/padhle akshay

PRESENTS

Control And Coordination

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NO BAKWAS

WHY THESE NOTES ???

- TOUCHES EVERY CORNER OF NCERT
- INCLUDES NCERT ACTIVITIES (AKQ), BOXES(BKQ) & EXEMPLAR (EKQ)
- EACH LINE, FLOWCHART & DIAGRAM IS MOTIVATED FROM PYQs
- APPROVED BY 3 CBSE TOPPERS

& SCAN & DONATE

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Coordination

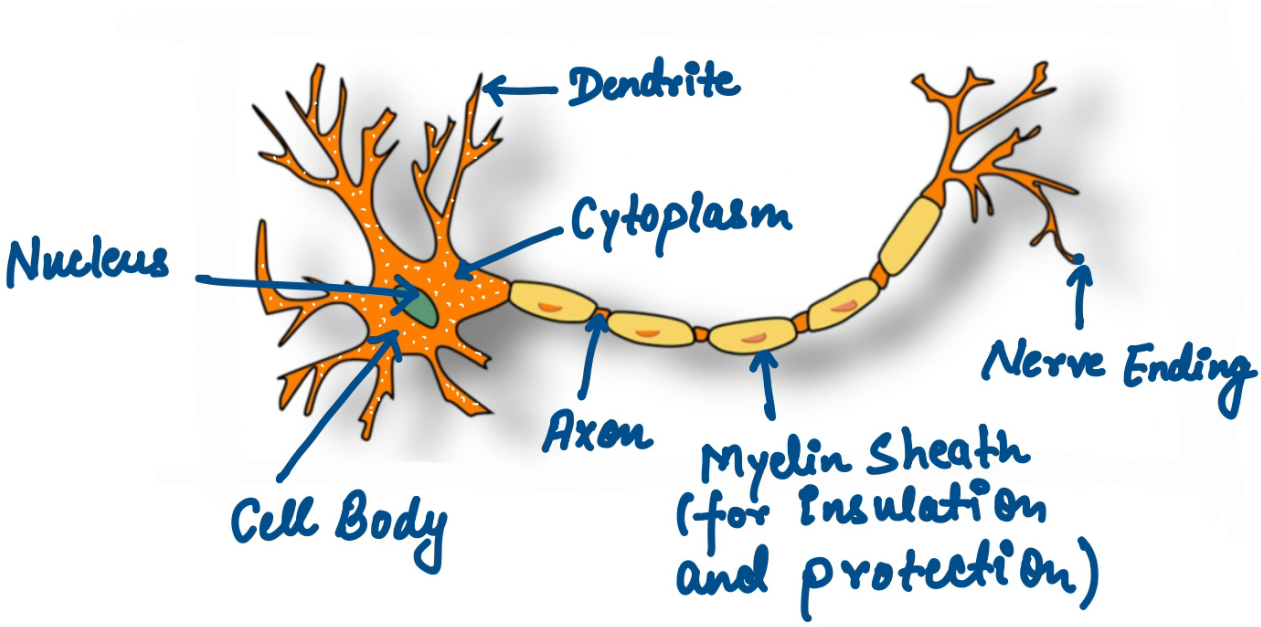
The working together of the various organs of an organism in a Systemmatic manner so as to produce proper response to the stimulus, is called coordination.

Stimuli: The change in the environment to which the organism respond and react are called stimuli.

Receptor: A receptor is a cell (or a group of cells) in a sense organ which is sensitive to a particular type of stimulus.

Light - Photoreceptors
Sound - Phonoreceptors
Smell - Olfactory receptors
Taste - Gustatory receptors
Touch - Thermoreceptors

Structure of neuron



- Neruous system is made of special cells called neurons.
- The unit of nervous system - Neuron.
- Chemical release: Acetylcholine
- Informations –> dendrite –> Cyton –> Axon –> nerve ending –> synapse –> dendrite of 2nd

Function / working of neuron

- The information acquired at the end of the dendritic tip of a nerve cell, Sets off chemical reaction that create an electric impulses.
- The impulses travels from the dendrite to the cell body, and then along the axon to its end.
- At the end of the axon, the electrical impulses sets off the release of chemical, cross the gap or Synapse and start a similar electrical impulses in a dendrite of the next neuron.

Nervous tissue:- Is made up of an organised network of nerve cells or neurons, and is specialised for conducting information via electrical impulses from one part of the body to another.

activity 7.1

Observation: Sugar tastes same whether nose closed or open.
Food tastes different when we close the nose while eating.

Explanation: When we bring food to our mouth, sensory organs inside the tongue and nose receives the sensory signal. Our brain interprets the signal and tells us about the food. By this, we can know the type of food, and we can even guess the name. When we eat sugar sweet sensor present in the tongue tell us it is sugar. Since there is no smell in sugar, we do not feel any difference in the taste even if our nose is closed. But when we taste different food ingredient, there, is smell part also. The food contains various volatile components like volatile oil in fennel, clove, volatile ester in fruits. When our nose is closed, our brain receives the signal only from taste buds. As a result, the taste feels different. The impact is such that many people can not guess the food if their eyes and nose are closed while eating.

Inference/Conclusion

This experiment demonstrates that taste and smell both help the brain in interpreting the food.

P.Y.Qs

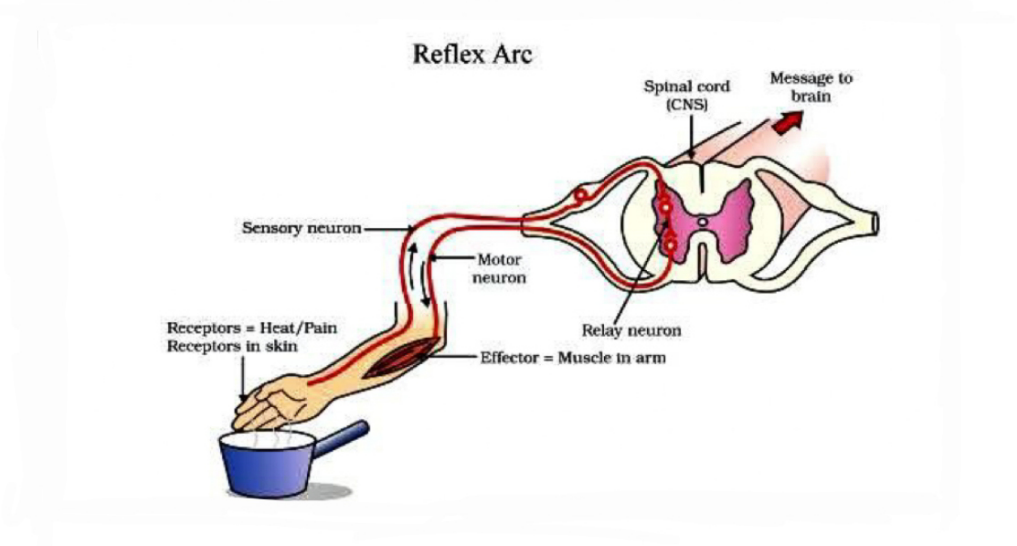
Question: Name two specialised tissues that provide control and coordination in multicellular organisms.
Answer: (1) Nervous tissue
(2) Muscular tissue

Question: Name the sensory receptors found in the nose and on the tongue.
Answer: Olfactory and Gustatory receptors.

Question: Name the part of neuron
(i) where information is acquired
(ii) through which information travels as in electrical impulses
Answer: The information is acquired at the end of the dendrite tip of a nerve cell.
The information travels as in electrical impulse from dentrite to the cell body and then along the axon to its end.

Synapse: A microscopic gap between a pair of adjacent neurons over wwhich nerve impulses pass when going from one neuron to the next.

Reflex action:- The Simplest form of response in the nervous system is reflex actions.
Reflex arc:- The pathway taken by nerve impulses in a reflex action is called the reflex arc.



Sensory neurons:- transmit impulses from the sensory cell (or receptor) towards the central nervous system. (Spinal cord and brain).

Motor neurons:- transmit impulses from the central nervous system towards the muscle cells (effectors).

Relay neurons:- occurs in the central nervous system where they serve as links between other neurons.

P.Y.Qs

Question: State the role of the brain in reflex action.
Answer: The sensory area of a brain receives information, interprets it and makes a rapid decision. The message is transmitted to the motor area. The motor neuron sends information to the receptor organ. The entire process is controlled by medulla in the hind brain.

Question: Which part of the nervous system controls reflex arc?
Answer: spinal cord

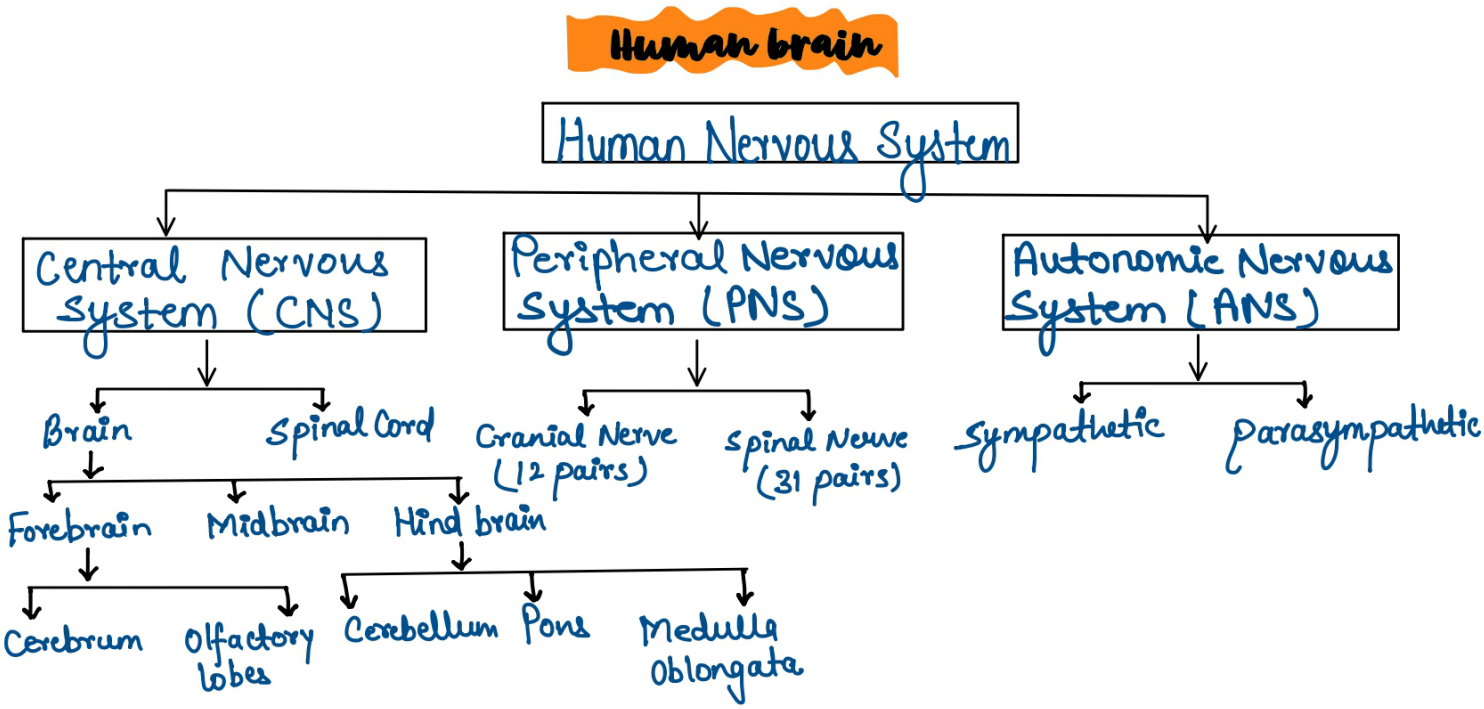
Question: How are involuntary action and reflex action different from each other.
Answer:

Involuntary action

- It involves autonomic nervous system.
- They occur in response to internal stimuli.
- They are connected with the functioning of internal body parts.
- It occur without the will of the organism e.g., heartbeat, breathing, etc.
- These are regulated by medulla oblongata (hind brain).

Reflex arc

- It envolves all parts of voluntary nervous system though they are not voluntary.
- They operate against harmful stimuli which are generally external.
- They are connected with emergency i.e., response to its stimuli.
- Some reflexes involve the brain, rather than the spinal cord.
- Reflex action is generally controlled by spinal cord.



Central nervous system

It includes the brain and the Spinal cord. It receives information from the body and sends out instruction to particular organ. The brain has three such major parts or regions namely the forebrain, mid brain and hind brain.

The **forebrain** is the main thinking part of the brain. It consist of the cerebrum and diencephalon. The cerebrum is the seat of memory and intelligence, and of Sensory centres like hearing, smell and sight. The diencephalon is the seat for pressure and pain.

The **midbrain** connect the forebrain to the hindbrain and controls the reflexes for sight and hearing.

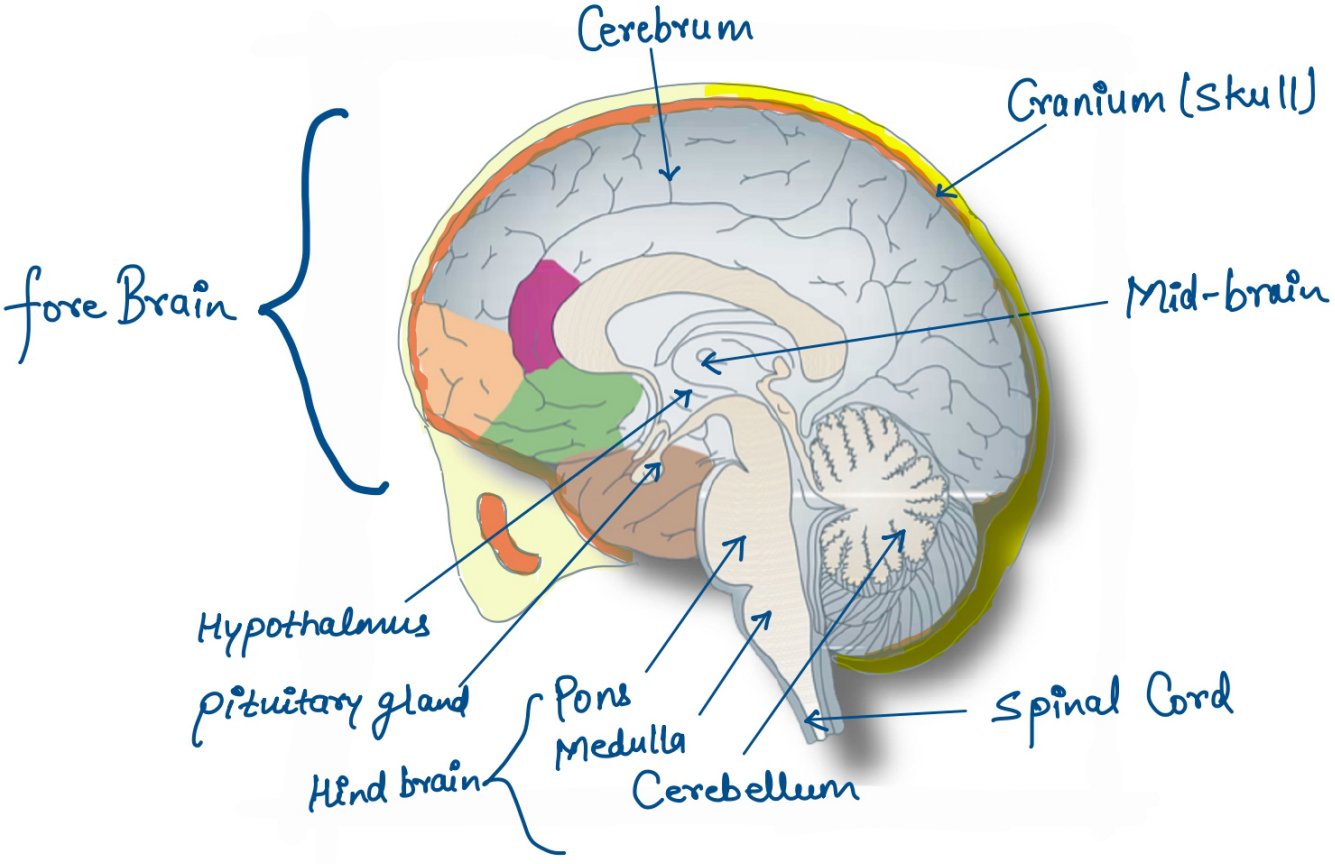
The **hindbrain** consist of the cerebellum, pons and medulla. The medulla contral Involuntary activities like blood pressure, salivation, vomiting and heartbeat. Cerebellum —> Balance.

★ The spinal cord extends from the medulla of the brain through the whole length of the vertebral column and is protected by the vertebral column or backbone.

Peripheral nervous system

The communication between the central nervous system and the other parts of the body is facilitated by the peripheral nervous system.
It consist of the cranial and spinal nerves arises from the brain and spinal cord respectively.

★ Human brain is protected by the thick bones of the skull and a fluid called cerebrospinal fluid which provide further shock absorption.



Human Brain

How does the nervous tissue cause action?

When a nerve impulses reaches the muscle the muscle fibre must move. The muscle cell move by changing their Shape so that they shorten. Muscle cells have special protein (actin and myosin) that change both their shape and their arrangement in the cell in response to nerves electrical impulses. When this happens new arrangement of these proteins give the muscle cells a shorter form.

P.Y.Qs

Question: Write two main function of the following

1. **Sensory neuron**
2. **Cranium**
3. **Vertebral column**
4. **Motor neruron**

Answer:

1. To pass information from receptors to brain.
2. Bony box which protects our brain.
3. Bony structure that protects the spinal cord.
4. To transmit information from brain or spinal cord to effector organ.

Coordination in plants

All living thing respond to environmental Stimuli. Plants also respond to Stimuli with the help of chemical compounds, secreated by the cells. Plants being living organism, exhibit some movements. Plants show two different types of movement - one dependent on growth and the other independent of growth.

The plant also use chemical means to convey this information from cell to cell but there is no specialised tissue in plants for the conduction of information. Plant respond to stimuli Slowly by growing in a particular direction. Because this growth is directional it appear as if the plant is moving.

Directional movement:- These are also called as tropic movement. These movement can be either towards the stimulus or away from it.

- **Positive phototropism** is seen in Shoot which respond by bending towards light.
- **Negative geotropism** is seen in shoots by growing away from the ground.
- Roots bend away from light exhibiting **negative phototropism.**
- They grow towards the ground exhibiting **positive geotropism.**
- **Hydrotropism** is a growth in which the direction is determine by the stimuli of water.
- **Chemotropism** is a growth response in which the part in response to chemical stimulus e.g, growth of pollen tube toward ovules.

P.Y.Qs

Question: How do auxin promote the growth of a tendril around us support?

Answer: When tendrils come in contact with any support, the part of the tendril in contact with the object does not grow as rapidly as the part of the tendril away from the object. This is caused by the action of auxin hormone. Less auxin occurs on the side of contact as compared to the free side. As a result, auxin promotes growth on the free side and the tendrils coil around the support.

Harmones are the chemical compounds released by stimulated cells. Hormones diffuse all around the cell. They are synthesised at places away from where they act and simply diffuse to the area of action. Different plant harmone help to coordinate growth, development and response to the environment. Different harmony secreation, by the plants are auxins, gibberellius, Cytokinins, abscisic acid.

Auxins: are the harmones synthesis at the tip of the stem. These help the plant in growth by cell elongations. Auxin induced shoot apical dominance.

Gribberelliness: are hormones that help in the growth of the stem, seed germination, bolting and flowering.

Cytokinins: are hormones present in the areas of rapid cell division, such as fruit and seeds. They also promote the opening of the Stomata.

Abscisic acid: is a hormone that inhibits the growth in various parts. It is also responsible for the closure of Stomata. It effects include wilting of leaves.

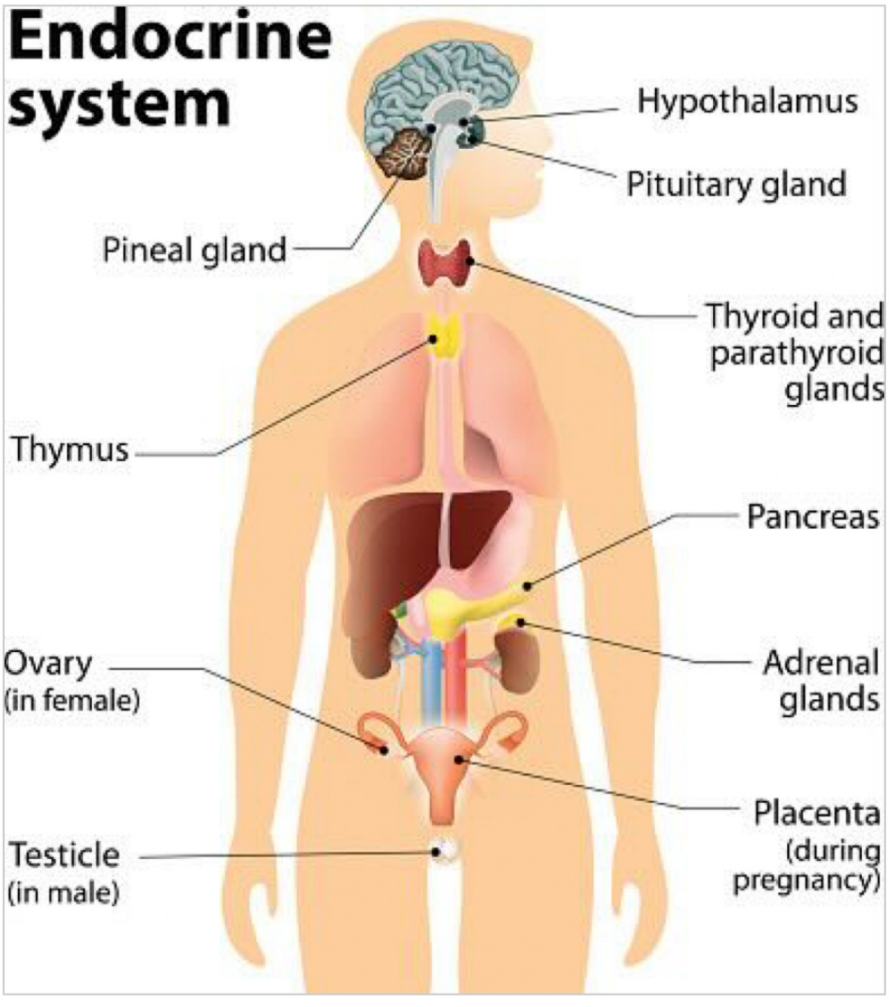
activity 7.2

Observation: Upper part of the plant (shoot) bend towards the light while its root moves away from light.
Explanation: Plants does not have a nervous system or nerve fibres, they show response towards change in the environment chemically.
Shoot exposed to light form auxin. Auxin now diffuses to the unexposed part of the shoot.

Auxin has growth promoting characteristic in stems. It induces growth in the unexposed parts. As a result, the plant bends toward the light.
Auxin has an inhibitory action on the root. As a result, root bends away from the light.
Conclusion:

- Plant stem grows toward the light. We call this phenomenon as positive phototropism.
- Plant root grows away from the light.

Hormone in animal



Pineal Gland
Hormone: Melatonin
Location: In the brain (dincephalon)
Function: control day and night cycle rhythm
Deficiency: ----

Hyphothalmus
Hormone: Neuron
Location: In the brain
Function: regulate the secretion of pituitary gland regulatory inhibitory hormone
Deficiency: -----

Pituitary gland
Hormone: Growth hormone
Location: just below the brain
Function: maintain growth
Deficiency: Dwarfish / excess - tallness

Thyroid gland
Hormone: Thyroxine
Location: attached to the wind pipe of the body
Function: Control the rate of metabolism of carbohydrate fat and protein. Iodine is required by thyroid gland to make thyroxine.
Deficiency: Goitre / excess - metal retardation

Parathyroid
Hormone: Parathormone
Location: Embedded in the thyroid gland
Function: Regulate calcium and phosphate levels in blood
Deficiency: ----

Thymus gland
Hormone: Thymous
Location: lie in lower part of neck and upper part of chest
Function: development of immune system. This gland is large in small children but shrink after puberty
Deficiency: ----

Pancreas
Hormone: Insulin
Location: just below the stomach
Function: lower blood sugar level
Deficiency: Diabetes, millitus / excess- coma

Adrenal gland
Hormone: Andrenil
Location: located on the top of the kidney
Function: Also known a fright/ fight emergency. It controls emotions. Target organ heart.
Deficiency: ----

Testes
Hormone: Testosterone
Location: In male
Function: Control development of male sex organ and male features, such as beard and deeper voice
Deficiency: ----

Ovaries

Hormone: Oestrogen and Progesterone
Location: In female
Function: Control development of female sex organ and female features, such as famine voice, mammary gland etc.
Deficiency: ----

P.Y.Qs

Question: Why is the use of iodised salt advisable?
Answer: Iodine is necessary for the thyroid gland to make thyroxin hormone. Thyroxin regulates carbohydrate, protein and fat metabolism in the body so as to provide the best balance for growth. If iodine is deficient in our diet, there is a possibility that we might suffer from goitre. The thyroid gland enlarges causing swelling in the neck. Iodised common salt contains proper content of iodine. Thus, to avoid deficiency of iodine, iodised salt is recommended.

Question: How does our body respond when adrenaline is secreted into the blood?
Answer: Adrenaline hormone is secreted in large amounts when person is rightened, or mentally disturbed. When it reaches the heart, it beats faster to supply more oxygen to our muscles. The breathing rate also increases because of the contractions of diaphragm and the rib muscles. It also raises the blood pressure, and allows more glucose to enter into the blood. All these responses together enable our body to deal with the emergency situations.

Question: Why are some patients or diabetes treated by giving injections of insulin?
Answer: Diabetes is caused due to less or no secretion or hormone insulin by pancreas. In such a person, blood sugar level is high. Insulin converts extra sugar present in blood into glycogen. Thus, patients uttering from diabetes are given insulin injection to control their blood sugar level.

Question: How does feedback mechanism regulate the hormone secretion?
Answer: The feedback mechanism regulates the timing and amount of hormone to be secreted, e.g., it a person has more sugar in his blood, this is detected by the cells of the pancreas. As a result, more insulin will be secreted to oxidise the sugar. In a reverse situation, the secretion of insulin will be reduced.

E.K.Q

Question: Which of the following statements is correct about receptors?
(a) Gustatory receptors detect taste while olfactory receptors detect smell
(b) Both gustatory and olfactory receptors detect smell
(c) Auditory receptors detect smell and olfactory receptors detect taste
(d) Olfactory receptors detect taste and gustatory receptors smell
Answer: (a) Gustatory receptors detect taste while olfactory receptors detect smell

Question: 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
Answer: (d) axonal end of one neuron to dendritic end of another neuron

Question: Choose the incorrect statement about insulin
(a) It is produced from pancreas
(b) It regulates growth and development of the body
(c) It regulates blood sugar level
(d) Insufficient secretion of insulin will cause diabetes
Answer: (b) It regulates growth and development of the body

Question: Select the mismatched pair
(a) Adrenaline : Pituitary gland
(b) Testosterone: Testes
(c) Estrogen : Ovary
(d) Thyroxin : Thyroid gland
Answer: (a) Adrenaline : Pituitary gland

Question: "Nervous and hormonal systems together perform the function of control and coordination in human beings." Justify the statement.
Answer: Control and coordination in human beings is under the influence of nervous system. Brain control all the organelles and organ system. The control is obtained by network of neurons which carry signals through neurotransmitters in the form of electric impulses to the brain and from the brain.
Hormonal system consist of varieties of hormones secreted by various glands in our body. Hormonal system coordinates the function of nervous system. Hormones indirectly control the life processes by feedback mechanism. They can produce hormones when required and can stop production when not required.

Question: How does chemical coordination take place in animals?
Answer: Chemical coordination takes place in animals through hormones produced by glands present in animals. Hormones are directly released into blood stream to reach the target site. Hormones control the behavior Of the target tissue.
Example:
Adrenal gland secretes Adrenalin which reaches the heart, lungs and Gastro intestinal tract. Heart speeds up its pumping action so that more blood could be supplied to the limbs and facial muscles. But activity of the GI tract is slowed down to ensure better blood supply in limbs. Thus, adrenalin prepares the body for a fight or flight situation.

Question:Why is the flow of signals in a synapse from axonal end of one neuron to dendritic end of another neuron but not the reverse?
Answer: Electrical impulse travels through a neuron. But to be transmitted to another neuron, it need to be passed in the form of neurotransmitters. Neurotransmitters are specialized chemicals. They can enter a neuron only through specialized channels. Such channels are present in dendrites but not in axon. On the other hand, a neurotransmitter can enter a dendrite. Due to this, the flow of signals in a synapse is from axonal end of one neuron to dendritic end of another neuron but not the reverse.