ENTRANCE TEST 2020
MDCAT
TEST # 5
BIOLOGY

Q.1 Changes in the external and internal environment of the animals are detected by:

A) Receptors
C) Effectors
B) Neurons
D) Nociceptors

Explanation:

1. Receptors

The neuron fibres and cell bodies can be excited by small electric shocks, mechanical, chemical, light and temperature stimuli. Receptors detect changes in the external and internal environment of the animal. The receptor may be a cell, or neuron ending or a receptor organ

Q.2 Taste buds are examples of:

A) Pressure receptors
C) Photoreceptors
B) Thermoreceptors
D) Chemoreceptors

Explanation:

Chemoreceptors: These are for smell, taste and for blood CO_2 oxygen, glucose, amino acids and fatty acids (e.g. receptors in the hypothalamus)

Q.3 The _____ receptors are nearly ten times less abundant than_____ receptors:

A) Cold, heat
C) Pain, cold
B) Heat, cold
D) Cold, heat

Explanation:

The relative abundance of various types of receptors differs greatly e.g. pain receptors are nearly 27 times more abundant than cold receptors. The cold receptors are nearly 10 times more abundant than heat or temperature receptors. The receptors are not distributed evenly over the entire surface of the body e.g. touch receptors are much more numerous in the finger tips than in the skin of the back, as might be expected in view of the normal functions of those two parts of the body.

Q.4 Neuroglia plays a vital role in the nutrition of neurons and their protection by:

A) Myelin sheath
C) Cerebrospinal fluid
B) Meninges
D) Epithelial cells

Explanation:

2. Neurons

The chief structural and functional units of the nervous system are neurons, but there are other cells, in higher animals, and in humans called **neuroglia,** which make up as much as half of the nervous system. Neuroglia play a vital role in the nutrition of neurons and their protection by myelin sheath. There are three functional types of neurons–the sensory, associative (intermediate/relay) and motor neurons, in mammals

Q.5 Nociceptors are:

A) Differentiated endings
C) Free nerve endings
B) Undifferentiated endings
D) Stray endings

Explanation:

Nociceptors: (Undifferentiated endings) which produce the sensation of pain.

Q.6 The cytoplasmic processes that bring the nerve impulse away from soma are called:

A) Dendrites
B) Axons
C) Neurons
D) Dendron

Explanation:

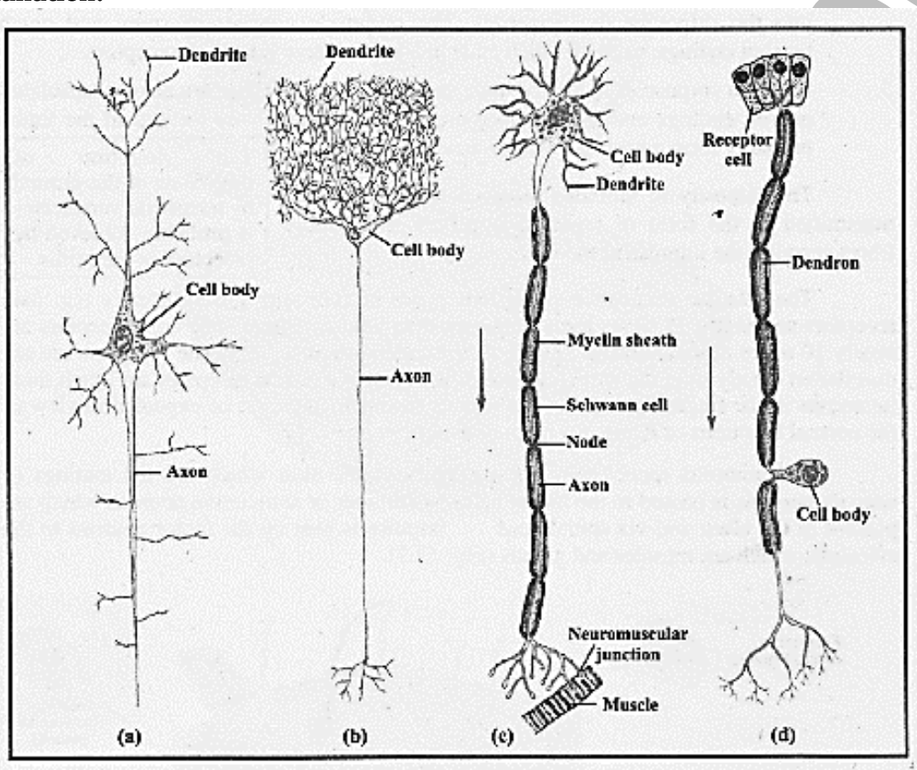


Fig 17.2 Avariety of neuron types in human beings.
(a) The dendrites unlike the axon, often give a spiny look. (b) The dendrites of certain brain cells branch profusely, giving cell a treelike appearance. (c) Motor neurons have long axons that run from the C. nervous system to the effector (muscle); these axons are frequently, but not always, myelinated. Note the presence of many granules in the cell body and dendrites and their absence from the axon.(d) Many sensory neurons have only one fiber, which branches a short distance from the cell body, one branch (peripheral) running between the receptor site and the dorsal-root ganglion in which the cell body is located, and the other branch (central) running from the ganglion into the spinal cord or brain. Except for its terminal portions, the entire fiber is structurally and functionally of the axon type, even though the peripheral branch conducts impulses toward the cell body. A sensory neuron of this type thus has no true dendrites a though the peripheral branch is often called a dendron because of the direction in which it conducts impulses.

Q.7 An impulse passing through myelinated neuron is called:
A) Action potential
B) Active membrane potential
C) Saltatory impulse
D) Threshold impulse

Explanation:

It may be added that in myelinated neurons the impulse jumps from node to node (node of Ranvier). This is called **saltatory impulse**.

The normal speed of nerve impulse in humans is 100 meters per second but maximum speed recorded is 120 meters per second.

Q.8 Glands and muscles receive directions via:
A) Associative neurons
B) Sensory neurons
C) Relay neurons
D) Motor neurons

Explanation:

3. Effectors

These are the structures which respond when they are stimulated by impulse coming via motor neuron. The principal effectors are glands, which respond by secreting; and muscles which respond by contracting.

Q.9 Part of brain involved in nervous as well as hormonal coordination is called:
A) Medulla
C) Cerebrum

B) Hippocampus
D) Hypothalamus

Explanation:

The limbic system is located in an arc between the thalamus and cerebrum. Limbic system works together to produce our most basic and primitive emotions, drives, and behaviours, including fear, rage, tranquillity, hunger, thirst, pleasure and sexual responses. Portion of limbic system is also important in the formation of memories. The limbic system consists of hypothalamus, the amygdala, and hippocampus, as well as nearby regions of cerebrum. The hypothalamus through its hormone production and neural connections acts as a major co-ordinating centre controlling body temperature, hunger, the menstrual cycle, water balance, the sleep-wake cycle etc.

Q.10 Conscious activities performed immediately and involuntarily are called:
A) Biorhythms
C) Reflex arcs
B) Reflex actions
D) Instinctive actions

Explanation:

effectors will be clear if we study an example of a reflex arc. Reflex arc is the path way of passage of impulse during a reflex action. Reflex action is a type of involuntary action. (Fig. 17.3). The direction of stimulus is from receptors to sensory neuron to associative (association / relay) neuron and then through motor neuron to the effectors.

Q.11 Pick up the correct path of reflex action:
A) Receptors, sensory neuron, associative neuron, motor neuron and effector
B) Receptors, associative neuron, sensory neuron, motor neuron and effector
C) Receptors, sensory neuron, motor neuron, associative neuron, and effector
D) Receptors, sensory neuron, associative neuron, effector and motor neuron

Explanation:

See explanation of Q#10.

Q.12 While driving on a bumpy road, our brain is protected from physical trauma by:
A) Cerebrospinal fluid
C) Meninges
B) Cranium
D) Pleural fluid

Explanation:

Central Nervous System (CNS)

The CNS consists of brain (Fig. 17.9) and spinal cord, which are both protected in three ways. Cranium, which is a part of skull, protects the brain and neural arches. of vertebrae of vertebral column protect the spinal cord. The brain and spinal cord are also protected by triple layers of meninges. The cerebrospinal fluid (CSF), similar in composition to blood plasma, bathes the neurons of brain and spinal cord and it cushions against the bumps and jolts. Both brain and spinal cord are hollow. The spinal cord has central canal and brain has many cavities (ventricles) filled by CSF, which is also present between the meninges.

Q.13 Characteristic gait of a person is controlled by:
A) Medulla
C) Pons
B) Cerebellum
D) Thalamus

Explanation:

The left cerebral hemisphere controls the right side of the body, and right cerebral hemisphere controls the left side of the body. **Midbrain** is reduced in humans, and it contains auditory relay centre and centre that controls reflex movements of eyes. Midbrain contains reticular formation, which is a relay centre connecting hindbrain with the forebrain. Reticular formation is very important in screening the input information, before they reach higher brain centres. **Hindbrain** includes the medulla, pons and cerebellum. Medulla controls several automatic functions, such as breathing, heart rate, blood pressure and swallowing. Certain neurons in pons, located above the medulla, appear to influence transitions between sleep and wakefulness, and the rate and pattern of breathing. The cerebellum is important in co-ordinating movements of the body. The cerebellum guides, smooth and accurate motions and maintains body position. The cerebellum is also involved in the learning and memory storage for behaviours. It is best developed in bird , which is engaged in the complex activity of flight.

Q.14 The limbic system is located in an arc between the:

A) Hypothalamus and cerebrum
B) Thalamus and cerebrum
C) Medulla and cerebellum
D) Amygdala and hippocampus

Explanation:

See explanation of Q#12.

Q.15 The electrical potential that exists across a cell membrane is known as:

A) Membrane potential
B) Action potential
C) Resting membrane potential
D) Active membrane potential

Explanation:

See explanation of Q#10.

Q.16 Several autonomic functions, such as breathing, heart rate, blood pressure and swallowing are controlled by:

A) Pons
B) Cerebellum
C) Medulla
D) Hypothalamus

Explanation:

See explanation of Q#13.

Q.17 Birds are capable to carry out complex activity of flight due to well developed:

A) Cerebrum
B) Thalamus
C) Cerebellum
D) Hippocampus

Explanation:

See explanation of Q#13.

Q.18 Reflex movements of eyes is controlled by:

A) Forebrain
B) Midbrain
C) Spinal cord
D) Hindbrain

Explanation:

See explanation of Q#13.

Q.19 Following are parts of forebrain, EXCEPT:

A) Thalamus
B) Limbic system
C) Cerebrum
D) Medulla

Explanation:

Fore brain	Mid brain	Hind brain
Thalamus	No Sub parts	Cerebellum
Limbic system Hypothalamus Amygdala Hippocampus		Medulla oblongata
Cerebrum		Pons

Q.20 The right and left cerebral hemispheres are connected by a large band of nerve fibers called:

A) Medulla
B) Corpus callosum
C) Pons
D) Hippocampus

Explanation:

Hippocampus plays an important role in the formation of long term memory, and thus is required for learning. Cerebrum is the largest part of the brain and is divided into two halves, called cerebral hemispheres. These halves communicate with each other by means of a large band of axons, called corpus callosum. Tens of billions of neurons are packed into this part. The outer region, the cerebral cortex, forms folds called convolutions, which greatly increase its surface area. This part receives sensory information, processes it, stores some in memory for future use, directs voluntary movements, and is responsible for the poorly understood process that we call thinking.

Q.21 The length of axon is always greater than that of dendrites in:

A) Sensory neurons
C) Associative neurons
B) Motor neurons
D) Relay neurons

Explanation:

See explanation of Q#6.

Q.22 Brain has many cavities called:

A) Meninges
C) Auricles
B) Canals
D) Ventricles

Explanation:

See explanation of Q#12.

Q.23 The exchange ratio of potassium and sodium ions across the cell membrane of a nerve cell, during rest is respectively:

A) 1:3
C) 3:1
B) 2:3
D) 3:2

Explanation:

Sodium and potassium ions: Of the many kinds of ions present in the nerve cells and the surrounding fluid, sodium (Na^+) and potassium (K^+) ions are the most important. Sodium ions are tenfold higher in concentration outside than inside the membrane surface, whereas potassium ions are twenty times more concentrated inside than outside. All the neurons have very active sodium and potassium pumps located in their cell membranes. Driven by the splitting of ATP, these pumps transport Na^+ out and K^+ into the cell, both against their respective concentration gradients. For every two K^+ that are actively transported inward, three Na^+ are pumped out. So inside becomes more negative than the outside of the cell membrane of neurons. (Fig. 17.4)

Q.24 In the language of coordination system, glands act as:

A) Receptors
C) Effectors
B) Control centre
D) Sense organs

Explanation:

See explanation of Q#8

Q.25 Hypothalamus have:

A) Chemoreceptors
C) Mechanoreceptors
B) Stretch receptors
D) Electromagnetic receptors

Explanation:

Chemoreceptors: These are for smell, taste and for blood CO_2 oxygen, glucose, amino acids and fatty acids (e.g. receptors in the hypothalamus)

Q.26 Ganglia are the concentrations of:

A) Axons
B) Dendrites
C) Schwann cells
D) Somas

Explanation:

Peripheral Nervous System (PNS)

It comprises of sensory neurons and motor neurons, which may form ganglia and the nerves. Ganglia are the concentrations of cell bodies of neurons. The nerves are the bundles of axons or dendrites, bounded by connective tissue. They may be sensory motor or mixed nerves depending upon the direction of impulse they conduct. In humans, there are 12 pairs of nerves, which arise from the brain, or lead to the brain. These nerves are called **cerebral** or **cranial nerves**. Some of these nerves are sensory, some motor, and some are mixed. From the spinal cord 31 pairs of spinal nerves arise or lead to spinal cord. All these nerves are mixed having fibres of both sensory and motor neurons.

Q.27 The number of cranial nerves in humans is:
A) 31
B) 12
C) 62
D) 24

Explanation:
See explanation of Q#26.

Q.28 Meninges consist of:
A) 2 layers
B) 3 layers
C) 4 layers
D) 5 layers

Explanation:
See explanation of Q#12.

Q.29 Slowing down of heart beat indicates:
A) Fear or rage
B) Startling
C) Activity of sympathetic system
D) Activity of Parasympathetic system

Explanation:

Parasympathetic system : A few cranial nerves including the vagus nerve together with the nerves from the bottom portion of spinal cord, form the parasympathetic nervous system. It promotes all the internal responses which are associated with the relaxed state i.e. contraction of the pupils, promotes digestion of food, retards heart beat etc.

Q.30 A threshold stimulus is a/an _____ needed to initiate a nerve impulse:
A) Minimum stimulus
B) Maximum stimulus
C) Optimum stimulus
D) Forceful stimulus

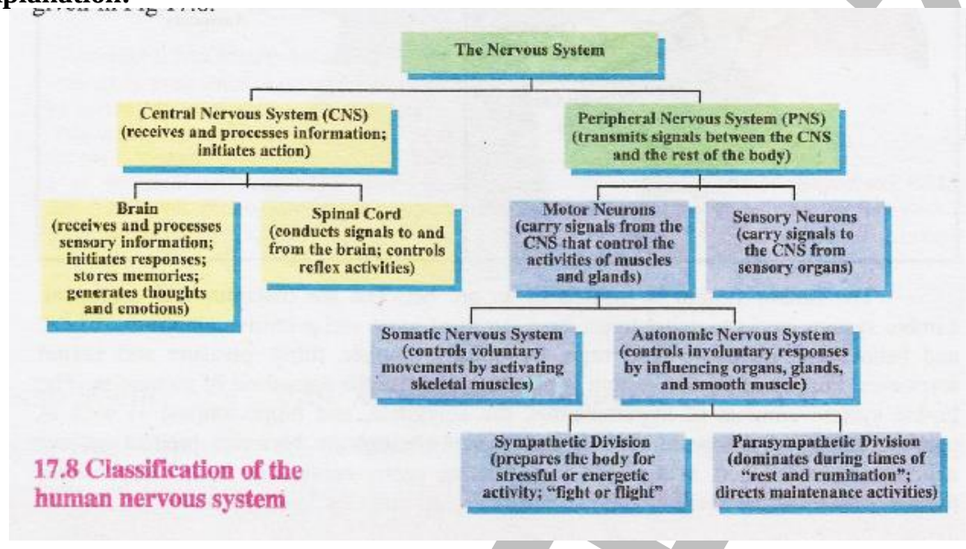
Explanation:

Initiation of nerve impulse: Under normal conditions a nerve impulse is initiated by an appropriate stimulus (called threshold stimulus) applied at one end of the neuron and it results in a remarkable localized change in the resting membrane potential. It disappears for a brief instant and is replaced by a new potential called **action** or **active membrane potential** which is in the form of impulse. During this state, the inner membrane surface becomes more positive than the outside. This change is so brief (for perhaps a millisecond) that only a portion of the neuron is in the active membrane potential state.

Q.31 Signals are transmitted, between the CNS and the rest of the body by:

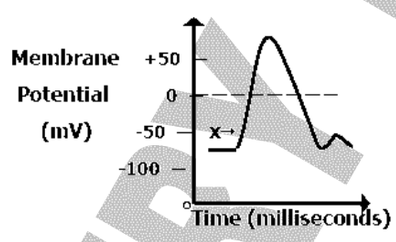
A) Central nervous system
C) Autonomic nervous system
B) Peripheral nervous system
D) Somatic nervous system

Explanation:



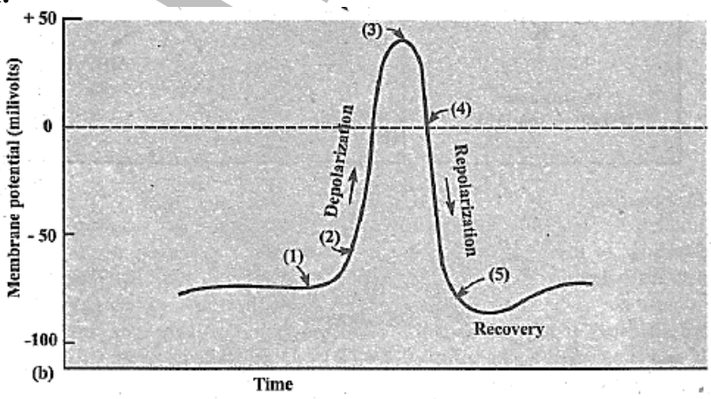
17.8 Classification of the human nervous system

Q.32 In the following diagram of action potential in a neuron, 'x' depicts:



A) Depolarization
C) Repolarization
B) Polarization
D) Hyperpolarization

Explanation:



17.5 Active or action potential
(a) When a neuron is stimulated, the cell membrane at the point of stimulation undergoes a momentary reversal in charge (dark color) called an action potential. Perhaps for a millisecond, the inside of the membrane becomes positive relative to the outside. (b) Sequence of membrane potential changes associated with an action potential: (1) resting potential (polarized state); (2) sodium gates open and Na^+ diffuses into the cell, causing a depolarization of the membrane; (3) sodium gates close and potassium gates open; (4) K^+ diffuses out, causing a repolarization of the membrane; (5) sodium - potassium pump restores original ion gradients and resting potential (recovery). Steps (2) - (5) take a mere 2 - 3 milliseconds.

Q.33 Emotions are generated by:

A) Somatic nervous system
C) Central nervous system

B) Peripheral nervous system
D) Sympathetic nervous system

Explanation:
See explanation of Q#31.

Q.34 The membrane of nerve cells is virtually impermeable to all ions, EXCEPT:
A) Negative organic ions
B) Positive organic ions
C) Sodium ions
D) Potassium ions

Explanation:
See explanation of Q#23.

Q.35 Sexual arousal is controlled by:
A) Forebrain
B) Midbrain
C) Hindbrain
D) Spinal cord

Explanation:
In the amygdala, clusters of neurons produce sensation of pleasure, punishment or sexual arousal when stimulated. It is also involved in the feelings of fear and rage.

Q.36 Skeletal muscles are controlled by:
A) Somatic nervous system
B) Autonomic nervous system
C) Sympathetic nervous system
D) Parasympathetic nervous system

Explanation:
See explanation of Q#31.

Q.37 The main neurotransmitter that lies outside the central nervous system is:
A) Dopamine
B) Serotonin
C) Adrenaline
D) Acetylcholine

Explanation:
Neurotransmitters are chemicals which are released at the axon ending of the neurons, at synapse. Many different types of neurotransmitters are known. These are: acetylcholine, adrenaline, nor-epinephrine, serotonin and dopamine.

Acetylcholine is the main transmitter for synapses that lie outside the central nervous system. Others are mostly involved in synaptic transmission within the brain and spinal cord.

Q.38 White matter of spinal cord is made up of:
A) Myelinated nerve fibres
B) Sensory nerve fibres
C) Mixed nerve fibres
D) Motor nerve fibres

Explanation:
Spinal Cord : Medulla oblongata narrows down into an oval shaped hollow cylinder, the spinal cord, running through the vertebral column. It is made up of a very large number of neurons, the cell-fibres and bodies of which are arranged in a definite pattern. In cross section, the spinal cord shows an inner butterfly shaped grey matter, containing a central canal and the outer portion composed of white matter. Gray matter, as in other parts of nervous system consists of cell bodies and non-myelinated nerve fibres or tracts. White matter is made up of myelinated nerve fibres or tracts.

Q.39 The site of communication between two nerve cells is called:
A) Synapse
B) Synapsis
C) Neuromuscular junction
D) Interstitial space

Explanation:
Glossary Book II – Page X – Definition # 2.

Q.40 Which one of the following is not true about hormones?

A) They initiate new biochemical reactions
B) They regulate enzymatic and other chemical reactions
C) They stimulate a function
D) They may inhibit a function

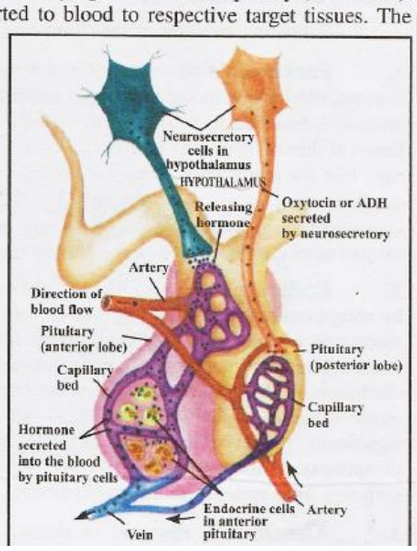
Explanation:

Hormones

Hormones are organic compounds of varying structural complexity (see below). They are poured directly and are transported to blood to respective target tissues. The hormones affect the target cells. They do not initiate new biochemical reactions but produce their effects by regulating enzymatic and other chemical reactions, already present. They may either stimulate or inhibit a function. Hormones may also control some long term changes, such as rate of growth, rate of metabolic activity and sexual maturity.

Chemically hormones may be of following four types:

(i) Proteins (e.g. insulin and glucagon .) (ii) Amino acids & derivatives (e.g. Thyroxine, epinephrine and norepinephrine) (iii) Polypeptides (e.g. vasopressin or anti-diuretic hormone and oxytocin), and (iv) Steroids (e.g. oestrogens, testosterone and cortisone.)



Q.41 Oxytocin is categorized in which chemical category of hormones?

A) Proteins
B) Amino acid and derivatives
C) Polypeptides
D) Steroids

Explanation:

See explanation of Q#40.

Q.42 Islets of Langerhans are controlled by pituitary tropic hormones called:

A) STH and TSH
B) TSH and ACTH
C) STH and ACTH
D) ACTH and GH

Explanation:

Islets of Langerhans (Pancreas)

This is under control of the pituitary trophic hormones STH and ACTH and also responds directly to the level of blood glucose. The islets contain large number of β cells associated with insulin production. The smaller number of α cells secrete glucagon.

Q.43 Insulin depresses glucose level in following ways, EXCEPT:

A) By increasing glycogen synthesis
B) By increasing cell utilization of glucose
C) By increasing starch synthesis
D) By stimulating conversion of glucose into lipids and proteins

Explanation:

In general, insulin depresses blood glucose levels, in a variety of ways which include increasing glycogen synthesis and increasing cell utilization of glucose. It also stimulates conversion of glucose into lipid and protein, which in turn reduce glucose levels. Insulin inhibits the hydrolysis of glycogen in the liver and the muscles. Failure to produce insulin leads to a condition called **diabetes mellitus.** The symptoms of this are high level of blood sugar, sugar in the urine, a disturbance of the body's osmotic equilibrium and derangement of the nervous system. Toxic metabolites from fat (which need 'glucose energy' for their oxidation) also accumulate and are only lost from the kidney with valuable metal cations. The body becomes dehydrated. If excess insulin is produced the utilization of sugar is too great and its level falls in the blood (hypoglycaemia) which upsets nerve and muscle functioning.

Q.44 Immediate effect of the excess of insulin will be:

A) Hyperglycemia
B) Hypertension
C) Hypoglycemia
D) Hypotension

Explanation:

See explanation of Q#43.

Q.45 Following are the stimuli for the secretion of ADH, EXCEPT:

A) Decrease in blood pressure
B) Decrease in volume of urine
C) Decrease in blood volume
D) Decrease in osmotic pressure of blood

Explanation:

1. **Antidiuretic hormone (ADH) or Vasopressin:** Its secretion is caused by decrease in blood pressure, blood volume, and osmotic pressure of the blood which is detected by osmoreceptors in hypothalamus. External sensory stimuli also influence hypothalamic neurosecretory cells. Increased levels cause increased water reabsorption in distal parts of nephron. A lack of this hormone produce diabetes insipidus, characterized by production of large quantities of dilute urine and great thirst.

Q.46 Lack of ADH results in:

A) Diabetes mellitus
B) Diabetes insipidus
C) Hypertension
D) Infrequent urination

Explanation:

See explanation of Q#45.

Q.47 Indole acetic acid and their variants are called:

A) Auxins
B) Gibberellins
C) Cytokinins
D) Abscisic acid

Explanation:

Auxins : These are indole acetie acid (IAA) or its varients.

Q.48 Following plant hormones are associated with delay in leaf senescence, EXCEPT:

A) Auxins
B) Gibberellins
C) Cytokinins
D) Abscisic acid

Explanation:

See plant hormone at page 55,56 and 57.

Q.49 Pick up synthetic auxin:

A) IAA
C) GA
B) NAA
D) GA_3

Explanation:

Synthetic auxins	
NAA (Naphthalene acetic acid) Indole propionic acid	Stimulates fruiting - help natural fruit set. Sometimes causes fruit setting in absence of pollination (parthenocarpy)
2,4 D (2,4 Dichloro phenoxy acetic acid)	Selective weed killer: Kills broad leaved species (dicots). Used in cereal crops and lawns to eliminate weeds. Inhibits sprouting of potatoes. Prevents premature fruit drop (retards abscission)

Q.50 Bolting of some rosette plants is promoted by:

A) Auxins
C) Cytokinins
B) Gibberellins
D) Abscisic acid

Explanation:

(b) Gibberellins : These are produced commercially from fungal cultures.

- Promote cell enlargement in the presence of auxins. Also promote cell division in apical meristem and cambium.
- Promote 'bolting' of some rosette plants.