

**Solution**  
**CONTROL AND COORDINATION**  
**Class 10 - Science**  
**Section A**

1.  
**(d)** testosterone from testes and estrogen from ovary  
**Explanation:**  
Dramatic changes in body features associated with puberty are mainly because of the secretion of the sex hormones. The sex hormones are responsible for the secondary character that appears after puberty. Males secrete testosterone and females secrete estrogen.
2.  
**(c)** Chewing  
**Explanation:**  
Involuntary actions are the actions that are happening without the conscious choice of an organism. The example, for involuntary actions, are Vomiting, yawning, salivation, heartbeats, coughing, sneezing, etc. Whereas chewing is a voluntary action, which is controllable.
3.  
**(d)** Increase the blood sugar  
**Explanation:**  
Glucagon hormone is released from the pancreas that increases the sugar level in the blood to facilitate the need for sugar in our body.
4.  
**(c)** Jumping from a height  
**Explanation:**  
Jumping from a height
5.  
**(d)** Opening of flower (evening primrose)  
**Explanation:**  
Nastic movements are plant movements that occur in response to environmental stimuli but unlike tropic movements.
6.  
**(b)** rapid cell divisions in tendrillar cells that are away from the support  
**Explanation:**  
rapid cell divisions in tendrillar cells that are away from the support due to accumulation of auxin phytohormone that help in cell division and growth.
7.  
**(b)** Insulin  
**Explanation:**  
It is a condition when there is high blood sugar in the body and it caused by when insulin hormone is not secreted by the pancreas which maintains blood sugar level in the body.
8.  
**(d)** Promote cell division.  
**Explanation:**

In plant cells, cytokinins encourage cell division, Plant roots and shoots contain it.

9.

**(d)** medulla in hind brain

**Explanation:**

Involuntary actions are those actions or activities controlled by medulla oblongata which is a part of the autonomous nervous system (hindbrain).

10.

**(d)** Sensory neuron

**Explanation:**

Sensory neuron carries electrical impulses from receptor to brain while motor neuron carries electrical impulses from the brain to effectors.

11.

**(b)** B and D

**Explanation:**

The main function of auxin is to help plants grow. Auxin stimulates plant cells to elongate, and the apical meristem of a plant is one of the main places that auxin is produced.

12.

**(d)** nervous and endocrine systems

**Explanation:**

Reproductive, respiratory, and digestive systems have no role to play in control and regulation of life processes. It is the nervous system and the endocrine system that controls and regulates all the processes including reproductive, respiratory, and digestive systems.

13.

**(c)** They reproduce asexually.

**Explanation:**

They reproduce asexually.

14.

**(b)** axonal end of one neuron to dendritic end of another neuron

**Explanation:**

The electric impulses travel from the axon to the dendrite of another neuron through a synaptic gap which consists of SYNAPSE.

15.

**(b)** spinal cord

**Explanation:**

A reflex action, or reflex, is an automatic reaction to a stimulus that is not under conscious control. A reflex arc is a neural pathway that mediates a reflex action. The Central Nervous System (CNS), which is composed of the brain and spinal cord, receives data from the receptor cell via the sensory nerve of a reflex arc. The sensory nerve fibres in the body terminate in the spinal cord, where motor neurons that control the effector organ share synapses with interneurons to transmit information.

16.

**(a)** Thymus gland

**Explanation:**

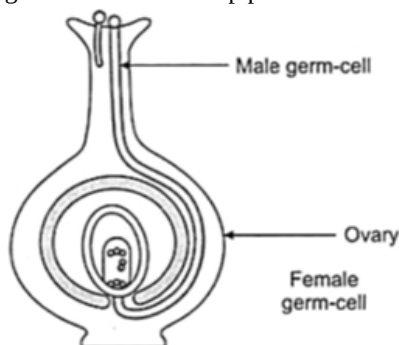
The thymus gland is larger in a newborn child which becomes smaller with increasing age. The thymus gland is a soft, flattened, pinkish-grey organ found in the upper chest under the breastbone.

17. **(c)** Under secretion of thyroxin  
**Explanation:**  
Under secretion of thyroxin
18. **(d)** synapse  
**Explanation:**  
Synapse is the gap between two neurons where one neuron send message to another neuron.
19. **(b)** Neuromuscular junction  
**Explanation:**  
In a nerve cell, the site where the electrical impulse is converted into a chemical signal is known as Neuromuscular junction.
20. **(c)** testosterone  
**Explanation:**  
Testosterone is the male hormone which promotes maleness. It is the hormone produced by testes. It helps in promoting spermatogenesis, the process of production of sperm. It also promotes secondary sexual characteristics.
21. **(c)** A is true but R is false.  
**Explanation:**  
Acetylcholine is a neurotransmitter, not neuro inhibitor. Thus assertion is true, but reason is false.
22. **(a)** Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).  
**Explanation:**  
Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).
23. **(a)** Both A and R are true and R is the correct explanation of A.  
**Explanation:**  
Absciscic is a stress hormone as its production is stimulated by drought, waterlogging and other adverse (stressful) conditions.
24. **(b)** Both A and R are true but R is not the correct explanation of A.  
**Explanation:**  
Both A and R are true but R is not the correct explanation of A.
25. **(a)** Both A and R are true and R is the correct explanation of A.  
**Explanation:**  
Both A and R are true and R is the correct explanation of A.
26. **(c)** A is true but R is false.  
**Explanation:**  
Assertion is true, but thigmonasty is the movement of plant part in response to the touch of an object. Thus assertion is true, but reason is false.
27. **(a)** Both A and R are true and R is the correct explanation of A.  
**Explanation:**  
Iodine is very necessary for the production of the hormone thyroxine, lack of thyroxine causes goitre in the body. So, iodine is necessary to prevent goitre. Thus both assertion and reason are true and reason is the correct explanation of the assertion.

28. **(b)** Both A and R are true but R is not the correct explanation of A.  
**Explanation:**  
 Synapse and neuron has no relation regarding function. Neuron is the functional unit but that doesn't define synapse. Thus both assertion and reason are true, but reason is not the correct explanation of the assertion.
29. **(a)** Both A and R are true and R is the correct explanation of A.  
**Explanation:**  
 Both A and R are true and R is the correct explanation of A.
30. **(d)** A is false but R is true.  
**Explanation:**  
 A is false but R is true.
31. i. Maintaining posture and balance: Cerebellum in hind brain  
 ii. Beating of heart: Medulla in hind brain  
 iii. Thinking: Cerebrum in forebrain  
 iv. Blood pressure: Medulla in hind brain
32. Iodine is the main element of thyroxine hormone
33. Luteotropic hormone is associated with lactation in mammals.
34. The disorder is Gigantism and over secretion of growth hormone causes this disorder. The endocrine gland associated with it is pituitary gland.
35. **Plant hormones:** Plant hormones are the fluids which are secreted within the plant also known as phytohormones. Plant hormones regulate the growth and development of the plant. Examples of plant hormones are auxin, gibberellins etc. These are chemical compounds secreted by plants which diffuse all around the other cells and regulate the activities. Plants hormones help to coordinate (i) growth (ii) development and (iii) responses to the environment.
36. Auxin is the plant hormone that causes a plant's shoot to bend when it is exposed to unidirectional light. Auxin accumulates on the side of the shoot that is shaded, causing the cells on that side to elongate more than the cells on the side that is exposed to light, which causes the shoot to bend in the direction of the light source.
37. Two components of central nervous system are  
 i. Brain (it is further divided into fore brain, mid brain and hind brain)  
 ii. Spinal cord
38. Adrenal cortex and adrenal medulla are the two portions of adrenal gland.
39. Oxytocin and Vasopressin or ADH secreted by posterior lobe of pituitary.
40. Gigantism is a rare condition that causes abnormal growth in children. Gigantism causes hypersecretion of growth hormone.

### Section B

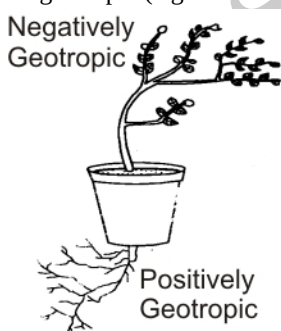
41. Chemotropism is shown by pollen grains. The orientation or movement of plant parts in response to chemicals is called chemotropism. Ovary produces some sugary substances which are chemicals and in response to these chemicals pollen grains germinate and develop pollen tube that moves through style to reach ovule present in ovary.



42. Control and coordination of functioning of various organ and organ system of the body is under the direct control of nervous system in close coordination with endocrine(hormonal) system. This control is achieved by a complex network of neurons which carry signals in the form of electric impulses; to and from the brain and controls the body function directly whereas, the endocrine system are the ductless glands which release chemical substances directly into the blood and reaching the target site for action.

Nervous and hormonal systems are complementary to each other. Thus, it can be said that nervous and hormonal system together perform the function of control and coordination in human beings.

43. i. Freshly plucked leaf should be taken for epidermal peel.  
ii. Hold the slide by its edges.  
iii. Peel should be cut to a proper size.  
iv. The peel should be allowed to dry.
44. i. Cerebellum is hurt because cerebellum controls and coordinates muscular activities as well as maintains posture and balance of the body.  
ii. Olfactory lobe of forebrain is damaged as it is the site for smell.  
iii. Hypothalamus part is damaged as the centre of hunger and thirst is located in it.
45. a. **Pituitary gland:** Hypothalamus present in brain releases hormones that regulate the secretion of pituitary glands. The pituitary gland is a part of **endocrine system which is also known as Master gland** it produces many hormones that travel throughout the body, directing certain processes or stimulating other **glands** to produce other hormones. Its main function is to secrete **hormones** into our bloodstream. These **hormones** can affect other organs and glands, especially **thyroid**. It also stimulates the adrenal **glands** to **secrete** steroid hormones, principally cortisol. growth hormone, which regulates growth, metabolism and body composition.  
b. **Pancreas:** It is part of the digestive system and produces insulin and other important enzymes and hormones that help break down foods. The pancreas has an **endocrine** function because it releases juices directly into the bloodstream, and it has an exocrine function because it releases juices into ducts.  
c. **Adrenal gland:** -The **adrenal glands** (also known as **suprarenal glands**) are endocrine **glands** that produce a variety of hormones They are found above the kidneys. Each **gland** has an outer cortex which produces steroid hormones and an inner medulla. Located at the top of each **kidney**, the adrenal glands produce **hormones** that help the **body** control blood sugar, burn protein and **fat**, react to stressors like a major illness or injury, and regulate blood pressure. Two of the most important adrenal **hormones** are cortisol and aldosterone.  
d. **Testis** The testis are housed in the **scrotum** just behind the penis. The testis is the male gonads — the primary male reproductive organs. They have two, very important functions that are very important to the male reproductive system, they produce gametes, or sperm, and they secrete **hormones**, primarily testosterone.
46. Stem bends towards the light called phototropism and moves away from the gravity of earth. Stem show positive response towards light and negative response toward gravity.
47. 1) Breaking of dormancy (seed germination)  
2) Flowering
48. The roots of plants bend down and grow towards the soil due to gravity. This is called geotropism. The term geotropism is applied to growth movements induced by stimulus of gravity. Growth of an organ towards the centre of the earth is termed positive geotropism (e.g. main roots are positively geotropic), and growth away from the centre of earth is termed as negative geotropism (e.g. main stems are negatively geotropic). When the axis of an organ grows at right angle to the direction of gravity it is said to be diageotropic (e.g. rhizomes of certain grasses or stolons of potato).



49. Difference between nervous control and hormonal control:

Nervous control	Hormonal control
(i) Consists of nerve impulses conducted by neurons from one organ to another organ.	(i) It consists of endocrine system which secretes chemical messenger's hormones secreted directly in blood.
(ii) Nervous impulses produce rapid short lasting responses.	(ii) Hormones produce longer lasting responses.
(iii) Nervous impulses are not specific in their action.	(iii) Action of hormones is highly specific.

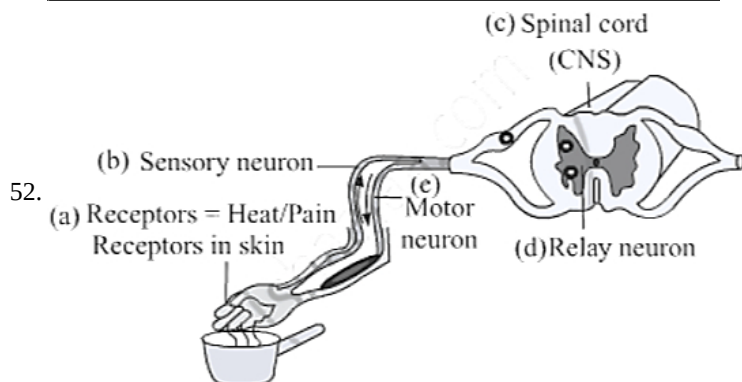
50. Name: Adrenaline

Location: Adrenal gland

Responses: Heart beats faster resulting in supply of more oxygen to our muscles. Blood to the digestive system is reduced due to contraction of muscles around small arteries. Breathing rate increases due to the contractions of diaphragm and rib muscles.

51. Difference between reflex action and walking:

Reflex action	Walking
(a) Take place without thought.	(a) Take place after thought.
(b) Controlled by spinal cord.	(b) Controlled by cerebellum.
(c) It is involuntary action.	(c) It is a voluntary action.



The term given is Reflex arc.

### Section C

53. As a result of castration in male, the secondary sexual characters do not appear and sex instinct is suppressed. This shows that the testosterone hormone produced by the testes are responsible for the development of secondary sexual characters in males and also for the sexual behaviour in male cat.

54. Differences between endocrine glands and Exocrine glands

Endocrine glands	Exocrine glands
1) Endocrine glands have no ducts, (ductless glands)	1) They have ducts. (Digestive glands)
2) They secrete chemical substances called hormones.	2) They secrete proteinaceous substances called enzymes.
3) These glands bring about the chemical co-ordination of the body.	3) These glands by their secretion hasten the biochemical reactions of the body.
4) Endocrine glands are complex.	4) Exocrine glands are simple.
5) The important endocrine gland are pituitary, thyroid, parathyroid, adrenals, sex-glands etc.	5) The important exocrine gland are salivary glands, liver, pancreas, sweat glands etc.

55. A number of interactions between the environment and the animal are a result of combined action of both neurons and endocrine system for which specialized tissues are used to provide control and co – ordinations activities. Nervous system that includes brain, spinal cord along with other peripheral nervous transfer the information for procesisng. The endocrine system releases hormones in response to stimulus to control and co-ordinate the functions.

### Section D

56. i. In plants, negative phototropism occurs in roots.  
ii. Phototropism in shoots is attributed due to auxin in plants.  
iii. Tendrils exhibit/ twining of tendrils show thigmotropism movement.

**OR**

Positive phototropic movement.

57. i. In plants, **chemical coordination** occurs with the help of plant hormones (Phytohormones).  
ii. *Mimosa pudica*'s leaves drop down when we touch it. It is due to the turgor pressure difference between the upper and lower halves of the base of the petiole. Its other name is "touch-me-not" or "chui-mui".  
iii. Turgor movement is the movement due to the difference in turgidity of the cells in the lower half and the upper half of pulvinus (petiole of a leaf).

**OR**

The movements which are in a particular direction in relation to the stimulus are called tropic movements. Tropic movements

happen as a result of the growth of a plant part in a particular direction. For example; the shoot usually grows in the direction of sunlight. This is called positive phototropic movement.

58. i. Diabetes, Diabetes is caused due to less or no secretion of hormone insulin by pancreas.  
ii. Insulin level in the blood is responsible for the given disease.  
iii. Low sugar high fibre diet

**OR**

> 180mg/dL.

59. i. In animals, chemical coordination is achieved through the agency of hormones which function as chemical messengers. Different plant hormones help to coordinate growth, development, and responses to the environment.  
ii. Adrenaline hormone is called an emergency hormone. Adrenaline hormone is released into the blood from the adrenal gland during stimulation of the nervous system.  
iii. The adrenal gland is present on the upper side of each kidney in our body.

**OR**

Adrenaline hormone is secreted in small amounts all the time. But in large amounts, it is secreted when a person is frightened. It increases the rate of heartbeat and breathing, raises blood pressure and allows more glucose go into the blood to give us a lot of energy so as to quickly fight or run away from the frightening situation.

60. i. Nerve cell is the largest cell present in the body.  
ii. Axon is a large, single, unbranched nerve fibre arising from the cyton. It carries impulses from cyton located in CNS to the effectors.  
iii. **Gustatory receptor:** Taste buds on the tongue. The receptors for gustation are located in the oral cavity, which brings food and fluids from outside the body into the gastrointestinal tract.

**Olfactory receptor:** Receptor in the nose. These receptors are common to arthropods, terrestrial vertebrates, fish, and other animals.

**OR**

- a. Dendrites  
b. Axon.

61. i. There are two types of movement:  
a. dependent on growth  
b. independent on growth.  
ii. Auxin is a plant hormone that promotes growth.  
iii. The function of the nervous system is to control and coordinate the activities of the body.

**OR**

The movements of the leaves of the sensitive plant are touch sensitive and independent of growth while the movement of the shoot towards light is growth related and known as phototropism.

62. i. Pancreas is a dual gland because it acts as both an endocrine and exocrine gland. As endocrine, it secretes hormones like insulin, glucagon. As an exocrine gland, it releases enzymes like trypsin, lipase, amylase etc.  
ii. Testosterone in males and oestrogen in females is the hormone that is secreted during adolescence.  
iii. If Insulin is not secreted in the proper amount then it causes diabetes.

**OR**

Glucagon and Insulin are secreted from alpha and beta cells of islets of the pancreas respectively.

63. i. Reflex Action is an unconscious, automatic and involuntary response of efforts, i.e., muscles and glands, to a stimulus, which is monitored through the spinal cord. Reflex action is controlled by the spinal cord.  
ii. Yes, reflex action involves all parts of the voluntary nervous system.  
iii. The part of the autonomic nervous system that controls involuntary actions are controlled or regulated by medulla (hindbrain).

**OR**

'Beating of heart muscle' is an example of involuntary action. Involuntary actions are slower than reflex actions.

64. i. These activities show tropic movements in plants due to their growth.  
ii. Yes, old parts of the shoot and root change direction and there is a difference in the direction of new growth.  
iii. Movement is related to stimulus i.e. plant organs either move towards the source of stimulus or away from it. Stimuli that cause movements in plants are gravity, light, touch, water, and chemical substances.

**OR**

Movements in the organs of a plant due to gravity are known as geotropism. This causes the roots to bend down towards the soil.

65. i. At the synapse, (functional junction between neurons) axon terminal comes in close proximity to the dendron terminal of next neuron. Axon terminal is expanded to form pre-synaptic knob and the other dendrite terminal forms post- synaptic depression.  
ii. The electrical impulse travels from the dendrite to the cell body, then along the axon to its end.  
iii. Acetylcholine is released at the end of the axon to transmit the signal to the other neuron.

**OR**

A synapse is a gap between two neurons. At the synapse, the electrical signals are converted into chemicals that can easily cross over the gap and pass on to the next neurons where it again converted into electrical signals.

#### Section E

66. The working together of various organs of human being in a systematic, controlled and efficient way to produce a proper response to various stimuli is known as coordination.

In human beings, the control and coordination is brought about by both nervous system and endocrine system. Nervous system consists of receptors that receive the stimulus from surrounding environment and send the message received by them to the spinal cord and brain in form of electrical impulses through the sensory nerves.

The motor nerves then transmit the response to the effector. The effectors are mainly the muscles and glands of our body. Thus, endocrine glands secreting hormones are directly or indirectly controlled by the nervous system. For example, when an emergency stimulus is detected by the nervous system, the stimulus is detected by the nervous system, the stimulus is received and analysed by central nervous system that send message to effectors to provide proper response. At the same time, the sympathetic nervous system activates adrenal gland to release adrenaline that prepares body by increasing heart rate, blood pressure, respiration and dilates pupil etc.

Hence, control and coordination in humans (or animals) depend on two things for transmitting information, i.e. chemical signals of hormones and nerve impulses.

If they depended only on nerve impulses through nerve cells, only a limited range of tissues would be stimulated. Since, they get additional chemical signals as well, a large number of tissues are stimulated. This is why animals can show a wide range of response to stimulus.

67. i. Touch

The shape of the leaves changes by changing the amount of water in them.

No

- ii. Growth of a part of plant in response to the pull of earth or gravity is called geotropism.

- Growth of a part of plant in response to the pull of earth or gravity is called geotropism.
- Negative geotropism - Movement of plant part away from the force of gravity. Example - Shoots grow upwards.

68. Major functions of the human brain are:

- The cerebral cortex is greatly enlarged in human brains and is considered the seat of complex thought. It coordinates activities of the body so that mechanism and hormonal reactions of the body work together.
- Visual processing takes place in the occipital lobe, near the back of the skull
- The temporal lobe is located behind our ears and extends to both sides of the brain involved in vision, memory, sensory input, language, emotion.
- The parietal lobe integrates input from different senses and is important for spatial orientation and navigation. It receives information carrying nerve impulses from all the sensory organs of the body.
- The primary functions of the brain stem include relaying information between the brain and the body; supplying some of the cranial nerves to the face and head; and performing critical functions in controlling the heart, breathing and consciousness.
- The thalamus relays sensory and motor signals to the cortex and is involved in regulating consciousness, sleep and alertness. The hypothalamus connects the nervous system to the endocrine system where hormones are produced via the pituitary gland.
- The cerebellum lies beneath the cerebrum and has important functions in motor control. It plays a role in coordination and balance and may also have some cognitive functions.

69. i. Touch is the stimulus which is common for movement in both the cases.  
ii. Drooping of leaves in touch-me-not plant is an example of growth-independent movement which occurs due to change in turgour pressure of the cells. But attaching of pea plant to a support with help of tendrils is a growth dependent movement. The pea plants develop tendrils which are sensitive to touch. When they come in contact with a support they encircle the support and clings to them. Auxin hormone plays an important role. Auxin synthesized at the tip diffuses to parts away from the support, so those parts away from support grow faster than those parts in contact. So the tendrils encircle the support.

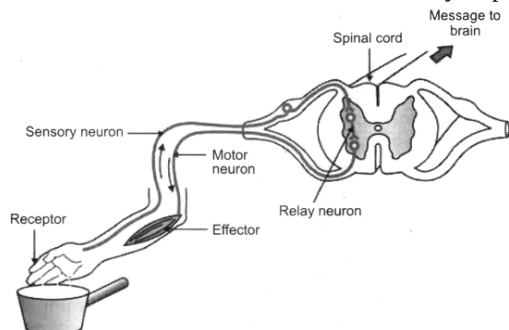


iii. Drooping of leaves in touch-me-not plant is an example of seismonastic movement whereas attaching of pea plant to a support with the help of tendrils is an example of curvature movement.

70. Reflex action is a quick, automatic, involuntary, unconscious response in the body brought about by a stimulus. Examples of reflex action:

- Withdrawal of hand suddenly on touching a hot plate.
- Withdrawal of finger suddenly when pricked by a thorn.
- Shivering of the body on feeling cold.
- Sudden closure of the eyelids when bright light falls on the eye.

**Reflex arc:** It is the shortest route taken by impulse from receptor to effector.



**Example:** When we touch a hot plate by our finger, we instantly withdraw our hand. Here stimulus is touching a hot plate, receptors are our fingers. The specialised epithelial cells of our fingers respond to stimulus and convert into impulse. This impulse is carried by sensory neuron to spinal cord which generates a motor impulse. This impulse is carried by motor neuron to effector organ i.e., muscles of hand. Response is withdrawal of our hand.

71. There are mainly three types of nervous system present in our body.

- Central nervous system which comprises of brain and spinal cord.
- Peripheral nervous system includes spinal nerves and cranial nerves which carry impulses to and from the central nervous system. There are 12 pairs of cranial nerves and 31 pairs of spinal nerves.
- Autonomic nervous system includes sympathetic and parasympathetic nervous system which controls the involuntary actions of internal organs. Brain and spinal cord are covered by a three layered membrane called meninges. The outermost layer is called dura mater, middle thin delicate layer is arachnoid and inner layer is pia mater. The space between the covering layers is filled with cerebrospinal fluid which acts as a cushion to protect them from shocks and injury.

72. i.	Nervous mechanism	Hormonal mechanism
	Transmits information through electrical impulses.	Transmits information through blood cells.
	Affects only a particular part of the body.	Affect different organs of the body
	Signal transmission is fast	Signal transmission is slow

ii. When light is coming from one side of the plant, auxin diffuses towards the shaded 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 the light.

73. a.	Name of hormone	Function	Disease
	Growth Hormone	stimulates growth of organs	Gigantism
	Thyroxine	regulates carbohydrates, proteins and fat metabolism	Goitre

b. It is regulated by feed back mechanism. Hormones has to be released in appropriate amount

Example:

- Rise in sugar level leads to more secretion of insulin from the pancreas
- Fall in sugar level leads to less secretion of insulin
- Return to Homeostasis:** With decreased TRH and TSH stimulation, the thyroid gland reduces its production of T3 and T4, helping to maintain hormonal balance and return to homeostasis.

74. Selye in 1948 defined hormones as "Physiological and organic compounds produced by certain cells (endocrine glands) for the sole purpose of directing the activities of distant parts of the same organism." They are also referred to as "chemical messengers". They have excitatory effects on some organs and inhibitory effects on others.

Functions of hormones:

- 1) Hormones stimulate the tissue activity.
- 2) Hormones regulate growth and reproduction.
- 3) Hormones control metabolism.
- 4) Hormones synthesize, store and utilize substances like glucose.
- 5) Hormones conserve water and minerals.

75. **Central - Brain and Spinal cord:** The central nervous system consists of the brain and spinal cord. The brain is the control center of the nervous system and is responsible for processing sensory information, initiating voluntary movements, regulating involuntary functions (such as heartbeat and respiration), and higher cognitive functions (such as thinking, memory, and emotions).

**Peripheral - cranial nerves and spinal nerves:** The peripheral nervous system consists of all the nerves and ganglia (clusters of nerve cell bodies) outside of the brain and spinal cord. The PNS connects the central nervous system to the rest of the body, including muscles, glands, and sensory organs.

- **Protection of the Components of the Central Nervous System:**

- The brain is protected by the skull, a hard and bony structure that surrounds and encases the brain tissue, providing physical protection against external trauma.
- The spinal cord is surrounded by a series of protective membranes called meninges, which provide additional cushioning and support. The three layers of meninges are the dura mater (outer layer), arachnoid mater (middle layer), and pia mater (inner layer).

- **Signals Disrupted in Case of Spinal Cord Injury:**

- A spinal cord injury disrupts the transmission of nerve signals between the brain and the rest of the body, leading to various impairments depending on the location and severity of the injury.
- Motor signals: Damage to the spinal cord can result in paralysis or weakness of muscles below the level of injury, leading to loss of voluntary movement and control.
- Sensory signals: Spinal cord injury can also cause loss of sensation, including touch, temperature, and proprioception (awareness of body position and movement).