ENTRANCE TEST 2020
MDCAT
TEST # 6
BIOLOGY

Q.1 Auditory relay center is located in:

A) Hypothalamus
B) Forebrain
C) Hindbrain
D) Midbrain

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.2 Following are the names of same neuron, EXCEPT:

A) Relay neuron
B) Intermediate neuron
C) Associative neuron
D) Somatic neuron

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.3 _____is responsible for the poorly understood process as:

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

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.4 The number of spinal nerves in humans is:

A) 12
B) 24
C) 31
D) 62

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.5 _____ have long axon that runs from the CNS to the effectors:

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

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.6 Primary sensory areas are located in:

A) Cerebral cortex
B) Cerebral medulla
C) Cerebellum
D) Medulla oblongata

Explanation:

See explanation of Q#3.

Q.7 Which one of the following conditions best describes active membrane potential?

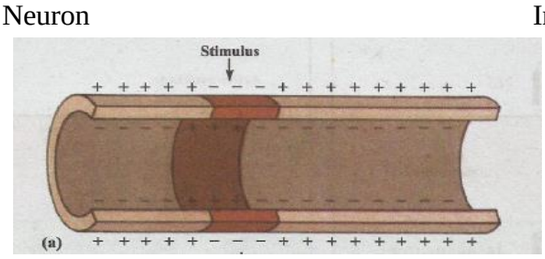
A) + + + + + + + + + + Outside
− − − − − − − − − − Inside Neuron

B) + + + + + + + + + + Outside
+ + + + + + + + + + Inside Neuron

C) + − + − + − + − + − Outside
+ − + − + − + − + − Inside Neuron

D) − − − − − − − − − − Outside
+ + + + + + + + + + Inside Neuron

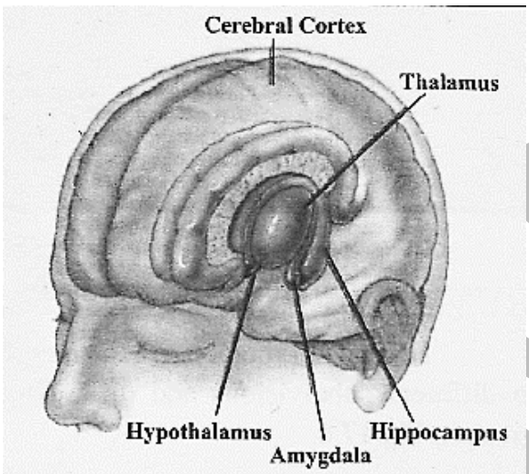
Explanation:



Q.8 _____extends through several brain regions:

A) Amygdala
C) Limbic system
B) Hypothalamus
D) Hippocampus

Explanation:

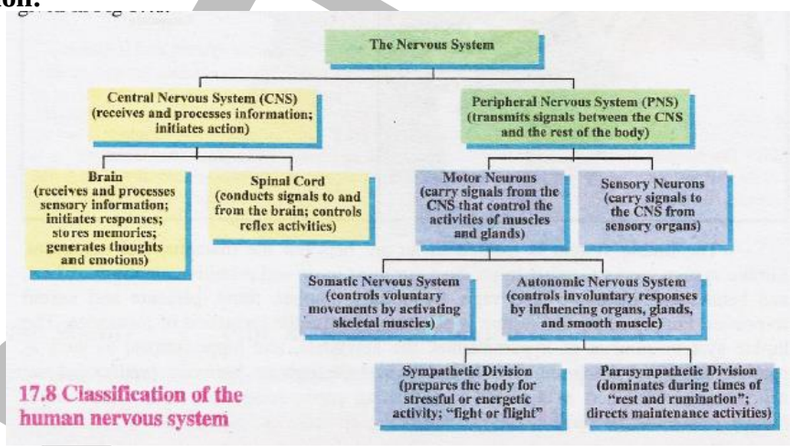


17.10 The limbic system and thalamus
The limbic system extends through several brain regions. It seems to be the center of most unconscious emotional behaviors, such as love, hatred, hunger, sexual responses, and fear. The thalamus is a crucial relay center among the senses, the limbic system, and the cerebral cortex.

Q.9 The part of nervous system that receives and processes information and then initiates actions is called:

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

Explanation:



17.8 Classification of the human nervous system

Q.10 In apical dominance, action of auxins can be enhanced by:

A) Cytokinins
C) Gibberellins
B) Abscisic acid
D) Indole acetic acid

Explanation:

- In apical dominance, enhance action of auxins.

Q.11 _____ carries sensory information to the limbic system and cerebrum:

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

Explanation:

Brain: The brain can be divided into forebrain, midbrain and hindbrain. **Forebrain** is further divided into three functional parts, the thalamus, the limbic system (Fig. 17.10) and the cerebrum. Thalamus carries sensory information to the limbic system and cerebrum. The information includes sensory input from auditory and visual pathways, from the skin and from within the body.

Q.12 Vertebral column accords protection to:

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

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.13 In neurons the sodium-potassium pump actively transports:

A) Cl^- in and Na^+ out of the cell
B) Ca^{2+} in and K^+ out of the cell
C) Na^+ in and Cl^- out of the cell
D) **Na^+ out and K^+ into the cell**

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.14 The major coordinating center in the body for regulation of hunger, the menstrual cycle, water balance, the sleep-wake cycle is:

A) Hippocampus
B) Thalamus
C) Hypothalamus
D) Pons

Explanation:

See explanation of Q#8.

Q.15 The major part of brain that acts as a relay center is:

A) Forebrain
B) Midbrain
C) Hindbrain
D) Cerebrum

Explanation:

See explanation of Q#1.

Q.16 Nissl's granules are groups of ribosomes associated with RER of:

A) Nerve cells
B) Motor neurons
C) Associative neurons
D) Sensory neurons

Explanation:

See explanation of Q#12.

Q.17 The fluid protection to CNS is provided by:

A) Pleural fluid
B) Pericardial fluid
C) Cerebrospinal fluid
D) Amniotic 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.18 In the formation of long term memory important role is played by:
A) Thalamus
C) Pons
B) Hippocampus
D) Medulla

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.19 The normal speed of nerve impulse in humans is _____ meters per second but maximum speed is _____ meters per second:
A) 100, 110
C) 120, 100
B) 100, 120
D) 110, 120

Explanation:

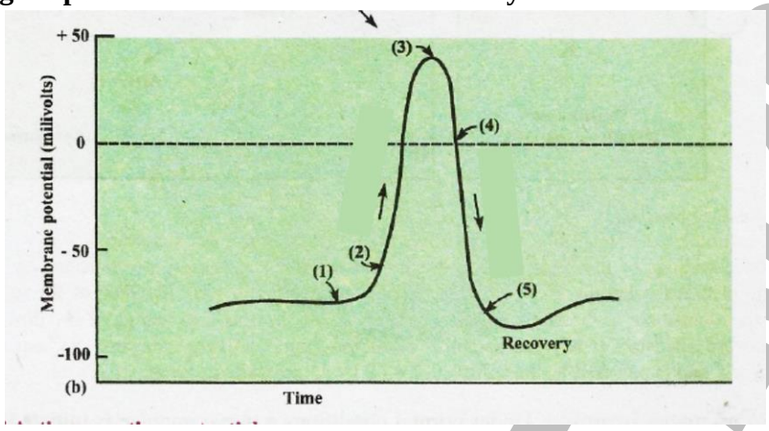
The normal speed of nerve impulse in humans is 100 meters per second but maximum speed recorded is 120 meters per second.

Q.20 Which one of the following parts of brain is included in forebrain?
A) Amygdala
C) Pons
B) Medulla
D) Cerebellum

Explanation:

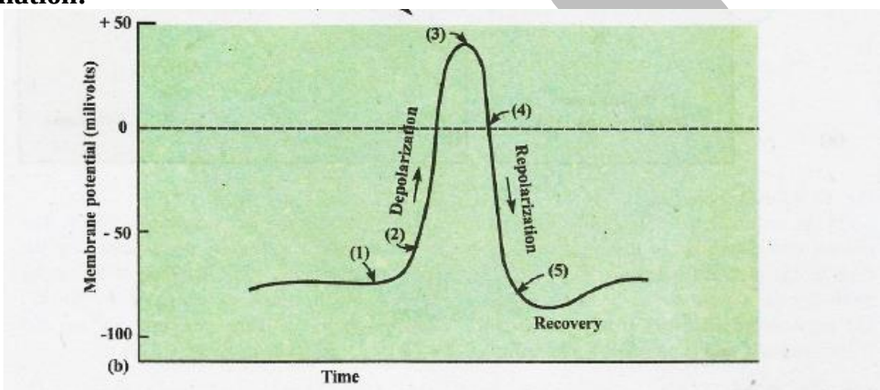
Fore brain	Mid brain	Hind brain
Thalamus	No Sub parts	Cerebellum
Limbic system Hypothalamus Amygdala Hippocampus		Medulla oblongata
Cerebrum		Pons

Q.21 In following figure polarized state have been labelled by:



A) 1
B) 2
C) 3
D) 4

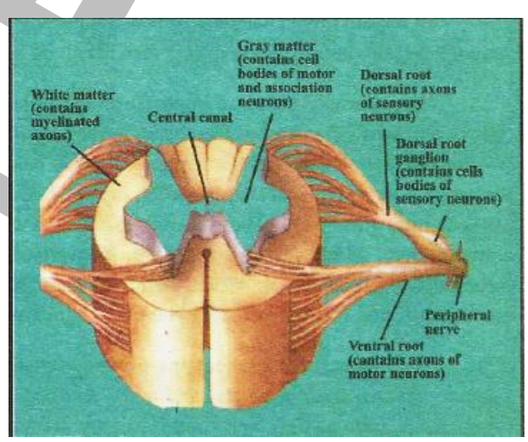
Explanation:



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.

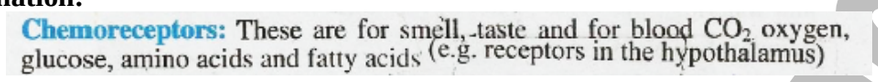
Q.22 Ventral root of spinal cord contains:
A) Axon of sensory neurons
C) Axon of motor neurons
B) Dendron of sensory neurons
D) Dendrites of motor neurons

Explanation:



Q.23 Receptors of smell are classified as:
A) Chemoreceptors
C) Photoreceptors
B) Mechanoreceptors
D) Nociceptors

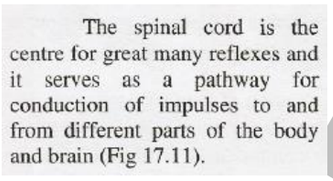
Explanation:


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.24 The center for great many reflexes is:

A) Pons
B) Medulla
C) Spinal cord
D) Midbrain

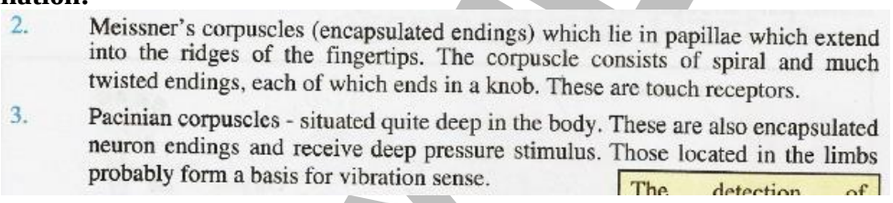
Explanation:


The spinal cord is the centre for great many reflexes and it serves as a pathway for conduction of impulses to and from different parts of the body and brain (Fig 17.11).

Q.25 Meissner's and Pacinian corpuscles resembles in having:

A) Spiral and twisted nerve endings
B) Nerve endings in papillae
C) Encapsulated nerve endings
D) Deeply located nerve endings

Explanation:


2. Meissner's corpuscles (encapsulated endings) which lie in papillae which extend into the ridges of the fingertips. The corpuscle consists of spiral and much twisted endings, each of which ends in a knob. These are touch receptors.

3. Pacinian corpuscles - situated quite deep in the body. These are also encapsulated neuron endings and receive deep pressure stimulus. Those located in the limbs probably form a basis for vibration sense.

Q.26 "Rest and rumination" is controlled by:

A) Central nervous system
B) Somatic nervous system
C) Parasympathetic system
D) Sympathetic system

Explanation:

See explanation of Q#9.

Q.27 Voluntary rate and pattern of breathing is controlled by:

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

Explanation:

See explanation of Q#1.

Q.28 Body position is maintained by:

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

Explanation:

See explanation of Q#1.

Q.29 Somatic nervous system is made by:

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

Explanation:

See explanation of Q#9.

Q.30 Vagus nerve is part of:

A) Sympathetic nervous system
B) Parasympathetic nervous system
C) Somatic nervous system
D) Autonomic nervous 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.31 Promotion of digestion is a:
A) Sympathetic activity
B) Parasympathetic activity
C) Somatic activity
D) Voluntary activity

Explanation:
See explanation of Q#30.

Q.32 The net difference of charges between the inner and the outer surface of a non-conducting neuron is called:
A) Resting membrane potential
B) Membrane potential
C) Electrical potential
D) Active membrane potential

Explanation:
See explanation of Q#13.

Q.33 There is no _____ between two neurons:
A) Cytoplasmic connection
B) Physical gap
C) Nervous connection
D) Functional connection

Explanation:

Synapse

Consecutive neurons are so arranged that the axon endings of one neuron are connected to the dendrites of the next neuron. There is no cytoplasmic connection between the two neurons and microscopic gaps are left between them. Each of these contact points is known as **synapse**.

Q.34 Following are mostly involved in synaptic transmission within the brain and spinal cord, EXCEPT:
A) Acetylcholine
B) Serotonin
C) Dopamine
D) Adrenaline

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.35 Receptors that respond to pressure are called:
A) Chemoreceptor
B) Mechanoreceptor
C) Photoreceptor
D) Nociceptor

Explanation:

Mechanoreceptors: These detect stimuli of touch, pressure, hearing and equilibrium (eg. Free nerve endings + expanded tip endings + stray endings)

Q.36 Depolarization occurs due to:
A) Influx of K^+
B) Influx of Na^+
C) Efflux of K
D) Efflux of Na^+

Explanation:

See explanation of Q#21.

Q.37 The simple reflex circuit includes each of the _____ elements of a neural pathway:

A) 3
B) 4
C) 5
D) 6

Explanation:

This simple reflex circuit includes each of the four elements of a neural pathway. (1) The sensory neuron has pain-sensitive endings in the skin and a long fiber leading to the spinal cord. That neuron stimulates (2) an association neuron in the spinal cord, which in turn stimulates (3) a motor neuron, also in the cord. The axon of the motor neuron carries action potentials to (4) muscles, causing them to contract and withdraw the body part from the damaging stimulus. The sensory neuron also makes a synapse on association neurons not involved in the reflex that carry signals to the brain, informing it of the danger.

Q.38 Nerve cells get insulation by:

A) Neurons
B) Muscle cells
C) Myelin
D) Glial 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.39 Sex hormones belong to the _____ category of hormones:

A) Protein
B) Steroid
C) Amino acid
D) Polypeptide

Explanation:

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.40 Time taken by a nerve cell from depolarization to recovery state is:

A) 1 – 2 milliseconds
B) 1 – 3 milliseconds
C) 2 – 3 milliseconds
D) 3 – 4 milliseconds

Explanation:

See explanation of Q#21.

Q.41 Islets of Langerhans contain maximum number of:

A) Insulin secreting cells
B) Glucagon secreting cells
C) Somatostatin secreting cells
D) Bile secreting cells

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.42 Glucagon is essentially_____ to insulin:

A) Antagonistic
B) Analogous
C) Homologous
D) Similar

Explanation:

Glucagon is essentially antagonistic to insulin and causes an increase in blood glucose levels. It does this mainly by promoting breakdown of glycogen to glucose in the liver and muscles. It also increases the rate of breakdown of fats.

Q.43 Production of large quantities of urine and great thirst are symptoms of:

A) Diabetes mellitus
C) Under secretion of insulin
B) Diabetes insipidus
D) Over secretion of ADH

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.44 ADH is produced by:

A) Anterior pituitary
C) Posterior pituitary
B) Middle pituitary
D) Hypothalamus

Explanation:

See explanation of Q#43.

Q.45 Leaf senescence is promoted by:

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

Explanation:

- Sometimes promotes leaf senescence.

Q.46 Abscisic acid is antagonistic to gibberellins with respect to:

A) Vernalization
C) Geotropism
B) Phototropism
D) Photoperiodism

Explanation:

- Promotes flowering in short day plants, and inhibits in long day plants (antagonistic to gibberellins).

Q.47 In brewing industry malting is promoted by:

A) GA
C) NAA
B) GA_3
D) 2,4 D

Explanation:

Commercial applications: Some of their commercial applications are as under.

1. GA promote fruit setting e.g. in tangerines and pears and are used for growing seedless grapes (parthenocarpy) and also increase the berry size.
2. GA_3 is used in the brewing industry to stimulate α-amylase production in barley and this promotes malting.
3. To delay ripening and improve storage life of bananas and grape fruits.

Q.48 _____ are produced commercially from fungal cultures:

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

Explanation:

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

Q.49 Geotropism is promoted due to lower concentration of:

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

Explanation:

- In root, promote growth at very low concentrations. Inhibit growth at higher concentrations. e.g. geotropism. Promote growth of roots from cuttings and calluses.

Q.50 A nerve impulse is passed from one neuron to the other through:

A) Axon
B) Dendrites
C) Cell body
D) Synapse

Explanation: