

Let us Practice

Exercise I

1. Bone cells that disintegrate the bone matrix to release Ca^{2+} in blood in response to parathormone are (4th NSEB)

(a) osteoblasts (b) osteoclasts
(c) osteocytes (d) All of these

2. Some single-celled, non-photosynthetic organisms have a water expulsion vacuole that collects water from the cytoplasm and expels it from the cell. If you were trying to grow one of these organisms in the laboratory, which growth medium would be closest to its natural habitat?

A dilute, aqueous, nutrient solution

(a) supplemented with 1M NaCl
(b) supplemented with 1M sucrose
(c) supplemented with 1M M glucose
(d) supplemented with 1M KCl
(e) with no supplements

3. The process by which the synthesis of a hormone is regulated by its concentration in the blood, is termed as

(a) forward excitation
(b) feedback inhibition
(c) the equilibrium mechanism
(d) the opposing synthesis theory
(e) catabolic regulation

4. Which statement is false?

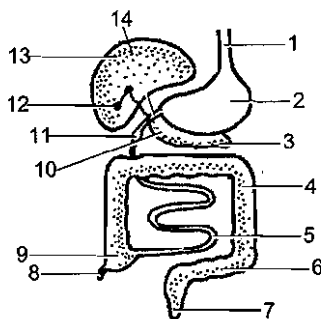
(a) Veins are typically larger in diameter than arteries
(b) Because of their small size, capillaries contain blood that is moving more quickly than in other parts of the circulatory system
(c) The walls of arteries are elastic, enabling them to stretch and shrink with changes in blood pressure
(d) Veins contain more blood than any other part of the circulatory system
(e) The blood pressure in the veins is normally too low for blood to return to the heart without the action of skeletal muscles

5. About 50% of our body cells are of a single tissue, which is (3rd NSEB)

(a) nervous tissue (b) blood
(c) muscles (d) connective tissue

6. Relaxin brings about (3rd NSEB)
- (a) inhibition of reproductive cycle
(b) enlargement of birth canal
(c) dilation of pupil
(d) dilation of uterus

7. Sphincter muscles are found at (refer figure)



(a) 12 and 9 (b) 2, 7 and 8
(c) 8 and 10 (d) 14 and 7

8. In a biology lab exam, a student is given two cultures of single-celled, colourless organisms. She is told that one culture is of an organism collected from the Pacific Ocean and one is of an organism collected from Lake Winnipeg, but neither culture is identified. A question on the exam asks the student to determine which organism came from which source. Which experiment would best provide the answer to the exam question?

(a) Look to see which cells had flagella; the flagellated cells were from Lake Winnipeg
(b) Put some cells of each culture into a 3M sucrose solution; the cells that shrank were from the Pacific Ocean
(c) Put some cells of each culture into a 3M sucrose solution; the cells that shrank were from Lake Winnipeg
(d) Put some cells of each culture into distilled water; the cells that burst were from the Pacific Ocean
(e) Put some cells of each culture into distilled water; the cells that burst were from Lake Winnipeg

9. Partial pressure of oxygen will be highest in (4th NSEB)

- (a) plasma (b) whole blood (c) serum (d) water

10. Various regions of the three embryonic germ layers in vertebrates develop into organs and tissues in the adult. Which match is false?

- (a) Mesoderm – Notochord
(b) Endoderm – Lungs
(c) Ectoderm – Liver
(d) Mesoderm – Muscular system
(e) Ectoderm – Eye

11. Suppose you were working in a diagnostic laboratory and had measured high levels of glucagon and low levels of insulin in a blood sample from a patient. What would be the most likely explanation?

- (a) The patient had consumed a large soft drink on the way to the lab
(b) The patient was suffering from diabetes.
(c) The patient had not eaten anything for several hours
(d) You had made an error in one or both of the measurements
(e) The patient was suffering from cancer of the pancreas

12. Thyroid stimulating hormone (TSH), luteinizing hormone (LH) and oxytocin are all

- (a) released from the pituitary gland
(b) tropic hormones (act on other endocrine tissue)
(c) steroid hormones
(d) sex hormones
(e) involved in the regulation of blood glucose

13. Fats are more difficult to digest than proteins or carbohydrates because (3rd NSEB)

- (a) they are very large and complex molecules
(b) they have ester linkages
(c) they are not easily soluble in water
(d) None of the above

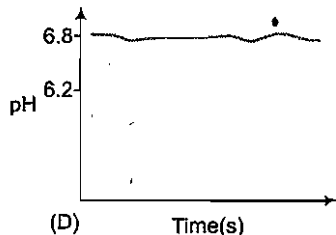
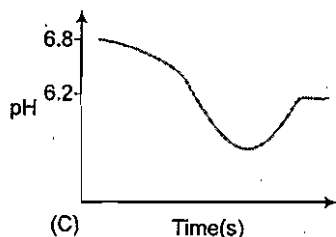
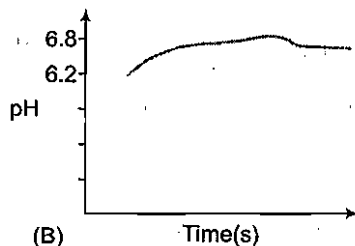
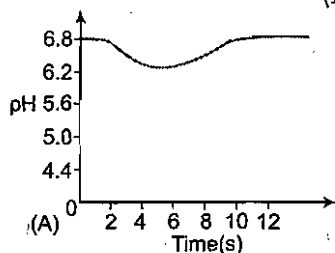
14. Blood stains were found at the site of crime. If DNA fingerprinting is to be used for conviction, which of the following can be used? (4th NSEB)

- (a) Erythrocytes
(b) Leucocytes
(c) Platelets
(d) Serum

15. The three-dimensional structure of villi of small intestine can be best studied by using (4th NSEB)

- (a) fluorescence microscopy
(b) scanning electron microscopy
(c) phase contrast microscopy
(d) transmission electron microscopy

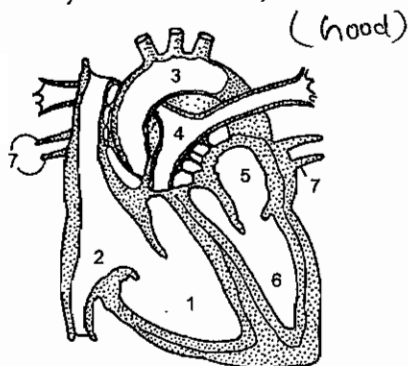
16. Four graphs (A, B, C, D) are given below. (1st NSEB)



Mark one of the following, which represents the pH curve of a muscles cell-excessively exercised and then rested:

- (a) B (b) A
(c) D (d) C

17. The correct sequence of blood flow beginning at the pulmonary arteries and passing through the lungs and the systemic circulation, is



- (hood)
- (a) 2 - 1 - 4 - systemic - 3 - 6 - 5 - 7 - lungs
(b) 3 - 6 - 5 - 7 - systemic - 4 - 1 - 2 - lungs
(c) 4 - lungs - 7 - 5 - 6 - 3 - systemic - 2 - 1
(d) 6 - 4 - lungs - 3 - systemic - 2 - 1 - 5 - 7

18. Oogenesis is the process in the ovary that results in the production of female gametes. Which statement about oogenesis in humans is false?

- (a) Oogenesis begins before birth
(b) In oogenesis, unequal cytokinesis results in one single large daughter cell, which goes on to form the egg
(c) At birth, an ovary already contains all the cells it will ever have that will develop into eggs
(d) The process of oogenesis is completed, when the egg cell is penetrated by sperm
(e) Oogenesis continues throughout the life of the individual

19. Which of the following is incorrectly paired with its function?

- (a) Small intestine—Enzymatic digestion of lipids, proteins and polysaccharides
(b) Oesophagus—transport food from the mouth to the stomach
(c) Large intestine—absorption of undigested sugars, fats and amino acids
(d) Stomach—mechanical and some chemical digestion of food
(e) Epiglottis—prevents food from entering the trachea

20. Various coloured filters were placed amongst a glass tank containing a large number of *Hydra* and light rays allowed to pass through the filters into the tank. It was observed that most of them aggregated in the area against the blue filter. What is the reason?

- (a) Because *Hydra* shows positive response to weak light (blue) and negative response to strong light (red)
(b) Because *Hydra* shows positive response to strong light (red) and negative response to weak light (blue)
(c) *Hydra* shows ambivalent response to both strong and weak light
(d) None of the above

21. If it was possible to genetically engineer humans to be able to run long distances faster at high altitudes, which of the following would not help?

- (a) Increasing the thickness of the cellular lining of the alveoli
(b) Increasing the amount of haemoglobin in each red blood cell
(c) Decreasing the binding affinity of oxygen and haemoglobin at very low oxygen partial pressures
(d) Decreasing the average size of the alveoli
(e) Both (a) and (d)

22. Which of the following is incorrectly paired with its function?

- (a) Epididymis—Maturation and storage of sperm
(b) Prostate gland—Secretes testosterone, a male sex hormone
(c) Fallopian tube—Catches ova and conducts them towards the uterus
(d) Seminal vesicles—Produce a sugar-containing fluid to nourish sperm
(e) Corpus luteum—Produces progesterone, a female sex hormone

23. Homeostatic mechanisms maintain a steady state in the

- (a) blood stream (b) intracellular fluid
(c) surface of the body (d) extracellular fluid

24. Which of the following would not result from the release of adrenaline (epinephrine)?

- (a) Decreased blood flow to skin
(b) Increased oxygen consumption
(c) Rise in blood pressure
(d) Increased conversion of glycogen to glucose
(e) Increased blood flow to intestine

25. Blood cells that increase in number during allergic conditions like asthma are (2nd NSEB)

- (a) neutrophils (b) basophils
(c) eosinophils (d) lymphocytes

26. Small hyperpolarizing changes in potential at the post-synaptic membrane induced by chemical transmitters are (3rd NSEB)

- (a) inhibitory post-synaptic potentials
(b) excitatory post-synaptic potentials
(c) minimal end plate potentials
(d) cumulative post-synaptic potentials

27. The relative high pressure generated in left ventricle can be due to (3rd NSEB)

- (a) thicker wall and stronger valves
(b) denser reticulum of Purkinje fibres
(c) greater volume of blood received by it
(d) stepwise pressure difference generated between right and left chambers of heart

28. At the gastrula stage, most animal zygotes

- (a) look similar to adults
(b) have gene expression patterns similar to that of cell of an adult of the same species
(c) are indistinguishable between animals
(d) are binucleated and diploid with one nucleus from the egg cell and one nucleus from the sperm cell

29. Which of the following animals is correctly matched with its type of skeleton?

- (a) Crab — Exoskeleton
(b) Earthworm — Exoskeleton
(c) Fly — Endoskeleton
(d) Dog — Exoskeleton

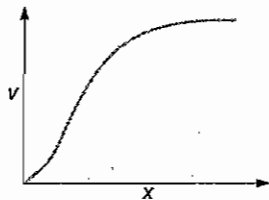
30. If someone had their gall bladder removed, which food would they have the hardest time digesting?

- (a) Salad green
(b) White bread
(c) Fatty bacon
(d) Skim milk
(e) Apples

31. Inside the rumen, the ruminants actually produce some of the following nutrients

- (a) Minerals and fats
(b) Minerals and vitamins
(c) Proteins and carbohydrates
(d) Proteins and vitamins

32. The graph indicates that binding of haemoglobin with oxygen, is (1st NSEB)



- (a) competitive (b) non-competitive
(c) allosteric (d) irreversible

33. Which statement about the mammalian circulatory system is correct?

- (a) The average diameter of arteries is greater than that of veins
(b) The order of decreasing velocity of blood flow is: Arteries > Capillaries > Veins
(c) The total surface area of the capillaries is considerably greater than that of all of the arteries, arterioles, venules, and veins combined
(d) In order to return blood to the heart, the blood pressure in veins is higher than it is in the capillaries
(e) The electrical activity that coordinates the beating of the heart originates in the atrio-ventricular node

34. What is the role of acetylcholine in muscle contraction?

- (a) It is used to link a nerve pulse with receptor in the muscle
(b) It makes upper part of the muscle fibres
(c) The myosin heads use acetylcholine to bind to action filaments
(d) It maintains contraction of a muscle in a manner similar to a brake

35. **Assertion** Insulin is the substance which does not pass through the pancreatic duct with the pancreatic enzyme.

Reason Ligation of pancreatic duct, shows no effect on blood sugar level.

- (a) Both Assertion and Reason are true and Reason is the correct explanation of Assertion
(b) Both Assertion and Reason are true but Reason is not a correct explanation of Assertion
(c) Assertion is true but Reason is false
(d) Reason is true but Assertion is false

Animal Anatomy, Physiology and Reproduction

36. A scientist put some single cells in a hypotonic (relative to the inside of the cells) solutions. She noticed that the cells quickly burst. These cells were probably
(a) plant cells (b) animal cells
(c) bacteria (d) cells killed by heat
37. Carbonic acid and sodium bicarbonate act as buffers in the blood. When a small amount of acid is added to this buffer, the H^+ ions are used up as they combine with the bicarbonate ions. When this happens, the pH of the blood
(a) becomes basic
(b) becomes acidic
(c) does not change
(d) is reversible
(e) ionizes
38. Which state of a living muscle, are the following events associated?
I. Ca^{2+} released by sarcoplasmic reticulum
II. Actin complexes with myosin
III. ATPase is activated
IV. Troponin binds Ca^{2+} (3rd NSEB)
(a) relaxed state
(b) muscle at the beginning of contraction
(c) muscle in tetanus
(d) muscle at the end of contraction
39. Marrow from which of the following bones is most suitable for transplant? (4th NSEB)
(a) Sternum (b) Femur
(c) Humerus (d) Ribs
40. A change in cell size, shape or arrangement due to chronic irritation or inflammation, is called
(a) anaplasia (b) dysplasia (4th NSEB)
(c) paraplasia (d) metaplasia
41. In which of the following is the surface area to volume ratio of the cell most important to its function?
(a) Red blood cell
(b) Tooth enamel cell
(c) Plant fibre cell
(d) Bone marrow cell
(e) White blood cell
42. Which one of the following compound is digested to the greatest extent in the mouth of humans?
(a) Protein (b) Lipid
(c) Nucleic acid (d) Starch
43. Vitamin is considered to have viricidal property.
(a) Vitamin-A (b) Vitamin-D
(c) Vitamin-C (d) Vitamin-K
44. Living organisms produce nitrogenous wastes. The most toxic of these which is also maximally water soluble is (1st NSEB)
(a) urea (b) uric acid
(c) creatine (d) ammonia
45. The main reason for some neurons being myelinated is to
(a) protect the nerve against physical damage
(b) increase the diameter of the axon to slow the speed of the action potential
(c) increase the speed of the action potential
(d) decrease the possibility of false triggering from nearby muscle activity
(e) increase metabolic activity to maintain nerve function
46. Where is blood pressure lowest during diastole?
(a) Arteries (b) Ventricles
(c) Capillaries (d) Venules
(e) Veins
47. In comparison to the cortical nephrons, Henle's loop of juxtamedullary nephrons, is
(a) shorter (b) longer (3rd NSEB)
(c) of same size (d) uncertain
48. Pheromones are considered to be an important means of communication between animals. They are
(a) not normally involved in the reproductive process
(b) specialized visual signals that are species specific and only displayed during courtship
(c) chemical signals that are often involved in the courtship process
(d) non specific communication signals exhibited during the entire reproductive process that change from season to season
49. Ducts that become vasa deferentia in male and degenerate in female are (3rd NSEB)
(a) Mullerian ducts (b) Wolffian ducts
(c) Cuvierian ducts (d) Bellin's duct
50. If the diameter of a blood vessel reduces to half due to the influence of a hormone, the rate of blood flow through it shall decrease to of the original rate. (3rd NSEB)
(a) 1/2 (b) 1/4
(c) 1/6 (d) 1/8

Easy

51. Bacteria are often classified on the basis of their nutrition. Which of the following is a true statement?

- (a) All bacteria are prokaryotes, so they are by definition heterotrophic
- (b) Methanogens derive their energy by consuming methane
- (c) Some bacterial autotrophs derive energy from simple inorganic reactions
- (d) All bacteria require oxygen to generate ATP

52. The glial cells that form the blood brain barrier by lining brain capillaries are the

- (a) oligodendroglial cells
- (b) astrocytes
- (c) Schwann cells
- (d) Ranvier cells

53. Basement membrane is made up of

- (a) only epidermal cell
- (b) endodermal cell
- (c) no cell product of epithelial
- (d) Both (a) and (b)

54. Melatonin and serotonin, the recently reported hormones, are secreted by (3rd NSEB)

- (a) thymus (b) pineal
- (c) adrenal (d) pituitary

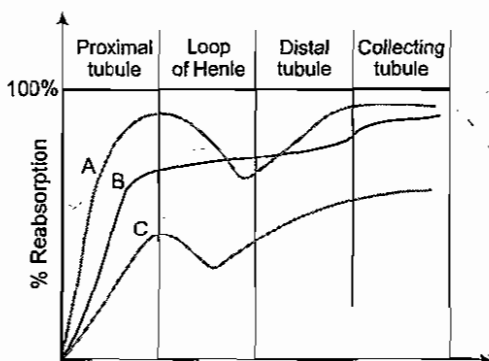
55. In an undamaged blood vessel, conversion of prothrombin to thrombin is prevented by (1st NSEB)

- (a) fibrinogen
- (b) Ca^{2+}
- (c) factor VII
- (d) heparin

56. If a healthy man drinks one litre of water on occasion A and one litre of 0.9 % saline on occasion B, within two hours we expect (3rd NSEB)

	Occasion A		Occasion B	
	Concentration of Na^+ in urine	Volume of urine	Concentration of Na^+ in urine	
(a)	+++	+	+	+++
(b)	+++	+	+	+
(c)	++	++	++	+++
(d)	+++	++	+++	+++

57. The accompanying figure shows reabsorption of some constituents of glomerular filtrate in different parts of mammalian nephron. What can these constituents be? (3rd NSEB)



- (a) A- Na^+ , B-water, C-urea
- (b) A-urea, B- Na^+ , C-water
- (c) A-water, B- Na^+ , C-urea
- (d) A- Na^+ , B-urea, C-water

58. If the vagus nerves (main nerves of the parasympathetic nervous system) were cut, which of the following would be true?

- (a) The heart would stop beating
- (b) The diaphragm would be paralysed
- (c) Adrenaline secretion by the adrenal gland would cease
- (d) None of the above
- (e) All of the above

59. Smoking induces degenerative changes in the lining of trachea. The epithelial cells most affected, are (1st NSEB)

- (a) columnar (b) ciliated
- (c) glandular (d) stratified

60. A scientist develops a drug that she thinks might inhibit the release of gonadotropin-releasing hormone (GnRH) from the hypothalamus. Some volunteer female subjects take the drug. Which of the following results obtained from the volunteers would support the scientist's hypothesis?

- (a) Increased levels of oestrogen in the blood
- (b) Earlier onset of menstruation
- (c) Follicle development
- (d) Decreased levels of luteinizing hormone in the blood
- (e) Enlargement of the breasts

61. Countercurrent exchange in the gills of fish
(a) enhances the flow of water across the gills
(b) enables the fish to obtain oxygen from unpolluted and polluted water
(c) means that water and the blood of the fish move in the same direction
(d) minimizes the diffusion of oxygen into the blood of the fish
62. Which of the following is not a correct match of hormone and function?
(a) Luteinizing hormone—Production of testosterone by the testes
(b) Prolactin—Milk production in the mammary glands
(c) Glucagon—Synthesis of glycogen in liver cells
(d) Oxytocin—Contraction of uterine muscles
(e) Adrenaline (epinephrine)—Inhibition of insulin release by the pancreas
63. Which statement about the vertebrate nervous system is false?
(a) Relaxation of a muscle is caused by nerve impulses in inhibitory neurons going to the muscle from the spinal cord
(b) After completely severing the brain from the spinal cord, reflex withdrawal of the foot from a painful stimulus could still occur
(c) In a simple reflex, the sequence followed by information is sensory receptor, sensory neuron, interneuron, motor neuron, muscle cells
(d) The sympathetic nervous system activates the body's responses to stress, e.g., by increasing heart beat and decreasing blood flow to the gut
(e) The spinal cord and the brain contain many synapses and both function in the processing of information
64. In a mammalian lung, the rate at which oxygen could be obtained from the air would increase if
(a) tidal volume decreased
(b) the cells lining the alveoli and capillaries were thinner
(c) blood haemoglobin content were lower
(d) you ascended to a higher altitude
(e) the alveoli were larger
65. Which statement about mammalian heart function is false?
(a) Contraction of the heart originates at the sinoatrial node in the right atrium
(b) The atrioventricular node propagates the contraction to the ventricles
(c) During atrial contraction venous blood flows into the right ventricle
(d) The pulmonary artery contains oxygenated blood
(e) The left side of the heart pumps only oxygenated arterial blood
66. In human beings, the placenta is formed from
(a) the allantois and the amnion
(b) the amnion and the chorion
(c) the chorion and the allantois
(d) the amnion and the yolk sac
67. If a molecule of carbon dioxide released into the blood in the food of a human foetus is exhaled through the mouth of the mother, it will not travel through the
(a) right atrium of the foetus
(b) right atrium of the mother
(c) left ventricle of the foetus
(d) left ventricle of the mother
(e) placenta
68. If you were to insert a tiny heating probe into the thermoregulatory centre of the hypothalamus and use it to raise the temperature of the hypothalamus slightly, what is most likely to occur?
(a) Shivering
(b) Decreased circulation in the skin
(c) Decreased activity of the sweat glands
(d) A drop in body temperature
(e) Increased muscular activity
69. Honey bees locate their nectar source with the help of Sun. When inside the bee hive, they communicate this information to other bees by
(1st NSEB)
(a) aligning to the axis of the rising Sun
(b) aligning along the gravitational axis
(c) secreting certain chemicals
(d) producing droning sounds
70. A sound is perceived (realized) when
(a) it is first created at its source
(b) the sound wave vibrates the ear drum
(c) vibrations within the inner ear activate a nerve impulse
(d) the nerve impulse initiated by a sound wave from the inner ear reaches the brain
71. The central portion of long bone is (3rd NSEB)
(a) epiphysis
(b) diaphysis
(c) hypophysis
(d) zygopophysis

72. Which of the following pairs is/are matched?

Animal	Gland
I. Toad	Parotid gland
II. Wall lizard	Femoral gland
III. Pigeon	Uropygeal gland

Select the correct answer using the codes given below.

Codes

- (a) I, II and III (b) II alone
(c) III alone (d) I alone

73. Match column I with column II and select the correct answer using the codes given below the lists.

Column I (Parasite)	Column II (Infective Stage)
A. <i>Plasmodium</i>	1. Onchosphere
B. <i>Fasciola</i>	2. Sporozoite
C. <i>Ascaris</i>	3. Cercaria
D. <i>Taenia</i>	4. Embryonated egg
	5. Metacercaria

Codes

- A B C D A B C D
(a) 4 3 5 1 (b) 2 5 4 1
(c) 4 5 2 3 (d) 2 1 4 3

74. Which of the following hormones is not a protein/peptide? (4th NSEB)

- (a) Oxytocin (b) Gastrin
(c) Oestrogen (d) Insulin

75. Some drugs are given to patient to help his body to accept new kidney from donor. They are

- (a) diuretic (3rd NSEB)
(b) antidiuretic
(c) antibiotics
(d) immunosuppressants

76. Which of the cells in retina are almost absent in many nocturnal animals? (3rd NSEB)

- (a) Rods (b) Cones
(c) Epithelial cells (d) Neurons

77. Which neurons found within the spinal cord and involved in recurrent inhibition are called

- (a) Purkinje cells (3rd NSEB)
(b) Renshaw cells
(c) Schwann cells
(d) Ranvier cells

78. Large surface to volume ratio is characteristic of
(a) villi (b) axon (4th NSEB)
(c) mitochondria (d) All of these

79. The general adaptation syndrome (GAS)

- (a) is a mechanism to maintain homeostasis under stress
(b) resets the levels of controlled conditions in the body in response to stress
(c) is a part of the sympathetic (fight or flight) response
(d) reduces the amounts of stress your body encounters

80. The transport of materials to and from the muscle layer in the walls of large arteries and veins is accomplished by their own small vessels called (3rd NSEB)

- (a) vasa recta (b) rete vasculosus
(c) vasa vasorum (d) sacchi vasculosi

81. A myofibril has the proteins—actin, myosin, tropomyosin and troponin. The ratio of actin myosin is (3rd NSEB)

- (a) 1 : 2 (b) 2 : 1
(c) 2 : 5 (d) 5 : 2

82. In a car accident, a person has the sensory neurons to their hand severed with no other damage being recorded. This person will

- (a) regain feeling as the motor neurons will adapt and carry sensory impulses
(b) be unable to feel and move their hand as feeling and movement is carried by the same neurons
(c) regain feeling as the motor nerves replicate and replace damaged neurons
(d) be unlikely to regain feeling in the hand but will be able to move it
(e) have limited movement and feeling in their hands, but this will reduce over time

83. The correct course of food carrying water current in ascidian, is

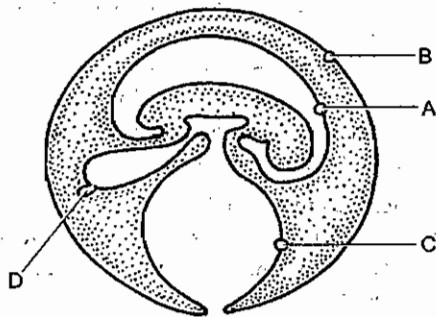
- (a) branchial siphon → atrial cavity → pharynx → gill slits → endostyle → atrial siphon
(b) branchial siphon → pharynx → gill slits → atrial cavity → atrial siphon
(c) atrial siphon → pharynx → gill slits → atrial cavity → branchial siphon
(d) atrial siphon → endostyle → pharynx → gill slits → atrial cavity → branchial siphon

84. Many animals are known to mark out a territory with substances synthesized by specialized glands. In rabbits, this function is performed by
- (a) urination (1st NSEB)
 - (b) testes coated with pheromones
 - (c) anal glands
 - (d) all of the above
85. Which of the following compounds is involved in decreasing blood glucose levels?
- (a) Insulin
 - (b) Glycogen
 - (c) Glucagon
 - (d) Parathyroid hormone
86. In a mammal, lymphatic vessels possess
- (a) a series of valves that facilitate flow in one direction
 - (b) a pumping organ known as the lymphobursae
 - (c) immature red blood cells, which enter the blood stream after maturation
 - (d) connective tissue, smooth muscle and endothelium like that in veins
87. The action of glucocorticoids involves many functions, but only one of the following is a correct one.
- (a) Increases inflammatory responses
 - (b) Decreases lipid hydrolysis (lipolysis)
 - (c) Increases glucose levels
 - (d) Retention of electrolytes by the kidneys
88. Climbing Perch survives out of water due to presence of (1st NSEB)
- (a) lungs
 - (b) both lungs and gills
 - (c) ventral and dorsal gills
 - (d) gill chambers and gills
89. Hibernating animals (that sleep all winter) have tissues containing mitochondria with a membrane protein that accelerates electron transport while blocking the synthesis of ATP. What is the consequence of this?
- (a) Energy is saved because glycolysis and the citric acid cycle shut down
 - (b) Hibernating animals do not have energy to keep warm in cold weather, so they have to sleep through the entire winter
 - (c) Pyruvate is converted to lactic acid by anaerobic fermentation
 - (d) Hibernating animals can synthesize fat instead of wasting energy on respiration
 - (e) The energy of respiration is converted to heat
90. Some of important events in the human female reproductive cycle are listed below. Which of the following best describes their sequence?
1. A drop in progesterone levels.
 2. Secretion of follicle stimulating hormone.
 3. Growth of the corpus luteum.
 4. Oogenesis.
 5. Menstruation .
 6. Ovulation.
 7. Growth of the follicle.
 8. A sudden increase in levels of luteinizing hormone.
- (a) 2 → 4 → 7 → 8 → 6 → 3 → 1 → 5
 - (b) 3 → 8 → 4 → 7 → 1 → 6 → 5 → 2
 - (c) 5 → 7 → 6 → 2 → 8 → 3 → 1 → 4
 - (d) 6 → 3 → 1 → 5 → 8 → 7 → 2 → 4
 - (e) 8 → 3 → 6 → 4 → 2 → 7 → 1 → 5
91. The separation of oxygen from haemoglobin is enhanced near exercising muscle (this is known as the Bohr effect) and is caused by
- (a) oxygen binding to haemoglobin in the lung
 - (b) carbon monoxide binding to oxygenated haemoglobin
 - (c) carbonic anhydrase
 - (d) the interaction of lowered pH with oxygenated haemoglobin
 - (e) the interaction of carbon dioxide with oxygenated haemoglobin
92. Lens, retina and cornea of vertebrate eye are developed from (3rd NSEB)
- (a) only ectoderm
 - (b) ectoderm and mesoderm
 - (c) ectoderm, mesoderm and endoderm
 - (d) ectoderm and endoderm
93. Which statement about gas exchange in vertebrates is false?
- (a) Most of the carbon dioxide in the blood is carried in the form of bicarbonate ions
 - (b) Without diffusion, there would be no gas exchange
 - (c) If the concentration of carbon dioxide in the alveolar air increases, the rate of carbon dioxide exchange decreases
 - (d) Less carbon dioxide would be carried by the blood if there were fewer red blood cells
 - (e) An increase in oxygen concentration would result in less oxygen binding to the iron atoms in haemoglobin

94. The trachea, bronchi and bronchioles of humans have all of the following functions, except
 (a) increasing the surface area available for gas exchange
 (b) moistening the incoming air
 (c) conducting mucus away from the alveoli
 (d) warming the incoming air to body temperature
 (e) conducting air from the exterior of the body to where the respiratory gases can enter or leave the blood
95. The mammalian heart beat
 (a) stops when the nerve supply to the heart is cut
 (b) originates at the atrioventricular node
 (c) decreases when stretch receptors in the vena cava are stimulated
 (d) slows down when activity in the vagus nerve increases
 (e) increases when carbon dioxide levels in the blood decrease
96. A heart beat is initiated by
 (a) the brain
 (b) cells within the heart
 (c) cells located near to the heart
 (d) a coordinated release of hormones throughout the body
 (e) a coordinated release of hormones in the thoracic cavity
97. The iris of the human eye functions to
 (a) focus the image on the retina
 (b) restrict the movement of the lens
 (c) shape the retina
 (d) regulate the amount of light entering the eye
 (e) protect the optic nerve from mechanical damage caused by excessive eye movement
98. In an experiment, the hypothalamus of a rat is artificially cooled to 2°C below normal body temperature. Which of the following would occur?
 (a) an increase in blood flow to the skin
 (b) an increase in general metabolic activity
 (c) Increased excretion of water by the kidneys
 (d) Increased sweating
 (e) Decreased activity of skeletal muscles
99. In a comparison of amounts of urea in human urine, the largest amount of urea would be found with a diet very rich in
 (a) animal fat
 (b) simple carbohydrates (sucrose)
 (c) complex carbohydrates (starches)
 (d) protein
 (e) fruits and vegetables
100. Heart wall is made up of (3rd NSEB)
 (a) fibrous pericardium, epicardium, visceral layer
 (b) serous pericardium, myocardium, endocardium
 (c) fibrous pericardium, parietal pericardium, visceral pericardium
 (d) epicardium, myocardium, endocardium
101. If an adult human female took a drug that inhibited the release of LH (luteinizing hormone) which of the following would not occur?
 (a) The menstrual cycle
 (b) Release of an ovum from a mature follicle
 (c) Secretion of FSH (follicle stimulating hormone) from the pituitary
 (d) Secretion of oestrogen by the follicle cells
 (e) Secretion of GnRH (gonadotropin releasing hormone) from the hypothalamus
102. Which of the following will not result in a blood clot? (4th NSEB)
 (a) Breakdown of platelets
 (b) Absence of prothrombin in blood
 (c) Absence of antithrombin activity in blood
 (d) Presence of factor VIII in blood
103. Which sequence best describes a simple reflex arc such as the knee-jerk reflex?
 (a) Sensory neuron \rightarrow Interneuron \rightarrow Motor neuron \rightarrow Effector cell
 (b) Sensory neuron \rightarrow Interneuron \rightarrow interneuron \rightarrow Motor neuron
 (c) Sensory neuron \rightarrow Motor neuron \rightarrow Interneuron
 (d) Sensory neuron \rightarrow Effector cell \rightarrow Motor neuron
 (e) Sensory neuron \rightarrow Motor neuron \rightarrow Effector cell
104. The secretion of a less than normal amount of the hormone gastrin would have which effect?
 (a) Stomach pH would decrease
 (b) Protein digestion in the stomach would decrease
 (c) Carbohydrate digestion in the stomach would increase
 (d) Secretion of alkaline mucus in the stomach lining would increase
 (e) The sensation of heartburn would begin

105. In the central nervous system, the amount of voltage change required to open enough sodium channels to initiate a nerve impulse, is referred to as the
- refractory potential
 - threshold potential
 - action potential
 - polarization potential
 - resting potential
106. The normal haematocrit (percent red cells in blood) in a human male is around 42%. What is the most likely explanation for a person who is found to have a haematocrit of 50%?
- They are suffering from anaemia
 - They live and work at high altitude
 - They do a lot of scuba diving
 - They are female
 - The measurement is incorrect, because a haematocrit of 50% is impossible
107. Human males produce all the following hormones, except
- testosterone
 - luteinizing hormone
 - follicle stimulating hormone
 - gonadotrophins
 - progesterone
108. How are the time of ovulation and the onset of menstruation related in the human menstrual cycle?
- Both are triggered by high luteinizing hormone 'spikes' (sharp increase in concentration)
 - Ovulation occurs approximately 7 days after the first day of menstruation
 - Ovulation occurs approximately 14 days before the first day of menstruation
 - Ovulation is triggered by copulation; menstruation is triggered by hormonal effect
 - Ovulation is triggered by hormonal effect; menstruation is triggered by copulation
109. Which statement is false?
- Steroid hormones act by passing through the cell membrane and affecting gene transcription
 - Adrenaline (epinephrine) acts on cell membrane receptors to stimulate production of second messengers
 - The anterior pituitary releases several hormones which act on other endocrine glands
 - Insulin is produced in the islets of Langerhans in the spleen, when blood sugar levels fall
 - The posterior pituitary releases a hormone that regulates kidney activity and blood pressure
110. Which statement is false?
- The kidney produces a concentrated urine by establishing a high concentration of salt and urea surrounding the collecting ducts
 - The hypothalamus is a region of the hind brain important in regulating cardiovascular function, such as heart rate and blood pressure
 - In typical reflex arcs, impulses in sensory neurons activate motor neurons *via* interneurons
 - A drop in body temperature is countered by measures such as increasing metabolic rate and shutting down circulation in the skin. This is an example of negative feedback
 - Both the brain and spinal cord are connected to nerves that carry motor and sensory information to and from the viscera
111. Increased sympathetic nervous system stimulation of afferent arterioles results in
- decreased filtrate production
 - increased filtrate production
 - no change in filtration rate
 - increased kidney function
112. This clotting factor is an important link between the intrinsic and extrinsic pathways and is deficient in haemophilia B
- factor IX
 - factor XII
 - factor VIII
 - fibrinogen
113. A mollusc sample is given to a biologist. After examining the sample he says that it belongs to Bivalvia. Which of the followings may be the key that makes him to reach this conclusion?
- Gills
 - Absence of radula
 - Body symmetry
 - Mantle

114. In a hormonal control system, hormone X inhibits the secretion of substance Y. If this system works by positive feedback, which of the following would be correct?
- Substance Y stimulates the production of hormone X
 - Secretion of substance Y should stop completely
 - Levels of hormone X should not be affected by levels of substance Y
 - Levels of substance Y will stabilize at a moderate level
 - Both (a) and (d)
115. Which of the following statements is correct about the nervous system in humans?
- The sympathetic nervous system promotes 'light or flight' responses.
 - Organs in the body are only controlled or influenced by either the sympathetic or the parasympathetic nervous systems.
 - The parasympathetic nervous system promotes food digestion and relaxation in the body.
- I and II
 - I and III
 - II and III
 - I, II and III
116. As a nerve impulse passes along an axon
- the membrane potential changes from positive to negative and then back again
 - sodium ions flow out through ion channels and potassium ions flow in
 - sodium channels open as the membrane potential becomes less negative
 - the sodium-potassium pump moves sodium ions into the cell
 - potassium channels close as the membrane potential becomes more positive
117. Heart of frog is 3-chambered (2 auricles and 1 ventricle) and mixed type of blood flows in the body, whereas in case of fish the heart is 2-chambered with 1 auricle and 1 ventricle. The type of blood that flows through the heart of fish is
- mixed blood
 - auricle has venous blood and ventricle has arterial blood
 - venous blood
 - arterial blood
118. A mammalian red blood cell (erythrocyte) is placed in a hypotonic solution (distilled water). The expected consequence of this is
- the cell volume only slightly increases
 - the cell bursts (lysis)
 - the cell shrivels (crenation)
 - that there is no change in cell volume
119. Read the following statements carefully. Which of the following is/are incorrect statements?
- Cartilage heals slower than skin because cartilage is a deeper tissue.
 - The inside lining of the intestine has a large surface area because of the presence of cilia.
 - Adipose is a type of connective tissue because that is where fat is stored.
- Only I and II are incorrect
 - Only II and III are incorrect
 - Only I and III are incorrect
 - All are incorrect statements
120. During the first two weeks of the human menstrual cycle, artificially increasing blood levels of oestrogen and progesterone will
- inhibit ovulation by reducing the release of LH and FSH from the pituitary
 - cause menstruation to start early
 - cause development of the ovarian follicle through binding to its receptors
 - prevent pregnancy by causing shrinkage and reabsorption of the uterine lining
 - stimulate secretion of milk by the lacteal glands in the breasts
121. Extra embryonic membranes in chick are shown in the given figure. Amnion, allantois, chorion and yolk sac are labelled in the figure respectively as



- D, A, B and C
- D, A, C and B
- A, D, C and B
- A, D, B and C

122. Two species of *Amoeba* X and Y were kept in freshwater and got adapted. Species X developed contractile vacuole. When both the species were transferred to sea water and got adapted both X and Y lost their contractile vacuole. The conclusion that can be drawn is that
- (a) both X and Y are marine species
 - (b) both X and Y are freshwater species
 - (c) X is a marine species while Y is a freshwater species
 - (d) Y is a marine species while X is a freshwater species
123. The pelagic animals remain floating in open water without sinking to the bottom. For this ability to remain a float, which of the following adaptations have been developed by these organisms?
- I. Reduced skeletal and shell materials.
 - II. Incorporation of large amounts of water or air in their tissues.
 - III. Glandular structures that secrete gases into them.
 - IV. Hollow bones.
- (a) I, III and IV
 - (b) I, II and III
 - (c) I, III and IV
 - (d) I, II and IV
124. The function of the gall bladder is to
- (a) store bile produced in the liver
 - (b) produce hormones essential for maintenance of glucose levels in the blood
 - (c) act as a back up if the urinary tract becomes too full
 - (d) sense changes in blood pressure and the oxygen concentration in blood
 - (e) allow hibernating animals to store large amounts of fat
125. Blood of a hypoglycaemic dog 'A' is cross circulated through the pancreas of a test dog 'B' in which pancreatic artery is clamped off so that blood from 'A' only is allowed to flow through the pancreas of 'B'. The blood of 'B' is then tested after 10 minutes. It will be (3rd NSEB)
- (a) hypoglycaemic
 - (b) hyperglycaemic
 - (c) without any change in glucose level
 - (d) Either (a) or (c)
126. Select the correct choice which represents the substance which do not contain any enzyme but important in fat digestion and the organ from where it is secreted.
- (a) Bile – Pancreas
 - (b) Saliva – Salivary gland
 - (c) Bile – Liver
 - (d) Gastric juice – Stomach
127. Of the following biological fluids, the correct order with increasing pH values, is
- I. Stomach. II. Intestinal fluids.
 - III. Blood. IV. Urine. (4th NSEB)
- (a) I, IV, III, II
 - (b) III, I, IV, II
 - (c) II, III, IV, I
 - (d) I, II, III, IV
128. Which of the following three statements is correct about red blood cells in mammals?
- I. Red blood cells circulating in the blood have a nucleus.
 - II. Red blood cells have a similar function to white blood cells.
 - III. Red blood cells are produced by the bone marrow.
- (a) I and II
 - (b) I and III
 - (c) II only
 - (d) III only
129. Some athletes take 'steroids' in an attempt to enhance their physical performance. This can lead to decreased sperm production and even sterility. What is the most likely explanation for this effect?
- (a) Interference in the proper negative feedback control of testosterone by luteinizing hormone
 - (b) Increased stimulation of the anterior pituitary to produce luteinizing hormone
 - (c) Excessive growth of testicular tissue
 - (d) Suppression of the natural production of thyroxine due to the destruction of thyroid tissue
 - (e) Excessive diversion of protein and other metabolites from the gonads to muscle tissue
130. If you were outside for a long time on a hot, dry day, without anything to drink, which of the following would happen?
- (a) The production of thyroxine by your thyroid gland would increase
 - (b) The osmotic pressure of your blood would decrease
 - (c) The re-absorption of fluids from your kidney tubules would decrease
 - (d) The concentration of urea in your urine would decrease
 - (e) The secretion of anti-diuretic hormone from your pituitary gland would increase

131. Suppose you are developing a new drug, and have found that when it is administered in humans there is a substantial increase in the volume of urine produced. When you administer antidiuretic hormone (ADH or vasopressin) at the same time, the volume of urine returns to normal. Which hypothesis best fits these observations? The new drug

(a) blocks the receptors for ADH on the collecting of the kidney
(b) blocks the release of ADH from the pituitary
(c) mimics the action of ADH
(d) damages the kidney
(e) decreases blood pressure

132. The correct sequence in the formation of spermatozoa is

(a) spermatogonia → spermatids → spermatocytes → spermatozoa
(b) spermatids → spermatogonia → spermatocytes → spermatozoa
(c) spermatids → spermatogonia → primary spermatocytes → secondary spermatocytes → spermatozoa
(d) spermatogonia → primary spermatocytes → secondary spermatocytes → spermatids → spermatozoa

133. Trace a sperm cell from the structure where it is produced till fertilization of the egg.

I. Seminiferous tubule V. Vagina
II. Vasa deferens VI. Epididymis
III. Uterus VII. Urethra
IV. Fallopian tube

(a) VI, I, II, VII, V, II, IV
(b) I, VI, II, VII, V, III, IV
(c) I, VI, II, VII, V, IV, III
(d) I, II, VI, VII, V, III, IV

134. When ants bite, they inject

(a) glacial acetic acid
(b) methanol
(c) Formic acid
(d) lactic acid

135. Match the hormones in column I with items in column II and select the correct answer using the codes given below the columns.

Column I	Column II
A. Adrenaline	1. Anger, fear and danger
B. Oestrogen	2. Attracting partners through sense of smell
C. Insulin	3. Females
D. Pheromones	4. Glucose

Codes

A	B	C	D	A	B	C	D
(a) 3	1	4	2	(b) 1	3	2	4
(c) 1	3	4	2	(d) 3	1	2	4

136. In the human eye, the retina functions to

(a) maintain a constant amount of light into the eye
(b) change the shape of the lens and hence the focus of the image
(c) turn light energy into nerve impulses
(d) provide protection against physical damage
(e) change the shape of the eye and hence, the focus of the image

137. Which of the following statements are correct about excreted nitrogenous waste products?

I. Ammonia is more soluble in water than urea.
II. For each nitrogen atom, urea requires more energy to be produced by animals than uric acid.

III. Birds and insects excrete uric acid.

(a) I only (b) III
(c) I and II (d) I and III
(e) II and III

138. The benzodiazepine drug known as valium produces relaxation of smooth muscles by aiding the binding of which of the following neurotransmitter proteins to receptor proteins?

(a) Acetylcholine (b) GABA
(c) Dopamine (d) Glycine

139. Which statement about the structure of skeletal muscle is true?

(a) The sarcoplasm of the muscle cell is contained within the sarcoplasmic reticulum
(b) When a muscle contracts, the A bands of the sarcomere lengthen
(c) When a muscle contracts, the H bands of the sarcomere shorten
(d) The light bands of the sarcomere are the regions where actin and myosin filaments overlap

140. In the liver,

I. oxygen is used to convert amino acid to ammonia.
II. hormones are produced to control blood sugar level.
III. transamination takes place.
IV. vitamins are stored.

Which of the above statements are correct?

- (a) I, II, and III (b) I, III, and IV
(c) III, and IV (d) All are correct

141. A tumour in the adrenal zona glomerulosa can cause hypersecretion of hormones produced in this region. Which of the following might you expect to find in a patient with such a tumour?

- (a) Increased blood sodium levels
(b) Increased blood glucose levels
(c) Decreased blood calcium levels
(d) Increased dehydration

142. For each patient listed in column I, select the blood type listed in column II that would be appropriate for a transfusion.

Column I	Column II
A. A patient who is B Rh ⁻	1. A Rh ⁻ or O Rh ⁻ blood
B. A patient who is A Rh ⁺	2. B Rh ⁺ or O Rh ⁺ blood
C. A patient who is AB Rh ⁻	3. O Rh ⁻ , A Rh ⁻ , B Rh ⁻ , AB Rh ⁻ , O Rh ⁺ , A Rh ⁺ , B Rh ⁺ or AB Rh ⁺ blood
D. A patient who is O Rh ⁻	4. AB Rh ⁺ blood
E. A patient who is AB Rh ⁺	5. None of these

Codes

- | | A | B | C | D | E |
|-----|---|---|---|---|---|
| (a) | 2 | 3 | 5 | 2 | 4 |
| (b) | 5 | 1 | 1 | 5 | 3 |
| (c) | 1 | 2 | 5 | 3 | 4 |
| (d) | 2 | 2 | 3 | 1 | 5 |

143. Long distance, competitive runners are usually small and wiry and run more slowly than sprinters, who run much shorter distances and generally have a large bulk of muscles. Which of the following best explains the differences between the two types of runners?

- (a) Long distance runners run more slowly because lactic acid quickly builds up in their muscles and causes fatigue. Sprinters do not run for a long enough for lactic acid to build up in their muscles
(b) The large muscles of sprinters increases the oxygen supply to each muscle, preventing lactic acid from forming
(c) Sprinters do not run for long enough for sufficient lactic acid to build up in their

muscles therefore they can have large muscles for more power. By being lighter and running more slowly long distance runners ensure that their muscles receive enough oxygen for aerobic respiration

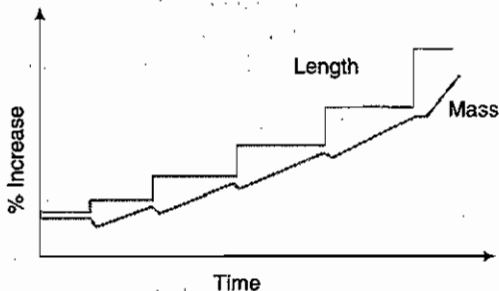
- (d) Sprinters run faster because their large muscles have more blood running through them to stop anaerobic respiration from taking place. Long distance runners run more slowly because they are using the energy from anaerobic respiration, which does not produce as much ATP as aerobic respiration

144. Red blood cells when immersed in 1.2% saline solution and observed under a microscope show
(a) bursting (b) shrinkage (1st NSEB)
(c) intact round cells (d) bulging

145. How is chyme (the semi-liquid stomach contents) treated in the stomach and small intestine?

- (a) The compacted chyme is pushed into the small intestine only after the stomach has completed its action
(b) The chyme has a high pH in the stomach, but that is changed to a low pH in the intestine
(c) Most of the nutrients are absorbed from the chyme before the chyme is passed into the small intestine
(d) Small amounts of chyme are continuously released into the small intestine through the pyloric sphincter
(e) Sucrose and proteins are broken down in the stomach by the enzymes sucrase and trypsin

146. Given graph depicts the growth of an insect. The correct order of the growth is (2nd NSEB)



- (a) Moulting → Increase in body length → Increase in mass → remoulting
(b) Increase in body length → Moulting → increase in body mass
(c) Increase in mass → Moulting → Simultaneous increase in body length and mass

- (d) Moulting → Increase in length → Decrease in mass → Remoulting

147. The region of the brain that integrates visceral activities, body temperature and heart beat is the

- (a) medulla oblongata
- (b) hypothalamus
- (c) cerebrum
- (d) cerebellum
- (e) corpus callosum

148. Which of the following produces negative pressure within your thoracic cavity?

- (a) Exhalation
- (b) Contraction of the diaphragm muscles
- (c) Relaxation of the the muscles between the ribs
- (d) Contraction of the muscles in the wall of the stomach
- (e) Relaxation of the diaphragm muscles

149. What normally causes blood to move in the veins back to the heart?

- (a) Contraction of precapillary sphincters
- (b) Contraction of nearby skeletal muscles
- (c) The closing of valves in the veins
- (d) Gravity
- (e) Energy stored in elastic fibres in the walls of the veins

150. Which of the following best represents the path taken by an amino acid molecule after it is ingested?

- (a) Mouth-Salivary glands-Oesophagus-Small intestine-Pancreas
- (b) Mouth-Oesophagus-Stomach -Duodenum-Liver
- (c) Mouth-Duodenum-Stomach-Small intestine-Colon
- (d) Mouth-Oesophagus-Pancreas-Jejunum-Stomach
- (e) Mouth-Jejunum-Liver-Colon-Small intestine

Which of the following statements about the gills of fish is false?

- (a) The flow of water over the gill is in the same direction as the flow of blood in the filament
- (b) Oxygen gas dissolved in the water diffuses into blood vessels of the gill
- (c) Blood flows into and out of each filament of the gill in separate vessels
- (d) Decreasing the rate of movement of water over the gills would decrease oxygen uptake

- (e) Most fish actively force water over their gills by movement of the operculum

152. Which statement regarding blood cells is correct?

- (a) All blood cells originate in red bone marrow
- (b) Red bone marrow is the primary source of all blood cells except mast cells and macrophage
- (c) Most type of leucocytes appear in equal amounts in the blood
- (d) Erythrocytes are produced in red marrow while leucocytes are produced primarily in lymph nodes

153. Villi found in the small intestine of humans

- (a) serve to increase the surface area of the small intestine for enhanced absorption of digested material
- (b) are not functional in adults
- (c) have no known function
- (d) are large enough to block the intestine to enhance digestion when required
- (e) change shape and function as determined by the material in the intestine

154. Astronauts face several biological problems in space, specially when they are unprotected. One of the below is not relevant to astronauts

- (a) A sense of detachment
- (b) Organs get shocked
- (c) Lack of oxygen in the lungs
- (d) A feeling of heaviness

155. **Assertion** Foetal haemoglobin differs from the adult haemoglobin.

Reason The α -chain of foetal haemoglobin has extra valine residue.

- (a) Both Assertion and are true and Reason is the correct explanation of Assertion
- (b) Both Assertion and Reason are true but Reason is not a correct explanation of A
- (c) Assertion is true but Reason is false
- (d) Assertion is false but Reason is true

156. Gas exchange in animals always involves

- (a) cellular respiration
- (b) breathing movements
- (c) neural control of exchange
- (d) diffusion across membranes
- (e) active transport of gases

157. Which statement explains why fish spend a lot of energy removing oxygen from water?

- They have to pump large volumes of water through their gills to keep their respiratory membranes moist
- CO_2 content of their tissues is much more than that of terrestrial animals
- gills are covered with protective plates which make it more difficult for them to process the oxygen from air
- They have to pump large volumes of water out of their gills because of water's high oxygen content
- They have to pump large volumes of water through their gills because of water's low oxygen content

158. The general functions of the nervous system include which of the following?

- Integration.
 - Motor output.
 - Sensory input.
- Only I
 - Only II
 - Only III
 - Only I and II
 - I, II and III

159. What effect does insulin have in a normal human body?

- It mediates release of glucose by liver cells
- It stimulates formation of glycogen in the liver
- It stimulates conversion of glycogen to glucose
- It increases absorption of glucose in the small intestine
- It counteracts the effects of vitamin deficiencies

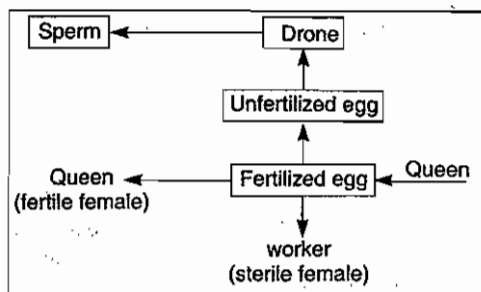
160. In the cardiac cycle, blood pressure is at a maximum when

- the atria are contracting during systole
- the atria are contracting during diastole
- the ventricles are contracting during systole
- the ventricles are relaxing during systole
- the ventricles are relaxing during diastole

161. Food passing beyond the back teeth signals all of the following, except

- churning of the stomach contents
- elevation of the palate to seal off the nasal cavity
- folding of the epiglottis over the trachea
- pressure against the pharynx initiating swallowing
- signals from the swallowing centre inhibit breathing

162. Life cycle of a honeybee is shown in the chart. Chromosomal number of the underlined stages are (2nd NSEB)



- fertilized egg- $2n$; unfertilized egg- n
- fertilized egg- n ; unfertilized egg- $2n$
- fertilized egg- $2n$; unfertilized egg- $2n$
- fertilized egg- $4n$; unfertilized egg- $2n$

163. Match column I (Physicochemical factors) with column II (effects) and select the correct answer using the codes given below the lists.

Column I	Column II
A. Temperature fluctuations	1. Problem of osmoregulation
B. Light fluctuations	2. Shortage of foods to herbivores
C. Concentration	3. Affects distribution of animals
D. Low salinity	4. Major limiting factor

Codes

A B C D

- 2 4 3 1
- 4 2 3 1
- 4 2 1 3
- 2 4 1 3

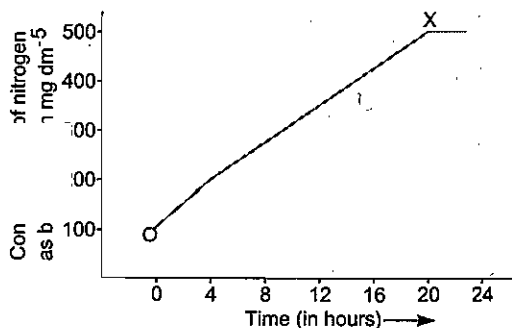
164. A rare disorder, where there is a complete absence of eyes, is called

- xerophthalmia
- anophthalmia
- Tay Sach's disease
- such disorder is not observed till now

165. The best reason, which explains why corpses first sink in water to eventually float to the surface, is

- due to the temperature difference at bottom and surface of water bodies
- due to the buoyant pressure of water

- (c) due to the inflation of body parts by gases like CO_2 and SO_2 evolved during bacteria decomposition of sugar and proteins in the tissues
- (d) due to stiffening of the muscles as a result of Rigor mortis
166. The failure of muscle to return to its original length after contraction, is called
- (a) treppe (b) tetany
(c) spasm (d) contracture
167. When a decrease in both the number and size of RBC occur, the cells may show a multiplicity of distortion in shape (known as poikilocytosis). This will result in anaemic condition known as
- (a) microcytic anaemia
(b) chlorotic anaemia
(c) macrocytic anaemia
(d) haemolytic anaemia
168. Insulin deficiency
- (a) was discovered by Banting and Best in the 1970s; both received Nobel Prize for it
- (b) acts on the liver to cause the release of glucose when glucose is needed during exercise
- (c) was originally difficult to obtain because it is destroyed by protein digesting enzymes from the pancreas.
- (d) can cause diabetic coma by raising blood sugar levels higher than normal
169. The graph shows the effect of liver and kidneys in dogs on the amount of urea in the blood. On the graph, two marks O and X shows the time when these two organs were removed. Which mark shows the removal of which organ?



- (a) 'O' stands for removal of liver and 'X' for the removal of kidney
- (b) 'O' stands for the removal of kidney and 'X' for the removal of liver

- (c) The given data is incomplete
- (d) Any of the mark can be taken as the time of removal of kidney or the liver
170. The cornea is a very important component of the human eye. The main function of the cornea is to
- (a) bend the light before it reaches the lens
- (b) provide structural support to the eye
- (c) contain a concentrated amount of cone cells in the correct orientation
- (d) change the shape of the lens to enable the image to be focused on the retina
171. Saliva in leech contains an anticoagulant called
- (a) hirudin (b) heparin
(c) antihistamine (d) ptyalin
172. Below are measurements of various factors in the blood at the two ends of a capillary bed. What is the most likely location for the capillary bed?

Factor	Arterial End	Venous End
Urea	2.5 mM	2.5 mM
Glucose	4 mM	8 mM
PO_2	100 mm Hg	50 mm Hg
PCO_2	41 mm Hg	46 mm Hg
Hydrostatic pressure	14 mm Hg	8 mm Hg
Osmotic pressure	26 mm Hg	25 mm Hg

- (a) Lung
- (b) Kidney
- (c) Liver
- (d) Small intestine
173. A wound making a hole through a person's chest will cause them difficulty in breathing mainly because
- (a) it would damage the nerves to the diaphragm
- (b) air breathed in through the mouth and nose would escape through the hole
- (c) the negative pressure caused by action of the diaphragm would be lost through the hole
- (d) air would enter the lungs through the hole instead of the normal route through trachea and bronchi
- (e) the expansion of the thoracic cavity would suck air in through the hole rather than expanding the lungs

174. Consider the following statements.

I Grey matter surrounds the white matter in the brain.

II. Grey matter surrounds the white matter in the spinal cord.

III. White matter surrounds the grey matter in the spinal cord.

IV. White matter surrounds the grey matter in the brain.

Of these statements

- (a) I alone is correct
- (b) I and III are correct
- (c) I and IV are correct
- (d) IV alone is correct

175. Which statements best explains why protozoans that live in pond water must use exocytosis to get rid of excess water in their cytoplasm?

- (a) The pond water is hypotonic to the protozoan cytoplasm
- (b) The pond water is hypertonic to the protozoan cytoplasm
- (c) The pond water is isotonic to the protozoan cytoplasm
- (d) Water cannot diffuse across the protozoan plasma membrane
- (e) Protozoans take up water by endocytosis, therefore, they must expel it by exocytosis

176. Steroid hormones

- (a) pass easily through cell membranes to act in the nucleus
- (b) include testosterone, oestrogen, and growth hormone
- (c) are only produced in the pituitary gland
- (d) stimulate liver cells to convert glucose to glycogen
- (e) are made of short chains of amino acids

177. The pancreatic acini produce about 240 mg amylase/hour/gram of pancreas, while the β cells of islets of Langerhans produce about 10 μ g insulin/hour/gram of pancreas. The islets comprises about 1-2% v/v of the pancreas. In equal volume of islet tissue and Acinar tissue, insulin production can be (3rd NSEB)

- (a) 100-200 μ g/hour
- (b) 250-500 μ g/hour
- (c) 500-1000 μ g/hour
- (d) 10-20 μ g/hour

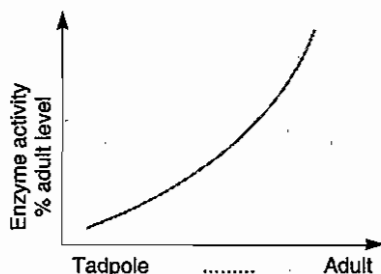
178. Crinophagy is (3rd NSEB)

- (a) release of secretion through the action of lysosomal proteases
- (b) endocytosis of pathogens by granulocytic leucocytes
- (c) endocytosis of low density lipids by lymphocytes
- (d) endocytosis of hormones by their target cells

179. Which of the following participates in increase as well as decrease in skin temperature? (4th NSEB)

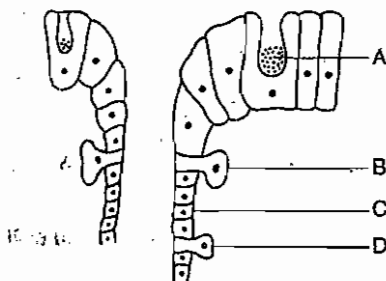
- (a) Skin arterioles
- (b) Skeletal muscles
- (c) Increased adrenaline production
- (d) Sweat glands

180. Graph depicts the concentration of enzymes involved in urea synthesis in a developing tadpole. It indicates a transition from (2nd NSEB)



- (a) ammonotelism to ureotelism
- (b) ammonotelism to ureotelism
- (c) ureotelism to ureotelism
- (d) ureotelism to ureotelism

181. Given diagram is a part of gastric gland (2nd NSEB)



Cell designated as A, B and C are

- (a) A - Zymogenic cells, B - Oxyntic cells, C - Mucous cells
- (b) A - Oxyntic cells, B - Mucous cells, C - Peptic cells

Easy

- (c) A - Mucous cells, B - Oxyntic cell,
C - Zymogenic cells
(d) A - Enteroendocrine cells, B - Mucous cells,
C - Peptic cells

182. Nucleus of the neutrophil is (2nd NSEB)
(a) 2 lobed (b) spindle shaped
(c) 3 lobed (d) spherical

183. The blood vessel with thin enough wall for nutrient exchange with tissue fluid is (2nd NSEB)
(a) vein (b) artery
(c) capillary (d) arteriole

184. The human kidney
(a) is responsible for the storage of nutrients such as glycogen
(b) concentrates the urine by actively transporting water out of the filtrate
(c) produces more dilute urine when the collecting ducts become less permeable to water
(d) responds to antidiuretic hormone by increasing urine output
(e) gets rid of urea from the body by secreting it into the descending arm of the loop of Henle

185. Which of the following is false?
(a) In vertebrate sensory neurons, nerve impulses normally travel both away from and toward the cell body
(b) The resting potential of a neuron is maintained by membrane 'pumps' actively transporting sodium into and potassium out of the cell
(c) Neurons operate with two main types of electrical signal: slow graded potentials and fast action potentials
(d) Saltatory conduction involves nerve impulses 'jumping' between regions of the axon where the myelin sheath is missing
(e) The 'processing' of information by integration of synaptic activity occurs in the spinal cord as well as the brain.

186. How are mature human sperm and ova similar?
(a) They are approximately the same size.
(b) They are formed before birth
(c) They each have a flagellum that provides motility
(d) They are produced from puberty until death
(e) They both have the same number of chromosomes

187. Consider the following statements
Rigor Mortis is accompanied by
I. Loss of excitability.
II. Increase in the thickness of the muscles.
III. Increase in pH.
Of these statements
(a) I, II and III are correct
(b) I and II are correct
(c) II and III are correct
(d) I and III are correct

188. A patient of diabetes mellitus excretes glucose in the urine even when he is kept on carbohydrate free diet. The most likely reasons for this is that
(a) amino acids are catabolized in the urea and form sugar
(b) amino acids are discharged in the blood stream from liver
(c) fats are catabolized to form glucose
(d) glycogen from muscles is released into the blood stream

189. In the series of mitotic divisions, a zygote goes through immediately after fertilization, is called
(a) cleavage (b) blastomere
(c) blastula (d) lastocoel
(e) blastodisc

190. Which part of brain is involved in the contraction of pupil in response to bright light? (3rd NSEB)
(a) Inferior colliculus
(b) Superior colliculus
(c) Hypothalamus
(d) Thalamus

191. The substance that does not directly participate in human digestion, is (4th NSEB)
(a) nucleotides (b) enterokinase
(c) bile salts (d) dipeptidase

192. The membrane proteins that confer blood groups are (4th NSEB)
(a) glycoproteins (b) tromatins
(c) spectrins (d) phosphoproteins

193. Endoscopy, a technique used to explore the stomach or other inner parts of the body, is based on the phenomenon of
(a) polarization
(b) interference
(c) diffraction
(d) total internal reflection

- ✓ 194. If a molecule of carbon dioxide released into the blood in the food of a human foetus is exhaled through the mouth of the mother, it will not travel through the

(a) placenta
 (b) right atrium of the mother
 (c) right ventricle of the mother
 (d) left ventricle of the foetus

- ✓ 195. Match column I with column II and select the correct answer using the codes given below the columns.

Column I	Column II
A. LH	1. Suppression of growth hormone
B. Somatostatin	2. Dispersion of melanin
C. Melatonin	3. Formation of corpora lutea
D. MSH	4. Antigonadal action

Codes

A B C D A B C D
 (a) 3 1 2 4 (b) 3 1 4 2
 (c) 1 3 2 4 (d) 1 3 4 2

- ✓ 196. Which cells of Graafian follicles secrete oestradiol-17 β ? (3rd NSEB)

(a) Stromal
 (b) Thecal
 (c) Granulosa
 (d) All of these

197. The secretory phase of the menstrual cycle

(a) is associated with dropping levels of oestrogen and progesterone
 (b) is when the endometrium begins to degenerate and menstrual flow occurs
 (c) corresponds with the follicular phase of the ovarian cycle
 (d) is the beginning of the menstrual flow
 (e) corresponds with the luteal phase of the ovarian cycle

198. The wishbone of a bird, which supports the flight muscles, formed from

(a) a fusion of the collar bones
 (b) ventral extensions of the vertebrae
 (c) anterior ribs
 (d) posterior extensions of the larynx

199. Which one of the following statements is correct?

(a) Bowman's corpuscles and Malpighian tubules constitute the glomerulus
 (b) Malpighian corpuscles and glomerulus constitute the Bowman's capsule
 (c) Renal corpuscle and glomerulus constitute Malpighian corpuscles
 (d) Bowman's capsule and glomerulus together constitute renal corpuscles

200. The non-excitable, variously shaped and found between neurons is

(a) glial cells (b) Schwann cell
 (c) dendrites (d) Nissl bodies

- ✓ 201. The absorption in the small intestines of humans is damaged, if the liver stops producing bile. The absorption of which compound (a-d) will be severely affected without bile? (1st NSEB)

(a) Dipeptides (b) Fat soluble vitamins
 (c) Starch (d) Glucose

- ✓ 202. The structural unit of kidney characteristic of class-Mammalia and involved in formation of hyperosmotic urine is (2nd NSEB)

(a) collecting tubules
 (b) Bowman's capsule
 (c) Loop of Henle
 (d) glomerulus

- ✓ 203. Myoglobin, when compared with haemoglobin has a

(a) greater affinity for O₂ and begins to release O₂ when it is at a lower partial pressure
 (b) greater affinity for O₂ and begins to release O₂ when it is at a higher partial pressure
 (c) lower affinity for O₂ and begins to release O₂ when it is at lower partial pressure
 (d) lower affinity for O₂ and begins to release O₂ when it is at higher partial pressure

- ✓ 204. Majority of the plasma proteins are synthesized in easy

(a) bone marrow (b) liver
 (c) blood (d) spleen

205. Which of the following organs perform the excretory function in vertebrates?

(a) Liver
 (b) Flame cells
 (c) Lungs
 (d) Kidneys
 (e) Green glands

206. Match the hormones listed under column I with the roles given under column II. Choose the choice in which the alphabets of the two columns are correctly matched.

Column I (Hormone)	Column II (Role)
A. FSH	1. Preparation of endometrium for implantation
B. LH	2. Female secondary sexual characters
C. Progesterone	3. Contraction of uterine muscles
D. Oestrogen	4. Development of corpus luteum
	5. Maturation of Graafian follicle

Codes

- A B C D
 (a) 2 4 1 3
 (b) 5 1 4 2
 (c) 3 5 4 2
 (d) 5 4 1 2

207. Match column I (animal) with column II (development of heart) and select the correct answer using the codes given below the lists.

Column I	Column II
A. Fish	1. Four-chambers
B. Snake	2. No heart
C. Crocodile	3. Three-chambers
D. Starfish	4. Two-chambers

Codes

- A B C D
 (a) 3 2 1
 (b) 4 2 1
 (c) 3 1 2
 (d) 4 1 2

208. Reabsorption of useful substances from glomerular filtrate occurs in

- (a) Collecting tube
 (b) Loop of Henle
 (c) Proximal convoluted tubule
 (d) Distal convoluted tubule

209. Match the structures listed under column I with the functional name given under column II. Choose the correct answer which gives correct combination of the alphabets of the following columns.

Column I	Column II
A. Larynx	1. Lid of pharynx
B. Trachea	2. Air sacs
C. Alveoli	3. Voice box
D. Epiglottis	4. Wind pipe
	5. Common passage

Codes

- A B C D
 (a) 3 5 2 4
 (b) 3 4 1 2
 (c) 3 4 2 5
 (d) 3 4 2 1

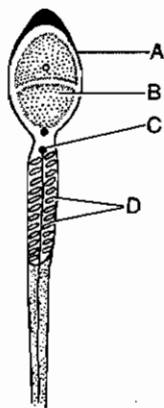
210. Match the parts of human brain listed under column I with the function given under column II. Choose the choice which gives the correct combination of the alphabets of the two columns.

Column I	Column II
A. Cerebral hemisphere	1. Relaying impulses
B. Thalamus	2. Posture and balance
C. Cerebellum	3. Movements of heart, stomach, lungs, etc
D. Medulla oblongata	4. Reflex action
	5. Voluntary control, intelligence, healing, speech, etc

Codes

- A B C D
 (a) 5 2 1 4
 (b) 5 1 2 4
 (c) 3 4 2 5
 (d) 3 2 1 4

211. The four parts labelled as A, B, C and D in the given figure represents, respectively.

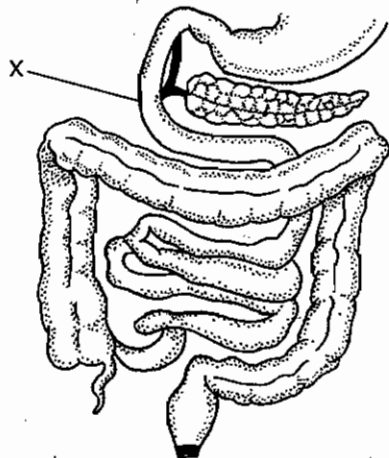


- (a) Mitochondria, Nucleus, Acrosome, Axoneme
(b) Nucleus, Axoneme, Acrosome, Centriole
(c) Acrosome, Nucleus, Centriole, Mitochondria
(d) Acrosome, Nucleus, Mitochondria, Centriole

212. Bordeaux mixture, which widely used in various diseases caused by fungi, contain

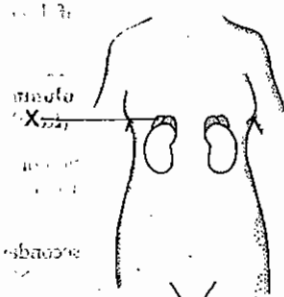
- (a) lime and calcium sulphate
(b) sulphur and lime
(c) copper sulphate and lime
(d) copper sulphate and sulphur
(e) calcium sulphate and sulphur

213. In the given figure of alimentary canal, the part marked as 'X', is



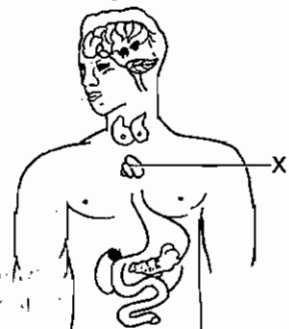
- (a) duodenum
(b) pancreas
(c) large intestine
(d) bile duct

214. What is the name of the gland marked 'X' in the given human figure?



- (a) Thyroid (b) Thymus
(c) Hypothalamus (d) Adrenal

215. In the given figure, different endocrine glands are shown. Name the gland which is marked 'X'.



- (a) Parathyroid (b) Adrenal
(c) Thymus (d) Thyroid

216. Which of the following events take place during inspiration in rabbit?

- (a) The abdominal muscles contract
(b) Due to contraction of external intercostal muscles and flattening of diaphragm, the volume of thoracic cavity increases.
(c) The internal intercostal muscles relax
(d) Due to contraction of external intercostal muscles and flattening of diaphragm, the volume of thoracic cavity decreases

217. RQ is defined as

- (a) $\frac{\text{Volume of } \text{CO}_2 \text{ evolved}}{\text{Volume of } \text{O}_2 \text{ consumed}}$
(b) $\frac{\text{Volume of } \text{O}_2 \text{ consumed}}{\text{Volume of } \text{CO}_2 \text{ evolved}}$
(c) $\frac{\text{Volume of } \text{CO}_2 \text{ evolved}}{\text{Volume of } \text{O}_2 \text{ consumed}}$
(d) $\frac{\text{Volume of } \text{O}_2 \text{ evolved}}{\text{Volume of } \text{CO}_2 \text{ consumed}}$

216. Deficiency of which of the following causes obesity, low plasma Na^+ , high K^+ and increased blood pressure?

- (a) Adrenaline
- (b) Thyroxine
- (c) Cortisol
- (d) Growth hormone

219. Which of the following pairs is/are correctly matched?

Gland	Hormone
I. Pituitary	Follicle stimulating hormone
II. Thyroid	Somatotropic hormone
III. Parathyroid	Thyroxine

- (a) I only
- (b) II and III
- (c) III only
- (d) I, IV and III

220. Starch is converted to maltose by the action of

- (a) amylase
- (b) maltase
- (c) sucrase
- (d) invertase

221. Which statement regarding blood cells is correct?

- (a) All blood cells originate in red bone marrow
- (b) Red bone marrow is the primary source of all blood cells except mast cells and macrophage
- (c) Most types of leucocytes appear in equal amounts in the blood
- (d) Erythrocytes are produced in red marrow while leucocytes are produced primarily in lymph nodes

222. A biologist dilutes blood cells with water on a glass slide and observes them through a microscope. The cells appear to burst. The biologist wants to observe these blood cells in a isotonic solution without the cells bursting. He should investigate

- (a) other types of cells to see if the bursting continues
- (b) the amount of salts in the water used to dilute the blood and the amount of salts in the blood plasma
- (c) the age of the blood sample used by the biologist
- (d) the chemical make-up of the cell membrane of the blood cells

223. Match column I (bone disease) with column II (characteristic) and select the correct answer using the codes given below the columns.

Column I	Column II
A. Gout	1. Bones fuse and joints become immovable
B. Rheumatoid arthritis	2. Erosion of the joint cartilages and roughening of their articular surfaces
C. Osteoarthritis	3. Accumulation of uric acid crystals in the synovial joints

Codes

- A B C
- (a) 3 2 1
- (b) 2 1 3
- (c) 3 1 2
- (d) 1 3 2

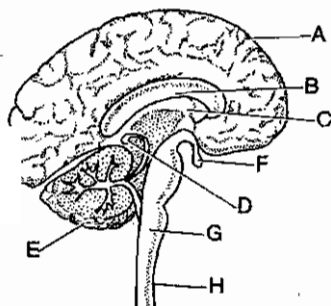
224. Match the endocrine glands, given under column I with their respective position in the body, given under column II. Choose the answer which gives the correct combination of alphabets of two columns.

Column I	Column II
A. Pituitary gland	1. Above kidney
B. Thyroid gland	2. Inside pancreas
C. Adrenal gland	3. On larynx
D. Islets of Langerhans	4. On gonads

Codes

- A B C D
- (a) 4 5 1 2
- (b) 2 4 5 1
- (c) 5 3 1 2
- (d) 1 2 3 5

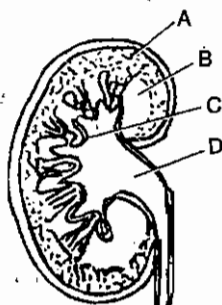
225. In the diagram of the section of human brain given below, different parts are indicated by alphabets. Try to find out that alphabet which represents pituitary?



(a) B
(c) F

(b) D
(d) C

226. The four parts labelled as A, B, C and D in the given figure represent, respectively



- (a) cortex, medulla, pelvis and papilla
(b) cortex, medulla, papilla and pelvis
(c) cortex, papilla, medulla and pelvis
(d) medulla, cortex, papilla and pelvis

227. Match column I (glands) with column II (hormones secreted by the glands) and select the correct answer using the codes given below the columns.

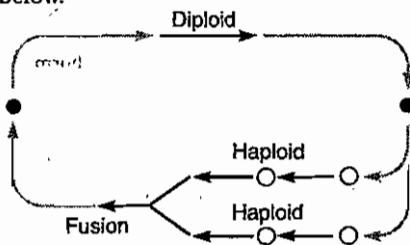
column I	column II
A. Adrenal medulla	1. Insulin
B. Pancreas	2. Adenocorticoid
C. Ovary	3. Epinephrine
D. Pituitary	4. Progesterone

Codes

- A B C D
(a) 3 1 2 4
(b) 3 1 4 2
(c) 1 3 4 2
(d) 1 3 2 4

228. Blastopore in frog's development occurs in
(a) blastula and opens in blastocoel
(b) gastrula and opens in archenteron
(c) blastula and opens in archenteron
(d) gastrula and opens in blastocoel
(e) sometime (b) and sometimes (c)

229. Reproduction is often connected with a shift from haploid to diploid or the other way round. Please read the diagram and decide which group of organisms shows the type of shift mentioned below.



- (a) Birds
(c) BGA
(e) Cryptogams
(b) Bacteria
(d) Ferns

230. Which of the following is a correct match?

- (a) Sickle cell anaemia-X-chromosome
(b) Down's syndrome-21st chromosome
(c) Parkinson's disease-X and Y-chromosome
(d) Haemophilia-Y-chromosome

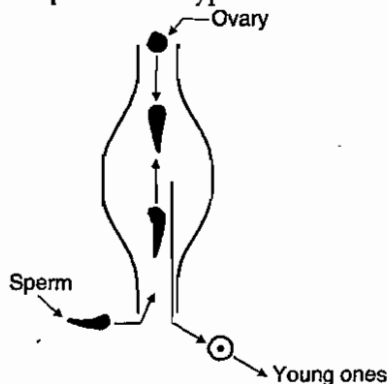
231. Insulin, the effective hormone for diabetes can be got only from animals and can not be artificially produced. Recently, humulin, a substance allied to insulin, has been produced by introducing a coded DNA into the body of bacteria and this achievement is through

- (a) hybridization
(b) inoculation
(c) cloning
(d) genetic engineering

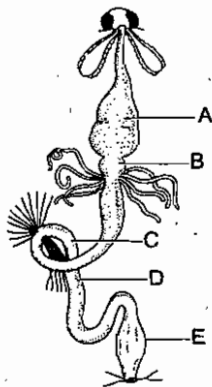
232. Kwashiorkor, an African word to signify 'rejected ones' affecting children of underdeveloped and developing countries with symptoms of stunted growth, loss of appetite, anaemia protruding bellies, match-stick legs, resulting, in great mortality is due to the deficiency of

- (a) vitamins
(b) proteins
(c) fats
(d) carbohydrates

233. The given diagram depicts fertilization and development of the type



- (a) oviparity characteristic of reptiles
 (b) viviparity characteristic of amphibians
 (c) oviparity characteristic of hen
 (d) ovoviviparity characteristic of some amphibians
234. Alimentary canal of the cockroach is given below. A, B, C, D and E indicate respectively.

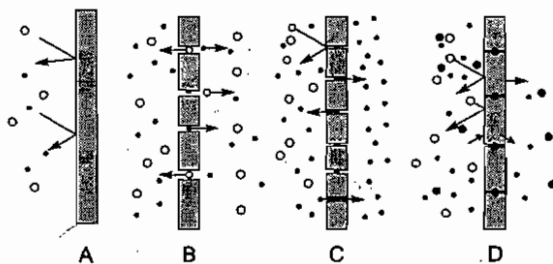


- (a) Gizzard, Crop, Colon, Ileum and Rectum
 (b) Gizzard, Crop, Colon, Ileum and Rectum
 (c) Crop, Gizzard, Colon, Ileum and Rectum
 (d) Crop, Gizzard, Ileum, Colon and Rectum

235. Human insulin has 15 amino acids in two chains. Mark the correct statement.

- (a) A Chain with 21 and B Chain with 30 amino acids
 (b) A Chain with 20 and B Chain with 31 amino acids
 (c) A Chain has 31 and B chain has 20 amino acids
 (d) A Chain has 30 and B Chain has 21 amino acids
 (e) Both the chains have equal amino acids i.e., 20 each

236. Selectively permeable membrane allows selective passage of solutes through them. Which one of the following figure represents selectively permeable membrane.

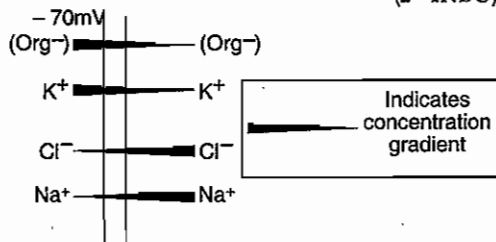


- (a) A
 (b) B
 (c) C
 (d) D

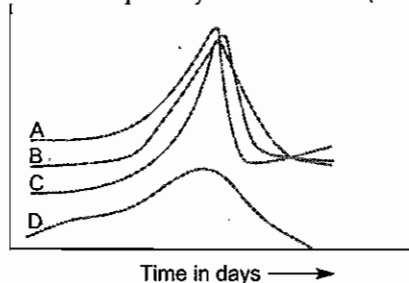
easy

Exercise II

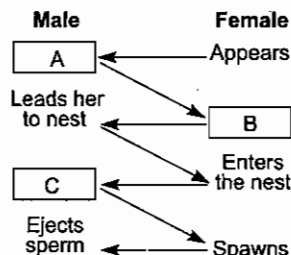
1. The resting membrane potential in the diagram below is -70 mV . Consider a situation in which membrane permeability can be altered to various charged molecules. Then, the correct statement is (2nd INBO)



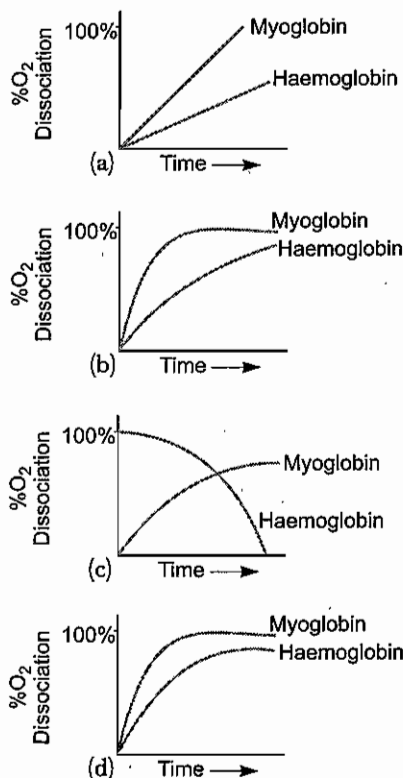
- (a) membrane permeable to only chloride ions and organic molecules will give a more negative membrane potential
- (b) membrane permeable to Na^+ and K^+ ions will give more positive membrane potential
- (c) membrane permeable to K^+ and Cl^- ions will result in no net change in membrane potential
- (d) membrane permeable to Na^+ ions and organic molecules will give more positive membrane potential
2. Two species of *Amoeba* X and Y were kept in freshwater and got adapted. Species X developed contractile vacuole. When both the species were transferred to sea water and got adapted both X and Y lost the contractile vacuole. The conclusion that can be drawn is that
- (a) both X and Y are marine species
- (b) both X and Y are freshwater species
- (c) X is marine species and Y is a freshwater species
- (d) Y is marine species and X is a freshwater species
3. Curves A, B and C indicate the levels of hypothalamic, pituitary and thyroid activity respectively in the development cycle of a frog. Curves would possibly indicate (2nd INBO)



- (a) body length
- (b) hind leg length
- (c) development
- (d) tail length of lungs
4. Rigor Mortis (stiffness after death) occurs due to muscle contraction. However, it lasts for 24 hours and then disappears. This is because: (2nd INBO)
- (a) Ca^{2+} channels in the sarcoplasmic reticulum are closed after 24 hrs
- (b) contraction is an energy requiring process. Since ATP synthesis ceases after death, contraction also ceases
- (c) proteolytic enzymes from lysosomes digest the cross linkages between myosin and actin
- (d) All of the above
5. Reproductive behaviour of stickleback fish is shown, A, B and C indicate (4th NSEB)



- (a) A-Trembling
B-Releases pheromones
C-Displays swollen belly
- (b) A-Zig zag dance
B-Displays swollen belly
C-Trembling
- (c) A-Trembling
B-Zig zag dance
C-Leaves the nest
- (d) A-Displays aggressive behaviour
B-Zig zag dance
C-Displays swollen belly
6. A long deep dive in seals promotes several physiological changes in them. During the dive, blood is shunted away from tissues like muscles and viscera towards the heart and CNS. At the end of the dive, there is great rise in lactic acid level in blood. This is correctly depicted in



✓ 7. Oxygen and carbon dioxide levels in four tissues are given below. Identify the correct one.

	Alveoli		Arterial blood		Muscle at work		Venous blood	
	pO_2	pCO_2	pO_2	pCO_2	pO_2	pCO_2	pO_2	pCO_2
(a)	96	40	104	40	0-12	50-80	40	46
(b)	104	40	96	40	0-12	50-80	40	46
(c)	104	40	40	46	0-12	50-80	96	40
(d)	96	40	104	40	40	46	0-12	50-80

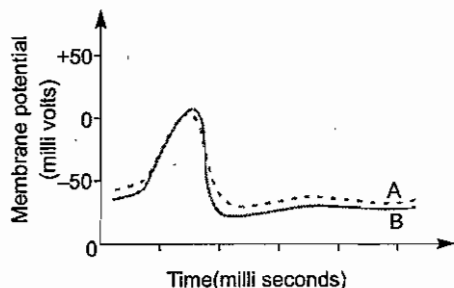
- ✓ 8. Suppose you were a neuroscientist and had been given a sample of a new snake venom. You test its action on action at a synapse, and find that it increases the magnitude of the normal depolarizing excitatory response. The most likely explanation for this is that the venom is
- blocking release of the neurotransmitter from the vesicles
 - binding with the neurotransmitter receptors to interfere with neurotransmitter binding
 - binding with the neurotransmitter receptors to mimic the action of the neurotransmitter

- acting to breakdown the neurotransmitter in the synaptic cleft
 - preventing the presynaptic action potential from arriving at the synapse
9. A scientist discovered that a protein associated with the plasma membrane of a cultured animal cell disappeared from the membrane soon after a hormone was added to the cell. After adding the hormone, if she disrupted the cell and centrifuged it, the protein did not stay in solution but went to the bottom of the centrifuge tube. After adding the hormone, if she disrupted the cell and dissolved all membranes with a detergent before centrifuging, the protein remained in solution. Which statement best explains her results?
- The protein was a peripheral membrane protein that came off the membrane after hormone treatment
 - The hormone caused the cell to make endocytotic vesicles that specifically formed at sites in the plasma membrane that contained the protein
 - The hormone destroyed the protein
 - The hormone bound to the protein to make the protein heavier
 - The hormone caused the plasma membrane to break into fragments, causing the cell to make new plasma membrane without the protein
10. Digestion of food involves breaking down of food components into smaller molecules by enzymes. These enzymes are active only at certain hydrogen ion concentrations. As a result certain food combinations can facilitate or retard the process of digestion. Of the following combinations, one that can result in very efficient digestion is
- meal with high proteins and acid fruits
 - meal with high starch and high proteins
 - meal with high starch and acid fruits
 - meal with high fat and high proteins
- ✓ 11. A major factor responsible for the evolution of four chambered heart with total separation of oxygenated and deoxygenated blood has been
- change in habitat from aquatic to terrestrial
 - increase in body size
 - homeothermism
 - higher mobility and varied diet

12. Papain is a whole dried product obtained from the latex of unripe green papaya fruit. It is used in food industries, confectionary, meat and brewing industries because (2nd INBO)

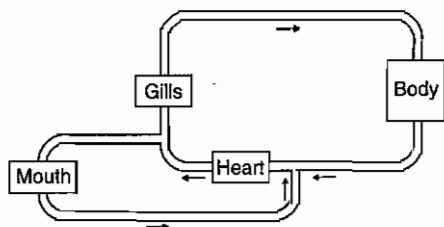
- (a) contains proteolytic enzyme and other components useful for product manufacture
- (b) adds sweetness to products
- (c) papain is antibiotic and kills contaminating microorganisms
- (d) All of the above

13. The figure shows two nerve action potentials recorded intracellularly in response to stimulating an axon. What experimental manipulation would most likely have caused the change from curve A (solid line) to curve B (dashed line)?



- (a) A decrease in stimulus intensity
- (b) A decrease in sodium concentration in the extracellular fluid
- (c) A decrease in the potassium concentration inside the neuron
- (d) The presence of a low concentration of tetrodotoxin, a sodium channel blocker
- (e) An increase in intracellular calcium concentration

14. The diagram depicts a circulatory system of certain air-breathing fish in which the blood gets oxygenated in the gills as well as in the mouth. In this type of fish (2nd INBO)



- (a) body receives fully oxygenated blood while gills receive partly oxygenated blood

- (b) both body and gills receive partly oxygenated blood
- (c) blood reaching the heart is fully deoxygenated
- (d) both body and mouth receive partly deoxygenated blood

15. Which of the following statements concerning mammalian reticulocytes are true?

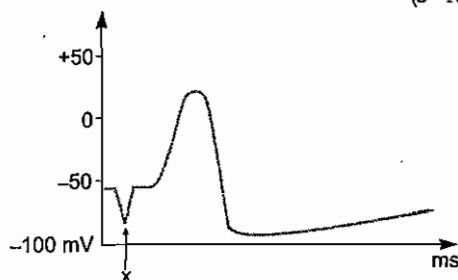
- I. More than 90% of proteins in the cells is haemoglobin.
- II. DNA is absent.
- III. Ribonuclease activity is very low.
- IV. RNA isolated from them can be used to synthesize globin in other cell free systems. (3rd NSEB)

- (a) I and II
- (b) I, II and III
- (c) I, II and IV
- (d) I, II, III and IV

16. In a colony of honey bees, only queen lays eggs, whereas most of the female workers do not have offsprings at all. This can be explained as (2nd INBO)

- (a) true altruistic behaviour for propagation of the species
- (b) collecting food consumes a major fraction of energy of worker bees and they compensate for this loss by not reproducing
- (c) since the worker bees do not contain a diploid set of chromosomes, they are unfit for reproduction
- (d) the behaviour is more advantageous for the worker bees as they are genetically more related to each other than they would be to their offsprings

17. In the graph given below 'x' represents (3rd NSEB)



- (a) auricular diastole in ECG
- (b) absorption of photon by PS-I
- (c) stimulation of axon in CRO
- (d) oxidation of NADH₂ in ETS

18. Ammonia is a very toxic substance especially to the brain cells. Injection of very dilute solutions of

it in the blood can comatose a person. This is because (2nd INBO)

- (a) toxic NH_4^+ ions are formed which penetrate easily through the plasma membrane of brain cells
- (b) neutral molecules of ammonia readily combine with glutamate in the blood to yield toxic glutamine molecules
- (c) molecules of ammonia readily pass through the mitochondrial membranes of brain cells and consume α -ketoglutarate
- (d) NH_4^+ ions affect the brain cell function by changing the polarity of the cell membranes

19. In an attempt to conserve energy, many mammals periodically become inactive and develop adaptive hypothermia. The events that occur during this are given below.

- I. Heat loss exceeds heat production.
- II. As body temperature falls, the heat loss decreases.
- III. Body temperature almost equals the environmental temperature.
- IV. Metabolic activities fall to the basal level.

The correct sequence in which these events occur is (2nd INBO)

- (a) III \rightarrow II \rightarrow IV \rightarrow I (b) I \rightarrow III \rightarrow II \rightarrow IV
- (c) IV \rightarrow I \rightarrow II \rightarrow III (d) III \rightarrow II \rightarrow I \rightarrow IV

20. The anterior pituitary gland facilitates growth of an individual by release of the human growth hormone (HGH) which in turn is regulated by two hormones namely growth hormone releasing hormone (GHRH) and growth hormone inhibiting hormone (GHIH). Imbalance of these hormones could result in gigantism (an individual gains excessive weight), dwarfism (a short statured individual) or acromegaly (thickening of limbs, fingers and toes). Interpret the data given below and select the appropriate statement.

Individual	Age Group	Hormones Released
3	2-5 yr	Excessive GHRH
	2-5 yr	Normal GHRH
4	30-35 yr	Excessive GHRH
4	30-35 yr	Excessive GHIH
5	2-5 yr	Excessive GHIH

(2nd INBO)

- (a) 1 and 3 will lead to gigantism while 4 and 5 will show dwarfism
- (b) 3 will show gigantism, 1 will show acromegaly and 4 and 5 will show dwarfism

- (c) 2, 3 and 4 will show normal growth
- (d) 1 will show gigantism, 3 will show acromegaly and 5 will show dwarfism

21. Intensive investigations have been made about communication of bees for locating the food source. Following are some statements.

- I. Honey bees perform a waggle dance inside or outside the hive.
- II. The slower the waggle dance, longer is the distance between the hive and the food source.
- III. Sound, scents and dancing movements are important "vocabularies" of bees.
- IV. Among different bee species, communication by dancing has evolved earlier than sound communication.

The correct statements are: (2nd INBO)

- (a) III and IV (b) I, II and IV
- (c) I, II and III (d) II and III

Note Questions 22 and 23 related to the following information.

An egg farmer is experimenting with different feed rations with the aim of increasing his production whilst reducing the cost of the feed per egg produced. The data from two feeding experiments is given below.

Experiment 1

	10	11	12	13	14	15	16
Protein concentration in feed (%)	100	100	100	100	100	100	100
Total vitamin level (mg/kg)	6.00	7.00	7.50	8.00	8.50	8.75	9.00
Cost of feed ration per 100 hens per day (s)	60	70	75	80	85	80	80
Number of eggs per 100 hens per day							

Experiment 2

	14	14	14	14	14	14	14
Protein concentration in feed (%)	50	75	100	125	150	175	200
Total vitamin level (mg/kg)	8.00	8.25	8.50	8.75	9.00	9.25	9.50
Cost of feed ration per 100 hens per day (S)	70	80	85	90	95	95	95
Number of eggs per 100 hens per day							

22. Which feed composition gives rise to the least cost per egg produced?

	Protein Concentration (%)	Total Vitamin Level (mg/kg)
(a)	16	100
(b)	14	50
(c)	14	100
(d)	14	150

23. What are the independent variables in each of the two experiments?

Experiment I	Experiment II
(a) Maximum daily egg production	Maximum daily egg production
(b) Protein concentration in the feed	Total vitamin level in the feed
(c) Total vitamin level in the feed	Protein concentration in the feed
(d) Cost of feed ration per egg produced	Cost of feed ration per egg produced

24. A muscle tissue of a bird is isolated to study its respiration. It is found that initially the rate of oxygen uptake by the tissue is very high and falls slowly with time. Which of the following measures will help restore the original rate of respiration?

- I. Excessive aeration of the tissue.
- II. Addition of glucose to the tissue.
- III. Addition of malonic acid with any of the organic tricarboxylic acid to the tissue.
- IV. Addition of cytochrome and flavoprotein to the tissue.
- V. Addition of succinic acid to the tissue.

(2nd INBO)

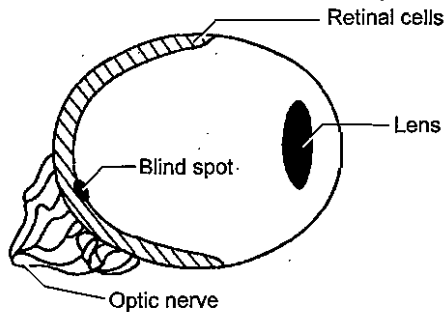
- (a) I and IV
- (b) I, II, III and V
- (c) II and V
- (d) I and III

25. Animals with a slow rate of metabolism usually show a longer life span over those with a very high metabolic rate. The rate of metabolism is determined by surface area to volume ratio of an animal. Considering these factors, mark the correct statement.

(2nd INBO)

- (a) Cow and fox will have very similar life span
- (b) Lion and elephant will have a similar life span
- (c) Crocodile will show much longer life span over a cat
- (d) Peacock will show much longer life span than turtle

26. Diagrammatic representation of an eye of an *Octopus* is shown below. The major mistake/s in the drawing is/are (2nd INBO)



- (a) lens should be biconcave
- (b) the retinal cells should be covered with a layer of neural cells
- (c) there should not be a blind spot in the eye
- (d) All of the above

Note Question 27 relate to the following information.

A sample of an enzyme called lactase was isolated from the intestinal lining of a calf. Assays were undertaken to evaluate the activity of the enzyme sample.

The substrate of lactase is the disaccharide lactose. Lactase breaks a lactose molecule in two producing a glucose molecule and a galactose molecule.

Two assays were carried out.

Assay 1

Lactose concentration (% w/v)	15	15	15	15	15	15
Concentration of enzyme sample (%v/v)	0	5	10	15	20	25
Reaction rate mole glucose sec ⁻¹ mL ⁻¹	0	25	50	75	100	125

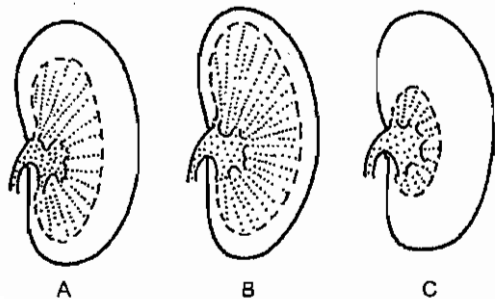
Assay 2

Lactose concentration (% w/v)	0	5	15	20	25	30
Concentration of enzyme sample (%v/v)	5	5	5	5	5	5
Reaction rate μ mole glucose $\text{sec}^{-1} \text{mL}^{-1}$	0	15	25	35	40	40

27. What are the variables in each of the two assays?

Assay 1	Assay 2
(a) Lactose concentration	Concentration of enzyme sample
(b) Concentration of enzyme sample	Lactose concentration
(c) Lactose concentration	Lactose concentration
(d) Concentration of enzyme sample	Concentration of enzyme sample

28. The diagrams show vertical sections of kidneys of coypu, brown rat and kangaroo rat, showing the relative size of cortex and medulla. Coypu are found in freshwater and are never short of water to drink. Brown rats are able to go some days without drinking. Kangaroo rats are able to live in deserts without drinking at all. Which kidney belongs to which animal?



	A	B	C
(a)	Brown rat	Coypu	Kangaroo rat
(b)	Brown rat	Kangaroo rat	Coypu
(c)	Kangaroo rat	Brown rat	Coypu
(d)	Kangaroo rat	Coypu	Brown rat

29. Pancreas have two types of cells namely islets of Langerhans and Acinar cells. In the early years of research on diabetes, extract of this gland was tested on diabetic patients.

Results are tabulated below.

(2nd INBO)

	Reduction in blood sugar level
I. Extract of pancreas	-
II. Islet cell extract	+
III. Acinar cell extract	-

The correct interpretation is

- (a) anti-diabetic factor present in extract 'III' was inactivated by extract 'I'
 (b) anti-diabetic factor present in 'I' was destroyed by 'II'
 (c) both 'I' and 'III' destroyed the anti-diabetic factor present in 'B'
 (d) anti-diabetic factor present in 'II' was destroyed by 'III'

30. Marine birds possess a pair of glands called the 'Salt glands' which remove Na^+ . The sequence of events involved in the functioning of these glands is given below.

Excellent

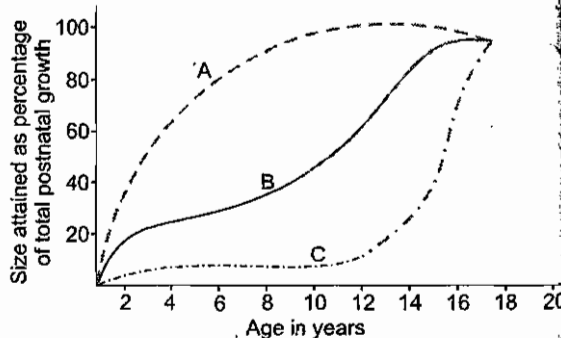
The correct order of events is

- I. Increase in amount of acetylcholine and Ca^{2+} ions.
 II. Increase in venous pressure.
 III. Activation of Na^+/K^+ -ATPase and Mg^{2+} -ATPase pumps.
 IV. Removal of sodium actively.
 V. Activation of acetylcholine secreting cholinergic neurons by osmoreceptors in the hypothalamus.

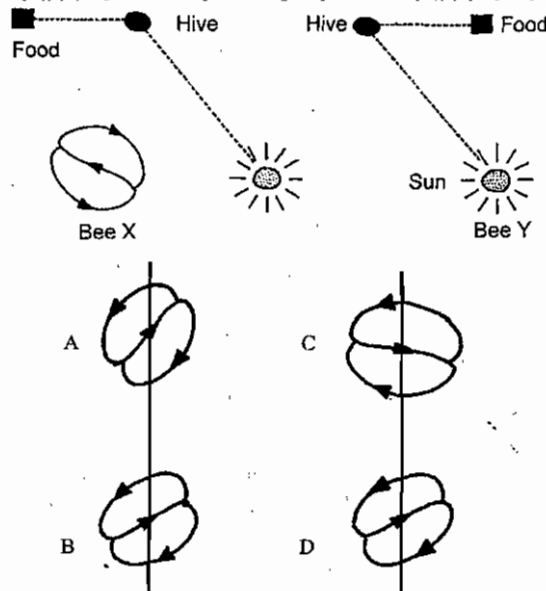
(2nd INBO)

- (a) V, I, II, III and IV
 (b) II, I, V, III and IV
 (c) II, V, I, III and IV
 (d) I, V, III, IV and II

31. Three curves (A, B, C) are given in the graph plotted and the size attained as percentage of total postnatal growth. Which of the following is the correct interpretation?



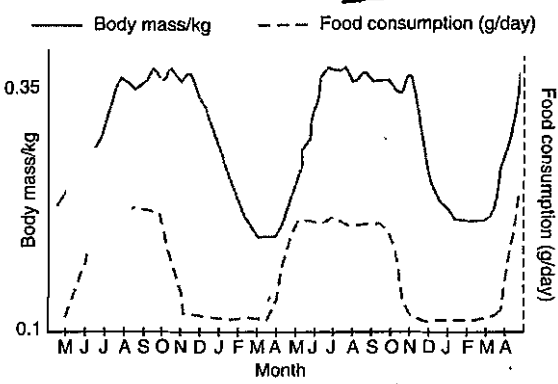
- (a) Curve A is for growth of brain and head
Curve B is for reproductive tissues
Curve C is for body as a whole
- (b) Curve A is for body as a whole
Curve B is for reproductive tissues
Curve C is for growth of brain and head
- (c) Curve A is for growth of brain and head
Curve B is for body as a whole
Curve C is for reproductive tissues
- (d) Curve A is for reproductive tissues
Curve B is for brain and head
Curve C is for body as a whole
32. Which one of the alternatives below defines the layers of the retina in the correct sequence? (Note The first layer in each sequence is supposed to be located next to the jellylike vitreous humor that fills the eyeball.)
- (a) Pigmented cells-Bipolar cells-Ganglion cells-Photoreceptors
- (b) Photoreceptors-Pigmented cells-Bipolar cells-Ganglion cells
- (c) Ganglion cells-Bipolar cells-Photoreceptors-Pigmented cells
- (d) Photoreceptors-Bipolar cells-Ganglion cells-Pigmented cells
33. A bee X has found a location with pollen supplies. His waggle dance in the hive is shown in the diagram. Another bee Y has found a location with food. Which of the following diagrams (A, B, C, D) represents the waggle dance of bee Y?



34. Trace a sperm cell from the structure, where it is produced to fertilization of the egg.
- Seminiferous tubules
 - Vas deferens
 - Uterus
 - Fallopian tube
 - Vagina
 - Epididymis
 - Urethra
- (a) VI, I, II, VII, V, III, IV
(b) I, VI, II, VII, V, III, IV
(c) I, VI, II, VII, V, IV, III
(d) I, II, VI, VII, V, III, IV
(e) I, II, VI, VII, V, IV, III
35. Cranchiadae (squid) float almost motionlessly in sea-water almost without any efforts. The squid shows high accumulation of NH_4Cl (80%) in its body fluid. Mark the incorrect statement.
- (a) NH_4^+ is a lighter cation than Na^+ and helps in floating
- (b) NH_4^+ is highly acidic and makes coelomic fluid acidic
- (c) NH_4^+ is toxic and demands special excretory tissues
- (d) NH_4^+ makes body fluid hypotonic, helping it to float
36. In a laboratory experiment, a snake-venom was injected into rabbits (test-animals), which caused severe haemolysis in them. The analysis of snake venom showed several minor enzymatic proteins with a majority of the two protein components
- phospholipase.
 - phosphodiesterase.
- Which of the proteins caused haemolysis?
- (a) Only I (b) Only II
(c) Both I and II (d) None of these
37. Barium in a suitable form is administered to patients before an X-ray examination of the stomach, because
- (a) barium allows X-rays to pass through the stomach on account of its transparency to X-rays
- (b) barium compound, like magnesium sulphate, helps in cleaning the stomach before X-ray examination
- (c) barium salts are white in colour and this helps the stomach to appear clearly in contrast with other regions in the picture
- (d) barium is good absorber of X-rays and this helps the stomach to appear clearly in contrast with other regions in the picture

38. When a muscle cell has a shortage of oxygen will the pH decrease or increase? What substance is responsible for this change in pH?
- Decrease carbon dioxide
 - Decrease lactate (lactic acid)
 - Increase carbon dioxide
 - Increase lactate (lactic acid)
39. The concentration of an electrically neutral substance within a certain type of blood cell is much higher than it is in the surrounding blood plasma, yet the substance continues to move into the cell. The process by which this substance moves into the cell is called
- osmosis
 - simple diffusion
 - facilitated diffusion
 - active transport
40. If there is a blockage between the AV node and AV bundle, how will this affect the appearance of the ECG?
- P-R interval would be smaller
 - QRS interval would be longer
 - There would be more P waves than QRS complexes
 - There would be more QRS complexes than P waves
41. Four possibilities for the transport of carbon dioxide from the body cells to the lungs are listed below. Which possibility does not exist?
- Bound to the ferro-ions of haemoglobin in erythrocytes
 - As a hydrocarbonate ion in the buffering system of the blood
 - Bound to the protein of haemoglobin in erythrocytes
 - Dissolved in blood plasma and in erythrocyte cytoplasm
42. The vitelline sac (= yolk sac) is expected to be small in which one of the following groups?
- groups that fertilize externally
 - groups with embryos that are fed from maternal blood
 - In groups that fertilize internally
 - In groups that have an allantoic membrane
43. In the blood of an adult man the total content of haemoglobin is, roughly
- several hundred grams
 - tens of grams (10-100 g)
 - several gram
 - several hundred milligrams
 - tens of milligrams
44. A woman married for the second time. Her first husband was of ABO blood type 'A' and her child by that marriage was of type 'A'. Her second husband is of type 'B' and their child is of type, 'AB'. What is the woman's blood group?
- $I^A I^B$
 - $I^A I^A$
 - ii
 - $I^A i$
45. Which of the following statements about the female reproductive system are true or false?
- Both oestrogen and progesterone are necessary for ovulation to take place.
 - Oestrogen tends to inhibit the production of FSH by the anterior pituitary gland.
 - Fertilization of the ovum by the spermatozoon normally takes place in the uterus.
 - Progesterone production is largely under the control of LH.
 - Throughout the part of the menstrual cycle that follows ovulation, there is a slight rise in body temperature.
- Your views are indicated by using + (true) or - (false). Choose the correct option.
- + - + +
 - - + + +
 - + - + -
 - + + - - -
46. A heron standing in a cold water for a long time doesn't get its legs over chilled because of
- counter circulation in limbs
 - even thin fat layer under limbs' skin
 - branched blood stream in limbs
 - intensive metabolism in limbs
47. Which reactions are made with the help of system of giant axons? V. Easy
- Quick non-differential reactions
 - Quick-differential reactions
 - Slow non differential reactions
 - Slow differential reactions
48. The data below was obtained from an experiment when a golden mantled squirrel was kept in the laboratory for 2 years under constant light and dark condition (12 h light and 12 h dark) and temperature (22°C).

done but good.



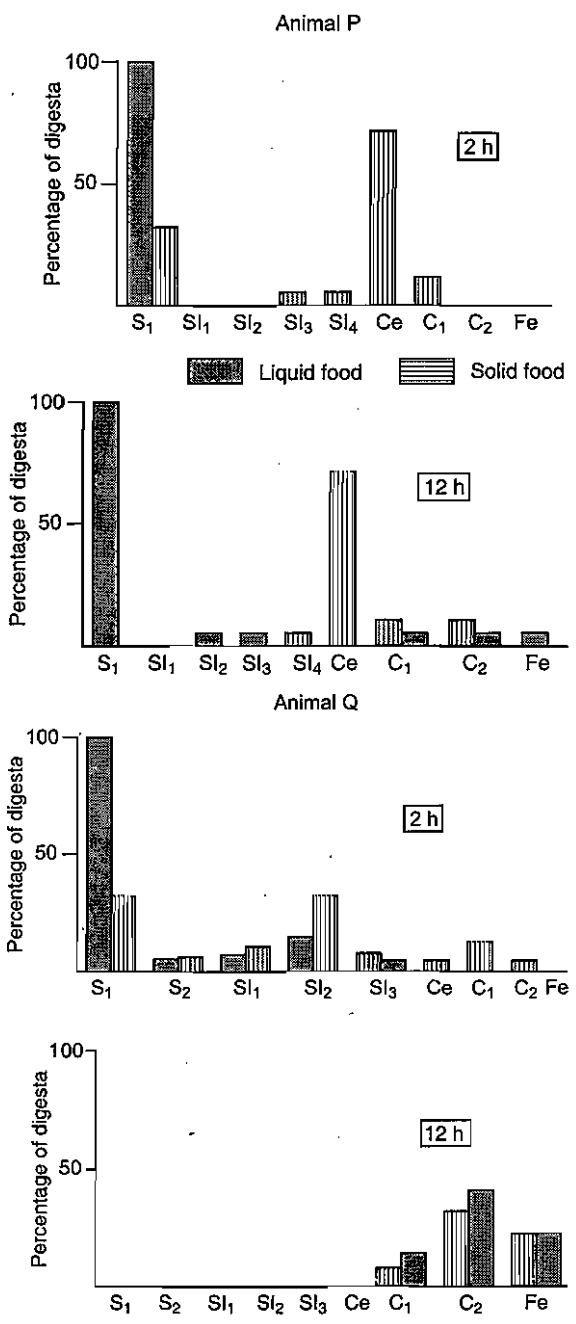
- The graph indicates that the animal is
- (a) an obligate hibernator with exogenous signals for entry into hibernation
 - (b) a facultative hibernator with endogenous signals for entry into hibernation
 - (c) an obligate hibernator with endogenous signals for entry into hibernation
 - (d) a facultative hibernator with exogenous signals for entry into hibernation

49. In vertebrates, the long bones are always hollow. The advantages that this anatomy provides are that
- I. they harbour and protect marrow.
 - II. they provide attachment to tendons.
 - III. they are stronger than solid structures made of same amount of material.
 - IV. only hollow bones can articulate better with one another.
- (a) Only I, II and IV
 - (b) Only I and III
 - (c) Only I, III and IV
 - (d) I, II, III and IV

50. Collagenase is an enzyme that breaks the peptide bonds in collagen. Excessive secretion of this enzyme will lead to weakening of
- I. Bones
 - II. Tendons
 - III. Intervertebral discs
 - IV. Hair shafts
 - V. Nails and claws
- (a) I, IV and V
 - (b) II, III and V
 - (c) I, II and IV
 - (d) I, II and III

51. Predominant chitinase activity will be detected in the gastric mucosa and pancreas of
- (a) sheep
 - (b) rabbit
 - (c) pigeon
 - (d) salamander

52. The percentage of digesta fluids and particulate markers recovered from the gastrointestinal tract of two animals is shown in the figures below. (S = stomach, SI = Small intestine, Ce = Caecum, C = colon, Fe = Faeces)



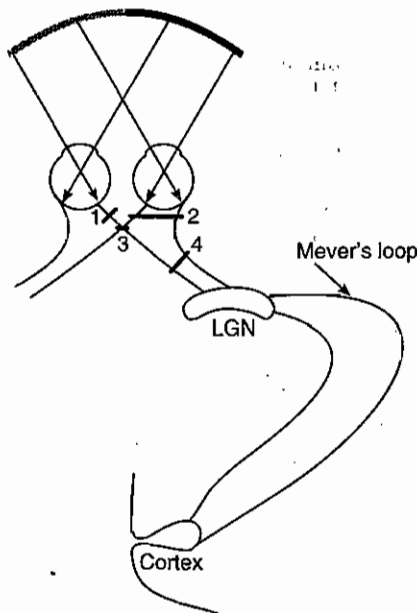
- P and Q respectively are
 (a) herbivore and carnivore
 (b) omnivore and herbivore
 (c) foregut fermentor and hindgut fermentor
 (d) piscivore and herbivore

53. The percentage of blood (by volume) occupied by corpuscles in two animals (1 and 2) which can survive at low as well as high altitudes is shown in the table

	Altitude	Corpuscles (%)
Animal 1	Sea level	34
Animal 2	Sea level	33
Animal 1	4700 m	50
Animal 2	4700 m	34

Mark the correct interpretation.

- (a) Animal 1 is poorly adapted at high altitude as compared to animal 2.
 (b) Animal 2 is poorly adapted at high altitude as compared to animal 1.
 (c) Affinity of haemoglobin for oxygen in animal 1 is higher at lower altitude.
 (d) Haemoglobin of animal 2 shows higher affinity for oxygen as compared to animal 1.
54. Vision is generated by photoreceptors in the retina. The information leaves the eye by the way of the optic nerve. The visual pathway from eye to cortex region is depicted in the diagram. A lesion in the optic nerve fibre can lead to partial or complete loss of vision depending on the site



of the lesion. Lesions in four different sites are indicated by black lines. Match them against the corresponding visual field defect and fill in the number in the appropriate box in the table.

Visual Field Defect (Shaded portion in the circle indicates loss of vision)	Lesion Site
(i)	4
(ii)	3
(iii)	
(iv)	
(v)	2
(vi)	1

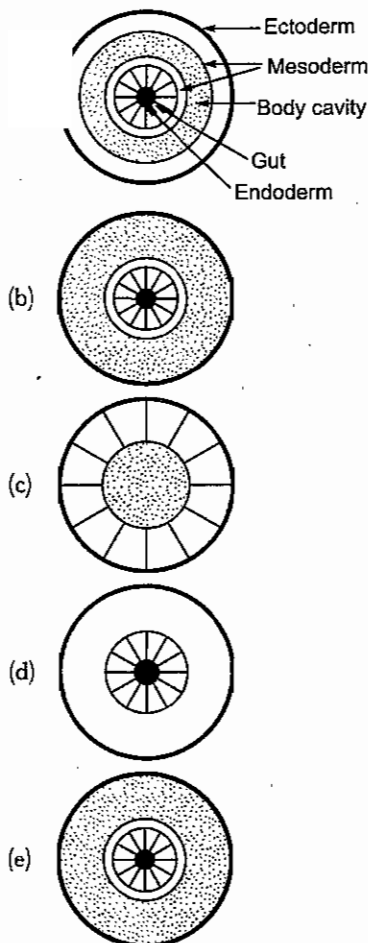
55. *Rhodinus*, a blood-sucking bug shows five instars before it metamorphoses into an adult. It has a very long head with the brain located at its tip and an organ called Corpora Cardiaca (CC) behind it. The hormone that ensures the continuum of the juvenile stages is called a juvenile hormone.

Behind the head is a pro-thoracic gland, which gets triggered by the Pro-Thoracico-Tropic Hormone (PTTH) to release ecdysone required for molting into an adult.

The following observations were made when the juveniles of this insect were subjected to various conditions:

- I. Starved juveniles (any instar) when decapitated → Remained juveniles and did not molt into adults.
 - II. Well-fed juveniles (any instar) when decapitated → Molted into adults.
 - III. Starved juveniles (any instar) when partially decapitated to remove the brain cells → Remained juveniles and did not molt into adults.
 - IV. Well-fed juveniles (any instar) when partially decapitated to remove the brain cells → Did not molt into adults.
- (A) Can the following conclusions be drawn from these data?
- (a) Ecdysone hormone is produced irrespective of the level of feeding
 - (b) CC is the site of production of juvenile hormone
 - (c) PTTH is produced irrespective of the level of feeding

56. Different types of 'tube-within-tube' body pattern of multicellular animals have been depicted as (a) (b) (c) (d) and (e).



Diameters of circles not to the scale

Determine the body pattern for each of the animal/animal groups listed below.

Animal Group	Body pattern (a/b/c/d/e)
Sea urchin	
Sea anemone	
Nematodes	
Star fish	
Corals	
Snakes	
Rotifers	
Tape worm	

57. Which of the following statements most accurately describes the structure of haemoglobin?

- Haemoglobin consists of a single polypeptide chain with a haem centre containing an iron ion to which a molecule of O_2 binds
- Haemoglobin consists of a single polypeptide chain with a haem centre containing a copper ion to which a molecule of O_2 binds
- Haemoglobin consists of four polypeptide chains, each of which have a haem group containing an iron ion. One haemoglobin molecule can bind a total of four O_2 molecules.
- Haemoglobin consists of four polypeptide chains, each of which have a haem group containing a copper ion. One haemoglobin molecule can bind a total of four O_2 molecules
- None of the above

58. Which of the following best explains the difference between oviparity and viviparity?

- Oviparous animals do not care for their young following fertilization, while viviparous animals do
- Oviparous animals are egg-bearing and embryonic development takes place in the environment, viviparous animals retain their embryos for development within the mother's body
- Oviparous animals receive nutrition directly from the mother's body during development, while the embryos of viviparous animals receive nourishment from yolk sacs
- Oviparous animals utilize external fertilization, while viviparous animals use internal fertilization
- None of the above

59. One of the effects of aspirin is the slowing of blood clotting by inhibiting the enzyme cyclo-oxygenase in blood platelets. The rate of reversal of the effects of aspirin parallel the rate of turnover of platelets. This information implies that aspirin

- is a negative allosteric effector of the cyclo-oxygenase
- regulates the production of platelets
- is a competitive inhibitor of the cyclo-oxygenase

- (d) is an irreversible inhibitor of the cyclo-oxygenase
- (e) is an uncompetitive inhibitor of the cyclo-oxygenase
60. All of the following represent differences between the processes of spermatogenesis and oogenesis in human, except
- that oogenesis produces polar bodies, spermatogenesis does not
 - that the production of oögonia stops before birth, while the production of spermatogonia occurs throughout adult life
 - that sperm cells are smaller in size than oocytes
 - that sperm are haploid, while eggs are diploid
 - spermatogenesis occurs in male and oogenesis occurs in females
61. Which of the following best describes the significance of the sigmoidal relationship between P_{O_2} levels and haemoglobin saturation?
- As tissue P_{O_2} levels decline with an increase in activity, the oxygen reserve increases
 - Once tissue P_{O_2} levels drop below 40 mm Hg, the amount of oxygen released by haemoglobin increases greatly
 - As tissue P_{O_2} levels decline, the amount of O_2 released increases proportionately
 - As it circulates, haemoglobin releases the same amount of oxygen to all tissues
 - None of the above
62. How does a new menstrual cycle become initiated when fertilization fails to occur?
- The nervous system detects the absence of implantation, signaling the release of GnRH from the hypothalamus, which triggers the release of FSH from the pituitary
 - Progesterone levels drop due to regression of the corpus luteum, releasing the hypothalamus and pituitary from feedback inhibition. FSH levels rise
 - CG, produced by the embryo following implantation in the uterus, signals the corpus luteum to regress. Progesterone levels drop and FSH levels rise
 - hCG, produced by the uterine lining signals the corpus luteum to regress, releasing the hypothalamus and pituitary from feedback inhibition. FSH levels rise
 - None of the above
63. Which of the following represents the correct route for sperm migration in the human, starting from its storage site and finishing at the site of fertilization?
- Testes → Vas deferens → Urethra → Uterus
 - Epididymis → Vas deferens → Ejaculatory duct → Uterus
 - Epididymis → Vas deferens → Urethra → Uterus → Oviduct
 - Epididymis → Vas deferens → Seminal vesicle → Uterus → Oviduct
 - Testes → Uterus → Urethra → Oviduct
64. One of the main advantages of a closed over an open circulatory system is Read all options
- the use of a heart to create pressure gradients necessary for blood flow
 - the ability to direct the flow of blood to certain tissues
 - the ability to use respiratory pigment to transport O_2
 - the ability to return blood to the heart
 - the ability to respire more quickly
65. What prevents the atria and the ventricles from contracting at the same time?
- Pace-maker cells located in the atria fire before the pace-maker cells in the ventricles
 - It takes time for epinephrine to diffuse from the atria to the ventricles to trigger contraction
 - The electrical signal generated in the right atrium is delayed at the AV node before passing to the ventricles
 - The Na^+ channels responsible for initiating ventricular contraction are inactivated and need to return to activated configuration to be electrically stimulated
 - None of the above
66. An enzyme arginase (that converts arginine to Ornithine and urea) extracted from an amphibian kidney shows following biochemical parameters (Good)
- | | P | Q |
|-------------------|-----------------------------------|-----------------------------------|
| V_{max} | 5.1×10^{-4} mol urea/min | 8.3×10^{-4} mol urea/min |
| Specific activity | 9.1×10^{-5} units | 1.3×10^{-4} units |

P and Q, respectively are

- (a) hydrated and desiccated environment of the animal
- (b) freshwater and saline environment
- (c) siccated and deoxygenated environment
- (d) ult and tadpole stage

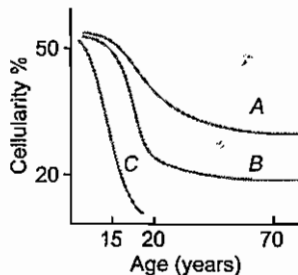
✓ 67. Oxytocin shows following four consequences in the human body

- I. Hypertension
- II. Uterine contraction
- III. Milk ejection
- IV. Anti-diuresis

These results are due to effect on

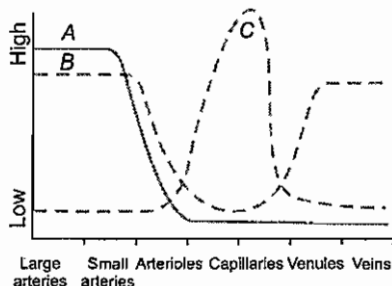
- (a) smooth muscle and membrane permeability
- (b) striated muscle and membrane depolarization
- (c) smooth and striated muscles
- (d) voluntary and involuntary muscles

68. Relative rates red blood cell production in the bone marrow of different bones at different ages are shown in the graph. A, C and D are likely to be, respectively



- (a) vertebra, rib and tibia
- (b) femur, carpal and rib
- (c) tibia, fibula and femur
- (d) radius, sternum and carpal

69. Characteristic features of different blood vessels in the body are shown. A, B and C represent



- (a) A-Total area B-Velocity C-Blood pressure
- (b) A-Blood pressure B-Velocity C-Total area

(c) A-Velocity B-Total area C-Blood pressure

(d) A-Total area B-Blood C-Velocity

In the given problem, A, B and C represents blood pressure, velocity and total area, respectively

70. Which of the following activities will increase the partial pressure of CO_2 in the lungs? Fill your answers by putting tick marks (✓) in the appropriate boxes in the table given in the answer sheet.

- (a) Rapid deep breathing
- (b) Holding breath
- (c) Slow muscular exercise
- (d) Breathing in a paper bag

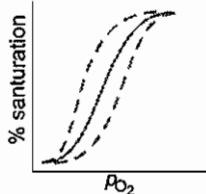
Activity	Will Increase	Will not Increase
(a)		
(b)		
(c)		
(d)		

71. An athlete runs a 100 m sprint. At the end of this event, she breathes rapidly for sometime and then slowly her breathing rate comes to normal in the next 30 min. Which of the following processes is predominantly going on in her body during this recovery period? Put a tick mark in the appropriate box in the answer sheet.

- (a) Uniform distribution of inhaled oxygen to all the tissues of the body
- (b) Generation of ATP to convert lactate to glucose
- (c) Excess breakdown of glycogen to maintain blood glucose level
- (d) Formation of depleted muscle glycogen from the glucose available from the blood

- (a)
- (b)
- (c)
- (d)

72. Normal haemoglobin saturation curve in the resting stage is shown in the graph as a solid line. However, it may shift to left or right (shown as dotted lines) depending on the need of the cell. Indicate whether the following



statements are true or false by putting tick marks (✓) in the appropriate boxes in the table given in the answer sheet.

- (a) During exercise, the curve is likely to shift to the right in the muscle
 (b) After exercise, the curve is likely to shift to the left in the alveoli
 (c) During exercise, the curve is likely to shift to the left in the liver

(d) After exercise, the curve is likely to shift to the left in the muscle

Statement	True	False
(a)		
(b)		
(c)		
(d)		

Answers

Exercise I

- | | | | | | | | | | |
|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| 1. (b) | 2. (e) | 3. (b) | 4. (b) | 5. (b) | 6. (b) | 7. (d) | 8. (d) | 9. (b) | 10. (c) |
| 11. (c) | 12. (a) | 13. (b) | 14. (b) | 15. (b) | 16. (b) | 17. (c) | 18. (c) | 19. (d) | 20. (a) |
| 21. (e) | 22. (b) | 23. (b) | 24. (e) | 25. (c) | 26. (a) | 27. (d) | 28. (c) | 29. (a) | 30. (c) |
| 31. (d) | 32. (c) | 33. (c) | 34. (a) | 35. (a) | 36. (b) | 37. (c) | 38. (b) | 39. (a) | 40. (b) |
| 41. (a) | 42. (d) | 43. (c) | 44. (d) | 45. (c) | 46. (b) | 47. (b) | 48. (c) | 49. (b) | 50. (c) |
| 51. (c) | 52. (b) | 53. (c) | 54. (b) | 55. (d) | 56. (b) | 57. (a) | 58. (d) | 59. (b) | 60. (d) |
| 61. (d) | 62. (c) | 63. (a) | 64. (b) | 65. (d) | 66. (c) | 67. (d) | 68. (d) | 69. (b) | 70. (d) |
| 71. (b) | 72. (a) | 73. (b) | 74. (c) | 75. (d) | 76. (b) | 77. (b) | 78. (d) | 79. (b) | 80. (c) |
| 81. (c) | 82. (d) | 83. (b) | 84. (d) | 85. (a) | 86. (a) | 87. (c) | 88. (d) | 89. (e) | 90. (a) |
| 91. (d) | 92. (a) | 93. (e) | 94. (a) | 95. (d) | 96. (b) | 97. (d) | 98. (b) | 99. (d) | 100. (d) |
| 101. (b) | 102. (b) | 103. (e) | 104. (b) | 105. (b) | 106. (b) | 107. (e) | 108. (c) | 109. (d) | 110. (b) |
| 111. (a) | 112. (a) | 113. (b) | 114. (b) | 115. (b) | 116. (c) | 117. (c) | 118. (b) | 119. (d) | 120. (a) |
| 121. (d) | 122. (c) | 123. (b) | 124. (a) | 125. (b) | 126. (c) | 127. (a) | 128. (d) | 129. (a) | 130. (e) |
| 131. (b) | 132. (d) | 133. (b) | 134. (c) | 135. (c) | 136. (c) | 137. (b) | 138. (b) | 139. (c) | 140. (b) |
| 141. (a) | 142. (b) | 143. (c) | 144. (b) | 145. (d) | 146. (a) | 147. (b) | 148. (b) | 149. (b) | 150. (b) |
| 151. (a) | 152. (a) | 153. (a) | 154. (d) | 155. (c) | 156. (d) | 157. (e) | 158. (e) | 159. (b) | 160. (c) |
| 161. (a) | 162. (a) | 163. (b) | 164. (b) | 165. (c) | 166. (a) | 167. (c) | 168. (d) | 169. (d) | 170. (a) |
| 171. (a) | 172. (d) | 173. (c) | 174. (b) | 175. (a) | 176. (a) | 177. (c) | 178. (a) | 179. (a) | 180. (b) |
| 181. (c) | 182. (c) | 183. (c) | 184. (c) | 185. (b) | 186. (e) | 187. (b) | 188. (c) | 189. (a) | 190. (b) |
| 191. (b) | 192. (a) | 193. (d) | 194. (c) | 195. (b) | 196. (d) | 197. (e) | 198. (b) | 199. (c) | 200. (a) |
| 201. (b) | 202. (c) | 203. (a) | 204. (b) | 205. (c) | 206. (d) | 207. (c) | 208. (c) | 209. (d) | 210. (b) |
| 211. (c) | 212. (c) | 213. (a) | 214. (d) | 215. (c) | 216. (b) | 217. (c) | 218. (c) | 219. (a) | 220. (a) |
| 221. (a) | 222. (b) | 223. (d) | 224. (c) | 225. (c) | 226. (b) | 227. (b) | 228. (c) | 229. (b) | 230. (b) |
| 231. (d) | 232. (d) | 233. (c) | 234. (d) | 235. (a) | 236. (d) | | | | |

Exercise II

- | | | | | | | | |
|---------|---------|---------|---------|---------|---------|---------|---------|
| 1. (b) | 2. (c) | 3. (d) | 4. (b) | 5. (b) | 6. (d) | 7. (b) | 8. (c) |
| 9. (b) | 10. (a) | 11. (d) | 12. (a) | 13. (c) | 14. (a) | 15. (c) | 16. (a) |
| 17. (c) | 18. (d) | 19. (a) | 20. (d) | 21. (b) | 22. (d) | 23. (b) | 24. (c) |
| 25. (c) | 26. (b) | 27. (b) | 28. (a) | 29. (d) | 30. (b) | 31. (c) | 32. (c) |
| 33. (c) | 34. (b) | 35. (b) | 36. (c) | 37. (d) | 38. (b) | 39. (d) | 40. (d) |
| 41. (a) | 42. (b) | 43. (a) | 44. (d) | 45. (c) | 46. (a) | 47. (a) | 48. (c) |
| 49. (b) | 50. (d) | 51. (d) | 52. (a) | 53. (d) | 54. (a) | 55. (c) | 56. (*) |
| 57. (c) | 58. (b) | 59. (d) | 60. (d) | 61. (b) | 62. (b) | 63. (c) | 64. (b) |
| 65. (c) | 66. (a) | 67. (a) | 68. (a) | 69. (b) | 70. (c) | 71. (b) | |

*See Explanation