

Sri Lankan Biology Olympiad 2019



Instructions:

This paper contains two parts, **A** and **B**.

Part A: 40 multiple choice questions; Total Marks 40.

Part B: 20 correct - incorrect answer questions; Total Marks 60.

Answer All Questions.

Time: Two (02) hours

Part A – Multiple Choice Questions

Mark the correct answer with an X on the answer sheet provided.

1. Which of the following is present in both the prokaryotic cells and eukaryotic cells?

- | | | |
|--------------------------|------------------------------|-------------------------------|
| a) Nitrogen fixation | b) 70S ribosomes | c) Introns |
| d) Cytoskeletal elements | e) Polypeptide in cell walls | f) Flagella with microtubules |
| g) RNA | | |

- | | | |
|-------------------|-------------------|----------------------|
| (1) b, e and g | (2) b, c, d and g | (3) a, b, c, e and g |
| (4) b, c, e and g | (5) c, e and g | |

2. Microtubules do not play a role in which of the following?

- (1) Fertilization of the human ovum
- (2) Anaphase of meiosis
- (3) Telophase of mitosis
- (4) Transport of Golgi vesicles
- (5) Maintenance of cell shape

3. This question is based on the following.

- | | |
|---------------------------------|--|
| (I) NADP reduction | (II) Synthesis of fatty acids |
| (III) Oxidative phosphorylation | (IV) Gene expression |
| (V) Calvin cycle | (VI) Citric acid cycle |
| (VII) Oxidation of pentoses | (VIII). Acceptance of electrons by water |

Which of the above occur in the mitochondria?

- | | | |
|--------------------------|-------------------------|-------------------------|
| (1) I, III, VI and VII | (2) II, III, IV and VII | (3) III, IV, VI and VII |
| (4) IV, VI, VII and VIII | (5) I, III, V and VIII | |

4. A solution of starch was mixed with a solution of amylase. Which of the following responses indicates the reagent that can be used to confirm the completion of the reaction and the colour of the mixture after completion of the reaction?
- (1) Benedict's solution - Brick red
 - (2) Benedict's solution - Blue
 - (3) Biuret solution - Blue
 - (4) Iodine in potassium iodide solution - Blue black
 - (5) Iodine in potassium iodide solution - Yellow brown
5. Features of some bonds in chemical compounds important for life are as follows.
- I. Contributes for cohesion
 - II. Contribute for thermal properties
 - III. Present within the molecule
- Which of the above features are correct regarding the hydrogen bonds of water?
- (1) I only
 - (2) I and II only
 - (3) II and III only
 - (4) I and III only
 - (5) I, II and III
6. Which of the following responses indicate a haploid, diploid and diploid structure respectively?
- (1) *Mucor* spore, *Selaginella* sporangium, Angiosperm endosperm
 - (2) *Agaricus* basidiospore, *Pogonatum* rhizoid, *Pinus* root
 - (3) *Pogonatum* sporophyte, *Pogonatum* sperm, *Agaricus* dikaryotic hyphae
 - (4) *Cycas* endosperm, *Selaginella* strobilus, *Nephrolepis* embryo
 - (5) *Selaginella* male gametophyte, *Nephrolepis* archegonium, *Cycas* mega sporophyll
7. Which of the following can be seen in *Paramecium*?
- (1) Autotrophic nutrition
 - (2) Pseudopodia
 - (3) Concentration of organelles at one end of the cell
 - (4) Two types of nuclei
 - (5) Cell wall
8. Which of the following statements regarding alternation of generations is correct?
- (1) Nonvascular plants and seedless vascular plants have a dominant gametophyte.
 - (2) Seedless and seed-producing vascular plants have a dominant gametophyte.
 - (3) Seedless and seed-producing vascular plants have a reduced gametophyte.
 - (4) Seedless and seed-producing vascular plants have an independent gametophyte.
 - (5) Nonvascular plants and seedless vascular plants have a dominant sporophyte.
9. Which of the following animal - characteristic feature combinations is correct?
- | Animal | Characteristic feature |
|---------------|-------------------------------|
| A. Snake | Three chambered heart |
| B. Sea Urchin | Parapodia |
| C. Chiton | Muscular foot |
| D. Hydra | Budding |
- (1) B and D (2) A and D (3) A and B (4) C and D (5) A, C and D
10. Pancreatic juice contains
- (1) insulin and dipeptidase.
 - (2) lipase and glucagon.
 - (3) trypsin and chymotrypsin.
 - (4) amylase and bicarbonate ions.
 - (5) water and carboxypeptidase.

11. Damage to which of the following could result in an increase in blood glucose level?
(1) Beta cells in the pancreas (2) Adrenal medulla (3) Thyroid gland
(4) Alpha cells of pancreas (5) Adrenal cortex
12. Which of the following structures is most likely to be seen in a cross section of the human brain taken through the thalamus at a right angle to the vertical axis of the body?
(1) Pons Varolii (2) Frontal lobe (3) Corpus callosum
(4) Pituitary (5) Fourth ventricle
13. Mid-brain of man
(1) perceives taste. (2) is involved in regulation of body temperature.
(3) is Involved in sexual behavior. (4) receives sensory information from eyes.
(5) receives sensory information from skin receptors.
14. Which of the following statements regarding the endocrine glands of man is correct?
(1) Thymus contributes for immunity.
(2) There are two parathyroid glands.
(3) Thyroid gland is responsible for increasing blood calcium level.
(4) Posterior pituitary synthesizes the hormone that stimulates the ejection of milk.
(5) Adrenal gland contributes for reabsorption of K^+ in the kidney tubules.
15. Breakdown of erythrocytes in man occurs in
(1) bone marrow. (2) liver. (3) endometrium. (4) intestine. (5) thymus.
16. Epididymis of man
(1) provides nourishment to spermatids and sperms.
(2) contributes for the production of semen.
(3) secretes anticoagulants.
(4) secretes alkaline mucus.
(5) stores sperms.
17. During pregnancy,
(1) ovulation is stopped due to high level of estrogen in maternal blood.
(2) menstruation is stopped due to formation of a mucus plug in the cervix.
(3) corpus luteum is maintained until birth to secrete progesterone to prevent abortion.
(4) one of the fetal membranes is involved in producing hCG.
(5) fetal movements are usually felt by the mother from the latter part of the first trimester.
18. In the human axial skeleton,
(1) sternum articulates with the 12 ribs to form the thoracic cage.
(2) sacrum is composed of six fused vertebrae.
(3) coccyx is a small triangular bone formed by five vertebrae.
(4) a pair of foramen present in the transverse processes of thoracic vertebrae form passage for vertebral arteries.
(5) the vertebra which is most deviated from the typical structure is the atlas.
19. Reduction in the secretion of ADH
(1) results in the formation of more urine.
(2) reduces reabsorption of water in the proximal convoluted tubules.
(3) reduces reabsorption of Na^+ in the distal convoluted tubules.
(4) reduces excretion of K^+ in the proximal convoluted tubules.
(5) reduces reabsorption of HCO_3^- in the proximal convoluted tubules.

20. Which of the following statements regarding respiration of man is correct?
- (1) When the partial pressure of oxygen in inhaled air is extremely high, five molecules of oxygen will bind with one molecule of haemoglobin.
 - (2) Partial pressure of oxygen in blood reaching glomerular capillaries is higher than that of blood reaching alveolar capillaries.
 - (3) Exchange of gases between blood and alveolar air occurs by active transport.
 - (4) HCO_3^- formed by the dissociation of H_2CO_3 resulting in due to dissolving CO_2 in water plays a major role in regulating breathing.
 - (5) Corpus callosum, pons Varolii and medulla oblongata are involved in the regulation of respiration.
21. Lymphatic system of man is **not** involved in
- (1) absorption of fat.
 - (2) providing immunity.
 - (3) transporting hormones.
 - (4) absorption of vitamins.
 - (5) maintaining blood volume.
22. Which of the following statements regarding human skin is correct?
- (1) Bleeding occurs when epidermis is damaged.
 - (2) Skin is involved in nitrogenous excretion.
 - (3) Skin colour is due to the melanophores present in the dermis.
 - (4) Four types of sensory receptors are found in dermis.
 - (5) Vitamins D and K are synthesized when skin is exposed to sunlight.
23. A small marker was inserted into the primary phloem tissue of one year old Jak plant. Four years later, where would this marker be found?
- (1) Between the vascular cambium and the secondary phloem
 - (2) External to the cork cambium
 - (3) Between the vascular cambium and the primary xylem
 - (4) Internal to the primary xylem
 - (5) Between the secondary phloem and the cork cambium
24. Which of the following would happen when a turgid cell is placed in a solution which has a similar solute potential to the cell sap?
- (1) Endosmosis until its water potential equals to the water potential of the solution
 - (2) Exosmosis until its water potential equals to the water potential of the solution
 - (3) Exosmosis until incipient plasmolysis
 - (4) Exosmosis until plasmolysis
 - (5) Increase in pressure potential
25. Trimming a hedge stimulates the hedge to become bushy because
- (1) it stimulates the production of gibberellin.
 - (2) removing lateral buds results in apical dominance.
 - (3) removing apical meristems makes more auxin which stimulate lateral branch buds to grow.
 - (4) removing apical meristems makes less ethylene which stimulates lateral branches to grow.
 - (5) removing apical meristems results in less auxin which then allows lateral branches to grow.
26. Casparian strip in root
- (1) induces symplastic transport of nutrients.
 - (2) induces apoplastic transport of nutrients.
 - (3) protects vascular cylinder from pathogens.
 - (4) is found in radial and inner walls of endodermal cells.
 - (5) blocks apoplastic transport of water to root xylem vessels.

27. Presence of which of the following is **not** an adaptation of plants for terrestrial life?
(1) Tracheids (2) Stomata (3) Root hairs
(4) Calvin cycle of photosynthesis (5) Collenchyma
28. If the fertilization of gametes to produce next generation occurs at random in a large closed population where there is no selection and mutation, then allele frequencies between generations
(1) increase. (2) decrease. (3) remain constant.
(4) become zero. (5) are unpredictable.
29. Identify the human genetic disorder that that does not involve X chromosome.
(1) Klinefelter syndrome (2) Turner syndrome (3) Sickle cell anaemia
(4) Haemophilia (5) Colour blindness
30. Which of the following responses indicates the greenhouse gasses in the decreasing potential of global warming?
(1) Carbon dioxide, Methane, Water vapour (2) Water vapour, Carbon dioxide. Methane
(3) Carbon dioxide, Nitrous oxide, Methane (4) Methane, Carbon dioxide. Nitrous oxide
(5) Water vapour, Methane, Carbon dioxide
31. Which of the following would happen if carnivores are removed from an ecosystem?
(1) Decrease in the number of herbivores and the amount of vegetation
(2) Decrease in the number of herbivores and increase in the amount of vegetation
(3) Increase in the number of herbivores and amount of vegetation
(4) Increase in the number of herbivores and decrease in the amount of vegetation
(5) Decrease in the number of omnivores and increase in the amount of vegetation
32. Which of the following is **not** a recognized cause of diarrhea?
(1) *Clostridium perfringens* (2) *Vibrio cholera* (3) *Staphylococcus aureus*
(4) *Corynebacterium diphtheriae* (5) *Shigella* sp.
33. Penicillin
(1) inhibits cell wall synthesis of bacteria.
(2) destroys cell walls of Gram negative bacteria.
(3) inhibits protein synthesis of bacteria.
(4) acts the same way as polymyxin.
(5) acts on cell walls of *Penicillium*.
34. Which of the following enzymes is produced industrially using *Saccharomyces cerevisiae*?
(1) Cellulase (2) Protease (3) Amylase
(4) Invertase (5) Lipase
35. Which of the following occurs in the light reactions of photosynthesis?
(1) Oxygen is released due to splitting of water
(2) NADP is produced.
(3) NADPH is reduced to NADP+.
(4) Carbon dioxide is incorporated into PGA.
(5) ATP is phosphorylated to yield ADP.

From questions 36 to 40, question A is for new syllabus students and question B is for old syllabus students. Answer either (A) or (B).

36

(A) – For new syllabus students

Which of the following statements is **false** regarding allosterically regulated enzymes?

- (1) Regulatory molecules bind to active sites of these enzymes.
- (2) They demonstrate cooperativity.
- (3) Their activity can be modulated by substrate concentration.
- (4) Binding one activator molecule will affect active sites of all sub units.
- (5) Shape of the enzyme oscillates between active and inactive forms.

(B) – For old syllabus students

Which of the following statements regarding an enzyme-catalyzed reaction does **not** indicate its difference from an un-catalyzed reaction?

- (1) Energy difference between reactants and products is reduced.
- (2) It has a smaller activation energy.
- (3) Equilibrium value is not changed.
- (4) Rate of the reaction is accelerated.
- (5) A maximal velocity can be achieved.

37

(A) – For new syllabus students

Which of the following statements regarding the human female reproductive system is correct?

- (1) Uterus is lined with ciliated epithelium to transport the fertilized ovum.
- (2) Cervix is located at the proximal end of the uterus.
- (3) Oviduct is capable of making wave-like contractions.
- (4) Immature eggs are formed in the ovary during pre-puberty period of a girl.
- (5) During ovulation, mature ovum is released by rupturing of the follicle.

(B) – For old syllabus students

Which of the following statements regarding the human female reproductive system is correct?

- (1) Outermost layer of the uterus is the perimetrium which is composed of smooth muscle fibers and connective tissue.
- (2) Vagina is lined with ciliated epithelium to transport sperms during intercourse.
- (3) Primary oocytes are present in the ovary even after puberty.
- (4) Ovaries are pear-shaped structures.
- (5) Fertilization takes place at the distal end of the uterus.

38

(A) – For new syllabus students

Which of the following statements regarding defense mechanisms of the human body is correct?

- (1) Inflammatory response is a type of barrier defense in innate immunity.
- (2) Phagocytes are not involved in inflammatory responses.
- (3) Interferons are secreted by healthy phagocytes in blood.
- (4) Complement proteins are present in plasma membranes of body cells.
- (5) When tissues are damaged, blood loss is reduced due to constriction of blood vessels by histamine.

(B) – For old syllabus students

Which of the following statements regarding defense mechanisms of the human body is correct?

- (1) Macrophages and lymphocytes are involved in specific defense mechanisms.
- (2) Immunoglobulins are important for nonspecific defense mechanisms.
- (3) Immunity developed due to injection of immune serum is an example for artificially acquired active immunity.
- (4) Antimicrobial proteins are produced by skin cells.
- (5) Naturally acquired passive immunity results in due to natural infections.

39

(A) – For new syllabus students

Select the **incorrect** stress response adaptation in plants

- (1) Increase in the proportion of unsaturated fatty acids in membranes by cold stress plants
- (2) Decrease in cytoplasmic sugar levels before winter in frost-tolerant plants
- (3) Presence of organic compounds in cell sap of salt tolerant plants
- (4) Release of abscisic acid by drought tolerant plants
- (5) Secretion of excess salts from leaves by salt-tolerant plants

(B) – For old syllabus students

Select incorrect statement regarding vegetative reproductive structures of angiosperms.

- (1) *Alocacia* - Vertically grown swollen underground stem
- (2) *Crinum* - Horizontally grown swollen underground stem
- (3) *Cyperus* - Lateral branches growing horizontally over the soil surface
- (4) *Bryophyllum* - Buds arising from leaves
- (5) *Dioscoria* - Axillary buds of aerial stems

40

(A) – For new syllabus students

Which of the following statements **does not** represent organisms living in one ecosystem in Sri Lanka?

- (1) *Manilkara hexandra*, *Drypetes sepiaraia*, *Diospyros ebenum*
- (2) *Nymphaea* spp., *Ipomea pescaprae*, *Nelumbo nucifera*,
- (3) *Dipterocarpus zeylanicus*, *Vateria copallifera*, *Mesua ferrea*
- (4) *Cinnamomum ovalifolium*, *Elaeocarpus montanus*, Sambar
- (5) *Rhizophora* spp., *Avicennia marina*, *Acanthus ilicifolius*

(B) – For old syllabus students

Which the following statements represent similar types of organisms in terms of biodiversity conservation in Sri Lanka?

- (1) *Melanochelys trijuga*, *Elephas maximus*, *Crocodylus palustris*
- (2) *Dipterocarpus zeylanicus*, *Garcinia quaesita*, *Puntius nigrofasciatus*
- (3) *Oreochromis mossambicus*, *Ophicephalus striatus*, *Hevea brasiliensis*
- (4) *Ichthyophis glutinosus*, *Lingula* sp., *Panthera pardus*
- (5) *Melursus ursinus*, *Dermochelys coreacea*, *Melanochelys trijuga*

Part B – Correct Incorrect answer Questions

Mark the correct answer on the answer sheet provided. Use only the symbols \checkmark or X.

1. Indicate whether each of the following statements regarding following diagram on cell division is correct (\checkmark) or incorrect (X).



- (1) This diagram illustrates the metaphase II of an animal cell.
(2) This species has six pairs of homologous chromosomes.
(3) Independent assortment of chromosomes takes place at this phase.
(4) Crossing over of homologous chromosomes takes place at this phase.
(5) After this phase, chromosomes migrate to two opposite poles.
2. Indicate whether each of the following statements regarding proteins is correct (\checkmark) or incorrect (X).
- (1) Amino acid sequence of a protein determines its three-dimensional shape.
(2) Function of a protein depends upon its three-dimensional structure.
(3) Only covalent bonds are important in specific three-dimensional structure.
(4) Proteins contain a wide range of functional groups.
(5) LH, growth hormone and glucagon are proteins.
3. Indicate whether each of the following statements regarding cell membrane is correct (\checkmark) or incorrect (X).
- (1) Its major structural components are phospholipids and proteins.
(2) Its integral proteins lack tertiary structure.
(3) It consists of a mosaic of polysaccharides and proteins.
(4) Its phospholipids can move laterally.
(5) Some proteins in the membrane act as enzymes.
4. Indicate whether each of the following statements regarding seed plants is correct (\checkmark) or incorrect (X).
- (1) Male gametophyte is enclosed within the pollen wall.
(2) They do not have flagellated sperms.
(3) Pollen grains are transferred towards the ovule in pollination.
(4) Megasporangium is retained within the parent sporophyte.
(5) Seeds are enclosed within mega sporophylls.
5. Indicate whether each of the following statements is part of the Darwin's theory of natural selection (\checkmark) or not (X).
- (1) Species produce more offspring than the environment could accommodate.
(2) Charles Darwin was the first person to propose a mechanism on how evolution occurs.
(3) Genetic variation due to hereditary factors exists within populations.
(4) Genetic frequencies within the population change.
(5) Well-adapted individuals leave more offspring than do poorly adapted individuals.

6. Indicate whether each of the following statements regarding blood circulatory systems of animals is correct (✓) or incorrect (X).
- (1) Vertebrates do not have open blood circulatory systems.
 - (2) Walls of none of the blood vessels of man is porous under normal conditions.
 - (3) Circulation of amphibians cannot be considered as double circulation.
 - (4) Some arthropods have a closed blood circulatory system.
 - (5) Animals without special respiratory structure do not have blood circulatory systems.
7. Indicate whether each of the following statements regarding male reproductive system is correct (✓) or incorrect (X).
- (1) Damage to Sertoli cells may increase FSH secretion.
 - (2) FSH stimulates Leydig cells to produce inhibin.
 - (3) LH regulates maturation of male reproductive organs at puberty.
 - (4) LH stimulates Sertoli cells to produce testosterone.
 - (5) Testosterone inhibits release of FSH from anterior pituitary
8. Indicate whether each of the following statements regarding appendicular skeleton of man is correct (✓) or incorrect (X).
- (1) Upper limb consists of 30 bones.
 - (2) Humerus is the longest bone.
 - (3) Scapula contributes for the formation of an incomplete ball and socket joint.
 - (4) Scapula has two articular surfaces.
 - (5) Five tarsal bones are present in the lower limb.
9. Indicate whether each of the following statements regarding human nephron is correct (✓) or incorrect (X).
- (1) Capillary network of the glomerulus receives blood from an arteriole.
 - (2) Blood from capillary network of glomerulus is collected to a venule.
 - (3) Water reabsorption does not occur in the ascending limb of the loop of Henle.
 - (4) Composition of glomerular filtrate is similar to blood plasma.
 - (5) H^+ are reabsorbed actively in the proximal convoluted tubule.
10. Indicate whether each of the following statements regarding respiratory structures of animals is correct (✓) or incorrect (X).
- (1) Body surface is used for respiration by some invertebrates and some vertebrates.
 - (2) Gills are used for respiration by some invertebrates and some vertebrates.
 - (3) No aquatic animals use lungs for respiration.
 - (4) Book lungs are present in some mollusks and some arthropods.
 - (5) Flame cells are used for respiration by some flat worms.
11. Indicate whether each of the following statements regarding plant hormones is correct (✓) or incorrect (X).
- (1) Gibberellins stimulate fruit growth.
 - (2) Auxin regulates cell division in shoots and roots.
 - (3) Auxin induces fruit growth.
 - (4) Ethylene promotes leaf abscission.
 - (5) Abscisic acid inhibits early seed germination.
12. Indicate whether each of the following statements regarding plant tissues is correct (✓) or incorrect (X).
- (1) Axillary meristems are found in both shoot apex and root apex.
 - (2) Lateral meristems are found in both shoot and root.
 - (3) Bark contains both primary tissues and secondary tissues.
 - (4) Annual ring represents both xylem and phloem formation within one year.
 - (5) Primary dicotyledonous root contains pith, xylem, phloem and pericycle.

13. Indicate whether each of the following statements regarding occurrence of mitosis and meiosis in the life cycles of fungi and plants is correct (✓) or incorrect (X).

- (1) Mitosis occurs in formation of basidiospores in *Agaricus*
- (2) Meiosis occurs in formation of male gametes in flowering plants.
- (3) Meiosis occurs in the division of megaspores in *Selaginella*.
- (4) Meiosis occurs inside mature ovule of flowering plants.
- (5) Meiosis occurs in the formation of endosperm in flowering plants.

14. Indicate whether each of the following statements regarding primary productivity is correct (✓) or incorrect (X).

- (1) It determines the total energy flow through an ecosystem.
- (2) World's highest primary productivity per unit area on land is in tropical rain forests.
- (3) It determines the amount of life which an ecosystem can support.
- (4) Gross productivity minus respiration is equal to net productivity.
- (5) It is carried out only by chemoautotrophs and photoautotrophs

15. This question is based on the following table on terrestrial biomes.

Biome	Distribution	Feature
A. Rain Forest	a. Tropical	I – Evergreen trees are prominent.
B. Chaparral	b. Temperate	II – Deciduous trees are prominent.
C. Grassland		III – Occurrence of forest fires
D. Coniferous forest		IV – Epiphytes are common.

Indicate whether each of the following combinations of the above table is correct (✓) or incorrect (X).

- (1) A, a, IV (2) B, b, III (3) C, b, I (4) D, b, II (5) B, a, I

16. Indicate whether each of the following “Organism - Example” combinations is correct (✓) or incorrect (X).

Organism	Example
(1) Facultative anaerobic organism	- <i>Saccharomyces</i> spp.
(2) Obligate anaerobic organism	- <i>Acetobacter</i> sp.
(3) Chemoautotrophic organism	- Fungi
(4) Chemoheterotrophic organism	- Protozoa
(5) Photoautotrophic organism	- Purple sulphur bacteria

17. Tall and short traits of pea plants are controlled by two alleles. Indicate whether each of the following statements regarding crosses involving pea plants with those traits is correct (✓) or incorrect (X).

- (1) Tall X Short plants cross is a dihybrid cross.
- (2) If tall is the dominant trait, above cross always produce tall plants in F1 generation.
- (3) If both parents in the above cross are true breeding, the F2 generation produced by crossing F1 generation shows 3:1 ratio of Tall:Short plants.
- (4) If the genotype of F1 generation of the above cross is Tt, then the genotypes of the parents should have been Tt and tt,
- (5) If the tall individuals of F1 was crossed with short plants this can be a testcross or a backcross.

From questions 18 to 20, question A is for new syllabus students and question B is for old syllabus students. Answer either (A) or (B).

18 **(A) – For new syllabus students**

Indicate whether each of the following statements regarding epithelial tissues is correct (✓) or incorrect (X).

- (1) Simple squamous epithelium is not present in the kidney.
- (2) Simple columnar epithelium is present in the small intestine.
- (3) Simple cuboidal epithelium is present in places where diffusion occurs
- (4) Some epithelia secrete digestive enzymes.
- (5) Stratified columnar epithelium is found in nasal passage.

(B) – For old syllabus students

Indicate whether each of the following statements regarding epithelial tissues is correct (✓) or incorrect (X).

- (1) Lining of vagina of human females is composed of pseudostratified epithelium.
- (2) Stratified epithelium is found in the lining of the buccal cavity of man.
- (3) Simple columnar epithelium is found in kidney tubules of man.
- (4) Simple squamous epithelium can be seen in the respiratory system of man.
- (5) Pseudostratified epithelium is an example for compound epithelia.

19 **(A) – For new syllabus students**

Indicate whether each of the following statements regarding salivary gland and saliva of man is correct (✓) or incorrect (X).

- (1) Saliva contains glycoproteins and immunoglobulins.
- (2) Saliva is secreted due to a nervous reflex.
- (3) Some salivary glands do not have ducts.
- (4) Sometimes saliva is secreted before food enters mouth due to a hormonal reflex.
- (5) Saliva acts as a physical barrier to invasions of microorganisms.

(B) – For old syllabus students

Indicate whether each of the following statements regarding salivary gland and saliva of man is correct (✓) or incorrect (X).

- (1) There are three pairs of major salivary glands in man.
- (2) Cl^- is present in saliva.
- (3) Sympathetic nervous system stimulates secretion of saliva.
- (4) Simple columnar epithelia are found in salivary glands.
- (5) Saliva is involved in defense mechanisms of the body.

20 **(A) – For new syllabus students**

Indicate whether each of the following statements regarding the applications of recombinant DNA technology in medicine is correct (✓) or incorrect (X).

- (1) Human insulin is produced by genetically engineered cells of human pancreas.
- (2) Hepatitis B vaccine is extracted from recombinant yeast cells.
- (3) The concept of edible vaccines involves engineering antigens in edible parts of the plants.
- (4) Factor VIII used to treat hemophiliacs are produced by genetically modified mammalian cell lines.
- (5) In gene therapy, recombinant *E. coli* with corrected genes is used to treat genetic diseases.

(B) – For old syllabus students

Indicate whether each of the following statements regarding the applications of recombinant DNA technology is correct (✓) or incorrect (X).

- (1) Mammalian cells have not been genetically modified so far.
- (2) Plasmids and viruses are used as vectors in the cloning of DNA.
- (3) Genes that have been modified by genetic engineering cannot be found in nature.
- (4) Cloning of modified genes is an essential step in genetic engineering.
- (5) Although human proteins have been engineered in *E. coli*, *E.coli* genes cannot be engineered in mammalian cells.