

CHAPTER 7

CONTROL AND CO-ORDINATION

Syllabus

Tropic movements in plants; Introduction of plant hormones; Control and co-ordination in animals; Nervous system; Voluntary, involuntary and reflex action; Chemical co-ordination: Animal hormones.



STAND ALONE MCQs

(1 Mark each)

Q. 1. Which of the following is a plant hormone?

- (A) Insulin (B) Oestrogen
(C) Thyroxine (D) Cytokinin

R

Ans. Option (D) is correct.

Explanation: Cytokinin is a plant hormone. It is primarily involved in performing cell division in plant roots, shoot system. Insulin, oestrogen, and thyroxine are animal hormones secreted from pancreas, ovary, and thyroid gland, respectively.

Q. 2. The growth of tendrils in pea plants is due to:

- (A) effect of light
(B) effect of gravity
(C) rapid cell divisions in tendrillar cells that are away from the support
(D) rapid cell divisions in tendrillar cells in contact with the support

A

Ans. Option (C) is correct.

Explanation: When a tendril touches an object, then the side in contact with object grows slowly than its other side, (i.e., rapid cell divisions in cells that are away from the support). This causes the tendril to bend towards the object by growing towards it, wind around object and cling to it.

Q. 3. The movement of sunflower in accordance with the path of sun is due to

- (A) phototropism (B) geotropism
(C) chemotropism (D) hydrotropism

U

Ans. Option (A) is correct.

Explanation: The movement of a plant part in response to light is called phototropism.

Q. 4. The growth of pollen tubes towards ovules is due to

- (A) hydrotropism (B) chemotropism
(C) geotropism (D) phototropism

U

Ans. Option (B) is correct.

Explanation: The growth of pollen tubes towards ovules is due to chemotropism. Chemotropism is the movement of a plant part towards a chemical. For example: During the process of fertilization, the movement of pollen tube towards ovule occurs due to secretion of a sugary chemical in the ovary.

Q. 5. The main function of abscisic acid in plants is to

- (A) increase the length of cells
(B) promote cell division
(C) inhibit growth
(D) promote growth of stem

A

Ans. Option (C) is correct.

Explanation: Abscisic acid is a growth inhibitor hormone. It is also known as stress hormone because it is produced in plants during adverse conditions such as drought, water logging, cold conditions, etc. It causes falling of fruits and flowers and induces dormancy in seeds and buds.

Q. 6. The shape of guard cells changes due to change in the

- (A) protein composition of cells
- (B) temperature of cells
- (C) amount of water in cells
- (D) position of nucleus in the cells

Ans. Option (C) is correct.

Explanation: The shape of guard cell changes due to change in amount of water in cells.

AI Q. 7. The movement of shoot towards light is known as

- (A) geotropism
- (B) hydrotropism
- (C) chemotropism
- (D) phototropism

Ans. Option (D) is correct.

Explanation: Phototropism is the ability of a plant, or other photosynthesizing organism, to grow directionally in response to a light source. Any reaction to the stimulus of earth's gravity is called geotropism. The movement of a part of the plant towards water is called hydrotropism. When certain chemical substances help to bring about curvature movements in plant organs, then it is called chemotropism.

Q. 8. The substance that triggers the fall of mature leaves and fruits from plants is due to

- (A) auxin
- (B) gibberellin
- (C) abscisic acid
- (D) cytokinin

Ans. Option (C) is correct.

Explanation: Abscisic acid is a growth inhibitor hormone. It is produced in plants during adverse conditions like drought, water logging, cold conditions, etc.

It causes falling of fruits and flowers and induces dormancy in seeds and buds. Auxin promotes cell elongation, root formation, etc. Gibberellin stimulates stem elongation and germination. Cytokinin helps in breaking dormancy and regulating phloem transport.

Q. 9. In humans, the life processes are controlled and regulated by

- (A) reproductive and endocrine system
- (B) respiratory and nervous system
- (C) endocrine and digestive system
- (D) nervous and endocrine system

Ans. Option (D) is correct.

Explanation: In humans, the life processes are controlled and regulated by nervous and endocrine system. Both the systems work together to maintain the homeostasis.

Q. 10. Junction between two neurons is called

- (A) cell junction.
- (B) neuro muscular junction.
- (C) neural joint.
- (D) synapse.

Ans. Option (D) is correct.

Explanation: Synapse is a junction or gap across which a nerve cell can send an impulse to another neuron. Impulse is the signal that travels along the length of a nerve fibre and ends in the release of neuro-transmitters.

AI Q. 11. In a neuron, conversion of electrical signal to a chemical signal occurs at/in

- (A) cell body.
- (B) axonal end.
- (C) dendritic end.
- (D) axon.

Ans. Option (B) is correct.

Explanation: In a neuron, conversion of electrical signal to a chemical signal occurs at axonal end. When an electrical signal reaches the axonal end of a neuron, it releases a chemical substance. This chemical diffuses towards the dendritic end of next neuron where it generates an electrical impulse or signal. Hence, the electrical signal is converted into a chemical signal at the axonal end. Since these chemicals are absent at the dendrite end of the neuron, the electrical signal cannot be converted into chemical signal.

Q. 12. In a synapse, chemical signal is transmitted from

- (A) dendritic end of one neuron to axonal end of another neuron.
- (B) axon to cell body of the same neuron.
- (C) cell body to axonal end of the same neuron.
- (D) axonal end of one neuron to dendritic end of another neuron.

Ans. Option (D) is correct.

Explanation: Synapse is a microscopic gap between two neurons where chemical signal is transmitted from axonal end of one neuron to dendritic end of another neuron.

AI Q. 13. Electrical impulse travels in a neuron from

- (A) Dendrite → axon → axonal end → cell body.
- (B) Cell body → dendrite → axon → axonal end.
- (C) Dendrite → cell body → axon → axonal end.
- (D) Axonal end → axon → cell body → dendrite.

Ans. Option (C) is correct.

Explanation: Electrical impulse travels in a neuron from dendrites to axonal end. The dendrites pick up the impulses from receptor and pass them to the cell body and then along the axon to its end. At the axonal end, these impulses release neuro-transmitter that crosses the synapse and start a similar impulse in dendrite of the next neuron.

Q. 14. The brain is responsible for

- (A) thinking.
- (B) regulating the heart beat.
- (C) balancing the body.
- (D) all of the above.

Ans. Option (D) is correct.

Explanation: Brain is a part of central nervous system. It functions as a control centre of the nervous system.

Q. 15. Involuntary actions in the body are controlled by

- (A) medulla in fore brain.
- (B) medulla in mid brain.

- (C) medulla in hind brain.
(D) medulla in spinal cord.

R

Ans. Option (C) is correct.

Explanation: Involuntary actions in the body are controlled by medulla oblongata. Medulla oblongata is a part of hind brain. Hind brain is considered the control centre of visceral functions.

AI Q. 16. Which one of the following statements is incorrect?

- (A) Adrenal gland is a ductless gland.
(B) Testes are found only in females.
(C) Adrenal glands are found above kidneys.
(D) Hypothalamus gland is present in the brain. R

Ans. Option (B) is correct.

Explanation: Testes are found only in males while in female ovaries are present.



ASSERTION AND REASON BASED MCQs (1 Mark each)

Directions : In the following questions, A statement of Assertion (A) is followed by a statement of Reason (R). Mark the correct choice as.

- (A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true but R is NOT the correct explanation of A.
(C) A is true but R is false.
(D) A is false and R is true.

Q. 1. Assertion (A): Plant hormones are growth regulator.

Reason (R): Growth regulators promote or inhibit the growth.

Ans. Option (A) is correct.

Explanation: Plant hormones are chemical compound produced naturally in plants which control the growth and other physiological functions at a site far away from the place of secretion. It is required in very small amount. It can have promoting or inhibiting effect on a process and hence, it is a growth regulator.

Q. 2. Assertion (A): Auxins are synthesised in the growing tips of the plant.

Reason (R): Auxin concentration is highest at the tip of the root.

Ans. Option (C) is correct.

Explanation: Auxin, a plant hormone is synthesized at the growing tips of the plant i.e. tip of coleoptile. in buds and in growing tips of leaves and roots. The concentration of auxin found at the tip of the root is significantly lower than the concentration found at the tip of coleoptiles.

Q. 3. Assertion (A): Phototropism is caused by auxin.

Reason (R): When light is coming from one side of the plant, auxin diffuses towards the shady side of the shoot.

Ans. Option (A) is correct.

Explanation: Auxin promotes phototropism. When light is coming from one side of the plant, auxin diffuses towards the shady side of the shoot. This concentration of auxin stimulates the cells to grow longer on the side of the shoot which is away from light. Thus,

the plant appears to bend towards light while growing.

Q. 4. Assertion (A): Abscisic acid is a stress hormone.

Reason (R): Stimulation of ABA occurs in adverse conditions.

Ans. Option (A) is correct.

Explanation: Abscisic is a stress hormone as its production is stimulated by drought, water logging and other adverse (stressful) conditions.

Q. 5. Assertion (A): Gibberellins induce internodal growth in dwarf plant varieties.

Reason (R): Gibberellins when applied to normal plants, it increases the length of the plant.

Ans. Option (C) is correct.

Explanation: Gibberellin induces internodal growth and overcome the phenotypic expression of dwarfism in certain plants. It has little or no effect when they are applied to the normal plant.

Q. 6. Assertion (A): Phototropism is a directional growth movement.

Reason (R): It occurs in the direction of light.

Ans. Option (A) is correct.

Explanation: Phototropism is the movement or bending of light towards light. Hence, it is known as directional growth movement.

Q. 7. Assertion (A): Units which make up the nervous system are called neurons.

Reason (R): Nerve impulses are carried by dendrites towards the cell body.

Ans. Option (B) is correct.

Explanation: Both the statements are true. Nervous system is the system of conducting tissues that receives the stimulus and transmits it to other parts of the body forming a network of nerves. It is involved in receiving information (sensation) and generating responses to that information (motor response). The units which make up the nervous system are called nerve cells or neurons. Nerve impulses are always transmitted across a synapse from the axon terminals of one neuron to the dendrite /cell body of the next neuron.

Q. 8. Assertion (A): Nerve impulse is a one way conduction.

Reason (R): Nerve impulse is transmitted from dendrite to axon terminals.

Ans. Option (C) is correct.

Explanation: Nerve impulses are always transmitted across a synapse from the axon terminals of one neuron to the dendrite / cell body of the next neuron but never in the reverse direction. Since, the neurotransmitter is present only in the axon terminals and not in the dendrite or cell body, it cannot be released from the dendrite or cell body even if the impulse reaches there.

Q. 9. Assertion (A): Our body maintains blood sugar level.

Reason (R): Pancreas secretes insulin which helps to regulate blood sugar levels in the body.

Ans. Option (A) is correct.

Explanation: Pancreas secretes insulin which helps to regulate blood sugar levels in the body. If the sugar level in blood rises, they are detected by the cells of the pancreas which respond by producing more insulin. As the blood sugar level falls, insulin secretion is reduced.

Q. 10. Assertion (A): Failure of secretion of growth hormone from an early age causes dwarfism in the patient.

Reason (R): Growth hormone stimulates the body growth and elongation of long bones.

Ans. Option (A) is correct.

Explanation: Growth hormone is secreted by the anterior lobe of pituitary gland. It stimulates body growth. The failure of secretion of growth hormone from an early age causes dwarfism while excessive secretion of this hormone from childhood leads to gigantism.

Q. 11. Assertion (A): Males have more stature than females during puberty.

Reason (R): This is because of presence of thyroxin in the blood of females.

Ans. Option (C) is correct.

Explanation: Males have more stature than females because of action of male sex hormone called testosterone, which is secreted by testis in males. Testosterone controls the development of secondary sexual characters in males. Thyroxin increases the metabolic rate of the body and maintains BMR.



CASE-BASED MCQs

Attempt any 4 sub-parts from each question. Each sub-part carries 1 mark.

I. Study the table in which the levels of Thyroid Stimulating Hormone (TSH) in women are given and answer the questions that follow on the basis of understanding of the following paragraph and the related studied concepts.

Age Range	Normal (mU/L)	Low (mU/L)
18 – 29 years	0.4 – 2.34 mU/L	< 0.4 mU/L
30 – 49 years	0.4 – 4.0 mU/L	< 0.4 mU/L
50 – 79 years	0.46 – 4.68 mU/L	< 0.46 mU/L

Women are at greater risk for developing abnormal TSH levels during menstruation. while giving birth and after going through menopause. Around 6% of women in the United States have some kind of thyroid problem compared to 3% of men. Despite claims that high TSH increases your risk for heart disease, a 2013 study found no link between high TSH and heart diseases. But a 2017 study showed that older women are especially at risk for developing thyroid cancer if they have high levels along with thyroid nodules.

Q. 1. A 35 year old woman has TSH level 6.03 mU/L. What change should she bring in her diet to control this level?

Ans. She should take more iodine in her diet which would bring thyroxine levels to normal.

Q. 2. When do women face a greater risk of abnormal TSH level?

Ans. During menstruation, while giving birth and after going through menopause.

Q. 3. State the consequence of low TSH level.

Ans. Low level of TSH causes – Goitre disease

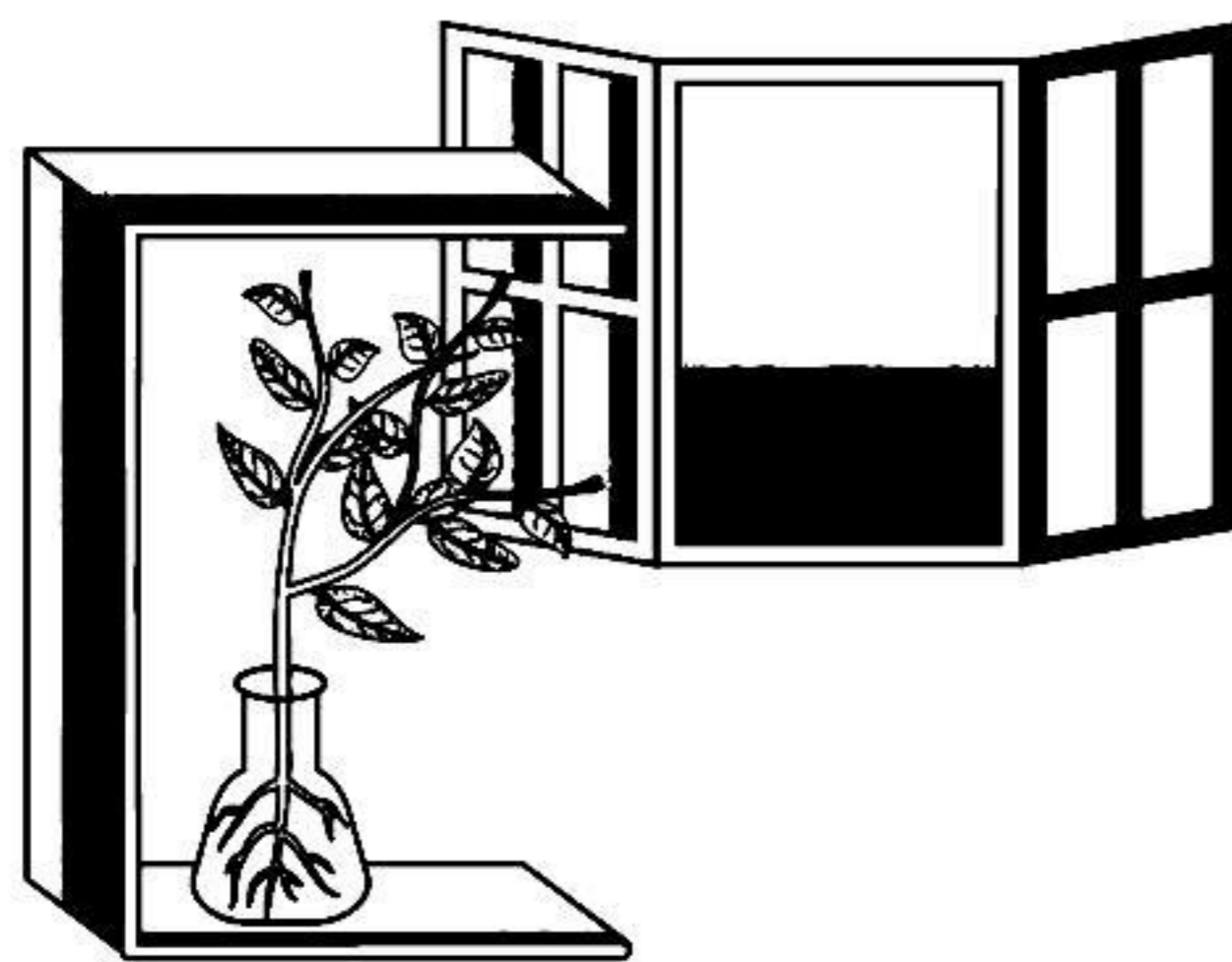
Q. 4. Name the mineral that is responsible for synthesis of hormone secreted by thyroid gland.

[Outside Delhi, Set- I, 2020]

Ans. Iodine.

AI I. Read the given passage and answer any four questions from Q.1. to Q.5.

Plants perform chemical coordination for various activities with the help of hormones. Different hormones are produced by plants. These are the chemical compounds released by stimulated cells that diffuse to various locations in plants performing different function. There is a hormone that is synthesized in the tip of shoots. When light is coming from one side of the plant, this hormone diffuses towards the shady side of the shoot. Its concentration stimulates the cells to grow longer on the side of the shoot which is away from light. Thus, the plant appears to bend towards light while growing.



Q. 1. The name of the hormone being described is:

- (A) Auxin (B) Gibberellin
(C) Cytokinin (D) Ethylene

Ans. Option (A) is correct.

Explanation: Auxin is the hormone.

Q. 2. The movement of shoot towards light is known as

- (A) Chemotropism (B) Phototropism
(C) Thigmotropism (D) Geotropism

Ans. Option (B) is correct.

Explanation: The movement of shoot towards light is known as phototropism.

Q. 3. A young plant receives sunlight from one direction only. Which of these statements is correct about the direction of their roots and shoots?

- (A) Shoot bends towards the light whereas root bends away from the light.
(B) Root bend towards the light whereas shoot bend away from the light.
(C) Both the shoot and root will bend towards the light.
(D) Both the shoot and root will bend away from the light.

Ans. Option (A) is correct.

Explanation: Growth movements of plants towards light e.g, shoots bend toward light (positively phototropic) and roots move away from light (negatively phototropic).

Q. 4. The stimulus in growth of pollen tube towards ovule during fertilisation is:

- (A) Pollen (B) Chemical
(C) Light (D) Water

Ans. Option (B) is correct.

Explanation: Growth of pollen tubes towards ovules is due to chemotropism.

Q. 5. Which of the following is not associated with growth of plant?

- (A) Auxin (B) Gibberellins
(C) Cytokinins (D) Abscisic acid

Ans. Option (D) is correct.

Explanation: Abscisic acid is a growth inhibitor hormone, it reverses the growth promoting effects of auxins and gibberellins. It causes dormancy of seeds, wilting of leaves, closing of stomata, etc.

III. Read the given passage and answer any of the four questions from Q.1. to Q.5.

Sonia went to the market along with her mother to buy fruits. She saw the fruit dealer putting small quantity of some powder wrapped in a paper in each wooden pack containing unripe mangoes. On enquiry, the fruit dealer told him that the powder is specific chemical which will help the mangoes to ripe early. Sonia was not convinced and she discussed the incidence with his class teacher the next day.

Q. 1. The chemical that fruit dealer had kept in wrapped paper in each box is:

- (A) Auxin (B) Gibberellin
(C) Cytokinin (D) Ethephon

Ans. Option (D) is correct.

Explanation: Ethephon is the chemical which is similar with ethylene plant hormone.

Q. 2. High concentration of ethylene is present in

- (A) young leaves (B) meristematic regions
(C) ripening fruits (D) buds

Ans. Option (C) is correct.

Explanation: A gaseous hormone which helps in artificial ripening of fruits.

Q. 3. All of these hormones are growth promoters except:

- (A) Gibberellin (B) Ethylene
(C) Auxin (D) Cytokinin

Ans. Option (B) is correct.

Explanation: Abscisic acid is a growth inhibitor hormone. It is produced in plants during adverse conditions like drought, water logging, cold conditions, etc.

Q. 4. The substance that triggers the fall of mature leaves and fruits from plants is due to

- (A) auxin (B) gibberellin
(C) abscisic acid (D) cytokinin

Ans. Option (C) is correct.

Explanation: Abscisic acid is a growth inhibitor hormone. It causes falling of fruits and flowers and induces dormancy in seeds and buds.

Auxin promotes cell elongation, root formation, etc. Gibberellin stimulates stem elongation and germination. Cytokinin helps in breaking dormancy and regulating phloem transport.

IV. Question numbers (1) to (4) are based on the two tables given below. Study these tables related to blood sugar levels and answer the questions that follow.

Table A (Blood glucose chart)

	Mean Blood Glucose Level (mg/dL)
Doctor's advice needed	380
	350
	315
	280
	250
Good	215
	180
Excellent	150
	115
	80
	50

Table B (Blood Report of Patient X and Y)

Time of check	Blood Glucose ranges (mg/dL)	
	Patient X	Patient Y
Before breakfast (Fasting)	< 100	70 - 130
Before lunch, supper and snack	<110	70 - 130
Two hours after meals	<140	< 180
Bedtime	<120	90 - 15

Q. 1. Refer to Table B showing the blood report of the levels of glucose of patients X and Y.

Infer the disease which can be diagnosed from the given data.

Ans. Diabetes is the disease diagnosed from the given data. It is a metabolic disorder disease related to the high sugar level in the blood.

Q. 2. Identify the hormone whose level in the blood is responsible for the above disease.

Ans. Insulin. It is a hormone produced by the pancreas for maintaining blood sugar level.

Q. 3. Which one of the following diets would you recommended to the affected patient?

- (A) High sugar and low fat diet.
- (B) Low sugar and high protein diet.
- (C) High fat and low fibre diet.
- (D) Low sugar and high fibre diet.

Ans. Option (D) is correct.

Explanation: Low sugar and high fibre diet are recommended to the diabetic patient.

Q. 4. Refer to the Table A and suggest the value of the mean blood glucose level beyond which doctor's advice is necessary:

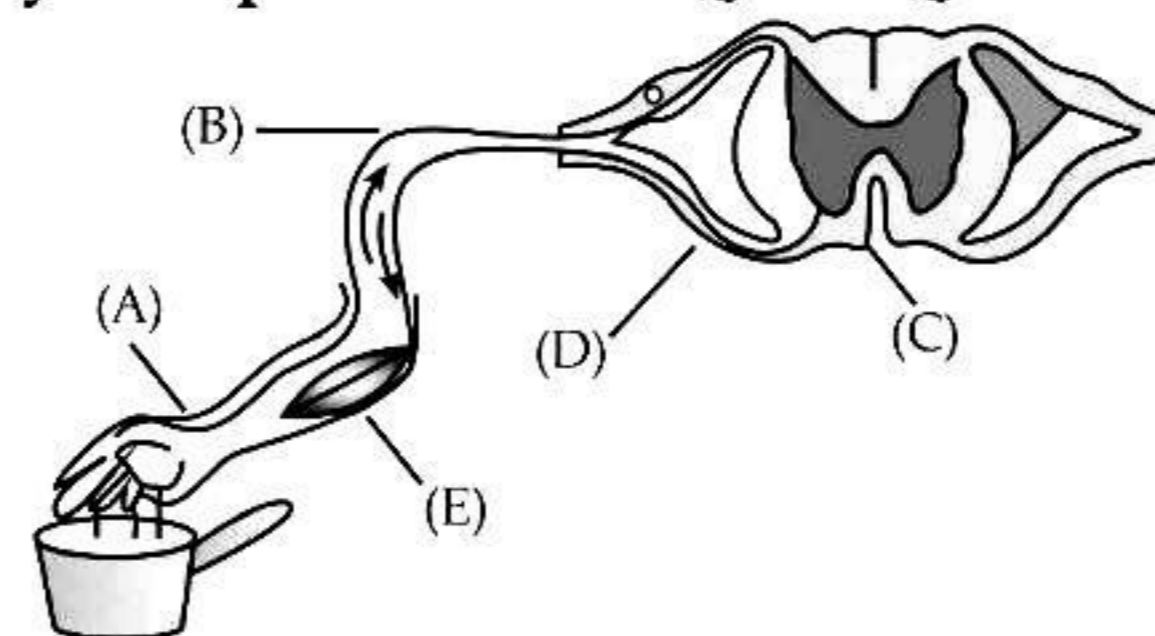
- (A) 180 mg/dL
- (B) 115 mg/dL
- (C) 50 mg/dL
- (D) 80 mg/dL

[CBSE SQP, 2019]

Ans. Option (A) is correct.

Explanation: The value of mean blood glucose level beyond 180 mg/dL requires a doctor's advice. Regular blood tests are mandatory for the management of the diabetic condition.

V. Study the given diagram of reflex arc and answer any four questions from Q.1. to Q.5.



Q. 1. The importance of reflex action is to

- (A) Protect the body from serious damage by quick automatic responses towards stimuli
- (B) Enable a person climb the stairs without looking
- (C) Enable a person to protect himself from attack by using self-defense techniques
- (D) Enable a person to choose his actions according to his will

Ans. Option (A) is correct.

Explanation: Reflex actions protect the body from serious damage by quick automatic responses towards stimuli.

Q. 2. The parts labelled as A and C are

- (A) Receptor and Relay neuron respectively
- (B) Receptor and Spinal cord respectively
- (C) Effector and Relay neuron respectively
- (D) Effector and Spinal cord respectively

Ans. Option (A) is correct.

Explanation: The part labelled as A is Receptor and C is Relay neuron.

Q. 3. Which of these is the correct function of part "B"?

- (A) It responds to stimulus.
- (B) It carries impulse from receptor to spinal cord.
- (C) It carries impulse from effector to spinal cord
- (D) None of these

Ans. Option (B) is correct.

Explanation: Part B is Sensory neuron. It carries impulse from receptor to spinal cord.

Q. 4. The correct path of reflex action is

- (A) Receptors → Sensory neuron → Spinal cord → Motor neuron → Effector
- (B) Receptors → Motor neuron → Spinal cord → Sensory neuron → Effector
- (C) Effector → Sensory neuron → Brain → Motor neuron → Receptors
- (D) Effector → Motor neuron → Brain → Sensory neuron → Receptors

Ans. Option (A) is correct.

Explanation: The pathway taken by nerve impulse in a reflex action is called the reflex arc. It follows a specific pathway as: Receptors → Sensory neuron → Spinal cord → Motor neuron → Effector.

Q. 5. Which of the following statements are true?

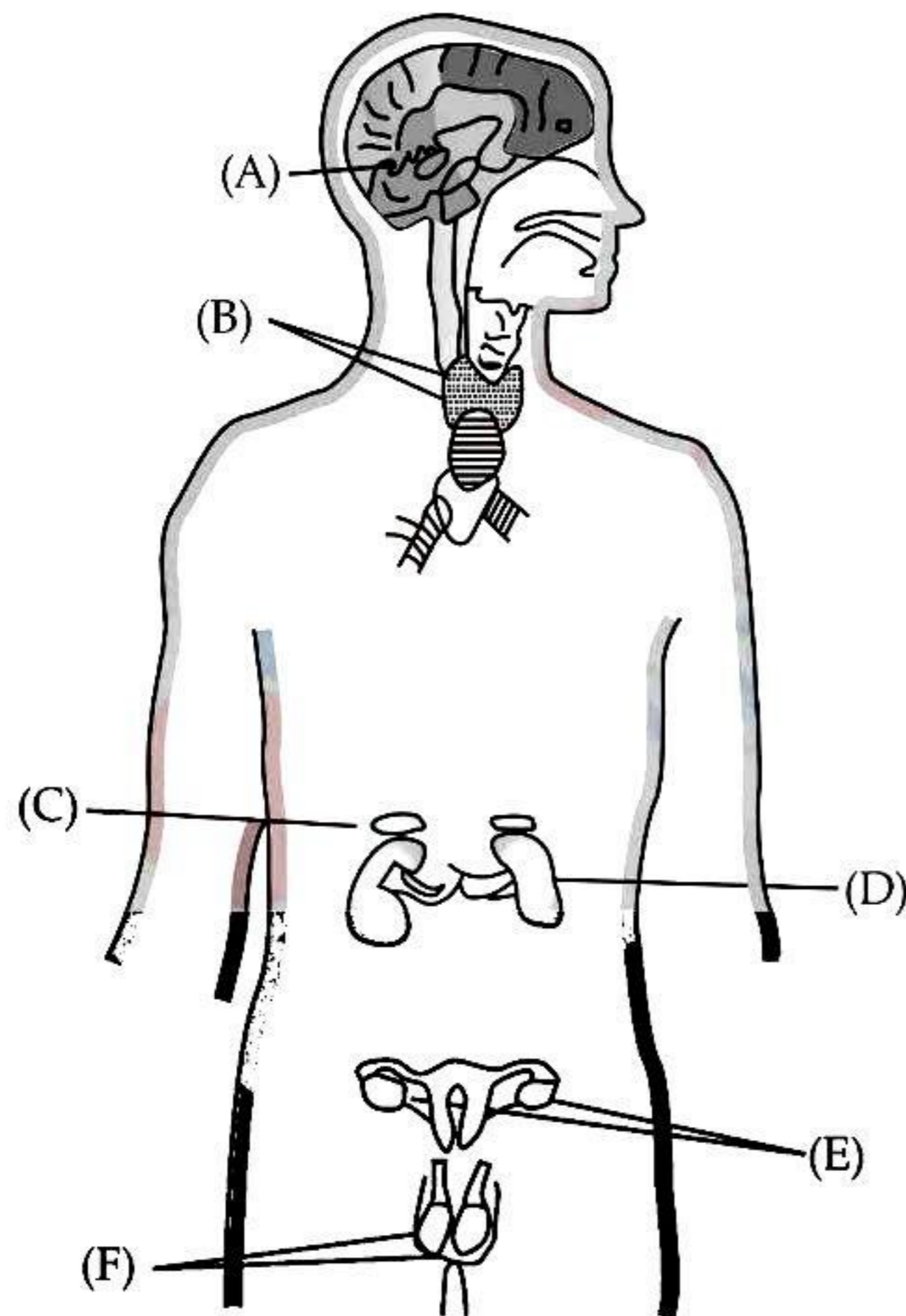
1. Sudden action in response to something in the environment is called reflex action
2. Sensory neurons carry signals from spinal cord to muscles.
3. Motor neurons carry signals from receptors to spinal cord.
4. The path through which signals are transmitted from a receptor to a muscle or a gland is called reflex arc.

- (A) 1 and 2 (B) 1 and 3
(C) 1 and 4 (D) 1, 2 and 3

Ans. Option (C) is correct.

Explanation: The statement 2 is false as sensory neurons carry signals from receptors to spinal cord. The statement 3 is false as motor neurons carry signals from spinal cord to effectors.

VI. The given diagram represents the human endocrine system. Study the diagram and answer any four questions from Q.1. to Q.5.



Q. 1. Which of the given statements are true about the gland B.

- (A) Controls the organic and mineral metabolism

- (B) Controls the mental and physical development of the body in children
(C) Prepares the body for fight of flight
(D) Both (A) and (B)

Ans. Option (D) is correct.

Explanation: Thyroid gland controls the mental and physical development in children. It controls the growth of hair.

Q. 2. The effect of chemical produced by gland F is:

- (A) Secretes insulin which controls the amount of sugar in blood.
(B) Secretes testosterone which controls sperm production.
(C) Controls the activity of all other glands of our body.
(D) All of these

Ans. Option (B) is correct.

Explanation: Gland F is Testis. It secretes testosterone which controls sperm production/secondary sexual character.

Q. 3. Which gland secretes digestive enzymes as well as hormones?

- (A) B (B) C
(C) D (D) E

Ans. Option (C) is correct.

Explanation: Gland D is pancreas. It secretes both digestive enzymes as well as hormones.

Q. 4. Select the mis-matched pair.

- (A) A - Adrenaline (B) F - Testosterone
(C) E - Estrogen (D) B - Thyroxin

Ans. Option (A) is correct.

Explanation: Adrenaline is secreted by the adrenal glands, located on top of kidneys. Growth hormone is secreted by the pituitary gland.

Q. 5. Which of the following endocrine glands is unpaired?

- (A) Adrenal (B) Testes
(C) Pituitary (D) Ovary

Ans. Option (C) is correct.

Explanation: There are two adrenal glands, one on top of each kidney that make adrenaline hormone. Testes are paired glands presents in males, secretes male sex hormone. Pituitary gland is present just below the brain and is unpaired. It is also called master gland and as it secretes a number of hormones. Ovaries are paired glands present in females, secretes female sex hormones.