

All Chapters

Biologyf4.

Questions & Answers

Chapter 1

1: Define nervous system.

- The nervous system is highly organized networks of cells that detects changes and controls metabolic processes, mental and physical activities and maintain homeostasis.

2: what is the made up of nervous system?

- The nervous system is made up of billions of neurons.

3: what is the ability of nervous system?

- The ability of nervous system is to monitor and respond to changes in the surrounding both external and internal.

4: what is the composed of nervous tissue ?

- The nervous tissue is composed of neurons and neuroglia.

5: Define neurons (nerve cells).

- Neurons (nerve cells) are the working units of the nervous system that generate and transmit nerve impulses.

6: Define neuroglia

- The neuroglia do not conduct nerve impulse instead they support and protect the nerve cells.

7: what does neuron consist of ?

- Neuron consists of three main regions: the dendrites, a cell body and an axon.

8: Define dendrites.

- Dendrites receive signals called impulses from the other neurones and conduct the impulses to the cell body.

9: Define an axon.

- An axon carries the nerve impulse from the cell body to other neurons and muscles.

10: How many types can be classified neurons according to the number of dendrites?

- Four types which are: an axonic, unipolar, bipolar, and multipolar.

11: How many types can be classified neurones according to functionally or direction of impulse conduction?

- Three types which are: sensory neurones, motor neurones and relay neurones.

12: Define sensory neurones (afferent neurones).

- Sensory neurones: are neurons get information about what is going on inside and outside of the body and bring that information into the brain and spinal cord in order to be processed.

13: Define motor neurons (efferent neurones)

- Motor neurons (efferent neurons): are neurons get information from the spinal cord and convey or transmit commands to the effector organs such as muscles or glands.

14: Define relay neurons.

- The relay neurons are found only in the brain and spinal cord connect one neuron to another.

15: write parts covering of protective connective tissue according nerves and define each one.

- A) Endoneurium: is a delicate tissue surrounding each individual fibre which is continuous with the septa that pass in words from the perineurium.
- B) Perineurium: is a smooth connective tissue surrounding each bundles of fibre.
- C) Epineurium: is the fibrous tissue with surrounds and encloses a number of

bundles of nerve fibres.

16: Define nerve impulse.

- A nerve impulse is an electrical charge travelling the length of neuron.

17: Define resting potential.

- Resting potential is a non-conducting nerve fibre is described to be in a resting potential.

18: Define action potential.

- Action potential is a localised change in the resting membrane potential b/w the inside and outside of the nerve fibre caused by a stimulus.

19: Define a synapse.

- A synapse is a junction b/w dendrites of two adjacent neurones.

20: How many divisions does nervous system consist of?

- Two major divisions: the central and peripheral nervous systems.

21: How many parts can be classified the central nervous system?

- Two and they are: the brain and spinal cord.

22: How many parts can be divided peripheral nervous system according divisions?

- Two and they are: the sensory and motor divisions.

23: write the meninges of the brain and define each one.

- They are three and they are: dura mater, pia mater, and arachnoid.

(A) Dura mater is the tough(taaf) outer membrane covering the brain and spinal cord of the vertebrates.

(B) Pia mater is the innermost membrane covering the brain and spinal cord.

(C) Arachnoid is the a layer of fibrous tissue that lies b/w dura and pia maters.

24: How many neurons does human's brain consist of?

- About 100 billions of neurones.

25: what is the mass of the brain of human adult?

- It is about 1.4kg.

26: How many oxygen can the brain consume?

- It consumes about 20% of the oxygen that reaches the body.

27: what is the food of brain cells?

- Its food is Glucose only.

28: How many parts can be consisted of the brain?

- The cerebrum, the diencephalon, the brain stem, and the cerebellum.

29: Define the cerebrum.

- The cerebrum is the longest and most complex parts of the brain and constitutes about 90% of the brain's volume.

30: what is the function of the cerebrum?

- It separates the two cerebral hemispheres and penetrates to the depth of the corpus collasum.

31: How many lobes does the cerebrum consist of?

- Four lobes and they are: frontal, parietal, temporal, and occipital lobes.

32: Tell the three types of activities associated with cerebral cortex.

- Higher order functions, sensory perception and initiation and control.

33: what is the function of diencephalon and tell what does it consist of?

- Connects the cerebrum and midbrain. It is consists of thalamus and hypothalamus.

34: what is the function of thalamus?

- Thalamus relays and redistributes impulses from the most parts of the brain to the cerebral cortex.

35: what is the function of hypothalamus?

- It controls and the output of hormones from the pituitary gland.

36: Tell parts of the brain stem.

- Three and they are : midbrain, pons and medulla oblongata.

37: Define midbrain

- The midbrain is the area of the brain situated b/w the cerebrum above and the pons below.

38: Define pons.

- Pons is the situated in front of the cerebellum , below the midbrain and above the medulla oblongata.

39: Define the medulla oblongata.

- The medulla oblongata is the most interior region of the brain stem.

40: Define the cerebellum.

- The cerebellum is situated behind the pons and immediately below the posterior portion of the cerebrum.

41: what is the function of cerebellum?

- The cerebellum controls and coordinates the movement of various groups of muscles ensuring smooth, even, precise actions.

42: Define spinal cord.

- The spinal cord is the elongated almost cylindrical part of the central nervous system that is protected by the vertebral column and surrounded by the meninges and cerebrospinal fluid those also give the spinal cord a protection.

43: what are the functions of spinal cord?

- A) Transfers of nervous information b/w the brain and other parts of the body except the head region.

(B) It controls the simple reflex actions.

44: Define reflex actions and tell its types.

- Reflex actions are a rapid automatic response to a certain stimulus. Its types are simple reflex and conditional reflex actions.

45: How many parts does peripheral nervous system consist of according to nerves? And define each one.

- Two cranial and spinal nerves

(A) Cranial nerves: are the nerves that rise from the brain and innervate areas in the head and face.

(B) Spinal nerves: are the nerves that rise from the spinal cord and innervates the limbs and trunk.

46: How many parts can be classified peripheral nervous system according to divisions?

- Two: motor and sensory divisions.

47: Tell parts of the motor.

- Somatic and autonomic.

48: Tell parts of the autonomic nervous system and define each other.

- Two: the sympathetic and the parasympathetic.

(A) The sympathetic is most active in times of emergency or stress when the heart rate and breathing rate increase.

(B) The parasympathetic nervous system is most active when the body is relaxed.

49: Define somatic nervous system.

- Somatic nervous system is the system relay information from external sensory receptors to the central nervous system and motor nerves relay information from the central nervous system to skeletal muscles.

50: Define autonomic nervous system.

- Autonomic nervous system is a system carries impulses from the central nervous system to the heart and other internal organs.

51: Define cornea.

- The part that light first enters the eye called cornea.

52: Define pupil.

- The cornea helps to focus the light through an opening called pupil.

53: Define iris.

- The colored portion of the eye and containing a circular opening that black called iris.

54: Define lens.

- The lens is located in the eye and changing the shape of the eye and is the white part of the eye.

55: Define retina.

The retina is a membrane at the back wall of the eyeball.

56: Define rods.

- Rods are more sensitive to light.

57: Define cones.

- Cones are sensitive to color.

58: List the light sensitive cells that cover the retina.

- They are: rods and cones.

59: Define

- They are: rods and cones.

59: Define brain.

- Brain is the portion of the central nervous system that is located within the skull.

60: Define neurotransmitters.

- Neurotransmitters are chemical messengers that transmit a message from a nerve cell across the synapse to a target cell and the target can be another nerve cell, a muscle cell or a gland cell.

61: Define optic nerve.

- Optic nerve is the nerve that connects the eye to the brain.

62: List the five sense organs and define each one.

- They are: eyes, ears, nose, tongue and skin.

The eye is the organ for sight.

The ear is the organ for hearing.

The nose is the organ for smell.

The tongue is the organ for taste.

The skin is the organ for touch.

Chapter 2: Endocrine system: Questions & Answers

1. Define endocrine glands?
 - Endocrine glands are groups of secretory cells surrounded by an extensive network of capillaries that facilitates diffusion of hormones from the secretory cells into the bloodstream.
2. What are also referred to as the endocrine glands?
 - Ductless glands because hormones diffuse directly into the bloodstream.
3. What do the hormones influence?
 - Almost every cell and organ in our bodies.
4. Define hormones.
 - Hormones are substances secreted by cells that act to regulate the activity of other cells in the body.
5. What do the exocrine glands secrete?
 - Substances through ducts.
6. What can include the substances that secreted by exocrine glands?
 - Water, enzymes and mucus.
7. What are the examples of exocrine glands?
 - Sweat glands, mucous glands, salivary glands and other digestive glands.
8. What are classified hormones based on their structure, solubility and mechanism of action?
 - Steroid hormones and non-steroid or amino acid hormones.
9. What are examples of steroid hormones?
 - Estrogen and Testosterone
10. What are also called non-steroid hormones?
 - Amino acid hormones.
11. What are soluble steroid hormones?
 - in lipids.
12. What are examples of non-steroid hormones?
 - Insulin and growth hormones.
13. List categories of hormones according to the manner or depending on their chemical nature.
 - Lipophilic (nonpolar), which are fat-soluble and Hydrophilic (polar), which are water-soluble.
14. What include the lipophilic hormones?
 - Steroid hormones and thyroid hormones. Most other hormones are hydrophilic.
15. Explain hydrophilic hormones.

- Hydrophilic hormones are freely soluble in blood, but cannot pass through the membrane of target cells. They must therefore activate their receptors from outside the cell membrane.
16. Explain lipophilic hormones
- Lipophilic hormones travel in the blood attached to transport proteins. Their lipid solubility enables them to cross cell membranes and bind to intracellular receptors.
16. What is Homeostasis?
- Homeostasis is defined as a stable internal environment.
17. What is the role of the endocrine system?
- The endocrine system plays an important role in the maintenance of homeostasis because hormones regulate the activities of cells, tissues and organs throughout the body.
18. Tell the function of feedback mechanisms, to maintain homeostasis.
- Control hormone secretion.
19. What is a feedback mechanism?
- Feedback mechanism is one in which the last step in a series of events controls the first.
20. List types of feedback mechanisms.
- Negative or positive.
21. Which most hormone systems use positive or negative feedback?
- Negative feedback.
22. Define Antagonistic Hormones.
- A number of hormones work together in pairs to regulate the levels of critical substances are referred to as antagonistic hormones.
23. Tell two of them the examples of antagonistic hormones.
- Glucagon and insulin.
24. Which includes the endocrine system?
- All the glands that secrete hormones such as pituitary, thyroid, parathyroid, adrenal glands, the pancreas, ovaries, testes, pineal gland and the thymus gland.
26. Define pituitary gland.
- Pituitary gland is a small gland with the diameter of 1 cm that is located at the base the hypothalamus.
27. List lobes of pituitary gland.

- Anterior and posterior pituitary.
28. Explain anterior pituitary.
- It consists of specialized glandular cells that secrete hormones with various functions which in turn regulate the secretions of other glands.
29. List hormones that include anterior pituitary.
- Growth hormone, Thyroid-stimulating hormone (TSH), Prolactin (PRL), Follicle-stimulating hormone (FSH) and Luteinizing hormone (LH).
30. Explain growth hormone.
- It stimulates cell division and growth especially bone and muscular cells in childhood and adolescence.
31. Explain thyroid-stimulating hormone.
- Stimulates the thyroid gland to produce the hormone thyroxine.
32. Define prolactin.
- Prolactin is the best known for stimulating the mammary glands to produce milk in mammals after giving birth.
33. Explain follicle-stimulating hormone.
- It is required for the development of ovarian follicles and sperm.
34. Explain luteinizing hormone.
- Stimulates the production of estrogen and progesterone by the ovaries and is needed for ovulation in female reproductive cycles and In male, it stimulates the testes to produce testosterone, which is needed for sperm production and for the development of male secondary sexual characteristics.
35. List hormones that include posterior pituitary.
- Antidiuretic hormone (ADH) and Oxytocin.
36. Explain posterior pituitary.
- The posterior pituitary appears fibrous because it contains axons that originate in cell bodies within the hypothalamus.
37. Define neurosecretory cells.
- Antidiuretic hormone are made by nerve cells in the hypothalamus and these nerve cells that secrete hormones are called neurosecretory cells.
38. Explain Antidiuretic hormone.
- Antidiuretic hormone stimulates water reabsorption by the kidneys, and in doing so inhibits diuresis (urine production).
39. Explain Oxytocin.

- Oxytocin stimulates the milk ejection reflex, during suckling, sensory receptors in the nipples send impulses to the hypothalamus, and Oxytocin is also needed to stimulate uterine contractions in women during childbirth.

40. Define islets of langerhans.

- Specialized cells in the pancreas called islets of langerhans.

Part2 true and false

41. The two lobes of the thyroid gland are located near the lower part of the larynx, true or false?

- True

42. List three hormones that thyroid gland secretes.

- Primarily thyroxine, smaller amounts of triiodothyronine and calcitonin.

43. What is the function of thyroid-stimulating hormone (TSH)?

- Regulates the release of the thyroid hormones.

44. What is the function of the thyroid hormones?

- Help maintain normal heart rate, blood pressure and body temperature.

45. The thyroid gland also secretes calcitonin which plays a role in maintaining proper levels of calcium in the blood, true or false?

- True.

46. The parathyroid glands are four small glands attached to the thyroid, true or false?

- True.

47. What is the function of the parathyroid glands?

- When blood calcium levels are too low, the parathyroid glands increase production of parathyroid hormone.

48. What is the function of parathyroid hormone?

- Increases blood calcium levels by stimulating the bones to release calcium.

49. Where are located the adrenal glands?

- Just above each kidney.

50. What is composed of each gland?

- Inner portion (Adrenal medulla) and outer layer (Adrenal cortex).

51. List adrenal glands.

- Right adrenal gland and left adrenal gland.

52. What produces the adrenal medulla?

- Two amino acid-based hormones: epinephrine and norepinephrine.

53. What is the function of medulla?

- When a person is stressed, the medulla secretes epinephrine and norepinephrine into the bloodstream.
54. What is the function of epinephrine and norepinephrine?
- Increase heart rate, blood pressure, blood glucose level, blood flow to the heart and lungs.
55. What responds the adrenal cortex?
- Adrenocorticotrophic hormone (ACTH).
56. Adrenocorticotrophic hormone is secreted by the anterior pituitary, yes or no?
- Yes.
57. What is the function of ACTH?
- Stimulates the adrenal cortex to produce the steroid hormone cortisol and aldosterone.
58. What is the function of cortisol?
- Promotes the production of glucose.
59. What is the function of aldosterone?
- Helps raise blood pressure and volume by stimulating salt and water retention by the kidneys.
60. Explain gonads.
- Gonads are the ovaries in females and the testes in males, are gamete-producing organs that also produce a group of steroid sex hormones.
61. What is the function of sex hormones?
- Regulate body changes that begin at puberty.
62. When secreted by the anterior pituitary, the hormones luteinizing hormone (LH) and follicle-stimulating hormone (FSH) stimulate secretion of sex hormones from the gonads, true or false?
- True.
63. In females, LH and FSH stimulate secretion of estrogen and progesterone from the ovaries, true or false?
- True.
64. Estrogen and progesterone hormones cause the monthly release of an egg by an ovary and buildup of the uterine lining, true or false?
- True.
65. In male, LH stimulates the testes to secrete a group of sex hormones called

androgens, true or false?

- True.

66. Testosterone is an androgen that regulates male secondary sex characteristics, true or false?

- True.

67. What is diabetes?

- Diabetes is a disease that results from the body not producing enough insulin or not properly using insulin.

68. List types of diabetes.

- Type 1 diabetes and type 2 diabetes.

69. What means type 1 diabetes?

- Insulin-dependent.

70. What is treatment for the people with type 1 diabetes or the patients with type 1 diabetes?

- Exogenous insulin injections.

71. What means type 2 diabetes?

- Non-insulin dependent.

72. What is treatment for the people with type 2 diabetes or the patients with type 2 diabetes?

- Control their diabetes through diet and exercise.

73. What is hyperthyroidism?

- Overproduction of the thyroid hormones is called hyperthyroidism.

74. What are the symptoms of hyperthyroidism?

- Include: weight loss, high blood pressure, heart rate and body temperature.

75. What can be treated with hyperthyroidism?

- Medication or by surgical removal of part of the thyroid gland.

76. What is hypothyroidism?

- Thyroid-hormone deficiency is known as hypothyroidism.

77. What are the symptoms of hypothyroidism?

- Include: growth retardation, lethargy, weight gain, low heart rate and body temperature.

78. What can be treated with hypothyroidism?

- Supplementary thyroxine.

79. Define goiter.

- Goiter is a swelling of the neck resulting from enlargement of the thyroid gland.
80. What can be prevented for goiters?
- Frequent consumption of seafood or iodized table salt.
81. If hypothyroidism is caused by iodine deficiency, then goiter, true or false?
- True.
82. List types of growth hormone disorders.
- Hyposecretion of growth hormone and Hypersecretion of growth hormone.
83. When occurs the growth hormone deficiency (GHD)?
- When the pituitary gland doesn't produce enough growth hormone.
84. Children with GHD are shorter than their peers and have younger, rounder faces, true or false?
- True.
85. Explain dwarfism.
- In children who are still growing, too low growth hormone can cause a condition called dwarfism.
86. Acromegaly is a hormonal disorder that develops when your pituitary gland produces too much growth hormone during adulthood, true or false?
- True.
87. Explain gigantism.
- In children who are still growing, too much growth hormone can cause a condition called gigantism.
88. What is hypo secretion?
- hypo secretion is when the amount of hormones are released is too low.
89. What is hyper secretion?
- is when the amounts of hormones are released is too much.
90. Define endocrine system.
- Endocrine system is the system of glands that produce endocrine secretions that help to control bodily metabolic activity.

Chapter 3 SKELETAL, MUSCULAR, AND INTEGUMENTARY SYSTEM

1. Define skeleton?

- Skeleton is the hard portion of organisms for protection of internal organs.

2. Define skeletal system?

- The framework of the body consisting of bones and other connective tissues which protects and supports the body tissues and internal organs?

3. Name the common types of skeleton in organisms? And differentiate them with examples?

- Exoskeleton and endoskeleton. Exoskeleton is the rigid hard case that surrounds the body to protect the internal organs and provide attachment sites of the muscles. Exoskeletons are found in insects, lobsters and snails while endoskeleton is the rigid internal skeleton that forms the body's framework to allow movement through contraction of muscles attached to the skeleton. Endoskeletons are found in vertebrates.

4. Name parts of human skeleton? And differentiate them with examples?

- Axial skeleton and appendicular skeleton. Skull, vertebral column, ribcage, and sternum forms axial skeleton while girdles and limbs forms appendicular skeleton of the human body and other mammalian organisms.

5. Describe the skull? And classify skull bones?

- The skull is a bony structure which encases the brain and gives form to the head and face. Skull consists of 8 Cranial and 14 facial bones.

6. Define foramen Magnum? And mention the significance of foramen magnum?

- Large oval opening at the base of the skull is called foramen magnum. It is the passage of the central nervous system through the skull connecting the brain and the spinal cord.

7. What is suture joint? Name the bones that are connected by a suture in the skull?

- Suture is a fairly rigid Joint between two or more hard elements of an organism with or without significant overlap of the elements. Suture joins the parietal and temporal bone it also links the frontal and sphenoid bone as well as it articulates the sphenoid and parietal bone.

8. The bones of the newborn's skull are soft and slightly spaced, how important is this for the child and the mother during birth?

- It helps the baby and mother to squeeze through birth canal.

9. Describe the vertebral column? And state its function?

- It is the central axis of the skeleton in all vertebrates and also called backbone, spinal column. It protects the spinal cord and help to maintain an upright body portion.

10. What is the function of Nasal bone and where it is located?

- The function of each Nasal bone is to bind together the cartilage that forms individual nose contours and shapes. It's located in the upper middle area of the face between the maxillary (upper jaw) bones.

11. Where is lacrimal bone located and tell of its function?

- It is located at the front part of the medial wall of the orbit. It releases fluid which cleanses and protects the eye's surface as it lubricates and moistens it.

12. Define sternum?

- It is a flat bone that can be felt just under the skin In the middle of the front of the chest and also called breast bone.

13. Explain the ribcage?

- The long, curved, flattened bones found middle trunk of the body called ribs forms ribcage. The first seven pairs of ribs articulate directly with the sternum are called true ribs while the other three pairs that are indirectly articulate with sternum are called false ribs.

14. What is the function of coastal cartilages?

- Coastal cartilages attach the ribs to the sternum.

15. What are floating ribs?

- The lowest two pairs of ribs are referred to as floating ribs.

16. Differentiate between pectoral girdles and pelvic girdles?

- Pectoral girdle connects the upper limbs to the axial skeleton while pelvic girdle connects lower limbs to axial skeleton.

17. Define clavicle or collarbone?

- This is a long bone that serves as a strut between the shoulder blade and the sternum.

18. Define scapula or the shoulder bone?

- This is the bone that connects the upper arm bone with the clavicle (collar bone).

19. The pelvis is broader in females than in males, deduce that?

- The women's pelvis is adapted for child bearing, and is a wider and flatter shape than the male pelvis.

20. What are the types of bones based on their structure?

- Bones are classified as long, short, irregular, flat and sesamoid bones.

21. Describe long bones, and give examples?

- The bones that have shaft and two extremities are called long bones include femur, tibia and fibula.

22. Give an example of short, irregular, flat and sesamoid bones?

- Short bones –carpals (wrist).
- Irregular bones – vertebrae and some skull bones.
- Flat bones -- sternum , ribs and most skull bones.
- Sesamoid bones –patella (knee cap)

23. State the role of collagen to bones?

- Collagen is a very strong and gives the bone slight flexibility .

24. Describe compact bone and tell its function?

- Compact bone is dense and strong part of the bone that consists of units called Osteons or Haversian systems- Tube like structures which run the length of compact bones. It provides strength and protection.

25. Define spongy bone?

- Spongy bone is less dense part of the bone that has many cavities contain bone marrow.

26. Differentiate between the two types of bone marrow?

- Red bone marrow is found in the humerus bone of the arm and the femur bone of the leg. Yellow bone marrow is found in many other bones and consists of stored fat.

27. How do spongy and compact bones differ in location and function?

- According to function, the compact bone is the main structure in the body for support, protection and movement while spongy bone is used for more active functions of the bones including blood cell production and ion exchange.
- Spongy bone is usually located at the end of the long bones while the compact bone is found in the marrow space (medullary cavity) of a bone.

28. Define ossification, cartilage, and chondrocytes?

- The formation of bone from osteoblasts is called ossification.
- Cartilage is an elastic supportive tissue that can withstand constant pressure and friction.
- The specialized cells that the cartilage consists of and produces large amounts of chondrin and collagen protein are referred to as chondrocytes.

29. How are nutrients and oxygen transported to the chondrocytes? And how are waste products removed?

- It gets oxygen, nutrients, and excretes the surrounding joint fluid when joint is loaded; the pressure squeezes fluid through diffusion.

30. Define joints?

- The places where two bones meet is known as a joint.

31. What are the three major kinds of joints?

- Fixed, semi-moveable and movable joints.

32. Differentiate the functions of Fixed, semi-moveable and movable joints?

- Fixed joints prevent movement and found in the skull.
- Semi-moveable permit only limited movement .They are found in the vertebral column and rib cage.
- Movable joints enable the body to perform a wide range of movements and activities. They are found in all other joints in the body.

33. Give examples of movable joints and explain their role?

The following are examples of movable joints and their role;

- Hinge joints are found in the elbows, knees and ankle allows only bending and straightening.

Ball-and-socket joint it is the shoulder joint which enables you to move your arm up, down, forward, and backward.

- ✓ Pivot joint is the joint formed by the top two vertebrae of your spine which allows you to turn your head from side to side.
- ✓ Saddle joint is found at the base of each thumb , allows you to rotate your thumbs and helps you grasp objects with your hand .
- ✓ Gliding joints allow bones to slide over one another .Examples are the joints between the small bones of your foot which allow you slightly movement.

34. What is the function of synovial fluid?

- Synovial fluid helps and protect the ends of bones from damage by friction.

35. What are the functions of the skeletal system?

- Skeletal system contributes support, protection, formation of blood cells, reservoir, and movement of the body.

36. Differentiate types of bone fractures?

- Simple fracture: the bone breaks but does not come through the skin.
- ✓ Compound fracture = The bone protrudes through the skin.
- ✓ Stress fracture = Thin crack in the bone.

37. Describe osteoporosis?

- Osteoporosis is a common bone disorder that causes bones to become weak and brittle.

38. What are the foods that are good for bone development?

- Milk, cheese , green leafy vegetables , fish , nuts and soya beans.

39. For healthy bones, sun exposure is advised, justify that?

- To stimulate the production of vitamin D in the skin to proper the bone development.

40. Define Arthritis. And name two common arthritis?

- Arthritis is an inflammation of the joints e.g Osteoarthritis and Rheumatoid arthritis.

41. How many ways can be classified muscles according to their structure and function?

- Structure: Skeletal muscle, smooth muscle and cardiac muscle.
- Function: Voluntary and involuntary muscles.

42. Rigor mortis is a condition in which all of the body muscles become rigid or stiff shortly after a person dies. Why does rigor mortis develop?

- Rigor mortis is the result of death of cells in muscle fibers of human body, which leads to chemical changes in those fibers that cause shortening or stiffening of the muscles for lack of ATP.

43. What does skeletal muscle fiber and myofibrils contain?

- It contains bundles of threadlike structures called myofibrils.
- Myofibril is made up of two types of protein filaments thick ones and thin ones. Thick filaments are made of the protein myosin, and thin filaments are made of the protein actin.

44. Differentiate between flexor and extensor with examples?

- Bicep muscle is an example of flexor muscle while triceps muscle is an example of an extensor muscle.

45. Define twitch?

- A muscle stimulated with a single electric shock quickly contracts and relaxes in a response called twitch.

46. How many ways can be classified skeletal muscle fibers on the basis of their speed of contraction?

- Slow-twitch and fast-twitch fibers.

47. Name some of health complications of muscles?

- Muscle cramps, muscle fatigue, muscle strain, muscle tearing.

48. What are the components of the integumentary system?

- Skin, hair and nails.

49. What are the four types of tissues that are composed of by the skin?

- Epithelial tissue covers body surfaces.
- ✓ Connective tissue provides support and protection.
- ✓ Muscle tissue involved in body movement.
- ✓ Nerve tissue forms the body's communication network.

50. What are the accessory glands containing the skin?

- Sweat glands and sebaceous glands.

51. Name the two main layers of the skin? And define each of them?

- Epidermis and Dermis. Epidermis is the most superficial layer and is composed of stratified keratinized squamous epithelium. Dermis is the inner layer of the skin it is composed of living cells and specialized structures.

52. What are melanocytes?

- The cells that produce melanin that helps to protect the skin from the harmful effects of ultraviolet rays in sunlight.

53. What are the functions of the skin?

- Protection of the body.
- ✓ Regulation of body temperature.
- ✓ Formation of vitamin D.
- ✓ Sensation and
- ✓ Excretion.

54. Define sebum?

- Is a fatty substance secreted from the sebaceous glands .

55. When does the skin disorder of acne result from?

- If the ducts of oil glands become clogged with excessive amounts of sebum, dead cells and bacteria.

56. Define the hair papilla or bulb?

- The base of follicle is a cluster of cells called papilla or bulb .

57. What is genetically determined by hair color?

- Hair color is genetically determined by and depends on the amount and type of melanin present.

58. Give two examples of skin disorders?

- Eczema and Acne.

59. What is the Eczema?

- Eczema is an allergic reaction that manifests as dry, itchy patches of skin that resemble rashes. disorders of the skin?

60. Name some of common skin disorders?

- Seborrhea dermatitis (on the scalp), psoriasis, cold sores, impetigo, scabies, and warts.

CHAPTER 4: THE GENETIC MATERIAL AND PROTEIN SYNTHESIS

1. Name the three parts of a nucleotide.

- A) Pentose Sugar
- (b) Nitrogenous bases
- (c) Phosphate Group

2. State the base-pairing rules in DNA.

- Answer:
 - ✓ Adenine will always binds with thymine while, cytosine will always bind with guanine.
 - ✓ Adenine forms two hydrogen bonds with guanine
 - ✓ Cytosine will for three hydrogen bonds with guanine.

3. A template strand of DNA has the following sequence:

3'-CGTTACCCGAGCCGTACGATTAGG - 5'

Use the sequence information to determine

a. The predicted sequence of the mRNA for this gene.

- Template strand is used to produce mRNA, such that A pairs with U, T pairs with A, C pairs with G and G pairs with C.

Template-3- CGTTACCCGAGCCGTACGATTAGG-5

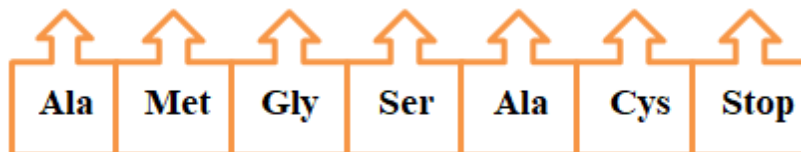
mRNA-5 GCAAUGGGCUCGGCAUGCUA AUCC-3

b. The predicted amino acid sequence of the protein.

- Answer:

Amino acid sequence is determined by the sequence of codons on mRNA.

mRNA-5 -GCA AUG GGC UCG GCA UGC UAA UCC-3



4. What is the meaning of genetic code, codon, anticodon, intron, exon, transcription and Translation?

- ANSWER:

Genetic Code: The genetic code is the set of rules by Which information encoded within genetic material (DNA or mRNA Sequences) is translated into proteins by living cells.

Intron: The intervening sequences or the non-coding regions of the gene. These are removed during mRNA maturation by splicing.

Exon : These are the coding sequences that code for a protein. These are the sequences that are actually expressed in a mature mRNA to be translated into a protein.

Codon : It is a sequence of three bases on DNA or RNA which form a Unit of genetic code encoding for a peptide.

Anticodon : It is a sequence of three bases on the tRNA corresponding to a complementary base sequence on mRNA

Transcription : The process of expression of genetic information on DNA on a new molecule of mRNA is known as transcription.

Translation : The expression of genetic code on mRNA to form a peptide sequence with the help of Ribosome's, tRNA etc. is known as translation.

5. Compare types of RNA according to structure and function

- Answer:

There are three main types of RNA, all involved in protein synthesis.

- ✓ 1. Messenger RNA (mRNA) serves as the intermediary between DNA and the synthesis of protein products during translation.
- ✓ 2. Ribosomal RNA (rRNA) It ensures the proper alignment of the mRNA and the ribosomes during protein synthesis and catalyzes the formation of the peptide bonds between two aligned amino acids during protein synthesis.
- ✓ 3. Transfer RNA (tRNA) carries an amino acid to the corresponding site of protein synthesis in the ribosome. It is the base pairing between the tRNA and mRNA that allows for the correct amino acid to be inserted in the polypeptide chain being synthesized

6. Describe the role of helicases and DNA polymerases during DNA replication

- Answer: The human genome is complex and large, it cannot be unwound and replicated in one go. Therefore, the process of replication takes place in small DNA stretches known as replication forks. These forks are formed by unwinding of

DNA strands. This unwinding is caused by the Helicase enzymes.

7. State why DNA replication is a semiconservative process.

- Answer:

During the DNA replication, DNA polymerase polymerizes only in 5' – 3' direction. Therefore, the replication is continuous only along one of the two strands of DNA. On the other strands the formation of Okazaki fragments takes place, which are later joined by ligases.

Hence, as the replication process is continuous only along one strand, it is called as semiconservative process

8. Summarize the flow of genetic information.

- Answer:

In a cell, information flows from DNA to RNA and from RNA to proteins. This flow of information is unidirectional.

✓ Replication: The process of copying of DNA is called replication.

✓ Transcription: The conversion of genetic information in DNA, into an intermediate form called the RNA, occurs in the process called transcription.

✓ Translation: In this process, information in RNA is interpreted in a chain of amino acid, which forms a polypeptide.

9. Sequence the main steps of transcription.

- Answer:

✓ 1. Initiation

✓ 2. Elongation

✓ 3. Termination

✓ 4. 5' Capping

✓ 5. Polyadenylation

✓ 6. Splicing

10. List the four ways in which the structure of RNA differs from that of DNA

- Answer:

RNA is different from DNA in four basic ways.

✓ 1. RNA has ribose instead of the deoxyribose DNA has.

Ribose and deoxyribose are very similar but differ in only one part; ribose has one more hydrogen molecule attached to it.

✓ 2. In RNA uracil replaces thymine in DNA. They are also very similar and thymine has 2 more hydrogen and one more carbon.

✓ 3. RNA is usually single-stranded while DNA is double stranded.

✓ 4. RNA is much shorter than DNA in length

CHAPTER 5 GENETICS

➤ Answer all of the following Questions

1. Explain the differences between the terms in the following sets

- a) Dominant and recessive
- b) Genotype and phenotype

- Answer:

Genotype: It is the presentation of genetic constitution complement of an individual with respect to one or more character.

Phenotype: It is Ops available external manifestation of morphological of you logical character same as dominant homozygous or heterozygous state.

Dominant: It is able to express its effect even in the presence of its contrasting allele it does not require company of another similar Allele for producing its effect

Recessive: It cannot express itself effect in presence of its contrasting it can produce of similar it cannot express itself effect in places of its contrasting it can produce It's phenotypic effect only in company of similar Allele it's phenotypic effect only in company of similar allele.

2. Which term describes a person who is heterozygous? for a recessive disorder?

- Answer:

Carrier

3. How is the inheritance pattern between parents and offspring represent diagrammatically

- Answer:

Pedigree

4. Predict the genotypes of the children of a father with Huntington's disease and an unaffected mother

- Answer:

Huntington's disorder is dominant trait. So the father can be homozygous or heterozygous. If the mother is normal, and father is homozygous, all the kids will have the trait. If The father is heterozygous , 50% of the kids will show the genotype Use the photo below to answer question 5



5. Describe a fetal test that results in the karyotype shown above.

Answer:

Amniocentesis is the fetal test done to obtain the karyotype.

6. What characteristics are associated with Down syndrome.

- Answer:

Characteristics:-

1. Health problems: heart defect, hypothyroidism, celiac disease, respiratory infections, eye and hearing problems, dental problems
2. Physical problems:- Short stature, weak muscles or hypotonia, irregularly shape face, slanted eyes

7. In pea plants yellow seed color is the dominant trait and green seed color is the recessive trait. Use a Punnett square to show the results of a cross between a heterozygous yellow-seed plant and a green seed plant

- Answer:

Cross between Yy (Yellow) $\times$ yy (green). Therefore, possible gametes for yellow seed plant are Y and y while for green seed plant is the only y .

Gametes	Y	y
Y	Yy (Purple)	yy (green)
y	Yy (Purple)	yy (green)

8. Based on your Punnett square from question 10, what percentage of the offspring would have a homozygous genotype? Explain your answer

- Answer:

Punnett Square is not given

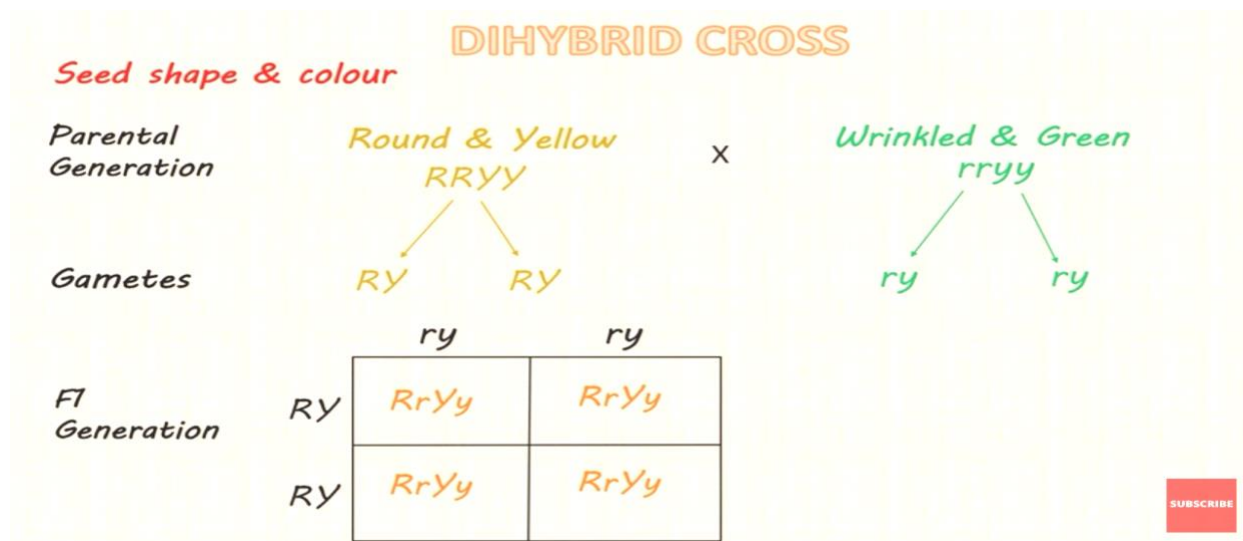
Assume that the genes for seed color and seed shape are located on the same chromosome. A plant heterozygous for both genes is testcrossed with wrinkled green with the following results: green, wrinkled 645 green round 36 yellow, wrinkled 29 yellow, round 590

9. What were the genotypes of the parents and how far apart are these genes?

- Answer:

The genotypes of the parents are YyRr (yellow,round) and yyrr (green wrinkled)
If the mating of these parents were independent, they resulting offspring would have been in 1:1:1:1 ratio. But in this case, linkage is seen. There are almost equal number of parental phenotypes and equal number of recombinant phenotypes.

The distance between Y and R genes can be calculated using the formula:



F₂
Generation

	RY	Ry	rY	ry
RY	RRYY Round Yellow	RRYy Round Yellow	RrYY Round Yellow	RrYy Round Yellow
Ry	RRYy Round Yellow	RRyy Round Green	RrYy Round Yellow	Rryy Round Green
rY	RrYY Round Yellow	RrYy Round Yellow	rrYY Wrinkled Yellow	rrYy Wrinkled Yellow
ry	RrYy Round Yellow	Rryy Round Green	rrYy Wrinkled Yellow	rryy Wrinkled Green

Round & Yellow 9

Round & Green 3

Wrinkled & Yellow 3

Wrinkled & Green 1

Phenotypic ratio
9 : 3 : 3 : 1

Genotypic ratio
1:2:1:2:4:2:1:2:1

SUBSCRIBE

- Write the phenotype and genotype of the parent in the first generation?
 - RRYY(round yellow) and rryy (wrinkle green)
- Write the genotype of the gamete in the first generation?
 - r and y small are the genotypes of the first gamete (wrinkle green seed)
- Write the genotypes and phenotype of first generation individuals?
 - RrYy (round yellow)
- How many types of gametes can second generation parents produce?
 - four types of gametes can produce
- Write the phenotype for members of the second generation?
 - 9 round yellow, 3 round green, 3 wrinkle yellow and 1 wrinkle green
- How many phenotypes appeared among the members of second generation?
 - : 9:3:3:1
- What is the ratio of green seed to yellow seed in second generation?
 - 3:9 respectively

8. What is the ratio of smooth seed to those wrinkled seed in second generation?
- 12 smooth seed and four wrinkled seed.

Chapter 6 BIOTECHNOLOGIES

1. Choose the correct answer from the following:

1. B 2. C 3. A 4. C 5. C 6. B
7. C 8. B 9. C 10. C

❖ Answer all of the following questions

1. Define the following terms:

A. biotechnology

- It is use of living organism or living entities with technological tool for better production of biomolecule and human services. Example antibiotics production, plant tissue culture, wine production, etc.

b. Plasmid

- It is a small circular, extra chromosomal, double stranded DNA molecule present in bacteria which carry gene to help bacteria to survive in adverse condition. Example: col plasmid, R plasmid

c. Genetic engineering

- It is manipulation of living organisms characters by altering its genetic material (example Bt cotton, delayed ripening in tomato, etc.

d. Transformation

- DNA transformation is process in which direct uptake and incorporation of exogenous genetic material from its surrounding through cell membrane transfer into the host cell.

2. List two types of medical products that can be produced using DNA technology?

➤ Answer:

Two types of medical products that can be generated using DNA technology are as follows:

- ✓ Human growth hormone that is used in treating dwarfism
- ✓ Colony-stimulating factors that are used in treating deficiencies of immune-system by stimulating the production of white blood cells.

3. Relate bioethics to the continued development of genetic engineering techniques.

➤ Answer:

The study of ethical issues associated to the DNA technology is termed as bioethics.

Many scientists are involved in

identification of and addressing any legal, ethical, and social issues that have arisen as the techniques of genetic engineering have developed nearly all scientists agreed to the fact of continued restraint and oversight is needed.

For example, it is of concern to some people that genetically modified (GM) crops may cause harm to the environment in unusual ways.

4. Describe two major goals of the Human Genome Project.

➤ Answer:

The HGP (Human Genome Project) is a scientific approach for the determination of the sequence of the chemical base pairs of human DNA.

The two main goals of HGP are:

1. for sequencing and mapping all the DNA base pairs of the chromosomes of humans
\Identifying all the genes within a sequence

5. Distinguish between proteomics and genomics.

➤ Answer:

Genomics is defined as the study of genomes, which is the complete genetic makeup of humans and other organisms. It helps in understanding the sequences of bases in genomes and also the function of genes, introns and as well as intragenic sequences like repetitive DNA (deoxyribonucleic acid) elements, transposons and unique noncoding DNA.

Proteomics is defined as the study of structure, function and interaction of cellular proteins. It helps in identifying and determining the proteins function within a particular cell type. It also helps in the studying of three-dimensional shape of cellular proteins through computer modeling

6. Outline the different applications of biotechnology

➤ Answer:

The applications of biotechnology include therapeutics, diagnostics, genetically modified crops for agriculture, processed food, bioremediation, waste treatment, and energy production

7. List some techniques of genetic engineering.

➤ Answer:

Techniques are as follow:

1. Molecular cloning (Recombinant DNA)
2. Gene delivery
3. Genome editing

8. Delineate the transgenic organisms and their significance.

➤ Answer:

Transgenic organisms are important research tools, and are often used when exploring a gene's function. Transgenesis is also related to the medical practice of gene therapy, in which DNA is transferred into a patient's cells to treat disease.

9. Explain the procedure for the following

a. PCR

➤ Polymerase chain reaction (PCR) is used to amplify a specific DNA sequence by using a pair of oligonucleotide primers. Each pair is complementary to one end of the target DNA sequence. Therefore, PCR is very useful to generate a DNA fragment required for cloning experiment. Diagnosis of specific mutation which are related to genetic diseases.

b. Gel Electrophoresis

➤ Electrophoresis is a method of separation of charged molecules by applying an electric field. Starch gel electrophoresis is used to separate molecules with the help of starch gel. This gel act as molecular sieve. Starch is partially hydrolysed in buffer to prepare a solution. Then the solution is heated and cooled to get starch gel.

c. Gene therapy

➤ Gene therapy is an experimental technique that uses genes to treat or prevent disease. It is designed to introduce genetic material into cells to compensate the abnormal genes or to make a beneficial protein. Gene therapy is used for the treatment of genetic diseases in humans. Example of genetic diseases are phenylketonuria, haemophilia A, cystic fibrosis etc

10. Describe human genome project and its main goals.

➤ Answer:

The HGP (Human Genome Project) is a scientific approach for the determination of the sequence of the chemical base pairs of human DNA.

The main goals of HGP are:

- ✓ For sequencing and mapping all the DNA base pairs of the chromosomes of humans.
- ✓ Identifying all the genes within a sequence.

11. Discuss the drastic environmental impacts of oil spills and how the microbes like bacteria can help mitigate the problem.

➤ Answer:

When oil spills occur in our oceans, they leave behind a wake of ecological devastation. Microbes can play an important role in biodegradation and bioremediation of environmental pollutants, as some can actively degrade these harmful substances, converting them into harmless metabolic byproducts

12. Give an account of significance of transgenic organisms in food industry.

➤ Answer:

A Transgenic organism is that whose genetic material has been altered using genetic engineering techniques. Transgenic organisms possess a novel combination of genetic material to improve the phenotypic traits and features. These modifications produce a new organism which has a new genetic makeup by adding or deleting or replacing genetic material.

The applications of transgenic organism is very beneficial in recent years, like production of crops with increased nutrient content and physical appearance like more thick walled (outer sheath) of tomatoes, colorful capsicums, short size of wheat, golden wheat etc.

13. Describe the uses of DNA finger printing.

➤ Answer:

➤ These are the possible uses of DNA fingerprinting

- (a) Use of DNA fingerprinting in legal disputes, notably to help solve crimes and to determine paternity.
- (b) It is also used to identify inherited genetic diseases.
- (c) It can be used to identify genetic matches between tissue donors and recipients.

14. What is gene cloning?

➤ Answer:

Gene cloning, also known as molecular cloning refers to the process of isolating a DNA sequence of interest for the purpose of making multiple copies of it. The identical copies are clones

15. Elaborately discuss recombinant DNA technology and its usefulness.

➤ Answer:

- Recombinant DNA (deoxyribonucleic acid) technology, joining of DNA molecules from two different species and inserting them into a host to produce new genetic combinations that have value medicine, science, agriculture, and human benefits.
- Applications of recombinant DNA (deoxyribonucleic acid) technology
- ✓ It is used for mass production of protein based drugs. First drug manufactured using this technology is insulin.
- ✓ Production of transgenic organisms
- ✓ Genetically modified foods are produced using recombinant DNA technology
- ✓ It helps in the process of bioremediation

CHAPTER 7 BIODIVERSITY AND ENVIRONMENTAL PROBLEMS

➤ Answer the following questions:

1. Compare species diversity and genetic diversity.

➤ Answer:

Genetic Diversity is the diversity of genetic characteristics (expressed or recessive) within a species (i.e. between individuals and populations of the same species).

Species Diversity is simply the number and relative abundance of species found in a given biological organization (population, ecosystem, Earth)

2. List several reasons to value biodiversity.

➤ Answer:

Biodiversity is important to value because these diverse species provide us with important medicines, useful chemicals, and recycle human wastes.

3. How does the greenhouse effect occur?

➤ Answer:

The greenhouse effect is a natural process that warms the Earth's surface. When the Sun's energy reaches the Earth's atmosphere, some of it is reflected back to space and the rest is absorbed and re-radiated by greenhouse gases. The absorbed energy warms the atmosphere and the surface of the Earth.

4. Identify the primary causes of modern species extinctions.

➤ Answer:

There are three primary anthropogenic processes that lead to species endangerment and extinction.

- ✓ Overharvesting;
- ✓ The introduction of nonnative species, including the spread of disease
- ✓ Habitat destruction.

5. Describe how pesticides, such as DDT, undergo the process of biological magnification.

➤ Answer:

DDT undergo the process of biological magnification because the pesticide is absorbed by small producers and low level consumers. Then, consumers of these organisms eat these infected organisms in high a quantity that magnifies the affect of DDT in the upper level animal. This trend continues all the way up the food chain until the highest animal on the chain gets an extremely magnified response to DDT that was introduced to the environment.

6. Choose a species that might be affected by global warming, and predict how that species might be affected.

➤ Answer:

Polar Bear:

Due to global warming, the global temperatures have been increasing, which has caused major melting of polar ice caps where the polar bears reside. In some areas, this melting has become so extensive that the polar bears have no land to live on and die as they cannot live in the arctic waters. If this continues, the population of polar bears will decrease.

7. Contrast conservation biology with restoration biology.

➤ Answer:

Restoration ecology assumes that environmental degradation and population declines are somewhat reversible processes while conservation biology attempts to preserve and maintain existing habitat and biodiversity.

8. Explain why reserves protect biodiversity.

➤ Answer:

We have natural reserves to protect our biodiversity that's the degree of variation of life. A sufficient biodiversity is required to keep our ecosystem in natural balance

9 .Explain causes and effects of acid rain

➤ Answer:

Acid rain is caused by a chemical reaction that begins when compounds like sulfur dioxide and nitrogen oxides are released into the air.

10. Give an account of the factors that threaten biodiversity.

➤ Answer:

Five main threats to biodiversity are invasive alien species, climate change, nutrient loading and pollution, habitat change, and overexploitation.

The end
Good lucky