (2) ultrastructure (3) site of differentiation (4) shape

4. CONNECTIVE TISSUE

Directions: each of the following statements contains five suggested completions. Choose the one that is best in each case.

1. The connective tissue functions are as follows, EXCEPT:
A – exchange between a body and the environment; B – immune and phagocytic defence; C – exchange between blood and tissues; D – support; E – repair.
2. Each of the following statements concerning the loose connective tissue is true, EXCEPT:
A – contains relatively fewer fibres, but more amorphous ground substance; B – its fibres are arranged in parallel bundles; C – contains various cells; D – is located under epithelia and around blood vessels; E – is mainly specialized for the transport function.
3. Each of the following statements concerning the fibroblasts is true, EXCEPT:
A – include fibroclasts, myofibroblasts, and fibrocytes; B – are predominant cells in connective tissues; C – contain granules with heparin and histamine; D – contain well-developed rER and Golgi apparatus; E – manufacture the extracellular matrix precursors.
4. Each of the following statements concerning the macrophages is true, EXCEPT:
A – arise from blood monocytes; B – contain numerous primary and secondary lysosomes; C – belong to the mononuclear phagocyte system; D – have variable shape, because they move in connective tissues; E – manufacture antibodies.
5. Each of the following statements concerning the mast cells is true, EXCEPT:
A – abound in metachromatic granules; B – contain heparin and histamine; C – are located near the blood vessels; D – manufacture collagen precursors; E – are involved in inflammatory and anaphylactic reactions.
6. Each of the following statements concerning the plasma cells is true, EXCEPT:
A – manufacture collagen fibres; B – arise from activated B lymphocytes; C – are ovoid in shape; D – have acentric nuclei; E – contain a lot of rER.
7. Each of the following statements concerning the white adipose cells is true, EXCEPT:
A – have a thin rim of cytoplasm; B – contain numerous mitochondria; C – possess flattened nuclei; D – contain a single fat drop; E – are responsible for the fat storage.
8. Each of the following statements concerning the brown adipose cells is true, EXCEPT:
A – generate heat; B – contain numerous mitochondria; C – have round active nuclei; D – contain many small fat droplets; E – their narrow cytoplasm possesses few organelles.
9. Each of the following statements concerning the reticular connective tissue is true, EXCEPT:
A – forms the stroma of hemopoietic organs; B – consists of reticular cells and reticular fibres; C – is the embryonic connective tissue; D – its fibres are argyrophilic; E – creates the microenvironment for hemopoietic cells.
10. Each of the following statements concerning the mucous connective tissue is true, EXCEPT:
A – is the embryonic connective tissue; B – is located in the umbilical cord; C – contains a jelly-like matrix; D – generates heat in infants; E – is specialized for amortization.
11. In embryogenesis the all types of connective tissue originate from:
A – neural tube; B – mesenchyme; C – ectoderm; D – endoderm; E – notochord.
12. Specialized connective tissues are as follows, EXCEPT:
A – mucous tissue; B – reticular tissue; C – dense regular tissue; D – white adipose tissue; E – brown adipose tissue.

Directions: one or more of the given statements or completions is/are correct. Choose the answer: A – if only 1,2, and 3 are correct; B – if only 1 and 3 are correct; C – if only 2 and 4 are correct; D – if only 4 is correct; E – if all are correct.

13. The connective tissue extracellular matrix is composed of:
(1) collagen fibres (2) amorphous ground substance (3) elastic fibres (4) blood vessels
14. The following statements regarding the collagen fibres are true:
(1) are composed of tropocollagen (2) have great tensile strength (3) are eosinophilic (4) electron micrographs reveal their cross-banding pattern
15. The following statements regarding the elastic fibres are true:
(1) require special staining to be observed by light microscopy (2) are coiled and branching (3) are able to stretch (4) consist of procollagen
16. The following statements regarding the reticular fibres are true:
(1) mostly consist of type III collagen (2) are stained by silver impregnation (3) are located in the stroma of hemopoietic organs (4) are secreted by reticular cells
17. The amorphous ground substance of the loose connective tissue matrix includes:
(1) glycosaminoglycans (2) proteoglycans (3) glycoproteins (4) water
18. The following statements regarding the dense irregular connective tissue are true:
(1) contains more fibres but less amorphous ground substance (2) its fibres are oriented in different directions (3) is located in the dermal reticular layer (4) forms organ capsules
19. The following statements regarding the dense regular connective tissue are true:
(1) contains more fibres but less amorphous ground substance (2) its fibres are arranged in parallel bundles (3) forms tendons and ligaments (4) contains various cells
20. The macrophages are specialized for the following functions:
(1) phagocytosis of bacteria, foreign particles, and cell debris (2) presentation of antigens to lymphocytes (3) release of interleukin, pyrogen, and other substances (4) manufacture of collagen fibres
21. The following statements regarding the plasma cells are true:
(1) have basophilic cytoplasm (2) light areas with Golgi apparatus are adjacent to their nuclei (3) manufacture antibodies (4) release histamine and heparin
22. The connective tissue cells that make up the capillary wall are as follows:
(1) pericytes (2) mast cells (3) endothelial cells (4) reticular cells
23. The following statements regarding the brown adipose tissue are true:
(1) forms the stroma of hemopoietic organs (2) is found in infants as well as in hibernating animals (3) is the embryonic connective tissue (4) has a rich vascular supply
24. The following statements regarding the pigment cells are true:
(1) are responsible for the synthesis and storage of melanin (2) arise from the neural crest (3) cluster in the dermis of coloured skin areas (4) are involved in immune reactions

5. CARTILAGE AND BONE

Directions: each of the following statements contains five suggested completions. Choose the one that is best in each case.

1. Each of the following statements concerning the hyaline cartilage location is true, EXCEPT:
A – covers articular surfaces of bones; B – forms the fetal skeleton; C – constitutes bone epiphyseal plates; D – forms the auditory tube; E – is found in the respiratory tract.

2. Each of the following statements concerning the hyaline cartilage matrix is true, EXCEPT:
A – is firm and pliable; B – abounds in elastic fibres; C – contains type II collagen fibrils; D – is highly permeable; E – is impermeable for immunoglobulins.
3. Each of the following statements concerning the perichondrium is true, EXCEPT:
A – provides nutrition for cartilages; B – its outer layer is fibrous; C – its inner layer is cellular; D – is avascular; E – provides appositional growth of cartilages.
4. Each of the following statements regarding the chondroblasts is true, EXCEPT:
A – originate from chondrogenic cells; B – are located in the inner perichondrium layer; C – are arranged in isogenous groups; D – synthesize the cartilage matrix; E – are capable of division.
5. Each of the following statements regarding the chondrocytes is true, EXCEPT:
A – arise from chondroblasts; B – can form isogenous groups; C – are capable of division; D – take part in the cartilage matrix synthesis; E – are located in the inner perichondrium layer.
6. Each of the following statements concerning the periosteum is true, EXCEPT:
A – contains osteocytes; B – is composed of fibrous and cellular layers; C – contains osteogenic cells and osteoblasts; D – provides blood supply to bones; E – provides growth and repair of bones.
7. Each of the following statements concerning the osteoblasts is true, EXCEPT:
A – are derived from osteogenic cells; B – are located in the inner periosteum layer; C – produce the organic portion of bone matrix; D – possess the ruffled border; E – contain well-developed rER and Golgi apparatus.
8. Each of the following statements concerning the osteocytes is true, EXCEPT:
A – produce the organic portion of bone matrix; B – differentiate from osteoblasts; C – house in their own lacunae; D – possess narrow cytoplasmic processes; E – maintain bone homeostasis;
9. Each of the following statements concerning the osteoclasts is true, EXCEPT:
A – are multinucleated giant cells; B – are located near the blood vessels; C – have the ruffled border; D – possess osteolytic activity; E – are derived from osteocytes.
10. Each of the following statements concerning the coarsely bundled bone tissue is true, EXCEPT:
A – is a primary immature bone tissue; B – contains thick bundles of collagen fibrils; C – occurs mostly in adult body; D – is replaced by lamellar bone tissue; E – is located near the skull sutures, in tooth sockets, and at insertion sites of tendons.
11. Each of the following statements concerning the osteon is true, EXCEPT:
A – is a morphostructural unit of the compact bone substance; B – is composed of 4-20 concentric lamellae; C – contains a central canal; D – is avascular; E – contains osteocytes in lacunae between lamellae.
12. The bone tissue embryonic origin is:
A – notochord; B – mesenchyme; C – ectoderm; D – endoderm; E – neural crest.
13. In contrast to the perichondral bone, the endochondral bone contains:
A – residues of calcified cartilage; B – bone matrix; C – osteoblasts; D – osteocytes; E – osteoclasts.
14. The epiphyseal plate function is:
A – formation of the perichondral collar; B – formation of periosteal buds; C – formation of the cartilage model; D – calcification of the bone matrix; E – bone growth.

Directions: one or more of the given statements or completions is/are correct. Choose the answer: A – if only 1,2, and 3 are correct; B – if only 1 and 3 are correct; C – if only 2 and 4 are correct; D – if only 4 is correct; E – if all are correct.

15. The following characteristics of the perichondrium are true:

(1) surrounds cartilages, except articular surfaces (2) consists of two layers (3) is a connective tissue envelope of cartilages (4) contains blood vessels, chondrogenic cells, and chondroblasts

16. The following characteristics of the hyaline cartilage are true:

(1) lacks blood vessels (2) contains zones of young cartilage and mature cartilage (3) undergoes age-related regressive changes (4) its matrix can become mineralized

17. The cartilages grow:

(1) not at all (2) only interstitially (3) only appositionally (4) interstitially and appositionally

18. The following statements regarding the elastic cartilage are true:

(1) is found in the auricle, the auditory tube, and the epiglottis (2) abounds in elastic fibres (3) never undergoes calcification (4) lacks the perichondrium

19. The following statements regarding the fibrocartilage are true:

(1) its collagen fibres are arranged in parallel bundles (2) exists in intervertabral disks (3) is found at the junction sites between tendons and articular cartilage (4) lacks the perichondrium

20. The following statements regarding the bone matrix are true:

(1) prevents free diffusion (2) contains type I collagen (3) contains calcium, phosphorus, and bicarbonate (4) abounds in elastic fibres

21. The following statements regarding the lamellar bone tissue are true:

(1) replaces primary bone (2) is immature bone tissue (3) forms spongy and compact bone substance (4) its collagen fibres are arranged in coarse bundles

22. The following statements regarding the bone spongy substance are true:

(1) is found in the epiphysises of long bones (2) its lamellae are irregularly arranged (3) contains bone marrow (4) contains osteons

23. The following statements regarding the bone compact substance are true:

(1) is found in the diaphysis of long bones, in flat and short bones (2) is avascular (3) its lamellae are arranged in osteons (4) contains bone marrow

24. Haversian canal contains:

(1) blood vessels (2) nerves (3) some loose connective tissue 4) few osteoblasts and osteoclasts

25. The following statements regarding the intramembranous bone formation are true:

1) is direct bone formation (2) is characteristic of long bone development (3) is characteristic of flat bone development (4) is indirect bone formation

26. The endochondral bone formation begins in:

(1) the epiphysis of the cartilage model (2) epiphyseal plates (3) mineralized cartilage (4) the perichondrium of the cartilage model diaphysis

27. The following structures are formed in the endochondral bone formation:

(1) endochondral bone (2) perichondral bone (3) periosteal buds (4) epiphyseal plates

28. The following structures make up the arrangement of the long bone diaphysis:

(1) osteons (2) outer circumferential lamellae (3) interstitial lamellae (4) inner circumferential lamellae

6. MUSCLE TISSUE

Directions: each of the following statements contains five suggested completions. Choose the one that is best in each case.

1. Each of the following statements concerning the skeletal muscle tissue is true, EXCEPT:

A – is derived from the myotome; B – consists of striated muscle fibres; C – connective tissue surrounds each fibre; D – possesses satellite cells; E – muscle fibres are joined by intercalated discs.

2. Each of the following statements concerning the smooth muscle tissue is true, EXCEPT:

A – is derived from the mesenchyme; B – consists of muscle fibres; C – consists of muscle cells; D – its cells lack cross striation; E– its contraction is involuntary.

3. Each of the following statements concerning the cardiac muscle tissue is true, EXCEPT:

A – consists of muscle symplasts; B – consists of muscle cells; C – is striated; D – is derived from the mesoderm; E – its cells are joined by intercalated discs.

4. Each of the following statements concerning the striated myofibril is true, EXCEPT:

A – consists of thick and thin filaments; B – contains actin and myosin; C – includes myoglobin; D – has dark and light bands; E – is subdivided into sarcomeres.

5. The main stages of the skeletal muscle tissue embryonic development are as follows, EXCEPT:

A – myoblasts arise from the myotome; B – myoblasts arise from the sclerotome; C – myoblasts fuse; D – myotubes result from fusion of myoblasts; E – muscle fibres differentiate from myotubes.

6. Each of the following statements concerning the sarcotubular system is true, EXCEPT:

A – includes T tubules; B – includes sER (L tubules); C – forms triads; D – produces proteins; E – contains terminal cisterns.

7. Each of the following statements concerning the smooth muscle cell is true, EXCEPT:

A – contains one nucleus; B – is surrounded by the basal lamina and reticular fibres; C – contains actin and myosin; D – is joined with other cells by nexuses; E – contains T tubules.

8. Each of the following statements concerning the red muscle fibres is true, EXCEPT:

A – contain a large amount of myoglobin; B – possess numerous mitochondria; C – are rich in oxidative enzymes; D – are adapted to fast short-lived contractions; E – show mild ATP-ase cytochemical staining.

9. Each of the following statements concerning the white muscle fibres is true, EXCEPT:

A – contain a large amount of glycogen; B – contain few mitochondria; C – are adapted to slow repetitive contractions; D – show marked ATP-ase cytochemical staining; E – are not rich in oxidative enzymes.

10. The typical cardiac muscle cells contain the following structures, EXCEPT:

A – one or two nuclei; B – many mitochondria; C – striated myofibrils; D – T tubules; E – pinocytotic vesicles.

11. The muscle cells producing hormones are:

A – atypical cardiac myocytes; B – smooth myocytes; C – atrial myocytes; D – satellite cells; E – none of them.

12. Each of the following statements concerning the striated myofibril structure is true, EXCEPT:

A – A band is anisotropic; B – I band is isotropic; C – Z line bisects I band; D – H zone transects I band; E – H zone has a dark M line in its centre.

13. Each of the following statements concerning striated myofibrils is true, EXCEPT:

A – include thick and thin filaments; B – lack crossbanding; C – run parallel to the long axis of fibre through its entire length; D – are held by intermediate filaments from desmin and vimentin; E – are surrounded by the sarcoplasmic reticulum.

14. Each of the following statements concerning striated myofibrils is true, EXCEPT:
A – I band contains only thin filaments; B – thin filaments anchor at Z line; C – A band contains both thin and thick filaments in 6 to 1 ratio; D – M line is formed by the midpoints of thick filaments; E – H zone contains only thin filaments.

Directions: one or more of the given statements or completions is/are correct. Choose the answer: A – if only 1,2, and 3 are correct; B – if only 1 and 3 are correct; C – if only 2 and 4 are correct; D – if only 4 is correct; E – if all are correct.

15. The characteristics of the skeletal muscle as an organ are true:
(1) is formed of striated fibres (2) contains the endomisium (3) contains the perimysium (4) contains the epymysium
16. The following statements regarding a sarcomere are true:
(1) is a distance between two successive Z lines (2) is a functional unit of striated myofibrils (3) is similarly arranged in skeletal tissue and cardiac muscle (4) includes 0.5 of I band + A band + 0.5 of I band
17. The cross striation of muscle fibres is due to:
(1) cross disposition of myofibrils (2) the presence of dark and light bands (3) the presence of many nuclei (4) alternation of dark and light bands
18. The following statements regarding the atypical cardiac muscle cells are true:
(1) contain few myofibrils (2) contain many glycogen granules (3) contain few mitochondria (4) make up the heart impulse-generating system
19. The following statements regarding the repair of skeletal muscle fibres are true:
(1) satellite cells divide (2) myoblasts arise from satellite cells (3) myoblasts fuse to form myotubes (4) myotubes differentiate to muscle fibres
20. The following statements regarding the satellite cells of the skeletal muscle tissue are true:
(1) are stem cells (2) exist in G_0 phase (3) take part in muscle repair (4) are located between the basement membrane and the muscle fibre plasmalemma
21. The following statements regarding the T tubules of striated muscle fibres are true:
(1) are plasmalemma invaginations (2) take part in the release of calcium ions (3) are located between adjacent terminal cisterns (4) take part in the diad formation
22. The intercalated disks of the cardiac muscle cells have the following specializations:
(1) sites of myofibril attachment (2) desmosomes (3) interdigitations (4) gap junctions
23. The following statements regarding the smooth muscle cells are true:
(1) are fusiform (2) contact by gap junctions (3) produce reticular fibrils (4) lack sarcolemmal vesicles
24. The following statements regarding the cytoplasmic and peripheral densities of the smooth muscle cells are true:
(1) are analogous to Z lines (2) contain α-actinin (3) function as myofilament attachment sites (4) facilitate the spread of excitation
25. The following statements regarding the sarcolemmal vesicles (caveolae) of the smooth muscle cells are true:
(1) are present along the periphery of the cell cytoplasm (2) are associated with sER (3) are associated with the cell membrane (4) function to take up and release calcium ions
26. The following statements regarding the smooth muscle tissue regeneration are true:
(1) smooth muscle cells can divide (2) minor wounds heal by new smooth muscle cells (3) large defects are closed by connective tissue (4) regeneration is not possible at all.
27. The following statements regarding the cardiac muscle tissue regeneration are true:

(1) cardiac muscle cells can divide (2) the cardiac muscle lacks capacity for reparative regeneration (3) minor wounds heal by new muscle cell production (4) any defect is closed by connective tissue scar

7. NERVOUS TISSUE

Directions: each of the following statements contains five suggested completions. Choose the one that is best in each case.

1. The following organelles are plentiful in the neuron cytoplasm, EXCEPT:
A – Golgi apparatus; B – mitochondria; C – microtubules and microfilaments; D – centrioles; E – rER.
2. Nissl bodies seen by light microscopy as basophilic clumps are:
A – sER; B – Golgi apparatus; C – mitochondria; D – microtubules; E – rosettes of polysomes and rER.
3. The neurofibrils seen by light microscopy are the fixation artefact and represent aggregated:
A – mitochondria; B – Golgi apparatus; C – microtubules and microfilaments; D – rER; E – sER.
4. Each of the following statements concerning the axon is true, EXCEPT:
A – lacks rER and polysomes; B – lacks mitochondria; C – contains many microtubules; D – demonstrates axonal transport; E – conducts impulses away from the soma.
5. Each of the following statements concerning the synapses is true, EXCEPT:
A – transfer impulses from one neuron to another; B – are chemical and electrical; C – interact with stimuli and generate nervous impulses; D – are axodendritic, axosomatic, and axoaxonic; E – may be exciting and inhibitory.
6. Each of the following statements concerning the chemical synapse is true, EXCEPT:
A – its presynapse contains vesicles with a neurotransmitter; B – its presynaptic membrane is thickened; C – its postsynaptic membrane has receptors; D – has a synaptic cleft; E – lacks glial cells.
7. The following glial cells belong to the macroglia, EXCEPT:
A – oligodendrocytes; B – protoplasmic astrocytes; C – glial microphagocytes; D – fibrous astrocytes; E – ependymal cells.
8. The glial cells arising from the blood monocytes are:
A – microglia; B – oligodendrocytes; C – protoplasmic astrocytes; D – fibrous astrocytes; E – ependymal cells.
9. The glial cells lining the brain ventricles and the spinal canal are:
A – microglia; B – oligodendrocytes; C – protoplasmic astrocytes; D – fibrous astrocytes; E – ependymal cells.
10. The glial cells forming sheaths around neuronal processes in the nerve fibres are:
A – protoplasmic astrocytes; B – fibrous astrocytes; C – microglia; D – oligodendrocytes (lemmocytes); E – ependymal cells.
11. Each of the following statements concerning the myelinated fibres is true, EXCEPT:
A – their outer sheath is neurilemma; B – contain several axis cylinders; C – their inner sheath is myelinated; D – conduct impulses at a rate of 80 to120 m/s; E – possess nodes of Ranvier.
12. Each of the following statements concerning the myelinated sheath is true, EXCEPT:

A – includes several layers of the lemmocyte plasma membrane; B – has lipoprotein organization with lipid predominance; C – contains nucleus and organelles of Schwann cell; D – is formed by mesaxon winding around the axis cylinder; E – possesses Schmidt-Lanterman clefts.

13. Each of the following statements concerning the receptors is true, EXCEPT:

A – are terminal modifications of sensory neuron dendrites; B – are the motor nerve endings; C – if they contain only nerve fibres, they are free; D – if they contain glial cells, they are nonfree; E – if they are enclosed by connective tissue capsules, they are encapsulated.

14. Each of the following statements concerning the lamellar (Pacinian) corpuscle is true, EXCEPT:

A – is a deep pressure receptor; B – contains the inner flask with a sensory fibre; C – contains the outer flask from glial cells; D – is the motor nerve ending; E – possesses connective tissue capsule from multiple layers.

Directions: one or more of the given statements or completions is/are correct. Choose the answer: A – if only 1,2, and 3 are correct; B – if only 1 and 3 are correct; C – if only 2 and 4 are correct; D – if only 4 is correct; E – if all are correct.

15. According to the morphological classification the neurons are:

(1) multipolar (2) bipolar (3) pseudounipolar (4) sensory

16. According to the functional classification the neurons are:

(1) sensory (2) motor (3) associative (4) bipolar

17. In embryogenesis the CNS and PNS neurons develop from:

(1) mesenchyme (2) neural tube (3) mesoderm (4) neural crest

18. In embryogenesis the CNS and PNS glial cells arise from:

(1) neural tube (2) neural crest (3) mesenchyme (4) mesoderm

19. The following statements regarding the dendrites are true:

(1) are numerous or single (2) conduct impulses toward the soma (3) have spines (4) have extensive arborizations

20. The following statements regarding the axon are true:

(1) is always single (2) is the longest and thickest neuronal process 3) branches to form collaterals (4) branches at its end

21. The chemical synapses transfer impulses in one direction because:

(1) their presynapse has vesicles with a neurotransmitter (2) they are nexuses (3) their postsynaptic membrane has receptors (4) they are only exciting

22. The following statements regarding the regeneration of the nervous tissue are true:

(1) neurons are unable to divide (2) glial cells can divide (3) neuron processes can regenerate (4) the neuronal soma can regenerate after injury

23. The following statements regarding the glial cells are true:

(1) take part in neuron nutrition (2) participate in regeneration of nerve fibres (3) form a protective barrier around neurons (4) maintain electrolyte balance

24. The glial cell functions are:

(1) support and defence of neurons (2) transport of substances from blood (3) formation of nerve fibre sheaths (4) conduction of nervous impulses

25. The following statements regarding the unmyelinated fibres are true:

(1) contain several axis cylinders (2) their sheaths are formed by lemmocytes (3) conduct impulses at a rate of 8 -10 m/s (4) possess nodes of Ranvier

26. The following statements regarding the node of Ranvier are true:

(1) lacks myelin (2) is the site between adjacent Schwann cells (3) provides saltatory conduction of nervous impulses (4) contains Schwann cell nucleus

27. The following statements regarding the Schmidt-Lanterman cleft are true:

(1) is the site between adjacent Schwann cells (2) is a myelin portion where the lemmocyte cytoplasm is preserved (3) provides saltatory conduction of impulses (4) is nutrition canal

28. The following statements regarding the motor end plate are true:

(1) contains acetylcholine as a neurotransmitter (2) is formed by ending of the motor neuron axon (3) exists on skeletal muscle fibres (4) contains glial cells

8. NERVOUS SYSTEM

Directions: each of the following statements contains five suggested completions. Choose the one that is best in each case.

1. Each of the following statements concerning the spinal ganglion is true, EXCEPT:

A – contains pseudounipolar neurons; B – is associated with the spinal cord ventral root; C – its neuron dendrites form part of the spinal nerve; D – its neuron dendrites possess receptors; E – its neurons are surrounded by satellite cells.

2. The dorsal root of the spinal cord is formed by:

A – the axons of motor neurons of the spinal cord; B – the dendrites of neurons of spinal ganglia; C – the dendrites of motor neurons of the spinal cord; D – the axons of neurons of spinal ganglia; E – the axons of interneurons of the spinal cord.

3. Each of the following statements concerning the autonomic ganglia is true, EXCEPT:

A – contain multipolar neurons; B – the axons of their neurons are unmyelinated; C – the axons of their neurons end on skeletal muscles; D – contain oligodendrocytes; E – preganglionic fibres form synapses on their neurons.

4. The gray matter of the spinal cord consists of the following structures, EXCEPT:

A – connective tissue trabeculae; B – multipolar neurons; C – astrocytes; D – oligodendrocytes; E – microglia.

5. The white matter of the spinal cord consists of the following structures, EXCEPT:

A – astrocytes; B – microglia; C – myelinated fibres; D – multipolar neurons; E – oligodendrocytes.

6. Each of the following statements concerning the cerebellar cortex is true, EXCEPT:

A – its molecular layer contains stellate and basket cells; B – lacks blood vessels; C – its granular layer contains granule cells and Golgi type II cells; D – its middle layer contains Purkinje cells; E – contains protoplasmic astrocytes, oligodendrocytes, and microglia.

7. Each of the following statements concerning Purkinje cells from the cerebellar cortex is true, EXCEPT:

A – are located in single layer; B – their dendrites arborize in the molecular layer; C – their axons enter the white matter; D – are inhibitory neurons; E – conduct impulses away from the cortex.

8. The cerebellar cortex neurons exciting Purkinje cells are:

A – granule cells; B – basket cells; C – Golgi type II cells; D – stellate cells; E – pyramidal cells.

9. The cerebellar cortex neurons connecting Purkinje cells along a folium are:

A – basket cells; B – pyramidal cells; C – stellate cells; D – Golgi type II cells; E – granule cells.

10. The cerebellum white matter contains the following structures, EXCEPT:

A – mossy afferent fibres; B – climbing afferent fibres; C – efferent fibres (axons of Purkinje cells); D – glial cells; E – ependymal cells.

11. The mossy afferent fibres enter the cerebellar cortex and synapse with the dendrites of:

A – basket cells; B – Purkinje cells; C – stellate cells; D – granule cells; E – Golgi type II cells.

12. The climbing afferent fibres enter the cerebellar cortex and synapse with the dendrites of:

A – basket cells; B – Purkinje cells; C – stellate cells; D – granule cells; E – Golgi type II cells.

13. Each of the following statements concerning efferent fibres of the cerebral cortex is true, EXCEPT:

A – are the axons of pyramidal cells from the 3rd and the 5th layers; B – convey impulses to the cortex; C – may end in the same hemisphere; D – may end in the other hemisphere; E – may leave the brain and enter the spinal cord.

14. Each of the following statements concerning afferent fibres of the cerebral cortex is true, EXCEPT:

A – convey impulses to the cortex; B – end and branch in the 1st and the 3rd layers; C – carry impulses away from the cortex; D – form transversal plexuses; E – synapse with cortex interneurons.

Directions: one or more of the given statements or completions is/are correct. Choose the answer: A – if only 1,2, and 3 are correct; B – if only 1 and 3 are correct; C – if only 2 and 4 are correct; D – if only 4 is correct; E – if all are correct..

15. The peripheral nerves are composed of:

1) nerve fibres (2) epineurium (3) perineurium (4) endoneurium

16. The ventral root of the spinal cord is formed by:

(1) the axons of motor neurons of the spinal cord (2) the axons of sensory neurons of spinal ganglia (3) the axons of autonomic interneurons of the spinal cord (4) the dendrites of sensory neurons of spinal ganglia

17. The following statements regarding the spinal cord neurons are true:

(1) are multipolar (2) are motor and associative (3) their axons may leave the spinal cord through the ventral root (4) their axons may extend from the gray matter into the white matter

18. The white matter of the spinal cord is formed by axons of neurons from:

(1) spinal cord (2) spinal ganglia (3) brain (4) autonomic ganglia

19. The following statements regarding the gray matter of the spinal cord are true:

(1) its anterior horns contain motor somatic neurons (2) its posterior horns contain interneurons for sensory impulses (3) its lateral horns contain autonomic interneurons (4) its commussure contains the central canal

20. The following statements regarding the white matter of the spinal cord are true:

(1) its posterior columns contain ascending sensory tracts (2) its anterior columns contain mainly descending motor tract (3) its lateral columns contain both ascending and descending tracts (4) its blood vessels extend from the spinal cord pia mater

21. The cerebellar cortex is composed of the following layers:

(1) molecular (2) of Purkinje cells (3) granular (4) pyramidal

22. The cerebellar cortex neurons connecting Purkinje cells across a folium are:

(1) granule cells (2) stellate cells (3) Golgi type II cells (4) basket cells

23. The cerebellar cortex neurons inhibiting Purkinje cells are:

(1) stellate cells (2) basket cells (3) Golgi type II cells (4) granule cells

24. The following statements regarding the cerebellar islands are true:

(1) are located in the granular layer of the cortex (2) contain synapses between mossy fibres and granule cell dendrites (3) contain synapses of Golgi type II cell axons with granule cell dendrites (4) contain Purkinje cell axons

25. The cerebral cortex includes the following layers:

(1) molecular (2) external granular (3) external pyramidal (4) layer of Purkinje cells

26. The cerebral cortex includes the following layers:
(1) internal granular (2) internal pyramidal (3) multiform (polymorphic) (4) molecular
27. The following statements regarding the granular type of the cerebral cortex are true:
(1) contains a well-developed external granular layer (2) contains a well-developed internal granular layer (3) is characteristic of sensitive areas of the cortex (4) contains a well-developed internal pyramidal layer
28. The following statements regarding the agranular type of the cerebral cortex are true:
(1) contains a well-developed external pyramidal layer (2) contains a well-developed internal pyramidal layer (3) is characteristic of motor areas of the cortex (4) contains a well-developed polymorphic layer

9. PRIMARY SENTIENT SENSE ORGANS

Directions: each of the following statements contains five suggested completions. Choose the one that is best in each case.

1. Each of the following statements concerning the cornea is true, EXCEPT:
A – is transparent; B – is avascular; C – receives nutrition by diffusion; D – is composed of five layers; E – contains numerous melanocytes.
2. Each of the following statements concerning the corneal epithelium is true, EXCEPT:
A – is stratified squamous nonkeratinized; B – is transitional; C – is bathed by tears; D – is highly innervated; E – arises from ectoderm.
3. Each of the following statements concerning the ciliary body is true, EXCEPT:
A – is avascular; B – is a modification of the eye vascular tunic; C – has processes with suspensory ligaments; D – contains intrinsic muscles; E – takes part in accommodation.
4. Each of the following statements concerning the iris is true, EXCEPT:
A – is a modification of the eye vascular tunic; B – blocks light entering except via the pupil; C – lacks colour; D – contains intrinsic muscles; E – regulates the amount of light entering the eye.
5. Each of the following statements concerning the photoreceptors is true, EXCEPT:
A – are bipolar neurons; B – form synapses with amacrine cells; C – their dendrites have the outer and inner segments; D – their axons synapse with bipolar cells; E – their cell bodies constitute the retinal outer nuclear layer.
6. Each of the following statements concerning the rods is true, EXCEPT:
A – number about 120 million; B – their outer segments include flat membranous disks; C – contain rhodopsin; D – are responsible for black-white vision; E – are excited by bright light.
7. Each of the following statements concerning the cones is true, EXCEPT:
A – their outer segments contain plasma membrane invaginations; B – their inner segments contain an ellipsoid; C – are excited by low-intensity light; D – are responsible for colour vision; E – contain iodopsin.
8. The retinal inner nuclear layer contains nuclear regions of the following cells, EXCEPT:
A – bipolar cells; B – ganglion cells; C – horizontal cells; D – amacrine cells; E – Muller cells.
9. The retinal ganglion cell layer contains the cell bodies of:
A – photoreceptors; B – horizontal cells; C – amacrine cells; D – bipolar cells; E – ganglion neurons.

10. The retinal optic nerve fibre layer contains the axons of neurons:
A – amacrine; B – ganglion; C – bipolar; D – horizontal; E – photoreceptor.
11. The optic nerve is composed of:
A – photoreceptor dendrites; B – bipolar cell axons; C – amacrine cell dendrites; D – ganglion cell axons; E – horizontal cell axons.
12. The retinal external and internal limiting membranes are formed by the processes of:
A – glial cells; B – photoreceptors; C – amacrine cells; D – ganglion cells; E – horizontal cells.
13. Each of the following statements concerning the pigmented epithelium is true, EXCEPT:
A – consists of columnar cells; B – its cells have processes investing the outer segments of photoreceptors; C – contains melanin granules; D – contains the photosensitive pigment; E – is the outermost retinal layer.
14. Each of the following statements concerning the pigmented epithelium functions is true, EXCEPT:
A – transports vitamin A and nutrients from the choroid; B – phagocytoses shed tips of rods and cones; C – absorbs light; D – takes part in light adaptation; E – transmits nervous impulses.
15. Each of the following statements concerning the olfactory cells is true, EXCEPT:
A – are bipolar neurons; B – their dendrites are characterized by bulbous projections; C – the cilia extend from their olfactory knobs; D – they are mechanoreceptors; E – their unmyelinated axons are gathered into the fila olfactoria.

Directions: one or more of the given statements or completions is/are correct. Choose the answer: A – if only 1,2, and 3 are correct; B – if only 1 and 3 are correct; C – if only 2 and 4 are correct; D – if only 4 is correct; E – if all are correct.

16. The following statements regarding the sclera are true:
(1) consists of dense connective tissue (2) maintains the eye shape (3) serves as the attachment site for oculomotor muscles (4) is transparent
17. The following statements regarding the aqueous humor are true:
(1) is produced by ciliary processes (2) flows from the posterior eye chamber into the anterior eye chamber (3) outflows via the canal of Schlemm into the eye venous system (4) is related to glaucoma
18. The following statements regarding the eye limbus are true:
(1) contains the canal of Schlemm (2) is corneal-scleral junction (3) its blood vessels provide corneal nutrition (4) contains muscles of accommodation
19. The following statements regarding the choroid are true:
(1) consists of loose connective tissue (2) is highly vascular (3) contains numerous melanocytes (4) absorbs light
20. The following statements regarding the lens are true:
(1) is an epithelial structure (2) possesses its own capsule (3) consists of transparent fibres (4) is biconvex
21. The following statements regarding the vitreous body are true:
(1) is refractile gel (2) contains few hyalocytes (3) is composed of water, collagen, and hyaluronic acid (4) takes part in accommodation
22. The following statements regarding the photoreceptors are true:
(1) their inner segments are cell metabolic centres (2) their tips are shed and phagocytosed (3) their outer segments face the back of the eye (4) their axons synapse with horizontal cells and bipolar neurons
23. The following neurons of the retina constitute the initial link of the optic tract:
(1) photoreceptors (2) bipolar cells (3) ganglion cells (4) amacrine cells

24. The following neurons form horizontal bonds within the retinal layers:
(1) Muller cells (2) horizontal cells (3) bipolar cells (4) amacrine cells
25. The retinal layer of rods and cones consists of:
(1) photoreceptor dendrites (2) cell bodies of rods and cones (3) pigmented epithelium processes (4) axons of rods and cones
26. The retinal outer plexiform layer contains:
(1) photoreceptor axons (2) bipolar cell dendrites (3) horizontal cell processes (4) the first synapse of the optic tract
27. The retinal inner plexiform layer contains:
(1) bipolar cell axons (2) ganglion cell dendrites (3) the second synapse of the optic tract (4) amacrine cell processes
28. The following statements regarding the optic disk are true:
(1) lacks rods and cones (2) the optic nerve leaves the eye here (3) lacks visual activity (4) contains only two retinal layers
29. The following statements regarding the fovea centralis are true:
(1) is a depression on the posterior retinal wall (2) contains only cones (3) is a region of the greatest visual activity (4) the optic nerve leaves the eye here
30. The olfactory epithelium consists of the following cells:
(1) olfactory cells (2) basal cells (3) supporting cells (4) glial cells
31. The following statements regarding the olfactory reception are true:
(1) olfactory cilia contain chemoreceptors (2) odoriferous substances dissolve in the olfactory gland secretion (3) interaction between the olfactory molecules and receptors causes the cell membrane depolarization (4) after interaction molecules are carried away by olfactory gland secretion to prepare receptors for new stimuli

10. SECONDARY SENTIENT SENSE ORGANS

Directions: each of the following statements contains five suggested completions. Choose the one that is best in each case.

1. Each of the following statements concerning the cochlea is true, EXCEPT:
A – is formed by a spiral bony tube; B – contains the osseous core, modiolus; C – consists of the saccule and utricle; D – houses the cochlear duct; E – contains the spiral organ of Corti.
2. The spiral ganglion is located in:
A – scala media; B – spiral lamina of the modiolus; C – scala vestibuli; D – tunnel; E – scala tympani.
3. The sensory neurons of the organ of hearing are located in:
A – stria vascularis; B – spiral ligament; C – tunnel; D – spiral ganglion; E – spiral organ.
4. Each of the following statements concerning the basilar membrane is true, EXCEPT:
A – separates the scala media and the scala vestibuli; B – consists of a thick layer of amorphous material; C – contains keratin-like fibrils; D – the spiral organ is located on its upper surface; E – separates the scala media and the scala tympani.
5. Each of the following statements concerning the stria vascularis is true, EXCEPT:
A – secrets endolymph; B – rests on the spiral ligament; C – consists of the psuedostratified epithelium; D – is vascularized by capillaries; E – is a thickened periosteum of the spiral lamina.
6. The following cells of the spiral organ enclose the tunnel of Corti:
A – outer hair cells; B – outer phalangeal cells; C – pillar cells; D – inner hair cells; E – inner phalangeal cells.

7. Each of the following statements concerning the outer hair cells is true, EXCEPT:
A – are columnar in shape; B – are chemoreceptors; C – are arranged in three rows; D – their stereocilia are arranged in V-formation; E – form point-like contacts with afferent fibres.
8. Each of the following statements concerning the inner hair cells is true, EXCEPT:
A – are arranged in a single row; B – are bulbous in shape; C – their stereocilia are arranged in a straight line; D – are chemoreceptors; E – form cup-like contacts with afferent fibres.
9. Each of the following statements concerning the vestibular macula is true, EXCEPT:
A – contains supporting cells; B – contains two types of neuroepithelial cells; C – is covered with the otolithic membrane containing otoliths; D – is a sensor of gravity; E – detects angular acceleration.
10. Each of the following statements concerning the vestibular cristae is true, EXCEPT:
A – are three in number; B – their covering contains otoliths; C – are oriented perpendicular to each other; D – are covered with the cupula; E – are the sensors of angular acceleration.
11. Each of the following statements concerning the vestibular neuroepithelial cells is true, EXCEPT:
A – are bulbar and columnar in shape; B – rest on supporting cells; C – possess numerous stereocilia; D – lack the kinocilium; E – are mechanoreceptors.
12. Each of the following statements concerning the neuroepithelial cells of the taste buds is true, EXCEPT:
A – are not capable of renewal; B – are arranged around the taste pit; C – possess microvilli on their apical surface; D – are chemoreceptors; E – synapse with afferent nerve fibres.

Directions: one or more of the given statements or completions is/are correct. Choose the answer: A – if only 1,2, and 3 are correct; B – if only 1 and 3 are correct; C – if only 2 and 4 are correct; D – if only 4 is correct; E – if all are correct.

13. The following statements regarding the modiolus are true:
(1) is osseous (2) contains the cochlear nerve (3) has a spiral lamina (4) is the cochlear axis
14. The following cochlear passages contain perilymph:
(1) scala media (2) scala tympani (3) cochlear duct (4) scala vestibuli
15. The following cochlear passages contain endolymph:
(1) scala media (2) scala tympani (3) tunnel of Corti (4) scala vestibuli
16. The following statements regarding the spiral lamina are true:
(1) is a lateral projection of the modiolus (2) contains the spiral ganglion (3) its thickened periosteum forms the spiral limbus (4) has the upper and the lower lips
17. The spiral organ of Corti consists of the following cells:
(1) phalangeal cells (2) pillar cells (3) hair cells (4) neurons
18. The following statements regarding the phalangeal cells of the spiral organ are true:
(1) rest on the basement membrane (2) possess phalangeal processes (3) are supporting cells (4) have cup-like depressions for hair cells
19. The tunnel of Corti contains:
(1) perilymph (2) endolymph (3) keratin-like fibrils (4) dendrites of sensory neurons
20. The following statements regarding the tectorial membrane are true:
(1) consists of glycoprotein-rich material (2) projects away from the spiral limbus (3) covers the hair cell tips (4) contains afferent nervous fibres

21. The maculae of the vestibular apparatus are located in:
(1) saccule (2) ampullae of semicircular canals (3) utricle (4) cochlea
22. The cristae of the vestibular apparatus are located in:
(1) saccule (2) utricle (3) cochlea (4) ampullae of semicircular canals
23. The movements of the following structures stimulate the vestibular neuroepithelial cells:
(1) otoliths (2) cupula (3) otolithic membrane (4) tympanic membrane
24. The taste buds are located on the lateral surface of following lingual papillae:
(1) fungiform (2) foliate (3) circumvallate (4) filiform
25. The following statements regarding the taste buds are true:
(1) consist of supporting, neuroepithelial, and basal cells (2) contain taste pits (3) their taste pores open into the interpapillar space (4) contains neurons
26. The following statements regarding the basal cells of the taste buds are true:
(1) are stem cells (2) give rise to supporting cells (3) give rise to neuroepithelial cells (4) are neurons

11. CARDIOVASCULAR SYSTEM

Directions: each of the following statements contains five suggested completions. Choose the one that is best in each case.

1. Each of the following statements concerning the elastic type arteries is true, EXCEPT:
A – their tunica intima is relatively thick, contains smooth muscle cells and elastic fibres;
B – they are the largest-diameter arteries; C – blood pressure in these arteries is the least; D – their internal and external membranes are not conspicuous; E – elastic fenestrated membranes are predominate in their tunica media.
2. Each of the following statements concerning the arterioles is true, EXCEPT:
A – the internal elastic membrane may or may not be present in their tunica intima; B – blood pressure in them is the highest in the arterial bed; C – their tunica media has one or two smooth muscle layers; D – their smooth muscles form precapillary sphincters; E – they control blood flow to the capillary bed.
3. The microcirculatory bed includes the following vessels, EXCEPT:
A – arterioles; B – venules; C – capillaries; D – arteriovenous anastomoses (shunts); E – lymphatic ducts.
4. Each of the following statements concerning the capillaries is true, EXCEPT:
A – contain smooth muscle cells; B – consist of endothelial cells on the basal lamina; C – their diameter is often smaller than that of erythrocytes; D – possess selective permeability; E – histamine increases capillary permeability.
5. Each of the following statements concerning the continuous capillaries is true, EXCEPT:
A – are endothelial tubules; B – typically found in endocrine glands; C – their endothelial cells are joined by tight junctions; D – their endothelial cells abound in pinocytotic vesicles; E – pericytes enclosed by the endothelial basal membrane may be found.
6. Each of the following statements concerning the postcapillary venules is true, EXCEPT:
A – consist of endothelium on the basal lamina; B – contain pericytes; C – contain smooth muscle cells; D – are the sites of histamine action; E – leukocytes emigrate through their wall into tissues (especially in inflammation and allergic reactions).
7. Each of the following statements concerning the vein structure is true, EXCEPT:

A – is devoid of the internal and external elastic membranes; B – contains few elastic elements; C – blood vessels supply all its layers; D – its tunica media is thicker than the tunica adventitia; E – its tunica intima may possess valves.

8. Each of the following statements concerning the endocardium is true, EXCEPT:

A – includes endothelium and subendothelial layer; B – contains middle layer of elastic fibres and smooth muscle cells; C – is supplied by diffusion; D – possesses blood vessels; E – has a deeper layer of connective tissue.

9. The myocardium consists of the following structures, EXCEPT:

A – typical cardiac muscle cells; B – atypical cardiac muscle cells of the impulse-conducting system; C – abundance of adipose tissue; D – blood vessels; E – connective tissue.

10. Each of the following statements concerning the epicardium is true, EXCEPT:

A – it is the internal sheet of the pericardium; B – consists of mesothelial cells and underlying connective tissue; C – contains blood vessels and nerves; D – is supplied by diffusion; E – contains adipose tissue.

11. Each of the following statements concerning the heart valves is true, EXCEPT:

A – have the central core of fibrous tissue; B – their surfaces are covered with endothelium; C – fibrous cords extend from the valve free edge to papillary muscles; D – prevent blood backflow; E – possess their own blood vessels.

12. Each of the following statements concerning the impulse-conducting system is true, EXCEPT:

A – consists of atypical cardiac muscle cells; B – contains neurons; C – includes the sinoatrial and atrioventricular nodes; D – includes the bundle of His and Purkinje fibres; E – generates and conducts impulses for cardiac muscle.

13. Each of the following statements concerning the lymphatic capillaries is true, EXCEPT:

A – have a continuous basal lamina; B – are formed by endothelial cells; C – drain most tissues; D – are “blind-ending tubules”; E – anchoring filaments extend between the lymphatic endothelium and the perivascular collagen.

14. Each of the following statements concerning large lymphatic vessels is true, EXCEPT:

A – are similar to venules in structure, but have a larger lumen; B – lack valves; C – return lymph to the venous system; D – their thin walls make it difficult to distinguish tunics; E – lymph moves due to compression of lymph vessels by adjacent skeletal muscles.

Directions: one or more of the given statements or completions is/are correct. Choose the answer: A – if only 1,2, and 3 are correct; B – if only 1 and 3 are correct; C – if only 2 and 4 are correct; D – if only 4 is correct; E – if all are correct.

15. The vascular tunica intima consists of:

(1) endothelium on the basal lamina (2) subendothelial connective tissue layer (3) internal elastic membrane (mainly in arteries) (4) circular layer of smooth muscle cells

16. The following statements regarding the vascular tunica media are true:

(1) consists of circular layers of smooth muscle cells (2) contains a variable amount of elastin (mainly in arteries) (3) contains reticular fibres and proteoglycans secreted by smooth muscle cells (4) is relatively thick in arteries and relatively thin in veins

17. The following statements regarding the vascular tunica adventitia are true:

(1) consists of loose connective tissue (2) contains blood vessels and nerves (3) is separated from the tunica media by the external elastic membrane (mainly in arteries) (4) is relatively thin in arteries and relatively thick in veins

18. The following statements regarding the artery structure are true:

(1) the tunica media is its thickest layer (2) possesses the internal and external elastic membranes (except elastic type arteries) (3) its tunica media abounds in elastic elements

(fibres or membranes) (4) blood vessels supply only its outer portion, the inner portion is supplied by diffusion

19. The arteries are classified into the following types:
(1) muscular (2) muscular-elastic (3) elastic (4) without muscles

20. The following statements regarding the muscular-elastic arteries are true:
(1) are branches of elastic arteries (2) blood pressure is higher in these arteries than in aorta (3) their tunica media contains approximately an equal amount of smooth muscle cells and elastic elements (4) blood vessels supply three layers of their wall

21. The following statements regarding the muscular arteries are true:
(1) blood pressure is the highest in these arteries (2) they are small-calibre arteries (3) they lack the internal and external elastic membranes (4) smooth muscle cells are predominant in their tunica media

22. In embryogenesis the blood vessels are derived from:
(1) endoderm (2) ectoderm (3) mesoderm (4) mesenchyme

23. The capillaries are divided into the following types:
(1) continuous (2) fenestrated (3) discontinuous (4) mixed

24. The following statements regarding the fenestrated type capillaries are true:
(1) are characterized by fenestrations (2) their fenestrations provide channels in the capillary wall (3) have pinocytotic vesicles (4) typically found in muscles

25. The following statements regarding the discontinuous type capillaries are true:
(1) typically found in the liver, spleen, and bone marrow (2) are characterized by multiple pores in endothelial cells and between them (3) are characterized by the absence of the basal lamina under pores (4) pericytes may be found in their wall

26. The veins are classified into the following types:
(1) elastic (2) muscular (3) muscular-elastic (4) muscle-free or fibre type

27. The muscular veins are subdivided into the following groups:
(1) with a small muscle content (2) with a moderate muscle content (3) with a large muscle content (4) muscular-elastic

28. The following statements regarding the fibre type veins are true:
(1) they usually convey blood towards gravity (2) their wall consists of the tunica intima and the tunica adventitia (3) their wall is devoid of the tunica media (4) they contain muscles in the tunica adventitia

29. The smooth muscle cells are located in the veins with a large muscle content:
(1) circularly in the tunica media (2) longitudinally in the tunica intima (separate cells) (3) longitudinally in the tunica adventitia (bundles of cells) (4) longitudinally in the tunica media

30. The heart embryonic origins are as follows:
(1) endoderm (2) mesoderm (3) ectoderm (4) mesenchyme

31. The following statements regarding the arteriovenous anastomoses are true:
(1) may be simple and complex (2) convey blood to venules bypassing the capillary bed (3) regulate organ blood filling (4) serve in termoregulation at body surface

32. The following statements regarding the Purkinje fibres are true:
(1) contain few myofibrils (2) are rich in glycogen (3) are glycolytic (anaerobic) cells (4) transmit excitation to typical cardiac muscle cells

12. HEMOPOIESIS. CENTRAL ORGANS OF HEMOPOIESIS

Directions: each of the following statements contains five suggested completions. Choose the one that is best in each case.

1. The first phase of hemopoiesis in fetal life occurs in:

A – liver; B – spleen; C – bone marrow; D – “blood islands” in the wall of the yolk sac; E - lymph nodes.

2. Each of the following statements concerning proerythroblasts is true, EXCEPT:

A – are derived from CFU-Er; B – give rise to basophilic erythroblasts; C – contain small heterochromatic nuclei; D – their cytoplasm is slightly basophilic due to free ribosomes; E – are able to divide.

3. Each of the following statements concerning basophilic erythroblasts is true, EXCEPT:

A – are derived from normoblasts; B – give rise to polychromatophilic erythroblasts; C – their cytoplasm reveals strong basophilia due to numerous ribosomes; D – are able to divide; E – their nuclei are smaller and more heterochromatic compared to the previous form.

4. Each of the following statements concerning polychromatophilic erythroblasts is true, EXCEPT:

A – are derived from basophilic erythroblasts; B – give rise to normoblasts; C – their nuclei are smaller and heterochromatic compared to the previous form; D – their cytoplasm displays both eosinophilia and basophilia; E – are not able to divide.

5. Each of the following statements concerning normoblasts is true, EXCEPT:

A – are derived from polychromatophilic erythroblasts; B – give rise to basophilic erythroblasts; C – their cytoplasm stains eosinophilic due to a large amount of hemoglobin; D – lose nuclei by extruding them from the cells; E – are not able to divide.

6. The following events take place in erythropoiesis, EXCEPT:

A – changing of cell shape for biconcave; B – reducing of cell dimensions; C – accumulating of hemoglobin; D – changing of cytoplasm eosinophilia for basophilia; E – reducing and extruding of nuclei.

7. Each of the following statements concerning promyelocytes is true, EXCEPT:

A – are derived from myeloblasts; B – give rise to myelocytes; C – their cytoplasm is light blue and contains primary granules; D – have large spherical nuclei; E – are not able to divide

8. Each of the following statements concerning myelocytes is true, EXCEPT:

A – are derived from promyelocytes; B – give rise to metamyelocytes; C – begin to form specific (secondary) granules; D – recognition of neutrophil, eosinophil, and basophil series is not possible at this stage; E – are able to divide.

9. Each of the following statements concerning metamyelocytes is true, EXCEPT:

A – are derived from myelocytes; B – give rise to promyelocytes; C – their nuclei are heterochromatic and kidney-shaped; D – specific granules outnumber primary granules in their cytoplasm; E – are not able to divide.

10. Each of the following statements concerning megakaryocytes is true, EXCEPT:

A – are derived from promegakaryocytes; B – give rise to platelets; C – are giant cells; D – have complex multilobulated polyploid nuclei; E – are located far from the marrow blood sinuses.

11. Each of the following statements concerning the thymus is true, EXCEPT:

A – consists of lobules; B – its lobule stroma is composed of epithelial tissue; C – contains lymphatic nodules; D – provides antigen-independent development of T lymphocytes; E – undergoes age-related involution and is replaced by adipose tissue.

12. Each of the following statements concerning the thymic lobule is true, EXCEPT:

A – its stromal epithelioreticular cells produce thymosin; B – its cortex contains numerous small lymphocytes; C – its medulla contains mostly large lymphocytes; D – Hassall’s corpuscles are located in its medulla; E – contains pluripotentional stem hemopoietic cells.

Directions: one or more of the given statements or completions is/are correct. Choose the answer: A – if only 1,2, and 3 are correct; B – if only 1 and 3 are correct; C – if only 2 and 4 are correct; D – if only 4 is correct; E – if all are correct.

13. The following statements regarding the hemopoietic stem cells are true:
(1) are pluripotential colony-forming units (2) in adults are located and function in the red bone marrow (3) presumably look similar to small lymphocytes (4) are morphologically indistinguishable from oligopotential and unipotential stem cells
14. The following statements regarding the reticulocytes are true:
(1) their cytoplasm contains some ribosomes that look like a reticular network (2) constitute about 1% of red blood cells in circulation (3) increase in number in cases of bleeding and hemolysis (4) possess small heterochromatic nuclei
15. The stages of the monocyte development are as follows:
(1) monoblasts (2) promonocytes (3) monocytes (4) tissue macrophages
16. The stages of the platelet development are as follows:
(1) CFU-Mg (2) promegakaryocytes (3) megakaryocyte (4) megakaryoblasts
17. The stages of lymphopoiesis in the central organs are as follows:
(1) CFU-Ly (2) lymphoblasts (3) prolymphocytes (4) immunocompetent lymphocytes
18. Antigen-independent proliferation and differentiation of T lymphocytes proceed in the following organs:
(1) liver (2) red bone marrow (3) spleen (4) thymus
19. Antigen-independent proliferation and differentiation of B lymphocytes take place in the following organs:
(1) spleen (2) appendix (3) liver (4) red bone marrow
20. The following statements regarding the red bone marrow are true:
(1) is the central organ of hemopoiesis (2) contains blood sinuses (3) contains few adipose cells (4) its stroma consists of epithelial tissue
21. The following statements regarding the red marrow stroma are true:
(1) consists of reticular cells and reticular fibres (2) contains hemopoietic cells (3) provides support to hemopoietic cells (4) produces substances controlling differentiation of hemopoietic cells
22. The following statements regarding the yellow bone marrow are true:
(1) mostly consists of adipose cells (2) does not retain hemopoietic potentials (3) replaces red bone marrow (4) is not capable of transformation to the red marrow after severe bleeding
23. The following statements regarding the thymus are true:
(1) its blood-thymus barrier is impermeable to macromolecules (2) contains numerous macrophages for phagocytosis of degenerating lymphocytes (3) their T lymphocytes programmed against “self” antigens are destroyed (4) provides antigen-dependent differentiation of T lymphocytes
24. The blood-thymus barrier is made up of the following components:
(1) capillary endothelium on the basal lamina (2) perivascular connective tissue spaces with numerous macrophages (3) epithelioreticular cells on their basal membrane (4) adipose cells

13. PERIPHERAL ORGANS OF HEMOPOIESIS AND IMMUNOGENESIS

Directions: each of the following statements contains five suggested completions. Choose the one that is best in each case.

1. Each of the following statements concerning the lymph node cortex is true, EXCEPT:
A – contains lymphatic nodules, each of which is a B-dependent zone; B – its deep part, paracortex, is a T-dependent zone; C – lacks lymphatic sinuses; D – its lymphatic nodules

are primary, if they contain small lymphocytes; E – its lymphatic nodules are secondary, if they possess the germinal centres.

2. Each of the following statements concerning the lymph node sinuses is true, EXCEPT:

A – are narrow spaces between connective tissue (capsule, trabeculae) and lymphatic tissue (nodules, cords); B – are subcapsular, peritrabecular, and medullary; C – lack their own lining; D – contain reticular cells, fibres, and macrophages; E – drain and filter lymph.

3. Each of the following statements concerning the spleen white pulp is true, EXCEPT:

A – consists of periarterial lymphatic sheathes and lymphatic nodules; B – contains the central artery; C – its lymphatic nodules are a B-dependent zone; D – its periarterial sheathes are a T-dependent zone; E – contains splenic sinuses.

4. Each of the following statements concerning the spleen red pulp is true, EXCEPT:

A – its stroma consists of reticular tissue; B – contains the central artery; C – includes red blood cells, granulocytes, lymphocytes, numerous plasma cells, and macrophages; D – contains splenic sinuses; E – erythrocytes are destroyed and phagocytosed by macrophages here.

5. Each of the following statements concerning the diffuse lymphatic tissue and lymphatic nodules is true, EXCEPT:

A – are located in the tunica mucosa of the alimentary canal, respiratory passages, urinary passages, and genital tract; B – are unencapsulated concentrations of lymphocytes; C – filter lymph and extract antigens from it; D – their lymphocytes after an encounter with antigen migrate to regional lymph nodes where they undergo proliferation and differentiation; E – cells returning to the lamina propria are effector lymphocytes.

6. Each of the following statements concerning the palatine tonsil is true, EXCEPT:

A – has crypts containing cellular debris; B – its stratified squamous epithelium is not infiltrated by lymphocytes; C – its connective tissue is infiltrated by lymphocytes; D – contains lymphatic nodules distributed along the crypts; E – possesses thin connective tissue capsule.

7. Each of the following statements concerning the germinal centre of lymphatic nodules is true, EXCEPT:

A – is a morphological indication of the lymphatic tissue response to antigens; B – contains large lymphocytes (lymphoblasts); C – reveals blast mitotic divisions; D – contains differentiating plasma cells; E – includes macrophages.

8. Each of the following statements concerning humoral immunity is true, EXCEPT:

A – B lymphocytes are responsible for this type of immunity; B – macrophages and T lymphocytes do not take part in humoral immunity; C – activated B lymphocytes are transformed into immunoblasts; D – immunoblasts differentiate into plasma cells; E – plasma cells synthesize specific antibodies.

9. Each of the following statements concerning cell-mediated immunity is true, EXCEPT:

A – T lymphocytes are responsible for this type of immunity; B – activated T lymphocytes are transformed into lymphoblasts; C – lymphoblasts proliferate and differentiate into effector cells; D – memory cells are not produced in the differentiation of T lymphoblasts; E – cytotoxic T lymphocytes direct their killer activity against virus-effected cells, cancer cells, cells with mutations, and graft cells.

10. Antigen-dependent differentiation of T lymphocytes results in the formation of the following cell types, EXCEPT:

A – plasma cells producing specific antibodies; B – T killer cells, primary effectors of cell-mediated immunity; C – T helper cells aiding in B cell differentiation; D –T suppressor cells suppressing B cell differentiation; E – T memory cells able to respond more quickly to the next encounter with the same antigen.

11. Each of the following statements concerning T helper cells is true, EXCEPT:

A – arise from T lymphoblasts; B – are able to recognize foreign antigens presented by macrophages; C – secrete interleukins; D – secrete antibodies; E – stimulate B cell differentiation.

Directions: one or more of the given statements or completions is/are correct. Choose the answer: A – if only 1,2, and 3 are correct; B – if only 1 and 3 are correct; C – if only 2 and 4 are correct; D – if only 4 is correct; E – if all are correct.

12. Antigen-dependent differentiation of lymphocytes takes place in the following organs:
(1) spleen (2) tonsils (3) lymph nodes (4) appendix
13. The following statements regarding the lymph nodes are true:
(1) are located along the lymphatic vessel pathway (2) their stroma consists of epithelioreticular cells (3) filtrate lymph (4) provide antigen-independent development of lymphocytes
14. The following statements regarding the lymph node medulla are true:
(1) contains medullary sinuses (2) contains medullary cords (3) its cords possess numerous plasma cells, macrophages, and lymphocytes (4) is a T-dependent zone
15. In the nasal and oropharyngeal infections, the cervical lymph nodes undergo enlargement due to:
(1) edema (2) lymph volume increase (3) inflammation of lymph nodes (4) lymphocyte proliferation in response to antigens
16. The following statements regarding the spleen are true:
(1) its capsule and trabeculae contain smooth muscle cells (2) is able to accumulate large volumes of red blood cells (3) contraction of its capsule and trabeculae returns stored red blood cells into circulation (4) has the cortex and the medulla
17. The following statements regarding the marginal zone of the spleen are true:
(1) is a region between the red pulp and the white pulp (2) contains T and B lymphocytes
(3) contains small sinuses located in the periphery of lymph nodules (4) contains the central artery
18. The following statements regarding the splenic circulation are true:
(1) splenic arterioles continue into capillaries of two types: open and closed (2) closed capillaries continue into venous sinuses (3) open capillaries empty directly into the red pulp (4) the red pulp filtrates blood and extracts antigens from it
19. The Immune functions of the spleen are as follows:
(1) antigen removal from blood (2) antigen-dependent differentiation of lymphocytes (3) antibody production (4) blood storage
20. The hematopoietic functions of the spleen are as follows:
(1) blood cell formation during fetal life (2) destruction of aged, abnormal erythrocytes and platelets (3) blood storage (4) antibody production
21. The macrophage participation in the immune response consists in:
(1) secretion of lymphokins stimulating lymphocyte proliferation (2) presentation of antigens to lymphocytes (3) elimination of the antigen-antibody complex (4) antibody production
22. The immediate performers in the graft rejection reaction are the following cells:
(1) T suppressor cells (2) T helper cells (3) T memory cells (4) T killer cells

14. ENDOCRINE ORGANS

Directions: each of the following statements contains five suggested completions. Choose the one that is best in each case.

1. The specific hormone interaction with target cells is provided by:
A – hormone chemical compound; B – tissue belonging of target cells; C – target cell origination; D – existence of receptors for hormone on the target cell plasma membrane; E – origination of endocrine gland producing hormone.
2. Each of the following statements concerning the adenohypophysis is true, EXCEPT:
A – consists of glandular epithelial tissue; B – originates from the neural crest; C – its endocrine cells respond to signals from the hypothalamus; D – contains fenestrated secondary plexus capillaries; E – is composed of the pars distalis, pars intermedia, and pars tubularis.
3. Each of the following statements concerning the hypophyseal portal system is true, EXCEPT:
A – its capillaries are narrow and continuous; B – its secondary capillary plexus arises from the portal veins and supplies the adenohypophysis; C – hypophyseal veins run from the median eminence along the pars tubularis into the pars distalis; D – its primary capillary plexus is located in the median eminence; E – its primary capillary plexus arises from the superior hypophyseal arteries and drains into the portal veins.
4. The pars distalis of the adenohypophysis contains the following endocrine cells, EXCEPT:
A – acidophils: somatotropes and lactotropes; B – chromophobes; C – basophils: thyrotropes and gonadotropes; D – oxytocin-secreting; E – basophils: adrenocorticotropes.
5. Each of the following statements concerning the physiological effect of adenohypophysial hormones is true, EXCEPT:
A – GH stimulates long bone growth; B – PR initiates and maintains milk secretion; C – ACTH controls adrenal medulla secretion; D – TSH regulates thyroid hormone secretion; E – FSH and LH regulate gonadal functions.
6. Each of the following statements concerning the neurons of the hypothalamic supraoptic and paraventricular nuclei is true, EXCEPT:
A – their cell bodies reside in the hypothalamus; B – their axons convey neurosecretory products to the secondary plexus of the hypophyseal portal system; C – their axons pass via the infundibular stalk to the neurohypophysis; D – their axons terminate on fenestrated capillaries of the pars nervosa; E – they secrete oxytocin and ADH.
7. Each of the following statements concerning the pineal gland is true, EXCEPT:
A – consists of pinealocytes and glial cells; B – produces serotonin (usually during the day) and melatonin (usually at night); C – contains calcified concretions called the brain sand; D – is an epithelial endocrine gland; E – modulates reproductive functions depending on the day length.
8. Each of the following statements concerning the thyroid gland follicles is true, EXCEPT:
A – are surrounded by continuous capillaries; B – are filled with gel-like mass called the colloid; C – their wall is made up of follicular and parafollicular cells; D – the colloid contains thyroglobulin, the inactive storage form of thyroid hormones; E – are the thyroid gland functional units.
9. Each of the following statements concerning the thyroid gland follicular cells is true, EXCEPT:
A – their basal portions rest on the basal membrane, their apical portions are in contact with the colloid; B – their cytoplasm contains colloid-resorbing droplets; C – transport iodide from blood into their cytoplasm and into the colloid; D – arise from the neural crest; E – secrete thyroxine (T_4) and triiodothyronine (T_3).
10. Each of the following statements concerning the process of T_4 and T_3 secretion is true, EXCEPT:

A – follicular cells synthesize and secrete thyroglobulin into the follicular lumen; B – thyroglobulin is an active form of the thyroid hormones; C – iodination of thyroglobulin occurs in the colloid near the apical cell surfaces; D – hormones are liberated from the storage form by resorption; E – hormones are released into fenestrated capillaries.

11. Each of the following statements concerning the thyroid parafollicular cells is true, EXCEPT:

A – arise from the neural crest; B – occur in the follicular wall or in the interfollicular spaces; C – their basal portions rest on the basal lamina; D – their apical portions are in contact with the colloid; E – their cytoplasm contains numerous granules with calcitonin.

12. Each of the following statements concerning calcitonin is true, EXCEPT:

A – is a physiological antagonist to parathyroid; B – lowers the blood calcium level; C – suppresses bone resorption and increases bone calcification; D – its secretion is regulated directly by the blood calcium level; E – its release is controlled by the pituitary gland.

13. Each of the following statements concerning the adrenal medulla is true, EXCEPT:

A – its secretion is modulated by ACTH; B – originates from the neural crest; C – secretes norepinephrine and epinephrine; D – its chromaffin cells are modified neurons; E – contains sinusoidal blood capillaries and large veins.

14. Each of the following statements concerning the adrenal cortex is true, EXCEPT:

A – secretes steroid hormones; B – consists of epithelial cells; C – arises from the mesoderm; D – secretes catecholamines; E – is divided into three zones: glomerulosa, fasciculata, and reticularis.

15. Each of the following statements concerning the adrenal cortex zona glomerulosa is true, EXCEPT:

A – lies beneath the capsule; B – its cells are arranged in the ovoid clusters surrounded by fenestrated capillaries; C – its cells secrete mineralocorticoids, primarily aldosterone; D – is controlled by ACTH; E – is under feedback control of the renin-angiotensin system.

16. Each of the following statements concerning the adrenal cortex zona fasciculata is true, EXCEPT:

A – its cells are arranged in the straight cords; B – contains narrow continuous capillaries; C – its cell cytoplasm is rich in lipid droplets containing steroid hormone precursors; D – secretes glucocorticoids, primarily cortisol; E – is controlled by ACTH.

Directions: one or more of the given statements or completions is/are correct. Choose the answer: A – if only 1,2, and 3 are correct; B – if only 1 and 3 are correct; C – if only 2 and 4 are correct; D – if only 4 is correct; E – if all are correct.

17. The following statements regarding the adenohypophysial hormones are true:

(1) are small proteins or glycoproteins (2) are tropic hormones modulating other endocrine gland activity (3) their secretion is controlled by releasing and inhibitory factors from the hypothalamus (4) are accumulated in the Herring bodies

18. The following statements regarding the functional significance of the hypophyseal portal system are true:

(1) hypothalamic regulating factors are released into the primary capillary plexus (2) hypophyseal portal veins carry these factors to the adenohypophysis (3) releasing factors leave the blood and enter the adenohypophysis through the secondary capillary plexus (4) adenohypophysial tropic hormones are released into the secondary capillary plexus

19. The following statements regarding the pars intermedia of the adenohypophysis are true:

(1) contains acidophils: somatotropes and lactotropes (2) its endocrine cells surround the colloid-filled cysts (3) hypophyseal portal veins run through it to the pars distalis (4) its endocrine cells presumably secrete lipotropins and the melanocyte-stimulating hormone

20. The following statements regarding the adenohypophysotropic factors are true:

(1) are synthesized by the neurons of the hypothalamic arcuate, ventromedial, and dorsomedial nuclei (2) are releasing and inhibitory factors (3) their synthesis and discharge are controlled by negative feedback (4) are accumulated and released into the bloodstream in the pars nervosa

21. The following statements regarding the neurohypophysis are true:

(1) originates from nervous tissue (2) contains nonmyelinated axons, pituicytes, fenestrated capillaries, and the Herring bodies (3) store and release into the blood secretory product from the hypothalamus (4) is a typical endocrine gland

22. The following statements regarding the Herring bodies are true:

(1) are dilated terminal portions of hypothalamic neuron axons (2) accumulate granules of oxytocin and ADH (3) are in contact with fenestrated capillaries (4) are located in the pars distalis of the adenohypophysis

23. The following statements regarding the functional effect of the neurohypophysial hormones are true:

(1) oxytocin promotes contraction of the uterine muscle cells (2) physiological ADH doses increase blood pressure by contraction of the arteriolar muscle cells (3) oxytocin stimulates contraction of the breast myoepithelial cells providing milk ejection (4) nonphysiological ADH doses are responsible for water resorption by the kidney nephron tubular cells

24. The following statements regarding the pituicytes are true:

(1) are principal cells of the neurohypophysis (2) store and release the hypothalamic hormones (3) are glia-like cells similar to astrocytes (4) are endocrine cells

25. The morphological features of the thyroid gland hyperfunction are as follows:

(1) follicular cells become columnar (2) follicles enlarge in diameter (3) the colloid is more vacuolated and resorbed rapidly (4) the colloid amount increases

26. The morphological features of the thyroid gland hypofunction are as follows:

(1) follicular cells become flat (2) follicles enlarge in diameter (3) the colloid is less vacuolated due to the inhibition of its resorption (4) the colloid amount is reduced

27. The following statements regarding the thyroid follicular cell hormones are true:

(1) are thyroxine and triiodothyronine (2) regulate cell and tissue metabolism (3) their release is controlled by the feedback system (4) their secretion is stimulated by TSH

28. The following statements regarding the parathyroid glands are true:

(1) contain principal and oxyphil endocrine cells (2) their endocrine cell cords are surrounded by fenestrated blood capillaries (3) produce parathyroid hormone (4) are adenohypophysis-dependent glands

29. The following statements regarding the parathyroid hormone (PTH) are true:

(1) increases the blood calcium level (2) its secretion is regulated by serum calcium levels (3) stimulates bone resorption by osteoclasts (4) reduces the kidney exretion and increases the intestinal absorption of calcium

30. The following statements regarding the adrenal medulla chromaffin cells are true:

(1) are equivalent to postganglionic neurons (2) sympathetic nerve fibres are in contact with them (3) release their hormones in response to nerve impulses (4) glucocorticoids induce them to convert norepinephrine to epinephrine

31. The catecholamines produce the following effects:

(1) increase in blood pressure (2) dilation of the coronary blood vessels (3) increase in the heart rate (4) increase in the rate and depth of breathing

32. The following statements regarding the adrenal cortex zona reticularis are true:

(1) its cells are arranged in anastomosing cords (2) its secretion is modulated by ACTH (3) secretes weak androgens (4) arises from the neural crest

33. The morphological features of steroid-secreting cells are the presence in their cytoplasm of:

(1) well-developed sER (2) scantily-developed Golgi complex (3) numerous mitochondria with tubular cristae (4) few lipid droplets

34. The following statements regarding the physiological effects of the adrenal cortex hormones are true:
(1) aldosterone acts on nephron tubules and stimulates sodium resorption (2) glucocorticoids regulate gluconeogenesis and glycogenesis (3) glucocorticoids depress the immune response and inflammatory reactions (4) mineralocorticoids regulate sodium and potassium homeostasis and water balance

15. DIGESTIVE SYSTEM – I

Directions: each of the following statements contains five suggested completions. Choose the one that is best in each case.

1. Each of the following statements concerning the alimentary canal mucosa is true, EXCEPT:
A – is a barrier separating the tract lumen from the body; B – secretes digestive enzymes, hormones, mucus, and antibodies into the lumen; C – selectively absorbs digested products; D – lacks diffuse lymphatic tissue and lymphatic nodules; E – may contain glands.
2. Each of the following statements concerning the muscularis externa of the alimentary canal is true, EXCEPT:
A – usually consists of three layers; B – its muscle contractions produce peristalsis; C – the myenteric nerve plexus is present between muscle layers; D – circular muscles form sphincters along the tract; E – its contraction moves the contents along the tract.
3. Each of the following statements concerning the structure of the oral cavity organs is true, EXCEPT:
A – mucosa is covered with stratified epithelium; B – epithelium is partially keratinized; C – mucosa possesses the muscularis mucosae; D – submucosa is absent at many sites; E – the organs contain striated muscles.
4. Each of the following statements concerning the tooth is true, EXCEPT:
A – consists of three parts: the crown, neck, and root; B – enamel covers all the tooth parts; C – dentin is the principal tooth substance; D – the root is covered with cementum; E – contains the pulp chamber.
5. Each of the following statements concerning the tooth pulp is true, EXCEPT:
A – is filled with connective tissue; B – contains blood vessels and nerves; C – the narrow canal extends from the pulp outside; D – the blood vessels and nerves enter and leave the pulp through the tooth canal; E – is lined with cementum.
6. Each of the following statements concerning the tooth development is true, EXCEPT:
A – the enamel organ cells induce odontoblast formation; B – odontoblasts arise from the outer enamel epithelium; C – odontoblasts produce dentin; D – ameloblasts arise from the inner enamel epithelium; E – ameloblasts deposit enamel on the dentinal surface.
7. Each of the following statements concerning the tooth development is true, EXCEPT:
A – odontoblasts produce predentin; B – predentin calcifies to become dentin; C – dentin appears first, enamel and cementum are secreted later; D – the dental pulp arises from the enamel organ pulp; E – cementum is secreted by cementocytes.
8. Each of the following statements concerning the myoepithelial cells is true, EXCEPT:
A – are contractile cells; B – are located only in the salivary gland acini; C – possess numerous processes; D – lie between the basal lamina and epithelial cells; E – provide secretion discharge towards ducts.

9. Each of the following statements concerning the intercalated ducts of the salivary glands is true, EXCEPT:
A – are lined with columnar cells possessing basal striations; B – secrete bicarbonate ions into the acinar product; C – absorb chloride ions from the acinar product; D – are most prominent in serous salivary glands; E – are short and difficult to identify in mucus salivary glands.
10. Each of the following statements concerning the esophageal glands is true, EXCEPT:
A – esophageal glands proper occur in the submucosa; B – esophageal glands proper are compound tubuloalveolar ones; C – produce serous secretion; D – esophageal cardiac glands occur in the mucosal lamina propria; E – esophageal cardiac glands are present in the proximal and terminal portions of the organ.
11. Each of the following statements concerning the esophageal muscularis externa is true, EXCEPT:
A – consists of two muscle layers; B – contains striated muscles in the upper third; C – contains striated and smooth muscles in the middle third; D – contains only smooth muscles in the distal third; E – lacks myenteric plexus.

Directions: one or more of the given statements or completions is/are correct. Choose the answer: A – if only 1,2, and 3 are correct; B – if only 1 and 3 are correct; C – if only 2 and 4 are correct; D – if only 4 is correct; E – if all are correct.

12. The mucosa of the alimentary canal consists of:
(1) lining epithelium (2) lamina propria from connective tissue (3) muscularis mucosae from smooth muscles (4) muscularis mucosae from striated muscles
13. The following statements regarding the submucosa of the alimentary canal are true:
(1) consists of connective tissue (2) contains blood vessels (3) contains nerve plexus (4) may contain glands
14. The submucosa of the alimentary canal contains glands in the following organs:
(1) large intestine (2) esophagus (3) stomach (4) duodenum
15. The adventitia of the alimentary canal is composed of:
(1) connective tissue (2) mesothelium (3) blood vessels and nerves (4) striated muscles
16. The following statements regarding the serosa of the alimentary canal are true:
(1) is equivalent to the visceral peritoneum (2) includes connective tissue (3) is covered with mesothelium (4) contains blood vessels and nerves
17. The following statements regarding the dorsal surface of the tongue are true:
(1) its mucosa forms papillae (2) its papillary epithelium contains taste buds (3) its epithelium covering filiform papillae is keratinized (4) possesses the submucosa
18. The following statements regarding the lower surface of the tongue are true:
(1) its mucosa forms papillae (2) its epithelium is keratinized (3) its epithelium contains taste buds (4) possesses the submucosa
19. The following statements regarding the serous acini of the salivary glands are true:
(1) are spherical (2) serous cells are high (3) cell cytoplasm is basophilic due to numerous ribosomes (4) their lumen is narrow and not conspicuous
20. The following statements regarding the mucous acini of the salivary glands are true:
(1) are large and oval (2) mucous cells are deep basophilic due to numerous ribosomes (3) mucous cells are light due to mucinogen granules (4) mucous cells are characterized by basal striations
21. The distinctive feature of the mixed acini of the salivary gland is the presence of:

(1) myoepithelial cells (2) striated epithelial cells (3) stratified cuboidal epithelium (4) serous demilunes

22. The following statements regarding the striated ducts of the salivary glands are true:

(1) are lined with simple cuboidal or columnar epithelium (2) their cells have basal striations (3) may be surrounded by small amount of connective tissue (4) are intralobular ducts

23. The following statements regarding the basal striations of the striated duct epithelial cells of the salivary glands are true:

(1) consists of numerous infoldings of the basal plasmalemma (2) contains longitudinally oriented mitochondria (3) reabsorbs sodium from the secretion (4) adds potassium to the secretion

16. DIGESTIVE SYSTEM – II

Directions: each of the following statements contains five suggested completions. Choose the one that is best in each case.

1. Each of the following statements concerning the gastric mucosa is true, EXCEPT:

A – gastric pits form its microrelief; B – is covered with simple columnar mucous epithelium; C – possesses its own nerve plexus; D – its lamina propria contains simple tubular glands; E – its muscularis mucosae consists of three muscle layers.

2. Each of the following statements concerning the gastric fundic glands is true, EXCEPT:

A – occur in the submucosa; B – are simple tubular and slightly branched; C – secrete gastric juice; D – consist of five cell types; E – open into gastric pits.

3. The gastric fundic glands consist of the following cells, EXCEPT:

A – chief cells; B – parietal cells; C – mucous neck cells; D – enteroendocrine cells; E – goblet cells.

4. Each of the following statements concerning the parietal cells of the gastric glands is true, EXCEPT:

A – secrete hydrochloric acid; B – secrete pepsinogen; C – their activity is stimulated by gastrin, histamine, and acetylcholine; D – secrete an intrinsic factor; E – their intrinsic factor is essential for vitamin B_{12} absorption.

5. Each of the following statements concerning the pyloric region of the stomach is true, EXCEPT:

A – pyloric gastric pits are deep and occupy about half of the mucosa thickness; B – pyloric glands are tubular branched; C – mucous cells are predominant in pyloric glands; D – pyloric glands contain parietal cells; E – its muscularis externa is very thick.

6. Each of the following statements concerning the undifferentiated cells of the gastric glands is true, EXCEPT:

A – are located mainly in the neck region of the glands; B – are absent in the pyloric glands; C – give rise to all glandular cell types; D – serve for renewal of gastric surface epithelium; E – their descendants migrate upwards along the pit and are shed at the luminal surface.

7. Each of the following statements concerning the intestinal villus is true, EXCEPT:

A – its core consists of connective tissue; B – contains fenestrated sinusoidal blood capillaries; C – contains a blind-ending lymphatic capillary called the lacteal; D – smooth muscle cells derived from muscularis mucosae extend to the villus and accompany the lacteal; E – lacks the covering epithelium.

8. Each of the following statements concerning the enterocytes of the small intestine epithelium is true, EXCEPT:

A – are tall columnar; B – lack microvilli; C – are specialized for absorption and transport of substances from the gut lumen to circulation; D – enterocyte junctions establish a barrier between the lumen and the intercellular compartment; E – produce enzymes needed for terminal digestion and absorption.

9. Each of the following statements concerning the lipid absorption in the small intestine is true, EXCEPT:

A – enterocytes absorb fatty acids and glycerol from the lumen; B – enterocytes resynthesize neutral fat; C – neutral fat is transported into the lacteal; D – neutral fat is transported into the blood capillaries; E – contractions of the villus muscle cells drive away chyle from the lacteal.

10. Each of the following statements concerning the Paneth cells of the small intestine mucosa is true, EXCEPT:

A – are located in villus epithelium; B – have large acidophilic apical granules; C – their granules contain the antibacterial enzyme lysozyme; D – their lysozyme digests cell walls of certain bacteria; E – take part in regulation of normal intestinal bacterial flora.

11. Each of the following statements concerning the renewal of the intestinal epithelium is true, EXCEPT:

A – all mature cells arise from the common stem (intermediate) cells; B – intermediate cells are located in the lower half of crypts; C – epithelial cells, except Paneth cells, migrate from crypts onto villi; D – Paneth cells are stem cells for intestinal epithelium; E – mature cells are shed at tops of villi.

12. The distinctive feature of the duodenum is the presence of:

A – lymphatic nodules; B – Pejer's patches; C – mucosal villi; D – mucosal crypts; E – submucosal glands.

Directions: one or more of the given statements or completions is/are correct. Choose the answer: A – if only 1,2, and 3 are correct; B – if only 1 and 3 are correct; C – if only 2 and 4 are correct; D – if only 4 is correct; E – if all are correct.

13. The gastric surface epithelium is called mucous, because:

(1) it is covered with thick mucus layer (2) gastric mucosa contains glands (3) gastric glands possess mucous cells (4) each cell of this epithelium produces mucus

14. The following statements regarding the chief cells of the gastric glands are true:

(1) are located in the deepest parts of the fundic glands (2) are typical protein-secreting cells (3) secrete pepsinogen, an inactive pepsin precursor (4) pepsinogen is converted to pepsin after contact with the acid gastric juice

15. The following statements regarding the parietal cells of the gastric glands are true:

(1) are located both in the neck and in the deeper gland parts (2) secrete hydrochloric acid and the intrinsic factor (3) their cytoplasm stains intensely with eosin and other acid dyes (4) have an extensive intracellular canalicular system

16. The gastric pits are:

(1) glands (2) crypts (3) villi (4) invaginations of the epithelium into the mucosal lamina propria

17. The stomach functions are:

(1) chyme formation from the food bolus (2) passage of chyme into the duodenum (3) protein digestion by pepsin (4) neutral fat absorption

18. The following statements regarding the enteroendocrine cells of the gastric glands are true:

(1) they are more prevalent at the base of the glands (2) any cells do not reach the gland lumen (3) some cells are in contact with the gland lumen (4) secrete hormones: gastrin, secretin, etc.

19. The three smooth muscle layers of the gastric muscularis mucosae provide:

(1) gastric peristalsis (2) chyme passing into the duodenum (3) plication of the gastric mucosa (4) outflow of gland secretion

20. The amplification of the small intestine mucosa surface for digestion and absorption is provided by:

(1) plicae circulares (2) intestinal villi (3) microvilli of enterocytes (4) goblet cells

21. The following statements regarding the microvilli of the small intestine epithelium are true:

(1) are small finger-like projections of the enterocyte apical plasma membrane (2) microvilli appear as a “striated border” (3) provide major surface amplification for digestion and absorption (4) the striated border is broken off over goblet cells

22. The following statements regarding the crypts of the small intestine mucosa are true:

(1) are epithelial invaginations into the lamina propria (2) extend through the lamina propria thickness up to the muscularis mucosae (3) are tubular structures (4) open onto the luminal surface at villus bases

23. The following statements regarding the intestinal goblet cells are true:

(1) contain mucinogen granules in the apical distended portion (2) contain organelles and nuclei in the narrow basal portion (3) produce mucus (4) are located only in intestinal villi

24. The epithelium of the small intestine villi contains the following cells:

(1) absorptive cells (2) goblet cells (3) endocrine cells (4) Paneth cells

25. The epithelium of the small intestine crypts contains the following cells:

(1) goblet cells (2) intermediate cells (3) Paneth cells (4) endocrine cells

26. The following statements regarding the gut-associated lymphatic tissue are true:

(1) lymphocytes infiltrate the mucosal epithelium and the lamina propria (2) lamina propria contains lymphatic nodules and Pejer’s patches (3) epithelial M cells transport antigens from the gut lumen to lymphocytes (4) antigens stimulate lymphocytes for immune response

27. The following statements regarding the gut-associated lymphatic tissue are true:

(1) after antigen stimulation lymphocytes migrate to lymphatic nodes and differentiate into plasma cells (2) plasma cells secrete IgA (3) enterocytes produce secretory glycoprotein (4) the IgA-secretory glycoprotein complex passes into the lumen to inactivate antigens

17. DIGESTIVE SYSTEM – III

Directions: each of the following statements contains five suggested completions. Choose the one that is best in each case.

1. Each of the following statements concerning the large intestine mucosa is true, EXCEPT:

A – contains numerous crypts; B – forms villi; C – its surface epithelium is the same as that of the small intestine; D – goblet cells are more numerous in its epithelium than in the small intestine; E – Paneth cells are normally absent in its crypts.

2. Each of the following statements concerning the liver circulation is true, EXCEPT:

A – the liver receives blood from the portal vein and the hepatic artery; B – blood is mixed in sinusoidal capillaries; C – capillaries empty into central veins; D – central veins lead to sublobular veins; E – sublobular veins carry blood into the portal vein.

3. Each of the following statements concerning the classic hepatic lobule is true, EXCEPT:

A – is a hexagonal block of tissue; B – triads are at its angles; C – the sublobular vein is its centre; D – cell plates radiate from its centre to the periphery; E – sinusoids carry blood from the periphery to the centre.

4. Each of the following statements concerning the hepatic sinusoids is true, EXCEPT:
A –arise from roundlobular arteries and roundlobular veins; B – perfuse cells with mixed portal and arterial blood; C – carry blood into the central veins; D – are the parts of hepatic plates; E – are surrounded by the space of Disse.
5. Each of the following statements concerning the portal area (the triad) is true, EXCEPT:
A – includes the central vein from the hepatic vein system; B – includes the interlobular bile duct; C – includes the interlobular vein from the portal vein system; D – includes the interlobular artery from the hepatic artery system; E – is surrounded by a small amount of loose connective tissue.
6. The central vein and the sublobular vein of the liver have common features, EXCEPT:
A – belong to the hepatic vein system; B – have equal diameters and wall thickness; C – are fibre type veins; D – are solitary veins (travel alone); E – carry blood away from the liver.
7. Each of the following statements concerning the hepatocytes is true, EXCEPT:
A – are large polygonal cells; B – have one or two nuclei with well-developed nucleoli; C – many of them are tetraploid; D – are not capable of regeneration when the liver substance is lost; E – are arranged in plates.
8. Each of the following statements concerning the hepatocyte organelles is true, EXCEPT:
A – Golgi apparatus and lysosomes are absent; B – sER is involved in the degradation of toxins and drugs, the synthesis of cholesterol and lipids; C – peroxisomes are involved in the breakdown of hydrogen peroxide and in alcohol metabolism; D – rER is involved in protein synthesis; E – numerous mitochondria reflect the high energy requirement.
9. Each of the following statements concerning the bile canaliculi is true, EXCEPT:
A – are intercellular gaps between the hepatocytes within the plates; B – drain bile into the roundlobular and interlobular ducts; C – have their own walls; D – hepatocyte microvilli project into their lumen; E – are isolated from the intercellular compartment by tight junctions.
10. Each of the following statements concerning the perisinusoidal space of Disse is true, EXCEPT:
A – lies between the hepatocyte basal surfaces and the endothelial cell basal surfaces; B – contains few reticular fibres; C – hepatocyte microvilli project into this space; D – fetal hemopoiesis occurs here; E – is the site of exchange between bile and hepatocytes.
11. Each of the following statements concerning the exocrine part of pancreas is true, EXCEPT:
A – is a compound branched acinar gland; B – produces pancreatic juice; C – its acini secrete digestive enzymes: trypsin, amylase, and lipase; D – its intercalated ducts secrete fluid rich in sodium and bicarbonate; E – its secretion enters the stomach.
12. Each of the following statements concerning the pancreatic acini is true, EXCEPT:
A – consist of pyramidal serous cells; B – basal portions of cells are acidophilic; C – the cell basal cytoplasm abounds in rER; D – apical portions of cells are acidophilic; E – the cell apical cytoplasm contains zymogen (secretory) granules.
13. Each of the following statements concerning the pancreatic islets is true, EXCEPT:
A – are scattered throughout the organ; B – are more numerous in the pancreas tail; C – contain five types of endocrine cells; D – lack blood capillaries; E – autonomic nerves are in contact with endocrine cells and influence the hormone secretion.

Directions: one or more of the given statements or completions is/are correct. Choose the answer: A – if only 1,2, and 3 are correct; B – if only 1 and 3 are correct; C – if only 2 and 4 are correct; D – if only 4 is correct; E – if all are correct.

14. The extensive development of GALT in the large intestine wall reflects the presence in its lumen of:
(1) mucus (2) a large number and a variety of microorganisms (3) chyle (4) noxious and metabolic products
15. The principal functions of the large intestine are as follows:
(1) absorption of electrolytes and water (2) digestion of proteins and lipids (3) formation of feces (4) absorption of amino acids, glycerol, and fatty acids
16. The following statements regarding the liver portal system are true:
(1) the portal vein carries venous blood from the digestive tube, the pancreas, and the spleen (2) portal blood contains nutrients and noxious materials from the intestine (3) portal blood contains products of the blood cell breakdown from the spleen (4) hepatocytes convert toxic substances to harmless ones
17. The liver blood capillaries are:
(1) continuous (2) discontinuous (3) fenestrated (4) sinusoids
18. The hepatic sinusoid wall contains the following cells:
(1) endothelium (2) hepatocytes (3) stellate macrophages (4) centroacinar
19. The following statements regarding the portal hepatic lobule are true:
(1) is a triangular block of tissue (2) the triad is its centre (3) three central veins are at its angles (4) is a diamond-shaped block of tissue
20. The following statements regarding the hepatic acinus are true:
(1) is a diamond-shaped block of tissue (2) its short axis is between two triads (3) its long axis is between two central veins (4) the sublobular vein is its centre
21. The following statements regarding the Kupffer cells of the liver are true:
(1) are stellate macrophages (2) are located in the hepatic sinusoid wall (3) belong to the mononuclear phagocytic system (4) arise from blood monocytes
22. The following statements regarding the hepatic plates are true:
(1) consist of two hepatocyte rows (2) bile canaliculi (capillaries) are between two cell rows (3) are separated by the blood sinusoids (4) hepatocyte junctions isolate the bile canaliculi
23. The following statements regarding the lipocytes of the liver are true:
(1) are the storage site for vitamin A (2) resemble fibroblasts and secrete reticular fibres (3) their broad basal portion faces the space of Disse (4) their narrow apical portion takes part in bile production
24. The following statements regarding the hepatocyte polarization are true:
(1) the vascular hepatocyte pole faces the perisinusoidal space (2) the vascular pole is involved in the exocrine function (3) the biliar hepatocyte pole faces the bile canaliculi (4) the biliar pole is involved in the endocrine function
25. The endocrine hepatocyte function includes the secretion into the blood the following substances:
(1) albumins and nonimmune globulins (2) prothrombin and fibrinogen (3) cholesterol (4) glucose released by hydrolysis of glycogen
26. The centroacinar cells from the pancreas belong to:
(1) acinus (2) interlobular duct (3) intralobular duct (4) intercalated duct
27. The following statements regarding the pancreatic duct system are true:
(1) is short (2) includes intercalated, intralobular, and interlobular ducts (3) the ducts are lined with the cuboidal or columnar epithelium (4) the duct cells are not involved in the secretion production
28. The following statements regarding the pancreatic endocrine cells are true:
(1) A cells secrete glucagon (2) B cells secrete insulin (3) D cells secrete somatostatin (4) are adenohypophysis-dependent cells

29. The following statements regarding the pancreatic hormones are true:
(1) insulin influences the liver, skeletal muscles, and the adipose tissue (2) insulin decreases the blood glucose level (3) glucagon raises the blood glucose level (4) the blood glucose level regulates the release of both insulin and glucagon

18. RESPIRATORY SYSTEM

Directions: each of the following statements contains five suggested completions. Choose the one that is best in each case.

1. The functions of the respiratory conducting passages are as follows, EXCEPT:
A – air filtration (removal of particles); B – air conduction; C – warming of inspired air; D – gas exchange; E – moistening of inspired air.
2. The tracheal epithelium consists of the following cells, EXCEPT:
A – goblet cells (mucus secreting); B – chief cells (enzyme-secreting); C – brush cells (receptor cells); D – small granule cells (endocrine cells); E – basal cells (stem cells).
3. Each of the following statements concerning the tracheal cartilages is true, EXCEPT:
A – are C-shaped structures; B – consist of hyaline cartilaginous tissue; C – are stacked on one another to form supporting structure; D – tracheal muscles bridge the free ends of each cartilage; E – lack perichondrium.
4. The structure of the large bronchi and the middle bronchi are similar, EXCEPT:
A – the epithelium is simple pseudostratified ciliated; B – the submucosa contains glands; C – the cartilaginous layer consists of large hyaline plates; D – the mucosa possesses the muscularis mucosae; E – the adventitia is composed of connective tissue.
5. Each of the following statements concerning the small bronchus is true, EXCEPT:
A – contains small plates of elastic cartilage; B – lacks the submucosa and glands; C – consists of the mucosa and adventitia; D – the mucosa forms large folds; E – possesses the well-developed muscularis mucosae.
6. Each of the following statements concerning the terminal bronchiolar epithelium is true, EXCEPT:
A – transforms into simple cuboidal; B – ciliated cells decrease in number; C – goblet cells are absent; D – brush cells and granule cells are prevalent; E – Clara cells increase in number.
7. Each of the following statements concerning type II alveolar cells is true, EXCEPT:
A – are cuboidal cells bulging into the air space; B – cover about 95% of the alveolar surface; C – are surfactant-secreting cells; D – their apical cytoplasm is filled with lamellar bodies; E – their lamellar bodies are rich in phospholipids.
8. Each of the following statements concerning the surfactant is true, EXCEPT:
A – forms the phospholipid layer over the alveolar epithelium; B – reduces surface tension at the air-epithelium interface; C – appears from lamellar bodies of alveolar cells by exocytosis; D – its adequate secretion prevents alveolar collapse on exhalation; E – is produced by type I pneumocytes.
9. On exhalation the alveoli diminish in size due to the presence in the alveolar septum of:
A – smooth muscle cells; B – collagen fibres; C – elastic fibres; D – fibroblasts; E – pericytes.
10. Each of the following statements concerning the air-blood barrier is true, EXCEPT:

A – includes cells and cell products, across which gases diffuse between the alveolar air and blood; B – type II alveolar cells are the principal barrier cells; C – contains thick and thin portions; D – most gas exchange occurs across the thin barrier portion; E – connective tissue cells and fibres widen the barrier and form its thick portion.

Directions: one or more of the given statements or completions is/are correct. Choose the answer: A – if only 1,2, and 3 are correct; B – if only 1 and 3 are correct; C – if only 2 and 4 are correct; D – if only 4 is correct; E – if all are correct.

11. The pulmonary acinus consists of:
(1) respiratory bronchioles (2) alveolar ducts (3) alveolar sacs (4) terminal bronchioles
12. The pulmonary internal bronchial tree consists of:
(1) large bronchi (2) middle bronchi (3) small bronchi (4) terminal bronchioles
13. The epithelium covering the mucosa of the air passages is:
(1) simple (2) pseudostratified (3) ciliated (4) striated
14. The following statements regarding the tracheal glands are true:
(1) are located in submucosa (2) contain mucus-secreting acini with serous demilunes (3) deliver their product on the epithelial surface (4) contain parietal cells
15. As the bronchi become reduced in size their cartilages change in the following way:
(1) cartilaginous rings are replaced by plates (2) cartilaginous plates become smaller and fewer in number (3) hyaline cartilage is replaced by elastic cartilage (4) cartilages disappear in small bronchi
16. The following statements regarding the Clara cells of the bronchiolar epithelium are true:
(1) are nonciliated cells (2) have dome-shaped apical surface projection (3) display the characteristics of protein-secreting cells (4) produce lipoproteins
17. In comparison with the terminal bronchiole wall, the respiratory bronchiole wall contains:
(1) knob-like septa (2) the well-developed muscularis mucosae (3) submucosal glands (4) alveoli
18. The distinctive feature of the alveolar ducts is the presence in their wall of:
(1) blood capillaries (2) alveoli (3) Clara cells (4) knob-like interalveolar septa
19. The following statements regarding type I alveolar cells (pneumocytes) are true:
(1) are extremely thin squamous cells (2) line most of the alveolar surface (3) gas exchange occurs through these cells (4) are secretory cells
20. The components of the alveolar septum are as follows:
(1) blood capillaries (2) fibroblasts (3) macrophages (4) collagen and elastic fibres
21. The air-blood barrier includes:
(1) surfactant (2) type I alveolar cell and its basal lamina (3) capillary endothelial cell and its basal lamina (4) connective tissue cells and fibres may be between two basal laminae
22. The following statements regarding the alveolar macrophages are true:
(1) remove particles from the air alveolar space (2) pass through the alveolar septum and may then return into septal connective tissue (3) filled with accumulated material, they remain in septal connective tissue (4) phagocytose infectious organisms such as tubercle bacilli

19. INTEGUMENTARY SYSTEM

Directions: each of the following statements contains five suggested completions. Choose the one that is best in each case.

1. Each of the following statements concerning the thick skin is true, EXCEPT:
A – covers the palms and the soles; B – undergoes considerable abrasion; C – is hairless; D – possesses sebaceous glands; E – has the thickest epidermis.
2. The epidermis of the thin skin contains the following layers, EXCEPT:
A – stratum spinosum; B – stratum basale; C – stratum lucidum; D – stratum corneum; E – stratum granulosum.
3. Each of the following statements concerning the epidermis stratum basale is true, EXCEPT:
A – is represented by a single layer of stem cells; B – its cells are not capable of division; C – rests on the basal lamina; D – new keratinocytes arise from its cells; E – is basophilic.
4. The distinctive feature of the cells of the epidermis stratum granulosum is:
A – they exhibit numerous cytoplasmic processes; B – they are capable of division; C – they are anucleate squamous cells; D – they rest on the basal lamina; E – their cytoplasm contains keratohyalin granules.
5. Each of the following statements concerning the epidermis stratum lucidum is true, EXCEPT:
A – has a refractile appearance; B – contains eosinophilic cells; C – is present both in the thick and in thin skin; D – the nuclei and the cytoplasmic organelles of its cells become disrupted; E – its cells gradually fill with keratin.
6. Each of the following statements concerning the cells of the epidermis stratum corneum is true, EXCEPT:
A – are capable of division; B – are anucleate squamous cells; C – are filled with keratin; D – their plasma membrane is thickened and coated with glycolipids; E – are sloughed off at the epidermis surface.
7. Each of the following statements concerning the process of keratinization is true, EXCEPT:
A – keratinocytes produce tonofilaments that are grouped into tonofibrils; B – keratinocytes synthesize keratohyalin granules; C – the substance of keratohyalin granules combines with tonofibrils converting them to keratin; D – keratinocyte plasma membrane gradually disappears; E – the nuclei and the organelles of keratinocytes break down.
8. Each of the following statements concerning the epidermis Merkel's cells is true, EXCEPT:
A – are macrophage-like cells; B – are located in the stratum basale; C – contain granules with a neurosecretion; D – are associated with the ending of afferent nerve fibres; E – the combination of Merkel's cell and a nerve fibre is a mechanoreceptor.
9. Each of the following statements concerning the hair is true, EXCEPT:
A – consists of the medulla, cortex, and cuticle; B – its keratinized cells are filled with soft keratin; C – a hair follicle is surrounded by the connective tissue sheath, external and internal root epithelial sheathes; D – the hair bulb contains the matrix and is invaginated by the connective tissue papilla; E – hair cells and cells of the internal root sheath arise from the matrix.
10. Each of the following statements concerning the sebaceous glands is true, EXCEPT:
A – are simple branched alveolar glands; B – are characterized by the holocrine type of secretion; C – empty onto the epidermis surface; D – secrete sebum coating hair and the skin surface; E – their new secretory cells arise from basal cells at the gland periphery.

Directions: one or more of the given statements or completions is/are correct. Choose the answer: A – if only 1,2, and 3 are correct; B – if only 1 and 3 are correct; C – if only 2 and 4 are correct; D – if only 4 is correct; E – if all are correct.

11. The skin functions are as follows:

(1) protection against environmental physical, chemical, and biologic agents (2) regulation of body temperature and water loss (3) reception of external stimuli (4) excretion of some products via sweat glands

12. The following statements regarding the thin skin are true:

(1) has hair follicles (2) possesses sebaceous glands (3) its epidermis is thin (4) contains arrector pili muscles

13. The following statements regarding the cells of the epidermis stratum spinosum are true:

(1) exhibit numerous spines, short cytoplasmic processes (2) spines of adjacent cells are attached to each other by desmosomes (3) their cytoplasmic tonofilaments become grouped in tonofibrils (4) are stem cells

14. The following statements regarding the keratinocyte lamellar bodies are true:

(1) keratinocytes produce lamellar bodies containing glycolipids (2) the body content is secreted by exocytosis into intercellular spaces (3) glycolipids coat and thicken keratinocyte plasma membranes (4) glycolipids form the epidermis water barrier

15. The following statements regarding the skin melanocytes are true:

(1) originate from the neural crest (2) are pigment-producing cells (3) are dendritic cells (4) reside both in the epidermis and in the dermis, especially in the sites of pigmentation

16. The following statements regarding the epidermis Langerhans cells are true:

(1) play a role in the immune response by presenting antigens to T cells (2) reside in the stratum spinosum (3) belong to the mononuclear phagocytic system (4) arise from the neural crest

17. The following statements regarding the skin dermis are true:

(1) its papillary layer consists of loose connective tissue (2) lacks blood vessels and nerve fibres (3) its reticular layer consists of dense irregular connective tissue (4) does not possess receptors

18. The following statements regarding the eccrine sweat glands are true:

(1) are simple tubular coiled glands (2) their secretory portions include secretory cells and myoepithelial cells (3) take part in body temperature regulation (4) are associated with hair follicles

19. The following statements regarding the functions of the eccrine sweat glands are true:

(1) regulate body temperature due to evaporation of water from the sweat on the body surface (2) produce “goose flesh” (3) participate in excretion of urea, uric acid, and ammonia (4) provide bacteriostatic protection of the skin

20. The following statements regarding the appocrine sweat glands are true:

are limited to the skin of the axilla, areola, nipple, and external genitalia (2) are associated with hair follicles (3) become functional only at puberty and are dependent on sex hormones (4) its odourless secretion undergoes bacterial action on the skin surface and becomes odorant

20. URINARY SYSTEM

Directions: each of the following statements contains five suggested completions. Choose the one that is best in each case.

1. Each of the following statements concerning the kidney functions is true, EXCEPT:

A – produce the urine; B – conserve water, essential electrolytes, and metabolites; C – secrete angiotensin; D – remove waste products of metabolism from body; E – secrete erythropoietin and renin.

2. The following structures are located in, and make up, the kidney cortex, EXCEPT:

A – renal corpuscles; B – transitional epithelium; C – proximal convoluted tubules; D – distal convoluted tubules; E – medullary rays.

3. Each of the following statements concerning the nephrons is true, EXCEPT:

A – are functional units of the kidney; B – have the renal capsules; C – include the proximal and distal convoluted tubules; D – include the descending and ascending parts of the loop of Henle; E – empty into the minor calyx.

4. Each of the following statements concerning the renal corpuscles is true, EXCEPT:

A – include the double-layered renal capsule; B – the capsular parietal layer consists of flat cells and surrounds the capsular space; C – the capsular visceral layer consists of podocytes and surrounds the capillary glomerulus; D – the glomerulus contains continuous- type capillaries; E – the site where afferent and efferent arterioles penetrate the capsule is the corpuscle vascular pole.

5. Each of the following statements concerning the renal filtration barrier is true, EXCEPT:

A – includes the capsular parietal layer; B – includes the endothelium of glomerular capillaries; C – the glomerular basement membrane is the principal barrier component; D – the glomerular basement membrane consists of three layers; E – the lamina densa of the glomerular basement membrane contains collagen network and acts as a physical filter.

6. Each of the following statements concerning the renal proximal convoluted tubules is true, EXCEPT:

A – are more tortuous and longer than the distal convoluted tubules; B – possess cuboidal cells specialized for absorption and fluid transport; C – lack the brush border and basal striations; D – reabsorb 80% of primary filtrate; E – reabsorb amino acids, sugars, and other organic substances.

7. Each of the following statements concerning the renal distal convoluted tubules is true, EXCEPT:

A – have cuboidal cells with basal striation; B – their epithelial cells possess the brush border; C – reabsorb Na^+ under aldosterone control; D – reabsorb water under ADH regulation; E – are less tortuous and shorter than the proximal convoluted tubules.

8. Each of the following statements concerning the renal collecting tubules is true, EXCEPT:

A – are lined with the cuboidal or low columnar epithelium; B – their epithelium includes dark and light cells; C – water permeability of their epithelium is regulated by ADH; D – their cells possess the brush border; E – their dark cells secrete hydrogen ions into the urine creating its acid reaction.

9. Each of the following statements concerning the renal macula densa is true, EXCEPT:

A – is formed in the distal convoluted tubule at the site of tubule contact with the vascular pole of its parent renal corpuscle; B – is located between afferent and efferent arterioles; C – its epithelial cells become higher and narrower, their nuclei appear crowded; D – its cells control NaCl concentration in the urine and regulate renin release; E – its cells produce renin.

10. Each of the following statements concerning the renal juxtaglomerular cells is true, EXCEPT:

A – are modified smooth muscle cells; B – are located in afferent and sometimes in efferent arterioles; C – contain secretory granules; D – are chemoreceptors and control the blood concentration of NaCl; E – synthesize, store, and release renin.

11. Each of the following statements concerning the transitional epithelium is true, EXCEPT:

A – lines the mucosa of all excretory passages; B – its surface cells are dome-shaped and bulge into the lumen; C – is highly permeable for salts and water; D – consists of 5 or 6 layers in unstretched condition; E – consists of 2 or 3 layers in stretched condition.

12. Each of the following statements concerning the juxtamedullary nephrons is true, EXCEPT:
A – are the principal nephrons producing the urine; B – the diameters of their afferent and efferent arterioles are equal; C – their vasa recta have arteriovenous anastomosis; D – their corpuscles are in proximity to the base of medullary pyramids; E – serve for the blood passage during exercise.

Directions: one or more of the given statements or completions is/are correct. Choose the answer: A – if only 1,2, and 3 are correct; B – if only 1 and 3 are correct; C – if only 2 and 4 are correct; D – if only 4 is correct; E – if all are correct.

13. The following structures are located in, and make up, the kidney medulla:
(1) descending limbs of the loops of Henle (2) ascending limbs of the loops of Henle (3) collecting tubules and ducts (4) vasa recta
14. The following statements regarding the kidney medullary rays are true:
(1) are parts of the kidney cortex (2) project into the cortex from the medulla (3) contain the collecting tubules (4) include the straight tubule components of nephrons
15. The following statements regarding the kidney lobule are true:
(1) consists of the collecting duct and all the nephrons it drains (2) the medullary ray is the lobular centre (3) the interlobular blood vessels mark the boundaries between the adjacent lobules (4) it is a renal secretory unit
16. The following statements regarding the kidney arterial portal system are true:
(1) the afferent arteriole branches and forms the glomerular capillaries (2) the glomerular capillaries are drained into the efferent arteriole (3) the efferent arteriole branches and forms the peritubular capillary network (4) the diameter of the efferent arteriole is larger than that of the afferent arteriole
17. The following statements regarding the renal podocytes are true:
(1) are the cells of the capsular parietal layer (2) have processes subdivided into pedicels (3) lack their own basement membrane (4) the processes of neighboring podocytes interdigitate to form filtration slits
18. The following statements regarding filtration in the renal corpuscle are true:
(1) filtration is caused by high blood pressure in the glomerular capillaries (2) the blood formed elements and large proteins do not pass through the filtration barrier (3) filtration results in the primary urine formation (4) contraction of afferent arterioles reduces filtration, contraction of efferent arterioles increases it
19. The following statements regarding the renal mesangial cells are true:
(1) these cells and their extracellular matrix constitute the mesangium (2) are positioned among the loops of glomerular capillaries (3) are enclosed by the capillary basal lamina (4) are parts of the filtration barrier
20. The following statements regarding the functions of the renal mesangial cells are true:
(1) are phagocytic and remove proteins, residues, and debris from the glomerular basement membrane (2) provide structural support for podocytes where the basement membrane is absent or incomplete (3) are contractile and play a certain role in regulating the glomerular blood flow (4) take part in filtration
21. The structures taking part in the countercurrent exchange are as follows:
(1) loops of Henle (2) collecting ducts (3) vasa recta (4) convoluted tubules
22. The following statements regarding the renal loop of Henle are true:
(1) water diffuses into the hypertonic interstitium from its descending portion (2) its ascending portion is largely impermeable for water (3) its ascending limb actively transports ions from the lumen to the interstitium (4) the interstitium becomes hypertonic due to the action of its ascending limb
23. The following statements regarding the renal collecting ducts are true:

(1) are lined with columnar epithelial cells (2) pass through the hypertonic medullary interstitium (3) water leaves their lumen passively, without energy (4) take part in countercurrent exchange

21. MALE REPRODUCTIVE SYSTEM

Directions: each of the following statements contains five suggested completions. Choose the one that is best in each case.

1. Spermatogenesis takes place in the following tubules:
A – straight tubules; B – rete testis; C – seminiferous tubules; D – ductuli efferentes; E – ductus deferens.
2. Each of the following statements concerning the spermatogenetic stage of proliferation is true, EXCEPT:
A – stem cells divide to give rise to two daughter cells: one remains as a stem cell, the other is committed spermatogonium; B – stem cells undergo meiotic divisions; C – committed spermatogonia undergo several successive divisions to increase their number; D – the daughter cells of committed spermatogonium remain connected by cytoplasmic bridges; E – offspring of a stem cell is united to form the syncytium.
3. The following events take place at the spermatogenetic stage of growth:
A – mitotic division of primary spermatocytes; B – meiotic division of secondary spermatocytes; C – mitotic division of spermatogonia; D – meiotic division of spermatogonia; E – prophase of the first meiotic division.
4. The following transformations of the spermatid take place in spermiogenesis (stage of formation), EXCEPT:
A – the nucleus becomes decondensed; B – Golgi complex produces an acrosomal granule that is converted to an acrosome; C – mitochondria form the helical sheath round the axonemal complex; D – the distal centriole initiates formation of the axonemal complex, the proximal centriole remains near the nucleus; E – residual cytoplasm is lost.
5. Each of the following statements concerning the testicular myoid cells is true, EXCEPT:
A – their cytoplasm is rich in myofilaments; B – are surrounded by the basal laminae; C – their rhythmic contractions create peristaltic waves of the seminiferous tubules; D – are not capable of collagen synthesis; E – are involved in selective transport into and out of the seminiferous tubules.
6. Each of the following statements concerning the testicular Sertoli cells is true, EXCEPT:
A – their basal portions rest on the basal lamina; B – their apical portions have processes extending into the tubule lumen; C – possess centrioles and are capable of division; D – their plasma membranes have receptors for FSH and testosterone; E – their cytoplasm is rich in organelles and inclusions.
7. Each of the following statements concerning the testicular Sertoli cell functions is true, EXCEPT:
A – support spermatogenic cells; B – provide the exchange of substances between spermatogenic cells and blood; C – eliminate residual bodies and abnormal sperms; D – secrete testicular fluid, ABP, and inhibin; E – provide peristaltic contractions of the seminiferous tubules.
8. Each of the following statements concerning the compartmentalization of the seminiferous tubules is true, EXCEPT:
A – Sertoli-Sertoli tight junctions establish basal and luminal compartments; B – spermatogonia are in the basal compartment; C – spermatocytes and spermatids are in

the luminal compartment; D – meiosis and spermiogenesis occur in the basal compartment; E – primary spermatocytes pass from the basal compartment to the lumenal one due to the formation of a new transitional compartment.

9. Each of the following statements concerning the testicular Leydig cells is true, EXCEPT:

A – are parts of the seminiferous epithelium; B – their cytoplasm is rich in sER, Golgi complex, vesicular mitochondria, and lipid droplets; C – produce androgens, mainly testosterone; D – their plasma membranes possess receptors for LH and estrogens; E – primarily release the hormone into testicular lymph.

10. The following structures constitute the blood-testis barrier. Choose the firmest structures providing the immune isolation:

A – capillary wall; B – connective tissue; C – lymphatic sinusoid; D – Sertoli-Sertoli tight junctions; E – the tunica propria of seminiferous tubules.

11. Each of the following statements concerning the hormonal regulation of the testis is true, EXCEPT:

A – FSH effects on the Sertoli cells and they produce ABP in testicular fluid; B – LH effects on the Leydig cells and they secrete testosterone; C – ABP concentrates testosterone within the tubules to regulate sperm maturation; D – inhibin from Sertoli cells provides feedback with LH; E – testosterone is involved in feedback loop regulating LH production.

12. Each of the following statements concerning the epididymis is true, EXCEPT:

A – has the head, body, and tail; B – sperm maturation in it is not androgen-dependent; C – sperms acquire motility passing through it; D – its epithelial cells secrete glycoproteins that are added to the sperm glycocalyx preventing from premature acrosomal reaction; E – smooth muscle coat of the ductus epididymis increases in thickness and becomes three-layered in the tail.

13. Each of the following statements concerning the prostate gland is true, EXCEPT:

A – surrounds the ejaculatory duct; B – its glands are mucosal, submucosal, and peripheral; C – the glandular epithelium depends on testosterone; D – the glands are surrounded by connective tissue with bundles of smooth muscle cells; E – its alveoli often contain concretions, especially in elderly males.

Directions: one or more of the given statements or completions is/are correct. Choose the answer: A – if only 1,2, and 3 are correct; B – if only 1 and 3 are correct; C – if only 2 and 4 are correct; D – if only 4 is correct; E – if all are correct.

14. The intratesticular part of the male genital ducts includes:

(1) seminiferous tubules (2) rete testis (3) ductuli efferentes (4) straight tubules

15. The extratesticular part of the male genital duct system consists of:

(1) ductuli efferentes (2) ductus epididymidis (3) ductus deferens (4) ductus ejaculatorius

16. The following statements regarding the spermatogenic syncytium are true:

(1) is a specific association of differentiating cells (2) occurs because intercellular bridges are present between the progeny of each stem spermatogonium (3) intercellular connections remain intact until the last stages of spermatid maturation (4) all its cells undergo synchronous divisions and differentiation

17. The spermatogenetic stage of maturation includes:

(1) first meiotic division (2) mitotic division (3) second meiotic division (4) sperm maturation

18. The spermatogenetic stage of formation includes:

(1) mitotic division (2) meiotic division of primary spermatocytes (3) meiotic division of secondary spermatocytes (4) differentiation of spermatids into sperms

19. The physiological conditions that are necessary for spermatogenesis are as follows:

(1) the presence of testosterone (2) temperature that is equal to body temperature (3) isolation of spermatogenic cells from the immune system (4) the absence of any hormones

20. The following statements regarding the vulnerability of spermatogenic cells are true:
(1) spermatogenic cells are not sensitive to noxious agents (2) spermatogenic cells are very sensitive to noxious agents (3) proliferating cells are not sensitive to injury (4) stem spermatogonia are much less vulnerable then actively dividing and differentiating cells
21. The tunica propria of the seminiferous tubules consists of:
(1) basal lamina (2) collagen and elastic fibres (3) several layers of myoid cells (4) amorphous ground substance
22. The following statements regarding the seminiferous epithelium are true:
(1) is complex stratified epithelium (2) is composed of two cell populations (3) the Sertoli cells are its true epithelial parts (4) spermatogenic cells are its principal parts
23. The androgens are responsible for:
(1) normal development of the male fetus (2) development and maintenance of secondary male sex characteristics (3) initiation and maintenance of sperm production (4) initiation and maintenance of the male accessory gland functions
24. The following statements regarding the testicular interstitial connective tissue are true:
(1) is testicular endocrine part due to the presence of Leydig cells (2) its blood capillaries are continuous (3) contains lymphatic sinusoids surrounding the seminiferous tubules like sheathes (4) its blood capillaries are sinusoidal fenestrated
25. The following statements regarding the blood-testis barrier functions are true:
(1) creates specific chemical composition for spermatogenic cell development (2) provides hormonal homeostasis in the seminiferous tubules (3) isolates antigenic spermatocytes and spermatids from the immune system (4) prevents sperm antigen entering the systemic circulation
26. The ductus deferens wall consists of the following tunics:
(1) mucosa (2) adventitia (3) three-layered muscularis (4) submucosa

22. FEMALE REPRODUCTIVE SYSTEM – I

Directions: each of the following statements contains five suggested completions. Choose the one that is best in each case.

1. Each of the following statements concerning the large growth of ovogenesis is true, EXCEPT:
A – begins at puberty; B – is represented by primary oocytes leaving the dictyotene; C – includes accumulation of organelles, yolk granules, and cortical granules; D – lasts about two weeks until just before ovulation; E – is hormone-independent.
2. Each of the following statements concerning the ovogenesis stage of maturation is true, EXCEPT:
A – the primary oocyte completes the first meiotic division shortly before ovulation; B – the secondary oocyte begins the second meiotic division at ovulation; C – cytoplasm division between daughter cells is equal; D – the second meiotic division progresses only to metaphase when it is arrested; E – the second meiotic division is completed if the secondary oocyte is fertilized.
3. Each of the following statements concerning the ovary is true, EXCEPT:
A – is invested by a connective tissue capsule and the germinal epithelium; B – its germinal epithelium is a source of new oogonia; C – its cortex contains follicles, atretic bodies, and the corpus luteum; D – its medulla contains connective tissue with blood vessels, lymphatics, and nerves; E – produces female gametes and secretes female sex hormones.

4. Each of the following statements concerning the secondary ovarian follicles is true, EXCEPT:
A – contain the primary oocyte at large growth surrounded by the zona pellucida; B – their follicular epithelium becomes stratified and is named the membrana granulosa; C – fluid-filled cavities appear among their granulosa cells; D – small cavities begin to coalesce eventually forming the antrum; E – lack the theca layer.
5. Each of the following statements concerning the ovarian theca cells is true, EXCEPT:
A – are located in the theca interna of growing and mature follicles; B – their cytoplasm is rich in sER, Golgi apparatus, vesicular mitochondria, and lipid drops; C – secrete androgens; D – their secretory activity is under FSH control; E – their androgens are transported to the granulosa cells where they become estrogens.
6. Each of the following statements concerning the ovarian mature follicle is true, EXCEPT:
A – represents the earliest stage of follicular development; B – bulges on the ovary surface because of its large size; C – its oocyte is surrounded by the zona pellucida and the corona radiata; D – its oocyte is acentrically positioned at the cumulus oophorum; E – its antrum increases in size and is surrounded by the granulosa cells.
7. Each of the following statements concerning the ovulation is true, EXCEPT:
A – it is controlled by the LH and FSH peaks; B – the secondary oocyte at metaphase II leaves the ovary and enters the oviduct; C – before ovulation the stigma disappears; D – the stigma ruptures forming a small gap in the capsule, germinal epithelium, and follicle wall; E – the oocyte with its surrounding leaves the ovary via this gap.
8. Each of the following statements concerning the corpus luteum activity and its hormonal regulation is true, EXCEPT:
A – the corpus luteum formation is controlled by LH; B – mature corpus luteum secretes progesterone; C – the corpus luteum secretion is controlled by prolactine (LTH); D – high blood progesterone levels stimulate the cyclic development of ovarian follicles; E – progesterone stimulates the endometrium to prepare it for future implantation.
9. Each of the following statements concerning the ovarian corpus luteum is true, EXCEPT:
A – the corpus luteum of pregnancy reaches the size of 2–3 cm and retains its functional capacity for about half a year; B – the corpus luteum of menstruation remains active for 28 days; C – the granulosa lutein cells are large, pale, and centrally located; D – the theca lutein cells are small, dark, and peripherally located; E – the corpus luteum undergoes involution after pregnancy or menstruation and is replaced by the corpus albicans.
10. Each of the following statements concerning the ovarian follicle atresia is true, EXCEPT:
A – oocyte degeneration appears later than degenerative changes in the follicular wall; B – the oocyte undergoes degeneration and autolysis; C – oocyte remnants are removed by macrophages; D – the zona pellucida is slowly broken down in the follicular cavity; E – results in the corpus luteum formation.

Directions: one or more of the given statements or completions is/are correct. Choose the answer: A – if only 1,2, and 3 are correct; B – if only 1 and 3 are correct; C – if only 2 and 4 are correct; D – if only 4 is correct; E – if all are correct.

11. The following statements regarding the ovogenesis stage of proliferation are true:
(1) begins and ends during early fetal life (2) is represented by oogonia that divide by mitosis (3) completes before birth when all oogonia become primary oocytes (4) includes the arrested phase called dictyotene
12. The following statements regarding the small growth of the ovogenesis are true:

(1) begins in embryogenesis (2) its essence is the prophase of the first meiotic division (3) prophase I completion does not occur until puberty (4) primary oocytes remain in the arrested prophase called dictyotene for several years

13. The following statements regarding the ovarian primordial follicles are true:

(1) are composed of the primary oocyte at the dictyotene surrounding by a single layer of squamous follicular cells (2) are the earliest stage of follicular development (3) predominate in number among ovarian follicles (4) are located in the ovarian medulla

14. The following statements regarding the ovarian primary follicles are true:

(1) their primary oocytes begin the large growth and considerably enlarge in volume (2) oocytes and follicular cells produce the zona pellucida (3) follicular cells proliferate, become cuboidal in shape, and form one layer (4) the theca layer appears

15. The following statements regarding the ovarian follicle granulosa cells are true:

(1) secrete liquor folliculi (2) are involved in selective transport between blood and the oocyte (3) can convert androgens to estrogens (4) possess plasma membrane FSH receptors

16. The following statements regarding the ovarian follicle theca are true:

(1) theca interna contains loose connective tissue, blood vessels, and theca cells (2) is present only in mature (Graafian) follicles (3) theca externa consists of dense irregular connective tissue (4) produces estrogens

17. The following statements regarding the events preceding follicle rupture in ovulation are true:

(1) follicular fluid volume and pressure increase (2) myofibroblasts of the theca externa contract (3) the follicular wall undergoes enzymatic proteolysis (4) the oocyte-cumulus complex separates from the granulosa layer

18. The following events take place in the ovarian corpus luteum formation:

(1) the basement membrane of granulosa cells undergoes destruction (2) granulosa cells and theca cells proliferate (3) blood vessels from the theca interna grow into the granulosa layer (4) a rich network of sinusoidal fenestrated capillaries is established

19. The granulosa cells and theca cells undergo the following morphological changes in the corpus luteum formation:

(1) increase in size (2) become filled with lipid droplets (3) accumulate sER and vesicular mitochondria (4) lipochrome imparts the yellow colour to them in fresh specimens

20. The following statements regarding the ovarian follicle atresia are true:

(1) numerous follicles undergo atresia during fetal development, early postnatal life, and puberty (2) atresia of primordial and primary follicles leaves no traces of their existence (3) atresia of growing follicles results in their reorganisation into atretic bodies secreting estrogens (4) atresia declines in the climacteric period

21. The following events take place in the ovarian follicle atresia:

(1) blood vessels, neutrophils, and macrophages invade the granulosa layer (2) granulosa cell slough into the follicle antrum (3) theca cells acquire the ability to secrete estrogens (4) the basement membrane separates from follicular cells, increases in thickness, and becomes a glassy membrane

23. FEMALE REPRODUCTIVE SYSTEM – II

Directions: each of the following statements contains five suggested completions. Choose the one that is best in each case.

1. Each of the following statements concerning the follicular phase of the ovarian cycle is true, EXCEPT:

A – lasts from the 1st to the 14th day of a cycle; B – actively secreting corpus luteum is present in the ovary; C – follicles at various stages of development, atretic follicles, and the

corpus luteum in involution up to the corpus albicans are present in the ovary; D – the ovaries primarily secrete estrogens; E – estrogen blood level rises and reaches the peak by ovulation.

2. Each of the following statements concerning the luteal phase of the ovarian cycle is true, EXCEPT:

A – begins after ovulation and lasts up to the 28th day of a cycle; B – at the beginning of this phase, the corpus luteum is formed; C – the corpus luteum produces progesterone; D – progesterone stimulates the ovarian follicle development; E – at the end of this phase, the corpus luteum begins to regress, and progesterone level declines.

3. Each of the following statements concerning the hormonal regulation of the ovarian cycle is true, EXCEPT:

A – FSH blood level possesses two peaks: on the 7th day and on the 14th day; B – LH blood level sharply increases by the 14th day; C – progesterone inhibits LH production; D – estrogens stimulate LH secretion and inhibit FSH secretion; E – prolactin (LTH) does not take part in the ovarian cycle regulation.

4. Each of the following statements concerning the endometrium is true, EXCEPT:

A – its epithelium is simple columnar, consisting of secretory and ciliated cells; B – its glands are simple nonbranched tubular; C – secretion of its glands is controlled by estrogens; D – its glandular bottoms contain stem cells for re-epithelialization; E – the endometrial stroma consists of loose connective tissue.

5. Each of the following statements concerning the proliferative phase of the menstrual cycle is true, EXCEPT:

A – is regulated by progesterone; B – epithelial cells in glandular bottoms proliferate and cover the endometrial surface; C – the endometrium thickens due to proliferation of stromal cells and matrix secretion; D – uterine glands are restored; E – the helical arterioles are re-established.

6. Each of the following statements concerning the secretory phase of the menstrual cycle is true, EXCEPT:

A – starts 2-3 days after ovulation; B – the endometrium thickens by edema; C – the uterine glands begin to secrete; D – the helical arterioles become more coiled; E – is controlled by estrogens.

7. Each of the following statements concerning the menstrual phase of the uterine cycle is true, EXCEPT:

A – starts when the corpus luteum begins to regress, and progesterone level declines; B – initially, contractions of the helical arteriole wall occur and last several hours; C – arterial contractions result in ischemia and necrosis of the functional layer; D – subsequent arterial dilation leads to vessel rupture, bleeding, and desquamation of the necrotic functional layer; E – the rising level of progesterone stops menstrual discharge.

8. Each of the following statements concerning the oviduct epithelium is true, EXCEPT:

A – its secretory cells produce mucus providing embryo implantation; B – its secretory cells produce mucus providing the initial embryo development till the morula stage; C – its secretory cells create the environment for fertilization; D – its ciliated cells facilitate the transport of gametes and an embryo; E – its cilium waves are directed towards the uterus;

9. Each of the following statements concerning the vaginal epithelium is true, EXCEPT:

A – is stratified squamous; B – undergoes keratinization during the cycle; C – its cells synthesize and accumulate glycogen; D – its cells are continuously desquamated into the vaginal lumen where bacteria metabolise glycogen into lactic acid; E – vaginal acid pH limits the growth of pathogenic organisms.

10. Each of the following statements concerning the mammary gland development is true, EXCEPT:

A – the nipple, areola, and rudimentary duct system develop in embryogenesis; B – at puberty, the glands increase in size due to duct formation and connective tissue development; C – secretory portions develop at puberty under estrogen stimulation; D – progesterone stimulates alveolus growth in pregnancy; E – alveoli begin to secrete milk after delivery.

11. Each of the following statements concerning the lactation regulation is true, EXCEPT:

A – the act of suckling initiates sensory impulses from the nipple to the hypothalamus; B – prolactin is released from the adenohypophysis in response to the impulses; C – sensory impulses cause oxytocin release in the neurohypophysis; D – oxytocin stimulates myoepithelial cells to contract; E – prolactin inhibits milk secretion in the alveolar cells.

Directions: one or more of the given statements or completions is/are correct. Choose the answer: A – if only 1,2, and 3 are correct; B – if only 1 and 3 are correct; C – if only 2 and 4 are correct; D – if only 4 is correct; E – if all are correct.

12. The following statements regarding the ovarian cycle are true:

(1) includes the follicular phase and the luteal phase (2) ovulation occurs between two phases at midcycle (3) is controlled by the adenohypophysial hormones (4) averages about 28 days in length

13. The following statements regarding the endometrial functional layer are true:

(1) is sloughed and then re-established during the cycle (2) includes the covering epithelium and the lamina propria (3) is supplied by the helical arterioles (4) includes the bottoms of uterine glands

14. The following statements regarding the endometrial basal layer are true:

(1) is retained during the cycle and serves for regeneration of the functional layer (2) is supplied by the helical arterioles (3) includes the bottoms of uterine glands (4) lacks stem and undifferentiated cells for re-epithelialization

15. The following statements regarding the menstrual cycle are true:

(1) is accompanied by the uterine discharge called menstruation (menses) (2) is controlled by the ovarian hormones: estrogens and progesterone (3) consists of three phases (4) if embryo implants, the cycle stops

16. The following statements regarding the uterine gland mucoid secretion are true:

(1) is rich in nutrients, particularly glycogen (2) is produced under FSH control (3) its immunoglobulins provide endometrial sterility (4) is secreted during the whole cycle

17. The following statements regarding the uterine cervix are true:

(1) its mucosa lacks the helical arterioles and is not sloughed during the cycle (2) its branched glands secrete the whole cycle (3) the volume and character of secreted mucus change during the cycle (4) its myometrium contains more connective tissue and less smooth muscle cells

18. The following statements regarding the secretion of uterine cervix glands are true:

(1) is watery under estrogen influence that allows easier sperm passage (2) increases in volume at midcycle under estrogen influence (3) is highly viscous under progesterone influence that hinders the passage of sperms or microorganisms (4) its character in pregnancy is the same as that in the luteal phase

19. The following statements regarding the oviduct mucosa are true:

(1) lacks the glands (2) forms folds that fill the oviduct lumen (3) its simple epithelium consists of ciliated and secretory cells (4) is not sensitive to the ovarian hormones

20. The following statements regarding the vaginal epithelium cyclic changes are true:

(1) epithelium thickens and its superficial cells are desquamated under estrogen control (2) estrogens inhibit the synthesis and accumulation of glycogen in the epithelial cells (3) cells

of intermediate and parabasal layers are desquamated under progesterone control (4) progesterone stimulates the synthesis and accumulation of glycogen in the epithelial cells

21. The following statements regarding the mammary glands are true:

(1) are the features of only mammals (2) phylogenetically, are modified apocrine sweat glands and belong to the skin system (3) are compound branched alveolar glands (4) produce milk that nourishes newborns and provide their immunological defence from enteric infections

22. The following statements regarding the mammary gland alveoli are true:

(1) consist of secretory and myoepithelial cells (2) secretory cells are rich in lipid and protein droplets (3) myoepithelial cells are arranged in basket-like network between secretory cells and their basal lamina (4) myoepithelial cell contractions help to eject milk from the acini

23. The following statements regarding the secretion mode of the mammary gland alveolar cells are true:

(1) the protein component of milk is released via the apocrine mode (2) the lipid component of milk is released via the apocrine mode (3) the lipid component of milk is released via the merocrine mode (4) the protein component of milk is released via the merocrine mode

24. INITIAL STAGES OF HUMAN EMBRYONIC DEVELOPMENT

Directions: each of the following statements contains five suggested completions. Choose the one that is best in each case.

1. The results of fertilization are as follows, EXCEPT:

A – sex determination; B – restoration of the diploid number; C – blastocyst formation; D – cleavage initiation; E – creation of new chromosome and gene combination.

2. Each of the following statements concerning the sperm passage in the female genital tract is true, EXCEPT:

A – sperm selection does not occur in passage; B – through the cervical canal spermatozoa pass by their tail movements; C – sperm passage through the uterus and oviduct is assisted by organ muscular contractions; D – seminal plasma prostaglandins stimulate these muscular contractions; E – ovum produces substances attracting sperm.

3. Each of the following statements concerning the acrosome reaction is true, EXCEPT:

A – may occur only after sperm capacitation; B – the acrosomal outer membrane fuses with the overlying sperm plasmalemma at many places; C – fused membranes rupture producing multiple perforations; D – the enzymes leave the acrosome through perforations; E – cortical granules open and release their enzymes.

4. Each of the following statements concerning the ovum penetration by a sperm is true, EXCEPT:

A – acrosomal enzymes facilitate the sperm passage through the oocyte envelopes; B – when the sperm passes through the zona pellucida, cortical reaction occurs; C – the oocyte and sperm plasma membranes fuse and break down at the point of contact; D – the sperm plasma membrane enters the oocyte cytoplasm; E – the sperm nucleus enters the oocyte cytoplasm.

5. Each of the following statements concerning the human cleavage is true, EXCEPT:

A – is a process of successive rapid mitotic divisions; B – blastomeres increase in volume becoming progressively larger; C – proceeds in the oviduct during the first three days when the morula is formed; D – continues in the uterus during 3 or 4 days when the blastula is formed; E – is holoblastic, unequal, and asynchronous.

6. Each of the following statements concerning the blastocyst is true, EXCEPT:
A – contains the outer layer called the trophoblast, from which the chorion arises; B – is surrounded by the zona pellucida before implantation; C – lacks its own cavity; D – contains the inner cell mass called the embryoblast, from which the embryo proper arises; E – lies in the uterine secretions until it is attached to the endometrium.
7. Each of the following statements concerning the first stage of gastrulation is true, EXCEPT:
A – embryoblast is transformed into the bilaminar disk; B – delamination is a mechanism of this stage; C – epiblast will give rise to three germ layers; D – hypoblast will be displaced to extraembryonic regions; E – occurs during the first week of development.
8. Each of the following statements concerning the second stage of gastrulation is true, EXCEPT:
A – occurs on the 7th day of development; B – morphological changes take place only in epiblast; C – proliferation and migration of epiblastic cells give rise to the primitive streak with a primitive groove; D – the primitive streak cells migrate through the primitive groove inwardly between epiblast and hypoblast to form endoderm and mesoderm; E – the cells that remain in epiblast after migration are refered to as ectoderm.
9. Each of the following statements concerning the notochord is true, EXCEPT:
A – is formed by cell migration through the primitive knot; B – looks like a cellular rod that grows between ectoderm and endoderm from the primitive knot towards the cranial end; C – forms the midline axis of the embryo; D – gives rise to the embryo skeleton; E – degenerates, but persists as the nucleus pulposus of intervertabral disks.
10. Each of the following statements concerning the mesoderm differentiation is true, EXCEPT:
A – somites divide into the myotome, dermotome, and sclerotome; B – the somite cord differentiates into the nephrogonadotome; C – coelom appears in the paraxial mesoderm; D – the somatopleure and splanchnopleure surround the coelom; E – some cells leave the mesoderm and become the mesenchyme.
11. Each of the following statements concerning the mesoderm differentiation is true, EXCEPT:
A – myotome gives rise to skeletal muscles; B – dermotome gives rise to the skin dermis; C – sclerotome gives rise to the skeleton; D – nephrogonadotome gives rise to the kidney and gonads; E – coelom will become the abdominal cavity.
12. Each of the following statements concerning the mesoderm and mesenchyme differentiation is true, EXCEPT:
A – somatopleure and splanchnopleure give rise to the mesothelium lining serous cavities; B – mesenchyme develops into blood, lymph, and blood vessels; C – endocardium is derived from mesenchyme; D – myocardium and epicardium arise from mesenchyme; E – splanchnopleure takes part in the adrenal cortex development.
13. Each of the following statements concerning the cell determination and differential genome activity is true, EXCEPT:
A – include changes in cell structure, biochemistry, and functions; B – they determine the pathway of cell differentiation; C – each cell nucleus contains a complete genome established in the zygote during fertilization; D – as cells develop, some genes are expressed and others repressed; E – only a small percentage of genome is expressed in each cell, and RNA portion is specific for a given cell type.

Directions: one or more of the given statements or completions is/are correct. Choose the answer: A – if only 1,2, and 3 are correct; B – if only 1 and 3 are correct; C – if only 2 and 4 are correct; D – if only 4 is correct; E – if all are correct.

14. The following statements regarding the ovum transport along the uterine tube are true:

(1) the ovum passes through the oviduct by beating action of epithelial cilia (2) muscular contractions of the tubal wall assist the ovum passage (3) it takes the oocyte 25 minutes to reach the ampulla (4) the ovum is viable during 24 hours after ovulation

15. The following statements regarding the fertilization are true:

(1) occurs in the oviduct ampulla (2) is part of progenesis (3) requires about 24 hours (4) completes the initial period

16. The following statements regarding the sperm capacitation are true:

(1) is removal of the glycoprotein coat from the plasma membrane over the acrosome (2) spermatozoa are capacitated by substances of the female genital tract (3) lasts for 7 hours (4) acrosome reaction occurs after capacitation

17. The following statements regarding the cortical reaction are true:

(1) cortical granules open and release their enzymes (2) physiochemical characteristics of the zona pellucida change, and the zona reaction is formed (3) zona reaction is impermeable to spermatozoa (4) zona reaction facilitates oocyte penetration

18. The following statements regarding the events of fertilization after penetration are true:

(1) the second meiotic division is completed (2) the sperm head enlarges to form the male pronucleus (3) male and female pronuclei approach, contact, and lose their membranes (4) chromosomes intermingle at metaphase of the first zygote division

19. The following statements regarding the cleavage are true:

(1) blastomeres do not differentiate (2) through the first divisions blastomeres retain totipotentiality (3) initially, cleavage is under control of maternal macromolecules (4) later, development depends on the embryonic genome

20. The following statements regarding the neurulation are true:

(1) includes the formation of the neural plate, neural groove, neural tube, and neural crest (2) the neural tube is the primordium of the central nervous system (3) the neural crest gives rise to spinal and autonomic ganglia, Schwann cells, meningeal covering of the brain, pigment cells, and the adrenal medulla (4) dermotome induces overlying ectoderm to form the neural plate

21. The following statements regarding the mesoderm differentiation are true:

(1) paraxial mesoderm divides into somites (2) intermediate mesoderm forms the somite cord (3) lateral mesoderm is divided into somatopleure and splanchnopleure (4) somatopleure and splanchnopleure surround the coelom

22. The following statements regarding the germ layer differentiation are true:

(1) some mesoderm cells migrate to form the mesenchyme (2) mesenchyme gives rise to blood, all types of connective tissue, smooth muscle cells, blood vessels, microglia, and the endocardium (3) surface ectoderm differentiates into the epidermis, hair, nails, skin glands, mammary glands, salivary glands, and tooth enamel (4) endoderm gives rise to the digestive tract epithelium, liver, pancreas, and lung epithelium

23. The following statements regarding the folding of the human embryo are true:

(1) longitudinal and transverse folds are formed in the early embryonic period (2) folds convert the flat embryonic disk to a C-shaped cylindrical embryo (3) folding separates the embryo body from the yolk sac and closes the primitive gut (4) folding results in the formation of the human amnion

24. Differentiation is:

(1) the choice of a cell's particular fate (2) development of specialized cell types from stem cells (3) cell capabilities have not yet been realized (4) changes in the cell structure and biochemistry for the cell to perform distinctive functions

25. The following statements regarding the cell potentialities are true:

(1) the zygote is totipotential (2) stem cells are pluripotential (3) immature descendants of stem cells are usually oligopotential (4) mature cells are unipotential

25. HUMAN EMBRYOLOGY

Directions: each of the following statements contains five suggested completions. Choose the one that is best in each case.

1. Each of the following statements concerning implantation is true, EXCEPT:
A – is a process of blastocyst invasion into the endometrium; B – begins on the 5 or the 6th day when the blastocyst loses the zona pellucida and is attached to the endometrium; C – invasion proper lasts about 40 h; D – is hormone-independent; E – finishes when regenerated epithelium covers the endometrial defect.
2. The events of the second week of embryonic development are as follows, EXCEPT:
A – blastocyst formation; B – the first stage of gastrulation; C – amniotic vesicle formation; D – chorion development; E – yolk sac formation.
3. Each of the following statements concerning the yolk sac is true, EXCEPT:
A – exists only two months and then regresses; B – its remnant will be a part of the umbilical cord; C – contains yolk and provides embryo nourishment; D – first blood cells develop in its endoderm; E – gonoblasts are located in its endoderm before they return into the embryo.
4. Each of the following statements concerning the chorion functions is true, EXCEPT:
A – provides selective exchange between the embryo and maternal organism; B – secretes enzymes to erode the endometrium; C – provides immune defence of the embryo; D – creates watery environment for the fetus; E – produces human chorionic gonadotropin.
5. Each of the following statements concerning the decidual reaction is true, EXCEPT:
A – trophoblastic cells undergo transformation and become decidual cells; B – implantation is a stimulus for this reaction; C – decidual cells are large, pale, and rich in glycogen; D – decidual cells take part in embryo nourishment; E – decidual cells create a specialized layer facilitating placenta separation from the uterus at the end of pregnancy.
6. Each of the following statements concerning the endometrium in pregnancy is true, EXCEPT:
A – is called the decidua because it is shed in parturition; B – its decidua basalis underlies the implantation site; C – its decidua capsularis separates the embryo from the uterine lumen; D – its decidua parietalis includes the remaining part of the endometrium; E – lacks decidual cells.
7. Each of the following statements concerning the chorion is true, EXCEPT:
A – its secondary villi become tertiary villi when they acquire blood vessels; B – its portion associated with the decidua basalis is a villous chorion; C – its portion associated with the decidua capsularis is a smooth chorion; D – its villi are never attached to maternal tissues; E – stem villi project from the chorionic plate and are divided into branch villi.
8. Each of the following statements concerning the fetal part of the placenta is true, EXCEPT:
A – the umbilical cord is not attached to the fetal surface; B – includes the chorionic plate and tertiary villi arising from it; C – the villi project into lacunae and are bathed by maternal blood; D – anchoring villi are attached to maternal tissues by the cytotrophoblastic shell; E – the amnion underlies the chorionic plate and continues as the umbilical cord covering.
9. Each of the following statements concerning the maternal part of the placenta is true, EXCEPT:
A – includes the decidua basalis; B – the decidua basalis lacks decidual cells; C – placental septa project from the decidua basalis towards the chorionic plate; D – the septa

divide the placenta into lobules (cotyledons); E – the deepest layer of the decidua basalis called the decidual plate remains after parturition and provides endometrial regeneration.

10. Each of the following statements concerning the uteroplacental circulatory system is true, EXCEPT:

A – fetal blood enters the placenta through the umbilical arteries; B – umbilical vessels branch in the chorionic plate and supply the villi; C – fetal blood returns through villous veins that converge to form the umbilical vein; D – fetal and maternal blood mix; E – maternal blood circulates through intervillous spaces and returns into the venous system through veins that communicate with the lacunae.

11. The placental barrier includes the following structures, EXCEPT:

A – syncytiotrophoblast of chorionic villi; B – connective tissue of the decidua basalis; C – chorionic cytotrophoblast with its basal lamina; D – connective tissue of tertiary villi; E – endothelium of chorionic capillaries and its basal lamina.

12. The placental barrier undergoes the following changes in pregnancy, EXCEPT:

A – gradually disappears; B – the cytotrophoblast degenerates; C – villous connective tissue lying between the capillaries and trophoblast thins out and disappears; D – villous capillaries become disposed just below the trophoblast; E – the barrier gets thin to facilitate product exchange.

Directions: one or more of the given statements or completions is/are correct. Choose the answer: A – if only 1,2, and 3 are correct; B – if only 1 and 3 are correct; C – if only 2 and 4 are correct; D – if only 4 is correct; E – if all are correct.

13. The human embryonic development is divided into the following periods:

(1) initial (2) embryonic (3) fetal (4) postnatal

14. The events of the first week of the human embryonic development are as follows:

(1) fertilization (2) cleavage (3) blastula formation (4) gastrulation

15. The following statements regarding the trophoblast in implantation are true:

(1) trophoblast differentiates into cytotrophoblast and syncytiotrophoblast (2) cytotrophoblastic cells divide, migrate outwards, fuse, and form a syncytiotrophoblast (3) syncytiotrophoblast produces enzymes to erode the endometrium (4) syncytiotrophoblast forms processes that invade the endometrium

16. The following statements regarding the implantation sites are true:

(1) blastocyst usually implants in the upper portion of the uterus (2) implantation in the lower uterine portion may cause severe bleeding (3) blastocyst usually implants on the posterior wall or rarely on the anterior wall of the uterus (4) implantation outside the uterine cavity is called ectopic

17. The following statements regarding the amnion are true:

(1) is filled with the amniotic fluid that creates watery environment for the fetus (2) provides mechanical defence of the fetus (3) exists and functions up to birth (4) appears in the first week of development

18. The following statements regarding the chorion are true:

(1) its primary villi consist of the trophoblast and blood vessels (2) its secondary villi include the trophoblast and extraembryonic mesoderm (3) its villi never contact with maternal blood (4) intervillous spaces form the trophoblastic lacunar network

19. The following statements regarding the embryo in the second week of development are true:

(1) the embryo appears like a bilaminar disk (2) the embryo is associated with the amniotic vesicle and the yolk sac (3) the chorion forms the chorionic sac with a cavity (4) the embryo is attached to the inner side of the chorion by a connecting stalk

20. The following statements regarding the human chorionic gonadotropin (hCG) are true:

(1) is produced by the embryonic disk cells (2) is excreted in the maternal urine (3) inhibits progesterone production (4) maintains the corpus luteum of the maternal ovary

21. The events of the third week of the human embryonic development are as follows:

(1) the second stage of gastrulation and trilaminar embryo formation (2) development of axial organs and their initial differentiation (3) formation of the primitive cardiovascular system (4) further development of chorionic villi

22. The following statements regarding the primitive cardiovascular system formation are true:

(1) angiogenesis begins in the yolk sac, the connecting stalk, and the chorion (2) development of embryonic vessels begins later (3) the primitive heart arises from the mesenchyme and appears like paired endothelial channels (4) the cardiovascular system is the last system to attain a functional state

23. The following statements regarding the selective exchange through the placental barrier are true:

(1) antibodies cannot cross the barrier (2) gases, electrolytes, some nutrients, and wastes freely pass the barrier by simple diffusion (3) red blood cells never pass the barrier (4) protein hormones do not reach the fetus in significant amounts, steroid hormones freely pass the barrier

24. The following statements regarding the placental barrier permeability for dangerous agents are true:

(1) most drugs freely cross the placenta by simple diffusion (2) measles, poliomyelitis, and rubella viruses may pass through the barrier (3) alcohol and nicotine cross the placental barrier (4) most of dangerous agents may cause congenital malformations

25. The following statements regarding the placenta metabolism are true:

(1) placenta synthesizes glycogen, cholesterol, and fatty acids (2) syncytiotrophoblast is the site of placental metabolic activity (3) placenta serves as a source of nutrients and energy for the embryo (4) placenta cannot synthesize hormones

26. The placenta is the major endocrine gland producing the following hormones:

(1) human chorionic gonadotropin (hCG) (2) human chorionic somatomammotropin (hCS) (3) relaxin (4) estrogens and progesterone

27. The following statements regarding the umbilical cord are true:

(1) is covered with the amniotic epithelium (2) includes one artery and two veins (3) contains mucoid connective tissue (4) lacks the allantois and yolk sac remnants

28. The following statements regarding the critical periods of the embryonic development are true:

(1) developmental disturbances may cause congenital malformations in these periods (2) implantation is not a critical period (3) the time from the 4th to the 8th weeks is the most critical period (4) placentation is not a critical period

29. The following statements regarding the allantois are true:

(1) appears on the 16th day as a finger-like projection elongating from the embryo into the connecting stalk (2) degenerates during the second month, its remnant is found in the umbilical cord (3) directs blood vessel growth from the embryo towards the chorion (4) its intraembryonic portion is associated with development of the urinary bladder

KEY

1. Cytology

1	E	11	C	21	E	31	B
2	D	12	E	22	E	32	B
3	B	13	C	23	A	33	A
4	C	14	A	24	B	34	E
5	B	15	B	25	E	35	C
6	A	16	D	26	E	36	D
7	C	17	C	27	E	37	E
8	E	18	B	28	A	38	D
9	C	19	A	29	E		
10	A	20	D	30	C		

2. Epithelial tissue

1	D	7	C	13	A	19	A
2	B	8	A	14	A	20	D
3	B	9	D	15	E	21	B
4	A	10	C	16	C	22	A
5	C	11	A	17	B		
6	E	12	E	18	A		

3. Blood

1	D	7	E	13	E	19	B
2	A	8	C	14	B	20	C
3	D	9	D	15	C	21	B
4	D	10	B	16	D	22	A
5	B	11	E	17	D	23	B
6	A	12	A	18	B	24	B

4. Connective tissue

1	A	7	B	13	A	19	A
2	B	8	E	14	E	20	A
3	C	9	C	15	A	21	A
4	E	10	D	16	E	22	B
5	D	11	B	17	E	23	C
6	A	12	C	18	E	24	A

5. Cartilage and Bone

1	D	8	A	15	E	22	A
2	B	9	E	16	E	23	B
3	D	10	C	17	D	24	E
4	C	11	D	18	A	25	B
5	E	12	B	19	E	26	D
6	A	13	A	20	A	27	E
7	D	14	E	21	B	28	E

6. Muscle tissue

1	E	8	D	15	E	22	E
2	B	9	C	16	E	23	A
3	A	10	E	17	C	24	A

4	C	11	C	18	E	25	E
5	B	12	D	19	E	26	A
6	D	13	B	20	E	27	C
7	E	14	E	21	A		

7. Nervous tissue

1	D	8	A	15	A	22	A
2	E	9	E	16	A	23	E
3	C	10	D	17	C	24	A
4	B	11	B	18	A	25	A
5	C	12	C	19	E	26	A
6	E	13	B	20	E	27	C
7	C	14	D	21	B	28	E

8. Nervous system

1	B	8	A	15	E	22	C
2	D	9	E	16	B	23	A
3	C	10	E	17	E	24	A
4	A	11	D	18	A	25	A
5	D	12	B	19	E	26	E
6	B	13	B	20	E	27	A
7	D	14	C	21	A	28	E

9. Primary sentient sense organs

1	E	9	E	17	E	25	B
2	B	10	B	18	A	26	E
3	A	11	D	19	E	27	E
4	C	12	A	20	E	28	E
5	B	13	D	21	A	29	A
6	E	14	E	22	E	30	A
7	C	15	D	23	A	31	E
8	B	16	A	24	C		

10. Secondary sentient sense organs

1	C	8	D	15	B	22	D
2	B	9	E	16	E	23	A
3	D	10	B	17	A	24	A
4	A	11	D	18	E	25	A
5	E	12	A	19	C	26	A
6	C	13	E	20	A		
7	B	14	C	21	B		

11. Cardiovascular system

1	C	9	C	17	E	25	A
2	B	10	D	18	E	26	C
3	E	11	E	19	A	27	A
4	A	12	B	20	B	28	A
5	B	13	A	21	C	29	A
6	C	14	B	22	D	30	C
7	D	15	A	23	A	31	E
8	D	16	E	24	A	32	E

12. Hemopoiesis. Central organs of hemopoiesis

1	D	7	E	13	E	19	D
2	C	8	D	14	A	20	A
3	A	9	B	15	E	21	E
4	E	10	E	16	E	22	B
5	B	11	C	17	E	23	A
6	D	12	E	18	C	24	A

13. Peripheral organs of hemopoiesis and immunogenesis

1	C	7	D	13	B	19	A
2	C	8	B	14	A	20	A
3	E	9	D	15	D	21	A
4	B	10	A	16	A	22	D
5	C	11	D	17	A		
6	B	12	E	18	E		

14. Endocrine organs

1	D	10	B	19	C	28	A
2	B	11	D	20	A	29	E
3	A	12	E	21	A	30	E
4	D	13	A	22	A	31	E
5	C	14	D	23	B	32	A
6	B	15	D	24	B	33	B
7	D	16	B	25	B	34	E
8	A	17	A	26	A		
9	D	18	E	27	E		

15. Digestive system – I

1	D	7	D	13	E	19	E
2	A	8	B	14	C	20	B
3	C	9	A	15	B	21	D
4	B	10	C	16	E	22	E
5	E	11	E	17	A	23	E
6	B	12	A	18	D		

16. Digestive system – II

1	C	8	B	15	E	22	E
2	A	9	D	16	D	23	A
3	E	10	A	17	A	24	A
4	B	11	D	18	E	25	E
5	D	12	E	19	D	26	E
6	B	13	D	20	A	27	E
7	E	14	E	21	E		

17. Digestive system – III

1	B	9	C	17	C	25	E
2	E	10	E	18	B	26	D
3	C	11	E	19	A	27	A
4	D	12	B	20	A	28	A
5	A	13	D	21	E	29	E

6	B	14	C	22	E		
7	D	15	B	23	A		
8	A	16	E	24	B		

18. Respiratory system

1	D	7	B	13	A	19	A
2	B	8	E	14	A	20	E
3	E	9	C	15	E	21	E
4	C	10	B	16	E	22	E
5	A	11	A	17	D		
6	D	12	E	18	D		

19. Integumentary system

1	D	6	A	11	E	16	A
2	C	7	D	12	E	17	B
3	B	8	A	13	A	18	A
4	E	9	B	14	E	19	B
5	C	10	C	15	E	20	E

20. Urinary system

1	C	7	B	13	E	19	A
2	B	8	D	14	E	20	A
3	E	9	E	15	E	21	A
4	D	10	D	16	A	22	E
5	A	11	C	17	C	23	E
6	C	12	A	18	E		

21. Male reproductive system

1	C	8	D	15	E	22	E
2	B	9	A	16	E	23	E
3	E	10	D	17	B	24	A
4	A	11	D	18	D	25	E
5	D	12	B	19	B	26	A
6	C	13	A	20	C		
7	E	14	C	21	E		

22. Female reproductive system – I

1	E	7	C	13	A	19	E
2	C	8	D	14	A	20	A
3	B	9	B	15	E	21	E
4	E	10	E	16	B		
5	D	11	A	17	E		
6	A	12	E	18	E		

23. Female reproductive system – II

1	B	7	E	13	A	19	A
2	D	8	A	14	B	20	B
3	E	9	B	15	E	21	E
4	C	10	C	16	B	22	E
5	A	11	E	17	E	23	C
6	E	12	E	18	E		

24. Initial stages of human embryonic development

1	C	8	A	15	B	22	E
2	A	9	D	16	E	23	A
3	E	10	C	17	A	24	C
4	D	11	E	18	E	25	E
5	B	12	D	19	E		
6	C	13	A	20	A		
7	E	14	E	21	E		

25. Human embryology

1	D	9	B	17	A	25	A
2	A	10	D	18	C	26	E
3	C	11	B	19	E	27	B
4	D	12	A	20	C	28	B
5	A	13	A	21	E	29	E
6	E	14	A	22	A		
7	D	15	E	23	C		
8	A	16	E	24	E		

CONTENT: