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Chapter No-17

Nervous coordination

Q1 what is Nervous coordination. Explain the steps - involved in nervous coordination.

Answer : Nervous coordination :

Definition :- The coordination due to the nervous system is called nervous coordination. —OR—
“ It is the coordination in which neurons are linked together directly or via the central Nervous system to form network that connects receptors and effectors.

Explanation :- Nervous coordination composed of specialized cells called neurons which detect and receive stimuli from receptors and then transmitted it into central nervous - system (CNS) for processing or analysis and then - transmit it from CNS to effector (muscles or glands) for response, in the form of electric signal or nerve impulse.

Steps involved in nervous coordination :-

Nervous coordination in higher animals is composed of the following steps.

1: Reception of Stimulus :-

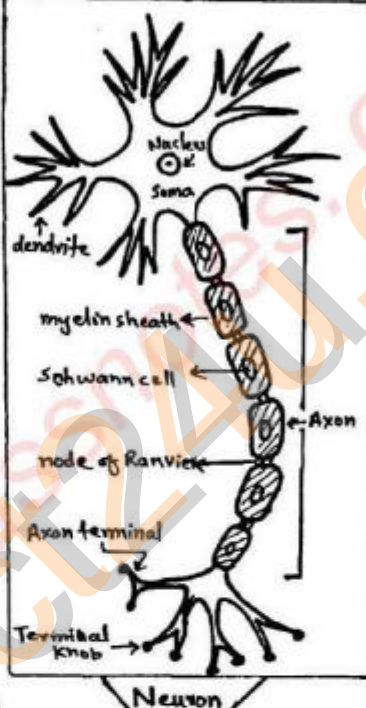
Receptor : < Transducer > — Those parts of the body which receive or detect stimuli from internal or external environment are called receptors.

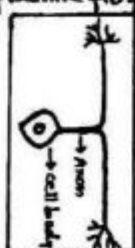
Example :- Receptors are specialized cells, structure ,

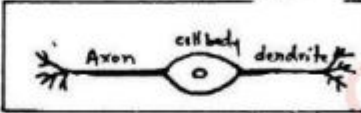
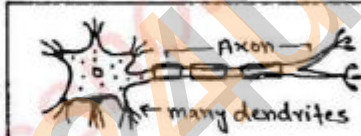
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Sense organs or ends of neurons which can detect any change in the external or internal environment of animal. <u>Sensory Neuron</u> :- The information collected from the receptors is then transmitted to the CNS, through sensory neuron, for analysis and develop response. <u>Classification of receptors on basis stimulus: (Types)</u> - On the basis of stimulus nature, receptors are classified into the following different types. i: <u>photoreceptors</u> :- Those receptors which are sensitive to certain range of wavelength of visible light are called photoreceptors. <u>Example</u> :- Rods and cones nerve endings in the retina of eye. ii: <u>chemoreceptors</u> :- Those receptors which can detect chemical stimuli (like ions, molecules) are called chemoreceptors. <u>Example</u> :- olfactory receptor (olfaction), gustatory receptors (Gustation) and osmoreceptors of hypothalamus. iii: <u>Mechanoreceptors</u> :- Those receptors which can detect the stimulus of touch, pressure, hearing and equilibrium are called M.R. <u>Example</u> :- Meissner's corpuscles (in skin), pacinian's corpuscle (in skin) and Baroreceptors found in blood vessels. vi: <u>Thermoreceptors</u> :- Those receptors which are sensitive to temperature changes (i.e- cold or warmth) are called Thermoreceptors. <u>Example</u> :- Thermoreceptors are mostly found in the skin. v: <u>Nociceptors</u> :- These are actually undifferentiated and - naked nerve endings which produce the sensation of pain.		

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<u>Example:-</u> pain receptors are found in skin, joints, bones, body organs. pain receptors are the most numerous type of receptor of skin i.e- 200 per cm².		
<u>2: processing or analysis of information:</u>		
<u>Controlling centre :-</u> The sensory-impulses from various receptors are received by controlling centre (Brain or spinal cord).		
<u>Associative Neurons :-</u> After collection of sensory information the controlling centre (CNS) process or analyzed the information with the help of associative neurons.		
<u>3: Response to stimulus:</u>		
<u>Motor neuron :-</u> After analysis of sensory information the analyzed information is send to effector (muscles or glands) through motor neuron for response.		
<u>Effectors :-</u> The organs which produce response fo stimulus are called effectors - e.g- muscles or glands.		
<u>Response of effectors :-</u> By receiving motory information effectors provides an appropriate response either by producing movements (by muscles) or secretion (by glands).		
<u>Q2</u> Explain the Structure of Neuron.		
<u>Answer:- Neuron :</u> (ETEA-2019)		
<u>Definition :-</u> Neurons are specialized cells which have the ability to conduct nerve-impulses — OR — "The chief structural and functional unit of Nervous system."		

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<u>Unit of nervous system</u> :- Neurons are specialized cells which are also called "information-processing units of nervous system" responsible for receiving and transmitted information from receptors to effectors.		
<u>Structure of Neuron</u> : (ETEA-2020)		Nervous tissue consists of two basic type of nerve cells i.e. neurons and glial cell (which provide nutrients to neurons)
<u>Neurilemma</u> :- The membrane of neuron is called neurilemma.		
<u>Parts</u> :- Structurally neuron consists of the following parts.		
1: <u>Cell body</u> : <Soma> -		
<u>Nutritional part</u> :- The cell body is the main nutritional part of the neuron and is concerned with the biosynthesis of - materials necessary for the growth and maintenance of neuron.		
<u>Cytoplasm and organelles</u> :- each neuron consists of - cytoplasm and nucleus. The cytoplasm also contains - different organelles such as - Endoplasmic reticulum, golgi-bodies and ribosomes.		
<u>Nissl's granules</u> :- Inside the cytoplasm of cell body a large number of granules are present called Nissl's granules. each nissl's granule consists of ribosomes, endoplasmic reticulum, and golgi-bodies.		
<u>Cytoplasmic-extension</u> :- <Fibres> - The fibres (such as - dendrites and axons) are the cytoplasmic extensions or processes arising from the cell body.		
2: <u>Dendrites</u> :		
<u>Short fibre</u> :- Dendrites are generally very thin and -		

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Short with many branches. <u>Non myelinated fibre:-</u> Dendrites are non myelinated because they don't have any association with Schwann's cells. <u>Spiny look :-</u> Dendrites often have Spiny look. <u>Function :-</u> Dendrites receive information ^{from} receptors and transmit them to the cell body of neuron. <u>3: Axon: (ETEA-2020)</u> <u>long fibre :-</u> Axons are long, single, thick-cytoplasmic extensions which extend from cell-body toward other neuron or towards muscle. <u>Function :-</u> It carries impulse away from cell body towards other neuron or towards muscle (effector). <u>Cytoplasm and organelles :-</u> Axon is thick and contains more cytoplasm than dendrites. The cytoplasm of axon is called - Axoplasm which contains microtubules, neurofibrils, rough-endoplasmic reticulum (RER) and mitochondria. <u>Schwann cells :-</u> Axons are usually covered by certain - neuroglia cells called Schwann cells which are strip-like cells wrapped around the axon fibers. <u>Myelin sheath :-</u> Schwann cells are also covered by a -		
		

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fatty layer called myelin sheath which acts as insulator layer. Due to presence of myelin sheath the axons are - also known as myelinated fibers. <u>Node of Ranvier</u> :- Between the two Schwann cells, there is a small non-myelinated portion of axon called node of Ranvier. <u>Axon terminals</u> :- At the terminal end of axon many fine branches are present, called axon terminals. <u>Terminal knob</u> :- (Synaptic knob) - at the tip of axon - terminals, a small knob like structure is present, called Terminal knob or Synaptic knob. <u>Velocity of impulse in axon</u> :- Velocity of impulse in axon fiber depends upon the diameter, length and myelin sheath of axon. <u>For example</u> :- Larger, thicker, and myelinated axon, transmit impulses much faster than smaller, thinner and non-myelinated axon.		
Q3	Write the different types of neurons.	Exercise Question
<u>Answer : Types of neurons :</u> 1: <u>Types on the basis of cytoplasmic extensions</u> :- There are 3-types of neurons on the basis of numbers of cytoplasmic fibres. i: <u>monopolar neuron</u> :- <u>Definition</u> :- Those neuron which have only one - cytoplasmic-extension are called monopolar neuron. <u>Axon type</u> :- The only one fibre of monopolar neuron		
		

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is axon which is further divided into two branches forming T-shape structure.		
ii: Bipolar neuron:-		
<u>Definition</u>:- Those neuron which passes two fibres or - cytoplasmic extension are known as bipolar neuron.		
<u>Axon and dendrite</u>:- Bipolar neurons have one axon and one dendrite.		
iii: multipolar neuron:		
<u>Definition</u>:- Those neuron which passes many cytoplasmic fibres is called multipolar.		
<u>Dendrite and axon</u>:- multipolar neuron have many dendrites and one axon. most our body neuron are multipolar neurons.		
2: Types on the basis of function:- Exercise Question-7		
There are 3-types of neurons on the basis of functions. i.e-		
1-sensory Neuron: <Afferent Neuron>- (ETEA-2006)		
<u>Definition</u>:- Those neurons which carry nerve impulse from receptors towards the central nervous system are called S.N.		
<u>Structure</u>: <monopolar>- Sensory neurons are monopolar - neurons because they have only one fiber (axon) - originated from cell body which further divided into two branches. i.e-		
i: peripheral branch:- The peripheral branch running b/w the receptor site and dorsal-root ganglion in which the cell body is located. It conducts impulses from receptor site toward the cell body and acts like dendron.		

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<u>ii: Central branch</u> :- The central branch running from - ganglion into the spinal cord or brain. It carries impulses from cell body to CNS and acts like axon. <u>Axon type</u> :- Except for its terminal portion, the entire fiber is structurally and functionally of the axon type. <u>Function</u> :- 1- The dendrite endings of some sensory neurons also act as receptors which detect the related stimulus. 2- These neurons also carry impulses from receptors to CNS. <u>2- Associative Neuron: (Intermediate Neuron)</u> :- <u>Definition</u> :- Those neurons which conduct message from Sensory neuron to motor neurons are called Associative-N. <u>location</u> :- These neurons are found in brain and spinal cord. <u>Structure: (multipolar)</u> - Associative neurons are multipolar because they have many dendrites and one axon. <u>Tree like</u> :- Due to many dendrites (like tree branches) and one axon (like tree stem) the associative neurons give tree like appearance. <u>Connect Sensory with motory neuron</u> :- The dendrites of associative neuron make a synapse with the axon of Sensory neuron while the axon is connected with dendrites of motor neuron. <u>Function</u> :- 1:- The function of associative neuron is to take impulse from sensory neuron and to pass it to motor Neuron.		

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2:- Associative neurons are involved in processing and interpretation of information coming from sensory neurons. A proper decision is made here for appropriate response.

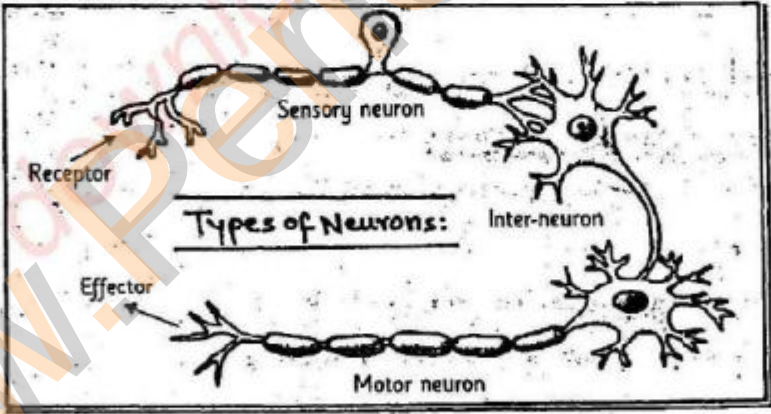
3- Motor Neuron: (Efferent Neuron) -

Definition :- Those neurons which carry message in the form of nerve impulse from CNS towards the effectors are called motor neurons.

Structure :- (multipolar) - motor neurons are also - multipolar because they have many dendrites and one long axon.

Long axon :- motor neurons have long axon which run from CNS to the effectors (muscle or gland).

Function :- motor neurons are responsible for carrying message from CNS to effectors for response.



The diagram illustrates the types of neurons involved in a reflex arc. It shows a Receptor connected to a Sensory neuron, which then connects to an Inter-neuron. The Inter-neuron connects to a Motor neuron, which finally leads to an Effector. The diagram is titled 'Types of Neurons:'.

Q4 what is reflex action. Describe the pathway or reflex Arc of nerve impulse :

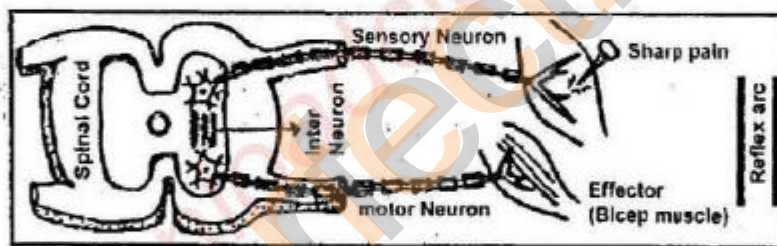
Answer:- Reflex action :-

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<u>Definition</u> :- An immediate, quick, automatic, involuntary response of the body to environmental changes (stimulus) is known as reflex action.		
<u>Controlling centre</u> :- Those reflexes which occurs in head region are control by brain, while those reflex actions which are below neck region are controlled by spinal-cord.		
<u>Example</u> :- 1: withdrawal of hand or legs by touching a hot surface or a sharp pin. 2: Blinking of eyes when dust particle touches the cornea of eye.		
<u>Reflex Arc</u> :		
<u>Definition</u> :- The pathway of nerve impulse during reflex-action is known as reflex arc.		
<u>Explanation</u> :- Reflex arc is the path for the conduction of nerve impulses from receptors to the CNS and from CNS towards the effector in reflex-action.		
<u>Work of Reflex arc: (components)</u> - A reflex arc consists of all the basic component of nervous system. i.e -		
<u>1: Receptor</u> :- when our hand touches the sharp pointed object (stimulus) pain sensitive ending of sensory neurons (receptor) present in the skin are stimulated.		
<u>2: Sensory Neuron</u> :- The stimulus detected by receptors is transmitted to cell body by peripheral branch of sensory - neuron. Then from cell body, it is transmitted to CNS through central branch of sensory neurons.		

3: Associative neuron:- When impulse reaches to spinal-cord the associative neuron are stimulated, decision is made and then decision message is transmits from to motory Neuron.

4: Motor neuron:- After receiving the message from associated neuron, the axon of the motor neuron carries the impulse to the effector i.e to the bicep muscle of arm.

5: Effector:- When the message reaches to effector (i.e- bicep muscle). The effector give response in the form of contraction, as a result the hand is drawn from damging Stimulus i.e- Sharp pin.



Q5 What is nerve impulse. Describe the transmission or conduction of nerve impulse.

Answer:- Nerve impulse:

Definition:- A wave of electro-chemical change which moves along the whole length of neuron is called nerve impulse.

Explanation:- Nerve impulse is the information about a Stimulus which is transmitted by neuron from receptors or sense organs to the central nervous system (CNS) and from CNS to the effectors (e.g-muscles and glands).

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polarized membrane :- The neuron membrane is a conductive membrane known as polarized membrane because they have +ve and -ve poles on their surfaces.

Electrical potential :-

Definition :- Electric potential is the measure of the capacity to do electric work.

Explanation :- Electric potential represents a type of stored energy (potential energy) which is produced during separation of charges across a barrier. In the case of neuron, the charges are positive and negative ions and the charges separating barrier is the neuron membrane.

Membrane potential : (m.p)

Definition :- The electrical-potential that exists across a cell-membrane is also known as membrane potential.

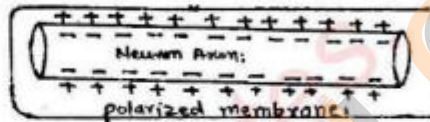
Types of membrane potential :-

There are of two types of membrane-potential. i.e-

1: Rest membrane potential (R.m.p) : (polarized state) -

Definition :- The net difference of charges between the inner and outer surface of a non-conducting neuron is called R.m.p.

Explanation :- A typical neuron at rest is more positive electrically outside than inside the membrane and more negative electrically inside than outside the membrane. This net difference in charge between the inner and outer surface



of a non-conducting neuron is called resting-m-potential.
Voltage of R.M.P:- The resting membrane potential of a non-conducting neuron is -70 milli volts (mv). The $-$ minus $(-)$ shows the more negative charge on inner surface.

Factors involved in resting membrane potential:

The following factors help in developing of R.M.P.

i: Na^+ and K^+ ions distribution :-

many kinds of ions are present in the nerve cells and the surrounding fluid. but the sodium (Na^+) and potassium (K^+) ions are the most important for developing of resting membrane-potential. i.e-

Na^+ and K^+ concentration :- Sodium (Na^+) ions are 10-times higher in concentration outside than inside the - neuron-membrane surface. while potassium (K^+) ions are 30-times more concentrated inside than outside.

Active Na^+ and K^+ pumps :- All neurons have very active sodium and potassium pumps located in their membrane. with the help of energy (from ATP) these active Na^+/K^+ -pumps transport Na^+ outside and K^+ ions into the neuron. Both Na^+ and K^+ are transported $(\text{active transport})$ against their respective concentration gradients.

For example :- For every two K^+ ions which are actively transported inside, 3- Na^+ ions are pumped outside the neuron membrane. (neuremma) .

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Resulted charge :- Due to active transport of Na^+ and K^+ ions, the inside charge - become more negative than the outside of the neuron membrane.

and more positive electrically outside than inside the membrane.

ii :- Negative organic ions :

There are many types of organic compounds in the neuron-cytoplasm that also have negative charges.

For example :- The organic substances which have negative charge are - some amino-acids, many proteins, DNA and RNA.

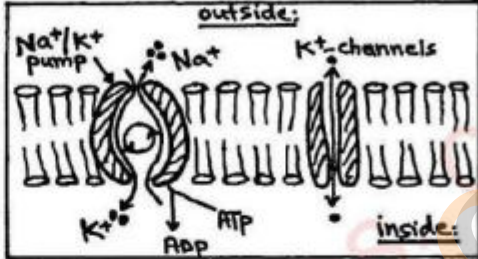
Resulted charge :- Due to the presence of the above -ve charge substance in the neuron-cytoplasm, makes the inside of neuron more negative than outside of neuron membrane.

iii: Leakage of K^+ ions:

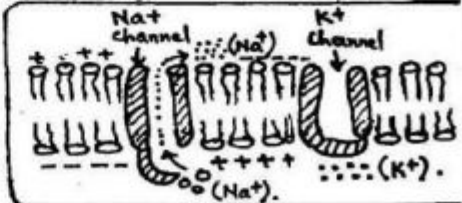
Neuron membrane has many K^+ -transport channel proteins called K^+ -gates. K^+ ions are continuously moved out of the neuron through some K^+ -gates called non-voltage regulated gates.

Resulted charge :- Due to continuous leakage of K^+ ions to outside of the neuron-membrane, more positive charge develop outside than inside the neuron membrane.

iv: No conduction of nerve impulse :- In rest condition no conduction of nerve-impulse occurs and neuron remain in an unstimulated and polarized state.



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2: Active membrane potential : < Depolarized state > -		
<u>Definition :-</u> The net difference of charges between the inner and outer surface of a conducting neuron is called A.M.P.		
<u>Explanation :-</u> < initiation of nerve impulse > -		
<u>Threshold stimulus :-</u> 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 occurs in the resting-M-potential		
<u>Active membrane potential :-</u> (ETEA-2018)		
After localized change in the neuron-membrane, the — resting membrane potential is disappear for a brief instant and is replaced by a new potential called active-membrane potential < depolarized state >, which is in the form of impulse		
<u>Charges in active membrane potential :</u>		
During active-membrane-potential the inner membrane surface becomes more positive than the outer surface.		
This change is so brief < i.e- for perhaps a milli-second > which only a portion of the neuron is the active membrane potential state < depolarized state >. after short period, It recovers back to previous polarized state. In this way, a wave of electrochemical change move from one end of neuron to another.		
<u>Factors involved in active membrane potential :</u>		
The following factors helps in developing of active M.P.		

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<u>i: Threshold stimulus</u>:- The stimulus which bringing an electro-chemical change in neuron or to excite a given tissue is called threshold stimulus (adequate stimulus) <u>Sub-threshold stimulus</u>:- If a stimulus is not capable to excite or fails to arise any response is called sub-threshold stimulus or inadequate stimulus. → For depolarization threshold stimulus is required otherwise no depolarization occurs. <u>Electrochemical changes</u>:- Threshold-stimulus bring remarkable localized change in the resting-membrane-potential of neuron and as a result active membrane-potential is develop i.e- depolarization occur and the charges becomes reversed. <u>ii: Influx of Na^+ ions</u>:- <u>Increase Na^+ permeability</u>:- When a neuron fiber is stimulated by a threshold stimulus the stimulated area of neuron fiber become several times more permeable to Na^+ than to the K^+ ion. <u>opening of Na^+ gates</u>:- increase permeability of neuron - membrane to Na^+ than K^+ is due to the opening of voltage regulated Na^+ gates and - closing of K^+ gates. <u>Influx of Na^+</u>:- Due to opening of some Na^+-gates, the influx		
		 The diagram shows a cross-section of a cell membrane with two ion channels. On the left, a Na^+ channel is open, and several Na^+ ions (represented by small circles with a plus sign) are shown entering the cell. On the right, a K^+ channel is closed. The membrane is represented by a phospholipid bilayer. The text 'Na+ channel' and 'K+ channel' are written above their respective channels. Below the channels, the text '(Na+)' and '(K+)' are written, indicating the ions involved.

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of Na^+ ions occurs by diffusion.

Electric potential :- (voltage) - Due to diffusion more Na^+ ions enter than leaving as a result the electric-potential of the neuron-membrane changes from -70mv towards zero and then reaches to the $+50$ milli volt (mv).

Depolarization :- Due to more influx of Na^+ ions, electro-positive is developed inside and electro-negative is developed outside the neuron membrane just for short time (about one milli-second). This reversal of polarity across the two side of neuron-membrane is called depolarization.

Opening of K^+ gates :

After reaching the action potential to a peak, the permeability of neuron-membrane to Na^+ decreases, while it become - more permeable to K^+ ions.

outflux of K^+ :- Increase - permeability of neuron-membrane to K^+ than Na^+ is due to opening of K^+ -gates which rapidly diffuse K^+ ions out from cytoplasm to extracellular fluid (outside).

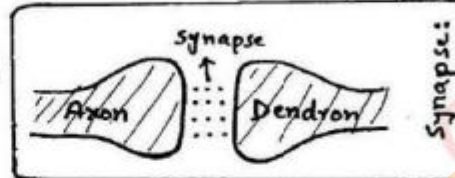
Na^+ - gates closed :- Due to - opening of K^+ -gates, the Na^+ -gates now are closed.

Repolarization :- Due to more diffusion of K^+ -ions to - outside, The neuron membrane regains it original polarity

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and becomes electro-positive on outside and electro -ve on inside. This is called repolarization. iii : <u>Refractory period: <Recovery></u> - <u>Introduction :-</u> After reaching the action-potential in a peak, nerve fiber undergoes a period of recovery called Refractory period. neuron agains recover its original ionic distribution and polarity. <u>Explanation :-</u> Soo after passage of the impulse, the resting membrane potential is restored by the movement of a small number of ions especially K^+ moving out. K^+ diffuse out, causing a repolarization of membrane. Na^+/K^+-pumps restores originals ion-gradients and resting potential. This neuron is ready to conduct another impulse. Q6 write the different types of nerve impulse. <u>Answer: Nerve impulse :</u> <u>Definition :-</u> A wave of electro-chemical change that travels along the length of neuron, from one end to the other is - Known as nerve impulse. <u>Types of Nerve impulse :-</u> There are two types of nerve impulse. 1: <u>Continuous impulse:</u> <u>Definition :-</u> A type of nerve-impulse which moves along the whole length of neuron in the form of wave is known as continuous impulse.		

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<u>Occurance :-</u> It is found in sympathetic nervous system. (PNS) <u>Explanation :-</u> This type nerve impulse travels in the whole length of neuron-membrane because the Na^+ and K^+ ions can move across the membrane all long the length of - non-myelinated neuron. so action-potential (impulse) flows as a wave. <u>2: Saltatory impulse :-</u> <u>Definition :-</u> A type of nerve impulse which moves in - jumping manner from node of Ranvier to node Ranvier of a neuron is known as saltatory impulse. <u>Occurance :-</u> It is found in cerebro-spinal system (CNS). <u>Explanation :-</u> In myelinated neuron fibers, the myelin sheath is impermeable to Na^+ and K^+ ions. so myelinated neuron - fiber prevents the ionic exchange and as a result no - depolarization occurs in myelinated neuron. But ionic - exchange and depolarization occur only at node of Ranvier because node of Ranvier have no myelin-sheath. so the - action-potential (impulse) is conducted from node to node in jumping manner, in case of myelinated neurons.		
Q7 what is synapse. write its types.		
<u>Answer: Synapse:</u> (ETEA-2020)		
<u>Definition :-</u> It is the junction between axon terminal of one neuron and the dendrite of another neuron or between axon terminal and muscle fiber, where information is transmitted.		

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Explanation :- information's from one neuron are transmitted to another neuron or to muscle fibers through synapse. The neurons are so arranged that there are empty spaces b/w them having no cytoplasmic connection between them called - synapse. but still information's are transferred from one neuron to another.		
Types of Synapse :- There are two types of Synapse. i.e -		
1: Electric synapse:		
Definition :- Electrical synapse is a mechanical and - electrically conductive-link between two adjacent - neurons that is formed at a narrow gap between the pre- and post-synaptic neurons is known as electric synapse.		
Synaptic cleft :- The gap which separate two adjacent - neurons is called synaptic cleft. electrical synaptic cleft or gap is only 0.2 nm.		
Smaller synapse :- The space between a electrical synapse is much smaller than chemical synapse ^{which help easily in depolarization on post neuron membrane.}		
Faster conductive-link :- Electric synapses conduct nerve - impulses faster than chemical synapses.		
2: chemical synapse:		
Definition :- chemical synapses are chemical conductive-links between two adjacent neurons in which information of -		



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Impulse from one neuron is transmitted to another by means of chemical messenger called neurotransmitters. <u>gap of synaptic cleft</u> :- chemical synaptic gap is more than 20nm. <u>larger synapse</u> :- The space between a chemical synapse is much larger than an electrical synapse. <u>Common type</u> :- chemical synapse is the most common type of occurring synapses.		
Q8 Describe the mechanism of the transmission of nerve impulse across synapse. <u>Answer: Transmission of nerve impulse across synapse:</u> <u>Introduction</u> :- A nerve impulse is passed from one neuron to the other through the synapse. However, a single impulse does not necessarily pass the synapse. It may take two or more (3) impulse arriving in rapid series. <u>Mechanism of transmission:</u> 1: <u>pre synaptic vesicles</u> :- The neuron which is present before synapse is called pre-synaptic neuron. It axon has expanded tips called synaptic knobs. These knobs possess many vesicles called synaptic-vesicles, which contain 10,000-molecules of neurotransmitter. 2: <u>Diffusion of Ca^{+2}</u> :- The arrival of action-potential at pre-synaptic neuron depolarize the neuron-membrane - which opens the voltage-gates that allow Ca^{+2} to diffuse into <u>knobs</u>.		

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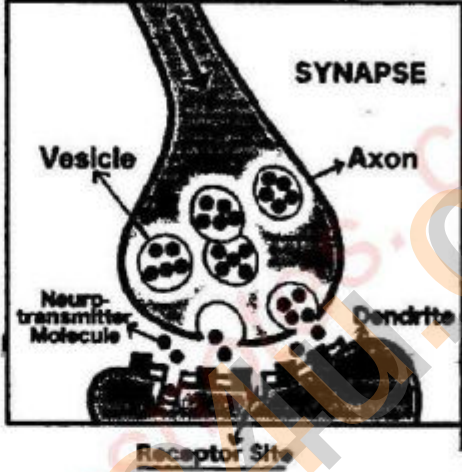
3: Release of neurotransmitter:-
 increase concentration of Ca^{+2} in pre-synaptic-knob cytoplasm causes some of the synaptic-vesicles to attach to membrane and then rupture releasing - neurotransmitter into synapse.

4: Binding of neurotransmitter :-
 neurotransmitter reach and binds with dendrites membrane of post-synaptic neuron and nerve impulse are transmitted across the synapse.

5: post synaptic potential:- now two types of potential can occur in post synaptic neuron membrane i.e -

i: Excitatory post synaptic potential:-
 This happens when neurotransmitters binds to post synaptic neuron which allow the Na^{+} ions to diffuse across the - membrane which result in the depolarization of that - membrane and action-potential towards threshold level is generated. This is called excitatory post synaptic potential.

ii: Inhibitory post synaptic potential:-
 Sometimes neurotransmitters binds to channels which are selectively permeable for only K^{+} or Cl^{-} ions. when these channels open, the post-synaptic membrane becomes - hyperpolarized. This hyperpolarization on post synaptic neuron



The diagram illustrates a synapse. At the top, an axon terminal (pre-synaptic knob) contains several vesicles. Some vesicles are shown fusing with the axon membrane, releasing neurotransmitter molecules into the synaptic cleft. These molecules are then shown binding to receptor sites on the membrane of a dendrite (post-synaptic neuron). Labels include: SYNAPSE, Vesicle, Axon, Dendrite, Neuro-transmitter Molecule, and Receptor Site.

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membrane is called inhibitory post-synaptic potential. <u>Removal of neurotransmitters:</u> After terminating the effects on post-synaptic neuron, the neurotransmitters are rapidly cleared by various mechanisms. i.e. 1- <u>Re-transported</u>:- Some neurotransmitters are actively transported back to pre-synaptic knob to be repacked in synaptic vesicles for future use. 2- <u>Used as fuel</u>:- Some neurotransmitter are transported to neuroglia to be metabolized as fuel. 3- <u>hydrolyzed by enzymes</u>:- Some are removed by enzymes. For example - acetylcholine is cleared by acetylcholinesterase and adrenalin by monoamine-oxidase enzyme.		
Q9 what is neurotransmitter. write its types.		
<u>Answer: Neurotransmitter:</u>		
<u>Definition</u>:- Neurotransmitters are the chemical messengers of the neuron system. — OR — "Neurotransmitters are chemicals which are released at the ending of the neurons at synapses, involved in message transmission.		
<u>Number</u>:- There are more than 100-known neurotransmitters which are classified into 2-groups on the basis of chemical structure.		
<u>Types of neurotransmitters</u>:- It is classified into 2-groups. i.e.-		
1: <u>Excitatory neurotransmitter</u>: (ETEA-2020)		
<u>Definition</u>:- Those neurotransmitters which produce excitation		

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on post-synaptic neuron receptors are called excitatory N.T. <u>Example</u> :- Epinephrine, nor epinephrine and acetylcholine. <u>2: Inhibitory neurotransmitter</u> :- <u>Definition</u> :- Those neurotransmitters which inhibit the post-synaptic action potential are called inhibitory N.T. <u>Example</u> :- Serotonin, GABA, etc. <u>Location of Neurotransmitters</u> :- Acetylcholine is the main transmitter for synapses which lie outside the CNS, while other are mostly involved in synaptic transmission within the brain and spinal-cord.		
<u>Q10</u> write the name of major division of Human nervous system <u>Answer</u> : Human Nervous system :- The nervous system of human is the most complex, advance, perfect and efficient among other animals. <u>Major division</u> :- Human Nervous system is divided into— 1: central nervous system (CNS). 2: peripheral nervous system (PNS). <u>Function</u> :- central nervous system act as a coordinating centre while peripheral nervous provides communication — among receptors, CNS and effectors.		
<u>Q11</u> what is CNS. write its protection. <u>Answer</u> : Central Nervous system : (CNS) —		

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<u>Location</u> :- Central nervous system of human is coordinating centre which lies in the mid-line of the body. <u>Division</u> :- CNS consists of brain and spinal-cord. <u>Function</u> : 1: Brain is involved more in coordination than spinal-cord. 2: Spinal-cord also acts as a link between peripheral nervous system and brain. <u>Protection of CNS</u> :- central nervous system (i.e brain and spinal cord) is highly sensitive parts of human body. There are different structures which protect the brain and spinal cord from mechanical stresses. <u>For example</u> : 1: <u>Skeleton</u> :- The parts of skeleton which protect the CNS from accidents and other physical traumas are given below- i: <u>Cranium</u> :- It is the part of skull which covers and protects the brain. ii: <u>Vertebral column</u> :- The vertebrae of vertebral-column protects the spinal-cord. 2: <u>Meninges</u> :- It is a system of membranes which surrounds the CNS: meninges consists of 3-layer membrane system i.e- i: <u>Dura mater</u> :- It is outer, thick, hard and fibrous layer. ii: <u>Arachnoid mater</u> :- It is the middle layer of meninges iii: <u>pia mater</u> :- It is the inner, thin layer of meninges. <u>Function of meninges</u> :- The main function of meninges is to protect the CNS. 3: <u>cerebrospinal fluid</u> : (CSF) - (BTEA-2015, 2016)		

Definition :- The fluid which is found in the membrane of brain and spinal cord is called cerebrospinal fluid.

Location :- Cerebrospinal fluid is found between pia-mater and arachnoid mater around the surface of brain and spinal cord, in the ventricles (cavities) of brain and in the central hollow canal of spinal cord.

Formation :- The cerebrospinal fluid is produced from blood vessels of brain and spinal cord, by a combined process of diffusion, pinocytosis and active transport. cerebrospinal fluid is actually lymph in nature.

Function of CSF :

- 1: cerebrospinal fluid protects the brain and spinal cord from mechanical shocks.
- 2: It also plays an important role in the homeostasis and metabolism of the brain and spinal-cord.

Q12 Explain the structure and function of human brain.

Answer: Human brain:

Main coordinating centre :- Brain is the main coordination centre which coordinates the actions at the right time and right sequence and place. It is also known as information storage centre, so that the behaviour can be modified according to the past experience.

Weight :- Average weight of human brain is about 1.34 kg.

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It is about 2% of whole body weight. But the male have more brain weight than female.		
<u>Location</u> :- Brain is located in the cranial cavity of skull.		
<u>Blood supply</u> :- about 750 mL blood is supplied to brain per min.		
<u>Protection</u> :- The brain is protected by 3-structures i.e. - Cranium, meninges and cerebrospinal fluid.		
<u>parts of brain</u> : <structure and function of brain> -		
Human brain is divided into 3-parts <fore, mid, Hind-brain>		
<u>1: Fore Brain</u> : <prosencephalon> -		
It is the first and largest part of brain, contain millions neurons		
<u>parts of fore brain</u> :- forebrain is further divided into 2-parts - such as - Telencephalon and diencephalon. i.e. -		
<u>i: Telencephalon</u> :- It is a largest part of forebrain which have two parts such as - olfactory bulbs and cerebrum i.e. -		
<u>a: olfactory bulbs</u> :- It is a small region of fore brain which are concerned with the sense of smell.		
<u>b: Cerebrum</u> : (ETEA-2006, 2016)		
<u>largest part of brain</u> :- cerebrum is the largest part of - brain having many folds which contains about 2-million neurons		
<u>Structure of cerebrum</u> :- cerebrum consists of -		
<u>1- cerebral hemisphere</u> :- cerebrum is divided into two - cerebral-hemisphere i.e. - right and left cerebral hemisphere. The right cerebral hemisphere controls Left side of the body and left cerebral hemisphere controls right side of the body.		

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<u>2- corpus callosum:-</u> corpus callosum is a mass of nerve fibres (Axons) which carries memory from one cerebral-hemisphere to the other.		
<u>3- Regions of cerebrum:-</u> The outer region of cerebrum is called cerebral-cortex, while the inner region of cerebrum is called cerebral-medulla.		
<u>Function of cerebrum:</u>		<u>pineal gland:-</u> It is an endocrine gland which is attached with thalamus that regulates sleep patterns.
1: It is the controlling centre of sight, hearing, smell, taste, and speech. ← (ETEA-2012)		
2: It controls the most of the voluntary muscles or movement.		
3: It is responsible for memory, intelligence, reasoning, judgment.		
<u>ii: Diencephalon:-</u> It consists of the following two parts.		
<u>a: Thalamus:-</u> Thalamus lies just above the mid brain and is completely covered by cerebrum. It acts as a relay station between the body and cerebrum. It contains a cavity called 3rd-ventricle.		
<u>Function:-</u> 1- Thalamus receives nerve impulses from different sensory areas of the body and passes them to cerebrum.		
2: Thalamus also controls pleasure and pain.		
<u>b: Limbic system:-</u> The limbic system is located in an arc between the thalamus and cerebrum. The limbic system works together to produce our most basic and primitive emotions, drives and behaviours. ← (ETEA-2010, 2014)		
<u>parts of limbic system:-</u> The limbic system consists of—		

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1- Hypothalamus :- It lies ^{below} the thalamus which controls the production of pituitary gland Hormones. (ETEA-2010,2012)

Function :-

- 1: It regulate heat of the body, Hunger (appetite).
- 2: It senses thirst, sexual response, sleep-wake cycle.
- 3: It control bio-rhythm (cyclic change in behaviour), fight or flight response.
- 4: It also control female menstrual cycle.

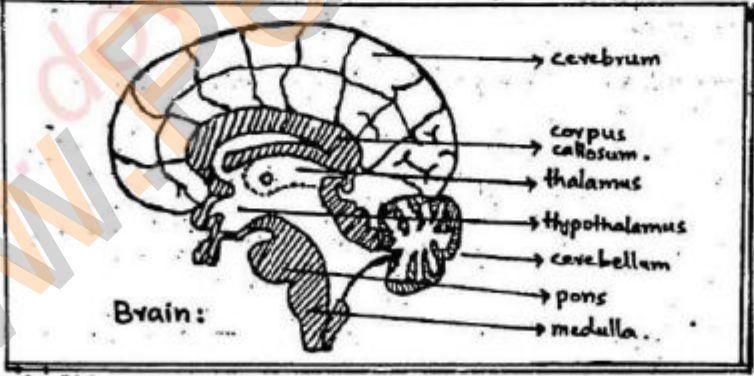
2- Amygdala :- It is called amygdala because of almond shape.

Function :-

- 1: In the amygdala cluster of neurons produce sensation of pleasure, punishment, love, hate or sexual - arousal when stimulated.
- 2: Amygdala also involved in the feeling of fear and rage.

3- Hippocampus :- Hippocampus mean sea horse b/c of its shape.

Function :- Hippocampus plays an important role in the formation of long-term memory and is thus required for learning.



2: Mid brain :- (mesencephalon) -

location :- mid brain is present at the lower side of -

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cerebrum between the two hemisphere. <u>Reduced brain :-</u> mid brain is reduced in human. its walls are thick and it has a small central-cavity. <u>Reticular formation :-</u> mid brain contains reticular formation i.e- network of nerves running through medulla in hindbrain, thalamus and hypothalamus of the fore brain. its reticular formation is very important in filtration of sensory information. <u>Release neurotransmitter :-</u> mid brain also contains a system of neurons that releases the neurotransmitter-dopamine. <u>Structure of mid brain :-</u> It consists of two parts. i.e- 1- Outer part which is made up of grey matter. 2- Inner part which is made up of white matter. <u>Function of mid brain:</u> 1: mid brain is a relay centre that connect forebrain with hind brain. 2: mid brain also contains auditory relay centre. 3: It controls reflex movements of eyes and hearing reflexes. 4: Reticular formation is also involved in sleep and wakefulness, pain preception, breathing, etc. <u>3: Hind Brain:</u> It is the last and lower portion of brain which consists of 3 parts <u>1: pons:</u> It is a small lobe like structure lies above the — medulla — oblongata. <u>Function :-</u> 1- pons regulate the rate of breathing. 2- pons act as bridge for the conduction of impulses.		

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3- pons also influence the transitions b/w sleep and wakefulness. <u>ii: Cerebellum:</u> <u>second largest part:-</u> Cerebellum is the second largest part of brain present at the lower region of brain. <u>Lobes :-</u> Cerebellum consists of 3-lobes. two lateral (right and left) and one central lobe. <u>Function :-</u> 1: Cerebellum controls muscular activities. 2: It guide smooth muscles and also causes accurates — movement possible. 3: It maintains body position or balance of the body. <u>iii: Medulla oblongata: (ETEA-2017, 2018)</u> <u>Lowest part :-</u> Medulla-oblongata is the lowest part of — brain. It is broad at the upper side and becomes narrow — towards lower side. It is connected to the spinal-cord. <u>Ventricle:-</u> It contains cavity called 4th-ventricle. <u>Function of medulla oblongata :-</u> Medulla oblongata controls many reflex-actions such as — heart beat, Breathing, Blood pressure (blood flow), coughing, Sneezing, swallowing, vomiting, digestion, peristalsis.		
<u>Q13</u> write the structure and function of spinal cord.		
<u>Answer: Spinal cord:</u>		
<u>Location :-</u> Spinal cord is the part of central nervous — system which runs through the vertebral column.		

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protection:- Spinal cord is protected by following structures.

1: vertebral column:- Spinal is protected by vertebral-column.

2: meninges:- Spinal cord is also protected by 3-layered membrane called meninges. i.e-

i- spinal cord is covered by innermost thin and pigmented layer of meninges called pia-mater.

ii- Spinal cord is present in the neural-canal of vertebral-column which is covered by outermost thick and tough layer of meninges called dura-mater.

iii- The middle layer of meninges is called arachanoid mater.

3: Cerebrospinal fluid:- It is a fluid which is present between pia-mater and arachanoid mater and protects spinal cord by providing cushion like matrix.

Morphology of spinal cord:-

1: length:- It is about 18-inches in length.

2: width:- It is about half inch in width.

3: Shape:- It is elongated hollow and -

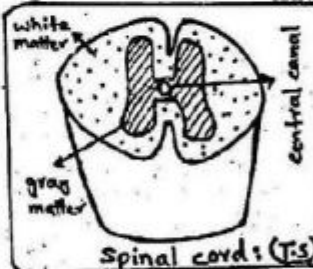
cylindrical structure lying in the neural canal of V-column.

Internal Structure:-

In a cross section, the Spinal cord shows the following portions

1: inner portion:- It is a butterfly shaped grey matter - containing a central canal. grey-matter is grey colour and contains of cell-bodies and non-myelinated nerve fibres.

2: outer portion:- It is the out portion of spinal cord which



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composed of white matter. white matter made up of — myelinated nerve fibres.		
<u>3: central canal</u> :- In the central-region a canal is situated called central canal. around this canal grey matter is present.		
<u>Spinal nerves</u> :-		
There are 31-pairs of spinal nerves which arise from spinal cord. All the spinal nerves are mixed nerves because each contains axons of both sensory and motor-neurons.		
<u>Function of spinal cord</u> :		
1- Spinal cord control reflex-actions below the neck region.		
2- The dorsal portion of spinal cord conducts sensory — impulses from receptors to brain.		
3- The ventral portion of spinal cord carries motory — impulses from brain to effectors (i.e-muscles or glands).		
4- Spinal cord also receives commands from brain and control functions accordingly in the trunk region.		
<u>Q14</u> what PNS. write its main division.		
<u>Answer</u> : peripheral Nervous system:		
<u>Definition</u> :- A network of nerves which arises from CNS and connect various parts of the body with CNS, constitute peripheral nervous system.		
<u>Origin of Nerves</u> :- These nerves may either arise from — brain or spinal-cord.		

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<u>Components of PNS:-</u> PNS contains sensory neurons and motor neurons which may form either ganglion or nerve fibers.		
<u>1: Ganglia:</u>		
<u>Definition:-</u> The collections of neuron cell bodies are called ^{ganglia} .		
<u>Plexus:-</u> Ganglia often interconnected with other ganglia to form a complex system of ganglia called a plexus.		
<u>Function:-</u> Ganglia provide relay points and intermediary connections between CNS and PNS		
<u>2: Nerves : (Tracts) -</u>		
<u>Definition:-</u> The nerves are the bundle of axons and dendrites bounded by connective tissues.		
<u>Function:-</u> All the communication between receptors to the CNS and from CNS to the effectors is carried by the nerves		
<u>Types of nerves:-</u> Nerves are classified on the basis of function to		
<u>1- Types on the basis of nerves function:</u>		
<u>i: sensory Nerves:-</u> Those nerves which only carry impulses from receptors towards CNS are called sensory nerves.		
<u>ii: Motor Nerves:-</u> Those nerves which carry impulses from CNS towards effectors are called motor nerves.		
<u>iii: mixed nerves:-</u> Those nerves which carry impulses from receptors to CNS and from CNS towards effectors are called mixed nerves. These nerves contains groups of sensory nerves and motor nerves.		
<u>2-Types on the basis of Nerves origin:-</u>		

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i: Spinal nerves: (ETEA-2019)

Definition:- Those nerves which arise from spinal cord and connect various trunk parts with the spinal cord are called spinal nerves.

Number :- Spinal-nerves are 31-pair in number.

Nerve type :- All spinal nerve are mixed nerves. These can - take impulse from receptors to spinal cord and from spinal-cord to effectors.

Distribution:- most of spinal nerves are distributed in - trunk region of body and connect different trunk parts with spinal cord.

For example:-

8-pairs is cervical spinal nerves.	5-pairs is lumbar spinal nerves.
12-pairs is Thoracic spinal nerves.	1-pair is coccygeal spinal nerves.
5-pairs is sacral spinal nerves.	

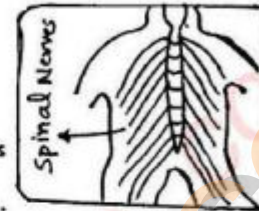
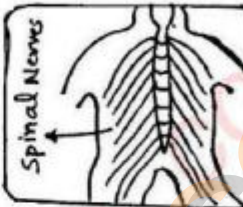
ii: cranial or cerebral nerves: (ETEA-2012, 2019)

Definition:- Those nerves which arise from brain and connect various head parts to the brain are called cranial nerves.

Number :- cranial nerves are 12-pair in number.

Nerve type:- Some of the cranial nerves are sensory, some are motor and some are mixed nerves. These nerves pass through openings in the skull called foramen, and mainly supply impulses to peripheral tissues in head except vagus nerve which extends down to abdomen.

Functional cranial nerve distribution:- (ETEA-2015)



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1: Functionally 3-pairs of cranial nerves are sensory in nature For example cranial nerve No - I, II, VIII. 2: Five pairs of cranial nerves are motor in nature (III, V, VI, XI, XII). 3: Four pairs of cranial nerves are mixed in nature (IV, VII, IX, X). <u>Main division of PNS:</u> Peripheral nervous system is divided into two system i.e- <u>1: Somatic nervous system:</u> <u>Definition</u> :- The type of PNS which controls voluntary movement of the body is called somatic nervous system. <u>Nerves</u> :- Somatic nervous system consists of only mixed nerves <u>Voluntary nervous system</u> :- It is also known as voluntary nervous system because it can control the body organs according to the wish or will of human. <u>Function</u> : 1:- Somatic nervous system carries sensory and motor impulses between CNS and voluntary parts of the body. 2: It controls skeleton muscles as well as external sensory organs. 3: This is voluntary nervous system, through which man can control body organs according to his wish or will. However, reflex action of skeleton-muscle is an exception. <u>2: Autonomic nervous system:</u> <u>Definition</u> :- The type of PNS which controls the involuntary function of internal organs is called autonomic nervous system. <u>Neurons</u> :- Autonomic nervous system consists of sensory neurons and motor neurons which run between the CNS and		

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Various internal organs such as - heart, lungs, glands, liver, etc <u>Involuntary system</u> :- It is also known as involuntary nervous system because this system is without the wish or will power. <u>Function</u> :- The contraction of both smooth muscles and cardiac muscles is controlled by motor neurons of autonomic nervous system. <u>Division of autonomic nervous system</u> :- Autonomic nervous system is further divided into the following two systems. 1- <u>parasympathetic nervous system</u> :- <u>Definition</u> :- The type of autonomic nervous system which controls various autonomic functions during the state of rest is called parasympathetic nervous system. <u>Explanation</u> :- parasympathetic nervous system controls different functions or activities during normal, relaxed and relatively calm conditions. It also returns the body functions to normal after they have been altered by sympathetic nervous system. For example - when sympathetic nervous system stimulates the body for extreme activity during danger time, then the parasympathetic nervous system reverses these changes when the danger is over. <u>Function</u> :- <u>< parasympathetic stimulation ></u> - parasympathetic nervous system promotes those activities which are associated with relaxed state of the body such as -		

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1: promotes digestion. 2: Slow down heart beat. 3: contraction of pupils of eyes. 4: lowering of blood pressure. 5: Constrict trachea and bronchi. 6: inhibits glycogenolysis. 7: Constricts urinary bladder, Rectum. 8: Increased blood flow to the skin and internal organs (viscera) 9: It is also concerned with homeostatic functions of the body.		
<u>2-sympathetic nervous system: (ETEA-2017)</u>		
<u>Definition:-</u> The type of autonomic nervous system which controls various autonomic functions or activities during the state of emergency is called sympathetic nervous system.		
<u>Explanation:-</u> Sympathetic nervous system works during the state of emergency and stimulates or prepares the body for violent-activity i.e- Fight or flight, during emergency or danger time. Similarly parasympathetic nervous system is inhibited by the sympathetic nervous system during stress and emergency.		
<u>Functions:- < Sympathetic stimulation >-</u>		
Sympathetic nervous system increases the activities of -- particular organs during stress and emergency such as--		
1: It quickens breathing rate. 2: Increases heart beat. 3: Dilates pupils of eyes. 4: Inhibit peristalsis or digestion 5: Rise in blood pressure. 6: Dilates trachea and bronchi 7: Dilates urinary bladder and rectum. 8: Stimulates glycogenolysis i.e- conversion of glycogen into glucose.		

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9: increases blood flow to skeleton, muscles, brain and heart.

Q15 what is sensory receptors. write the structure and -
function of some special receptors.

Answer:- Sensory receptors:

Definition:- Sensory receptors are those structures in the body which receive the stimulus and transmit the impulses towards CNS and keep the CNS informed from any kind of change in external environment or inside the body.

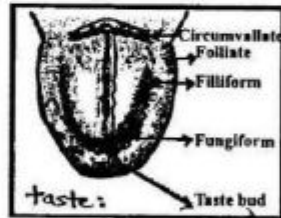
Occurance:- Some of the receptors are scattered in the - skin (i.e.- touch, pressure, vibration, temp; and pain), while others are concentrated into special organs (i.e.- Eyes, nose, ear and tongue). For example:-

1: Taste:- (ETEA-2016)

Biological name:- Biological term used for taste is Gustation.

Definition:- This is the ability for - appreciation of the flavour of a dissolve substance in the mouth.

Structure and occurrence:- organ used for taste is tongue. It possess 3000 to 10000 taste buds. each taste bud contains a cluster of taste detecting cells called taste cells which have receptors on its apical surface. Besides this tongue contains many ridges called papillae making tongue rough. These -



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papillae contain taste-buds.

Types of papillae :- There are 4-types of papillae .i.e-

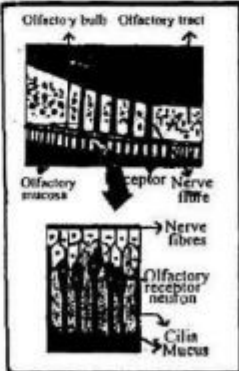
- 1- Filiform papillae :- It is numerous and taste-blind (i.e- no taste buds is present) which is found all over the tongue. It is about cone shaped. The presence of these papillae makes the tongue look like rough.
- 2- Fungi form papillae :- These types of papillae are found on the tip and sides of tongue. They are mushroom shape in — Structure: These papillae contains taste buds.
- 3- Foliate papillae :- These ridges and grooves towards the posterior part of tongue as well as on the side of tongue. These papillae also contain taste buds.
- 4- Circumvallate papillae :- These are large and circular — shaped papillae and found at the back of tongue. These — papillae also contain taste buds.

2: Smell :

Biological name :- Biological term used for smell is olfaction.

Definition :- Act of inhaling to identify — odour of something is called smell (olfaction).

Advantages :- Sense of smell makes us able to recognize the information of certain — chemical before coming in direct contact. It is not as important to human as vision and hearing. However, it is very much important

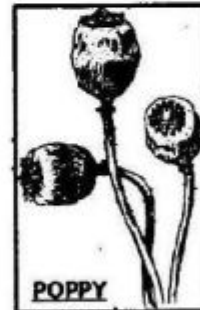


The diagram illustrates the olfactory system. At the top, the 'Olfactory bulb' and 'Olfactory tract' are shown. Below them, the 'Olfactory mucosa' is depicted as a layer of tissue. Within this mucosa, 'Olfactory receptor neurons' are shown. These neurons have 'Cilia' extending into the mucus layer. 'Nerve fibres' are shown exiting from the base of the neurons and passing through the olfactory bulb and tract.

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to other animals. <u>Structure and occurrence</u> :- organ for smell is nose. The inner membrane of nose is called olfactory mucosa. This membrane contains special neuron called as olfactory receptor neurons. it has many cilia which possess about 1000 various protein for each and every odour. <u>Mechanism</u> :- Smell receptors are stimulated by odour molecules that enter the nose and dissolve in the mucosa fluid. with the help of olfactory nerve, it is conducted to brain to evaluate the particular odour. <u>3: Touch</u> :- <u>Biological name</u> :- Biological term used for touch is Tactition. <u>Definition</u> :- Any physical contact is called touch. <u>Mechanoreception</u> :- touch is actually a type of mechanoreception <u>Structure and occurrence</u> :- The organ for touch is skin which contain touch receptors called - Meissner's corpuscles. Besides the skin, these receptors are also found on tongue and - mucosa membrane. although they are not distributed evenly over the body. For example - 1: - as the tip of finger and lips are rich in touch receptors - i.e - They may have as many as 100 per cm^2. 2: - while, at the back of hand these receptors are fewer. $<10/\text{cm}^2$. <u>Disorder of touch</u> :- 1: <u>Anesthesia</u> :- The loss of ability to feel any thing is called tactile anesthesia.		

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<u>ii: paresthesia</u> :- The sensation of numbness, pricking and tingling of the skin resulting from nerve damage is called - paresthesia. It may be permanent or temporary depends upon whether fibers are damaged or cell bodies.		
<u>4: pain</u> :-		
<u>Biological name</u> :- Biological term used for pain is Nociception.		
<u>Definition</u> :- Feeling of any distress in an tissue or organ is called pain or nociception.		
<u>Structure and occurrence</u> :- These are the most numerous type of receptors present in skin called nociceptors. Every cm^2 of skin contains around 200 pain receptors.		
<u>Function</u> :- They inform and warn us about danger and - Signal that there is something wrong in the body. For example, --- Human avoid touching a sharp needle or hot object or extending an arm beyond a safe limit because it hurts, and this is dangerous.		
<u>Types of pain receptor</u> :- on the basis of location pain - receptors are of 3-types, i.e. -		
<u>i: Cutaneous</u> :- This type of pain receptors are present in skin.		
<u>ii: Somatic</u> :- This types of pain receptors are found in joints & bones.		
<u>iii: Visceral</u> :- This type of pain receptors are found in internal organs like --- stomach, intestine, etc.		
without pain people could do many dangerous things without realizing it.		

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Q 16 Discuss the uses and abuses of Narcotic drugs.		
<u>Answer: Narcotic drugs:</u>		
<u>Definition :-</u> Those drugs which are used for the treatment of nervous disorders are called narcotic drugs.		
<u>Explanation :-</u> if narcotic drugs are used in moderate amount then they will help to treat various nervous disorders. when narcotic drugs are used in excess amount then they are dangerous for health and is illegal also.		
<u>Example: 1: Heroin:</u>		
<u>Definition :-</u> Heroin is highly addictive drug which is white crystalline form of morphine.		
<u>Processing of Heroin :-</u> Heroin is processed from morphine where as morphine is a naturally occurring substance extracted from the seed of poppy plant.		
<u>Ways of intakes :-</u> for medical use its intake is in the following manner.		
1: injected in subcutaneous tissues. 2: injected intramuscularly. 3: injected intravenously.		
<u>Medical uses :-</u> uses of drugs for treatment, curing and prevention or diagnosis is known as medical uses. i.e.-		
1. Heroin is a best analgesics agent and thus relieve pain. 2. used after severe trauma or even after surgery for post surgical pain.		



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3- Heroin is used for treatment of chronic pain.

4- Heroin is used for mental illness and disorders

5- Heroin is used for myocardial infraction (Heart attack).

6- Heroin is used for end stage cancer or diseases.

Abuses or misuses :- The illegal uses of drugs for other —

purposes than medical uses is called misuses or abuses. i.e.

i: short term effects:

1- Dry mouth.	2- Suppression of pain.
3- Nausea and vomiting.	4- Severe itching.
5- abortion in female.	6- warm flushing of the skin.
7- Depressed respiration (shortness of breath)-	

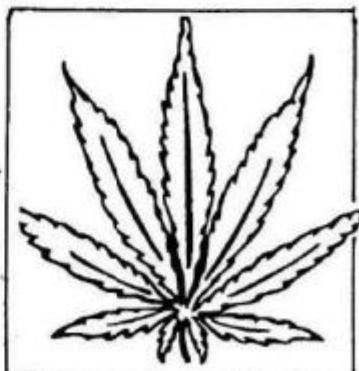
ii: Long term effects:

1- Infectious diseases e.g- HIV, Hepatitis-B, C.	3- Bacterial infections.
2- collapsed veins.	5- Heart, liver, kidney diseases.
4- Abscesses (Boils).	7- Heart Infraction.
6- Arthritis.	
8- Addiction (dependence).	

2: cannabis :

Definition:- A dried form of extract from cannabis sativa plant is called cann-
-abis.

Explanation:- cannabis is also —
called marijuana and is used as —
psychoactive drug. another form of
cannabis is obtain from the flower



CANNABIS SATIVA PLANT

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If someone consumes plant called hashish or others which are made from hemp and marijuana.

Med. uses of cannabis :-

1. It serves as appetite stimulant.
2. Used as analgesics (painkiller drugs) -
3. Used in treatment of vomiting and nausea.
4. Also used in treating symptoms of AIDS patients.
5. Helpful in treating chronic non-cancerous pain.
6. Lowering of intracranial eye pressure.

Abuses or misuses of cannabis :- (MPPA-2015)

most common adverse effect due to abuses of cannabis is -

1: Air way injury	2: lung inflammation
3: Anxiety (Restlessness)	4: Depression
5: suicidal thoughts	6: Severe mental disorder
7: panic fear	8: Impaired cognitive development
9: Heart and blood vessels disease	9: Decrease immune system
11: Decrease judgement ability	12: Throat and lung cancer

2: Nicotine - (ETEA-2011)

Definition :- Nicotine is a form of alkaloid obtain from the leaves of tobacco plant of family Solanaceae.

Medical uses of nicotine

1. It is used as a stimulant because it causes the release of chemical messengers like Acetylcholin, Serotonin, etc.

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2: Nicotine is used in different drug formation which are - used to treat wounds, depression, anxiety and other disorders. 3: Stimulate the release of beta-endorphin which produce - claming effect. 4: pain killer effect 5: used as sedative. <Nts depressant> <u>Abuses or misuses of nicotine:</u> 1: Nicotine is toxic in nature and often sold as pesticide. 2: Nicotine poisoning causes - Nausea, vomiting, stomach pain. 3: It damage placenta and cause pre mature birth. 4: about 60 mg of nicotine will kill an adult when absorbed at once. but consumption of a single cigarette is enough to make a child severely ill. 5: In severe cases, It may also lead to oral cancer. 6: cause high blood pressure, increase heart beat and cough. 7: causes bad breath and staining of teeth. 8: causes addiction, heart diseases. 9: It also decreases the insulin levels. <u>4: Alcohols:</u> <u>Definition:</u> - The most harmful drugs in liquid form and very rapidly absorbed in intestine and even in stomach is organic- solvent called alcohol. <u>medical uses of alcohol:-</u> 1: It used as antiseptic. 2: it used in cough syrups. 3: It used in washing of wounds and injuries, during		

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bandages or administering injections. 4: Improve general health in small quantity (as a medicine use). 5: used as a best solvent in medicines. <u>Abuses or misuses of alcohol:</u> - Alcohol is one of the most harmful and dangerous drugs to humans because it is most frequently used on large scale throughout the world. 1: large doses kill brain cells. 2: cause depression because it reduce the level of dopamine and Serotonin. 3: cause memory loss and Hallucination (confusion). 4: loss of control of speech, movement and affect judgement time. 5: causes vitamins deficiency. 6: causes Liver damage or diseases. 7: Driving after drinking causes accidents. 8: Extreme drunkenness causes unconscious conditions. 9: paranoia (live in magical world) and anxiety. <u>5: Inhalents:</u> <u>Definition:</u> - Those chemical substances in vapours and - fumes (gas) form which produce psychoactive effects when abused by concentrating and intentionally inhaling these fumes is known as inhalents. <u>Example:</u> - Volatile organic solvents, nitrates, anesthetic-gases, gasoline, thinner and nail-polish. <u>Medical uses of inhalents:</u> 1: Inhalents are used in medical clinics and hospitals to		

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enhance the depressed activity of nervous system during subconscious or unconscious conditions due to shock.

2: Some inhalents are also used as anesthetic gases.

Effects of abuses or misuses of inhalents:

1- Euphoria <عُذْرَة>.

3- Hallucination. <هلوسة>

5- Violent behaviour.

7- loss of appetite.

9- Deep breathing.

11- Rush <sudden attack on CNS>

13- loss of self control.

2- Depression <اكتئاب>

4- vomiting and giddiness <قيء>

6- Slurred speech.

8- heart abnormal beating:

10- loss of motor skills.

12- Nausea, unconsciousness.

Q17 Describe the different nervous disorders.

Answer:- Nervous disorders:

Definition:- Any abnormal condition or disorder in the CNS or PNS as called neurological disorder or nervous disorder.

classification:- Nervous disorders can be categorized — according to the primary location, affected, the primary type of dysfunction involved, or the primary type of cause.

Neurological disorders are classified into following categories.

1: stroke <vascular disorder> | 2: meningitis <infectious disorder>

3: Brain tumor <structural dis> | 4: Headache <functional disorder>

5: Alzheimer's disease <degenerative disorder>.

Explanation:-

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1: Stroke: —< stroke means trauma or damage>— Biological name: — It is also called cerebro-vascular accident. Definition: — Improper supply of blood flow to brain due to damage in cerebral-blood vessels is called stroke. Types and causes: — There are the following type of stroke. 1- Ischemic stroke: less supply of blood flow to brain cause ischemic stroke. or blockage This occurs due to narrowness of blood vessels in brain cells so brain cells does not receive required amount of blood and oxygen which result in death of nerve-cells. This condition is called ischemic stroke. prevalence: — Ischemic stroke is the most common type of stroke and their prevalence is 87%. Types of ischemic stroke: — Ischemic stroke is of 2-types. i.e— i: wholly ischemic stroke: — In wholly ischemic stroke blood-supply to particular brain part is completely blocked and — results in paralysis of the muscles controlled by them. ii: Transient ischemic stroke: — It is also called mini-stroke. In transient ischemic stroke blood supply to brain cells is — partly blocked and results in temporary paralysis of the muscles occurs which controlled by such brain cells. 2- Hemorrhagic stroke: The stroke result from rupturing of blood vessels in brain is called Hemorrhagic stroke. This rupturing of blood vessels		

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occurs when there is a high blood pressure and weak spots in blood vessels—walls. <u>Prevalence</u>:- prevalence of Hemorrhage stroke is 13%. <u>Symptoms of stroke</u>:- It is also classified as medical emergency. 1: numbness (lack of feel) and weakness of the face, arm and leg. 2: Trouble in speaking or understanding speech. 3: Trouble in one or both eye (have blurred or blacked vision). 4: confusion and trouble in walking. 5: Dizziness (دھنچ) and severe headache. 6: non-coordinated muscular movements. (loss of balance). <u>Diagnosis and tests</u>:- To determine the most appropriate treatment for stroke, several tests are used, including - Blood test, ECG, MRI, CT-scan. <u>Treatment: (medication)</u>:- 1: I.V. injection of tissue plasminogen activator. This drugs dissolve the clot or thrombus. 2: Aspirin is administrated orally as it makes the blood thin. 3: Drugs are given which lower down the blood pressure. 4: Thrombolytic drugs are given. 5: Heparin and warfarin are used as anticoagulants. 6: physiotherapy is very much necessary. 7: In Severe Stroke the Surgery is advised. <u>2: meningitis</u> : (منجنتیس) :- <u>Meaning</u> :- 'meninges' - CNS covering membrane, 'itis' - inflammation.		

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<u>Definition</u>:- Inflammation of meninges of brain and - Spinal cord is known as meningitis.		
<u>Causes of meningitis</u>:- The common causes of meningitis are-		
1: Bacterial infection.	2: viral or other microbial infection	
3: Cranial trauma.	4: Severe heat stroke.	
5: drugs allergies.	6: chemical reactions.	
7: Some types of cancer and inflammatory diseases.		
<u>Symptoms of meningitis</u>:- The meningitis is very severe - condition that's why it is classified as medical emergency. Following are the some common symptoms of meningitis.		
1: High grade fever and chills.	2: Nausea and vomiting.	
3: photophobia (sensitive to light).	4: Severe headache.	
5: Rapid breathing.	6: Agitation (disturbance).	
7: sleepiness or difficulty walking up.		
8: Stiff neck and unusual posture with neck and head arched $\rightarrow$ backward.		
9: poor feeding and irritability in children.		
10: Decreased consciousness.		
11: mental status changes or swing in mood.		
12: lack of interest in drinking and eating.		
<u>Tests and diagnosis</u>:- meningitis can be diagnosed based on a medical history, a physical exam and certain - diagnostic tests, e.g - Blood cultures, x-rays, CT-scan, MRI.		
<u>Treatment of meningitis</u>:		
1: Different vaccines are used for the treatment of -		

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meningitis Such as— meningitis-C-vaccine, Hib-vaccines. 2: For bacterial meningitis , antibiotics are given. 3: Corticosteroids medication 4: The patient is placed in dark , quiet-room as a part of treat; 3: <u>Brain tumors :</u> <u>Meaning :-</u> Tumor mean swelling or mass. <u>Definition :-</u> Any mass or abnormal growth in brain is called - Brain -tumors. <u>Types on the basis of affect or cancer :-</u> The tumor are may be cancerous or non-cancerous. i.e - 1- <u>Benign tumor :-</u> It is due to uncontrolled division of neuroglia cells. It is non-cancerous therefore it is non-metastatic. 2- <u>Malignant tumor :-</u> It is due to uncontrolled division of nerve cells. It is cancerous therefore it is metastatic. <u>Types on the basis of origin :</u> 1: <u>primary brain tumor :-</u> primary brain tumors are those - which originate in the brain itself or in tissues or in meninges or even in pineal gland. 2: <u>Secondary brain tumor :-</u> secondary brain tumors are those which results from cancer. It arise in any part of body and then spread towards brain. This is also called metastatic tumor and is more common than primary tumor. <u>causes of brain tumor :-</u> There are no specific causal - agent for brain tumor, but the following factors may cause it.		

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1: mutation in DNA.	2: Hormonal imbalances.	
3: Family History	4: Exposure to certain rays.	
5: Uses of Hormonal drugs.	6: aging, etc.	
<u>Symptoms of brain tumor:-</u> The symptoms of brain tumor is vary and depend on the brain tumor's size, location and rate of growth. general symptoms caused are -		
1: Severe headache.	2: unexplained nausea or vomiting	
3: poor coordination among organs.	4: Speech difficulties.	
5: confusion in every day matter.	6: Hearing problems.	
7: personality or behavior change	8: seizures.	
9: vision problem like - double vision, blurred vision or loss of peripheral vision.	10: difficulty with balance.	
11: gradual loss of sensation or movement in an arm or leg.		
<u>Tests and diagnosis:-</u> CT-scan, MRI-brain, X-ray, complete blood count and relevant diagnostic test are advised.		
<u>Treatment of brain tumor:</u>		
The treatment for a brain tumor depends on the type, size and location of the tumor as well as overall health condition of patient. However, chemotherapy, radiotherapy and surgery is the — generally treatment for tumors. i.e. —		
1: <u>Chemotherapy</u> :- Treatment through different medicines.		
2: <u>Radiotherapy</u> :- destroy the affected cells through rays.		
3: <u>Surgery</u> :- The infected area can be removed surgically.		

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4: Headache : <Ache mean pain>.

Medical name :- Cephalalgia.

Definition :- pain anywhere in the region of head is called — headache.

Explanation :- Although brain can't sense pain because it does not have pain receptors but headache is caused by disturbances in pain sensitive structure around brain which include — scalp, head tissues, neck-tissues, periosteum of skull, muscles, nerves, arteries, veins, sub-cutaneous — tissues, eyes, ears, sinuses and mucus membrane.

Types of headache :-

1: primary headache :- primary headache is caused by — problems associated with over activity of pain sensitive — structures in the head.

2: Secondary headache :- Secondary headache is due to diseases activating pain sensitive structure in the head.

Causes of headache:

1: Sinusitis, brain tumor.	2: Stress, lack of sleep.
3: Abnormal emotional status	4: less blood supply towards brain.
5: Alcoholism, heat stroke	6: Disturbance in vision.
7: Hypertension or hypotension.	8: Dehydration, influenza.
9: Dental problems.	10: Ear infection, meningitis.

Treatment and prevention :

1: medication like— painkiller, Nerve and muscle relaxants

2: Treatment of under lying causes should be done.

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3: Stress reduction and regular exercise also reduce headache.		
5: Alzheimer's disease :- <Alzheimer is a German physician>		
<u>Definition</u> :- The progressive and gradual loss of memory is called alzheimer's disease. ← (ETEA-2016)		
<u>Causes and risk factors</u> :		
1: <u>Beta-amyloid protein</u> :- many Scientists believe that this disease result from accumulation of beta-amyloid-protein which cause nerve-cell death.		
2: <u>Family History</u> :- Alzheimer's appears to be some what higher in first degree relative.		
3: <u>Age</u> :- old age <after the age of 70> is also one of the cause. about 50% peoples are affected over the age of 85-year.		
4: <u>Head trauma</u> :- people affected from trauma are also - in the risk of this disease.		
5: <u>mild cognitive impairment</u> :- have memory problems.		
6: <u>Other factors</u> :- other risk factors for alzheimer's are - Lack of exercise, Smoking, High blood pressure, high blood-cholesterol, poorly controlled diabetes, etc.		
<u>Symptoms of alzheimer's disease</u> :		
1: Dementia <loss of memory>	2: irritability.	
3: Apathy <absence of emotions>	4: Agitation. <angriness>	
5: mild personality changes.	6: Behaviour changes.	
7: problem in thinking and reasoning.		
8: Inability to perform daily work.		

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9: less spontaneity. <slowness of activities>- 10: problem with figures and numbers. 11: understanding problem when reading. 12: misinterpreting spatial relationships. 13: Quarrelsome <having different point of view than others> <u>Tests and diagnosis:-</u> clinical diagnosis are made. other diagnosis methods are - CT-scan, MRI-brain, Lab tests, mental status testing, Neuropsychological testing, etc. <u>Treatment and prevention for alzheimer's :</u> 1: Drugs which enhance the production of acetylcholine - <Hormone> are used to treat alzheimer's disease. 2: Nutritional therapy — balance diet for healthy life. 3: Regular exercise — for improve mood and health. 4: Creating a safe and supporting environment. 5: Keeping active life and more enjoyable, also reduce alzheimer's — End — Alzheimer's disease is not a normal part of aging and is not something that inevitably happens in later life. for example, many people live to over 100-years of age and never develop alzheimer's disease.		

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Exercise

Exercise MCQs

A . Multiple Choice Questions (MCQs).

1. Most of the neurons of our body are:

a) Unipolar
b) Bipolar
c) Pseudounipolar
☒ d) Multipolar
2. Largest number of cell bodies of neuron in our body are found in:

a) Retina
b) Spinal cord
☒ c) Brain
d) Tongue
3. Nerve fibre is different from the muscle fibre due to the presence of

a) Myofibrils
b) Lines
c) Sarcolemma
☒ d) Dendrites
4. A nerve impulse will travel through a nerve fibre only if the membrane suddenly becomes more permeable to

a) Chloride ions
☒ b) Potassium ions
c) Sodium ions
d) Calcium ions
5. Telencephalon refers to

a) brain stem
b) cerebellum
☒ c) cortex
d) cerebral hemispheres
6. The somatic nervous system is part of the

a) autonomic nervous system
☒ b) peripheral nervous system

c) central nervous system
d) parasympathetic nervous system
7. Which of the following is NOT a function of cerebrospinal fluid:

a) exchange nutrients and metabolic waste
☒ b) improve conduction of nerve signals between different brain regions
c) provide mechanical protection to the brain
d) carry neuroactive hormones in the nervous system
8. Which of the following is common to all neurons?

☒ a) A cell body which contains a nucleus
b) A thick myelin sheath

c) Presence of nodes of Ranvier
d) Presence of Schwann cells
9. The groups of ribosomes present in the cell body of the neuron, which are associated with rough endoplasmic reticulum are called:

a) Meissner's corpuscles
b) Pacinian corpuscles

☒ c) Nissl's granules
d) Lysosome granules
10. The number of human spinal nerves is:

a) 24
b) 50
☒ c) 62
d) 64
11. The electrical potential of cell membrane of neuron when it is not transmitting any signal is called _____.

☒ a) resting membrane potential
b) action potential

c) propagation of impulse
d) synapse

Short Questions

Q1: — Enlist main parts of a typical neuron.

Answer: Neuron:

Definition:- The chief structural and functional unit of the nervous system is called neuron.

Structure or parts of neuron:- Neuron have 3-main parts-i.e.

1: cell body:- It is main nutritional part of neuron which contain cytoplasm and different organelles. from cell body different fibres arises called cytoplasm-extensions.

2: Dendrites:- Dendrites are short, thin fibres arising from cell body of neuron which carry message from — receptors to neuron cell body.

3: Axon:- Axon is thick, long extension of neuron cell — body which carry message from cell-body to other neuron or muscles. Axon have more cytoplasm than dendrites. Some axon is covered by myelin sheath and are called myelinated axon or neuron. at the end of axon many fine branches are present, called terminals which have knob like tips called Terminal knob.

Q2: — In what circumstances the distribution and pumping of Na^+ and K^+ ions across the neuron-membrane during — resting membrane potential takes place.?

Answer:- see Question No-5. (write only — Na^+ and K^+ ions —

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distribution in resting membrane potential topic>.		
Q3:	- Differentiate b/w R.M.p and active.m.potential.	
	<u>Answer:-</u> See Question No-5 <write only - Definition and explanation of both R.M.p and A.M.p in Question No-5>.	
Q4:	- Define a nerve impulse.	
	<u>Answer:-</u> See Question No-6. <write only definition>.	
Q5:	- What are the conditions under which an impulse move from one neuron to another neuron across the synapse.	
	<u>Answer:</u> Impulse move from one neuron to another across → Synapse.	
	<u>Introduction:-</u>	
	A nerve impulse is passed from one neuron to the — other through the synapse. However, a single impulse does not necessarily pass the synapse. It may take two or 3- impulses arriving in rapid series.	
	<u>Mechanism: <condition></u> - when a nerve impulse arrives at the end of the axon of one neuron, neurotransmitters <chemical messengers> are released and travel to the — dendrite of another neuron across synaptic gap, carrying the nerve impulse from one neuron to the next.	
Q6:	- locate the parts of brain specified for the storage of memo-ries.	
	<u>Answer: Hippocampus:</u>	
	1: The hippocampus, located in the brain's temporal lobe, is where episodic memories are formed and indexed for — later access.	

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2: Episodic memories are autobiographical memories from specific events in our lives, like the coffee we had with a friend last week.		
Q7: - Differentiate b/w sympathetic and parasympathetic N.S.		
<u>Answer:</u> - See Question No-14. <write only - division of autonomic nervous system of Q-14>.		
Q8: - what is compositional difference b/w gray and white matter.		
<u>Answer: composition of gray matter vs white matter:</u>		
1: Gray matter contains numerous cell-bodies and - relatively few myelinated axons, while white matter - contains relatively few cell bodies and is composed - chiefly of long-range myelinated axons.		
2: The colour difference arises mainly from the ^{whiteness of myelin.}		
3: Gray matter - conducts, processes and sends information to various parts of the body, while white-matter - interprets sensory information from various parts of body.		
4: about 40% of the brain is Gray matter while 60% of the brain portion is white-matter.		
Q9: - Differentiate between medulla and pons.		
<u>Answer:</u> See Question No-12. <write only - pons and modulla of Hind brain in Question No-12>.		
Long Questions		
Q1: - Differentiate b/w myelinated and non-myelinated neurons.		

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<u>Ans:</u> <u>Myelinated neuron:</u>	<u>Non-myelinated neuron:</u>	
1: They are insulated by a myelin-sheath.	1: They do not have a myelin sheath.	
2: It is white in colour	2: It is gray in colour.	
3: They have nodes of Ranvier.	3: They have no nodes of Ranvier.	
4: The speed of transmission of nerve impulses is high.	4: The speed of transmission of nerve impulses is slow.	
5: They do not lose the impulse during conduction	5: They lose the impulse during conduction.	
6: They have long and myelinated Axon.	6: They have short and non-myelinated axon.	
7: In myelinated neuron the Nerve impulse move by — saltatory conduction.	7: In non-myelinated neuron the Nerve impulse move as — continuous waves.	
8: The schwann cells wrap — tightly around the nerve axon and form the myelin sheath.	8: Schwann cells are not wound around the axons but simply form a groove.	
Q2: — Describe in detail the transmission of nerve impulse.		
<u>Answer :-</u> See Question No--5.		
Q3: — Explain the structure of synapse with diagram. How synaptic transmission of nerve impulse take place.		
<u>Answer:-</u> see the definition and explanation of Q-7 for structure of synapse and see Q-8 for synaptic transmission of nerve impulse		
Q4: — Give a general over view of the structure of brain. Highlight		

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the main functions of the various parts of the brain.

Answer:- See Question No-12.

Q5: - Differentiate b/w the cranial and spinal nerves. List down the number and nature of these nerves.

Answer:- See Question No-14. <write only - part-2: i.e. - types on the basis of nerve origin.>.

Q6: - Name the major receptor present in human body. Describe in detail how sense of olfaction, Tactition and nociception are accomplished in human body.

Answer:- See Question No-15. <write only part-2,3,4 - of Question No-15>.

Q7: - Describe the causes, symptoms and treatment of stroke

Answer:- See Question -No-17 <write only part-1: stroke>

Q8: - critically discuss the use and abuse of any one - narcotic drug.

Answer:- See Question No-16 <write only one example>.

Q9: - with the help of diagram differentiate b/w the - structure and function of 3-types of neuron.

Answer:- See Question No-3. <write only- "Types on the basis of function"- Sensory, motor and associated N>.

Q10: - write short note on the following nervous disorders.

a: meningitis b: Alzheimer's disease .

Answer:- See Question No-17. <write only part-2,5 of Question No-17>.

—End—

Chapter-17	236	ETEA-MCQs
Previous Entry Test MCQ's of Biology Chapter No-17: (Nervous coordination)		(a) Cerebrum (b) Cerebellum (c) Medulla (d) Hypothalamus
2006 ETEA		9. In human being, the numbers of cranial nerves are: (a) 8 pairs (b) 10 pairs (c) 12 pairs (d) 31 pairs
1. Control center of speech is: (a) Medulla oblongata (b) Diencephalon (c) Cerebrum (d) Cerebellum		10. Thirst is controlled by: (a) Hypothalamus (b) Adrenal gland (c) Parathyroid (d) Thyroid
2013 ETEA		11. Meissner's capsules are the receptors for: (a) Temperature (b) Pain (c) Pressure (d) Touch
2. Receptor is sensitive to smell are: (a) Mechanical (b) Chemical (c) Photo (d) Geo		2014 ETEA
3. Neuron that carries message from sense organ to the central nervous system is: (a) Afferent (b) Efferent (c) Associative (d) None of them		12. Hypothalamus is a part of--- (a) Diencephalon (b) Mesencephalon (c) Metencephalon (d) Telencephalon
2010 ETEA		2015 ETEA
4. Limbic system in forebrain consists of: (a) Hypothalamus (b) Hippocampus (c) Amygdale (d) All of the above		13. CSF is found in between----- (a) pia mater and dura mater (b) pia mater and arachnoid mater (c) grey mater and pia mater (d) dura mater and grey mater
5. Hunger center is located in: (a) Hypothalamus (b) Cerebellum (c) Medulla (d) Mid brain		14. Blood pressure towards the brain during rest hours is- (a) 850mm/minute (b) 900mm/minute (c) 750mm/minute (d) 730mm/minute
2011-ETEA		15. How many pairs of cranial nerves are mixed in nature? (a) 02 pairs (b) 04 pairs (c) 06 pairs (d) 08 pair
6. Nicotine in tobacco: (a) Decreases the heart rate (b) Decreases blood pressure (c) Block the transport of oxygen (d) Paralyzes cilia		16. Misuses of cannabis results----- (a) psychosis (b) euphoria (c) paranoia (d) photophobia
2012 ETEA		2016 ETEA
7. Speech and language area are located in: (a) Thalamus (b) Medulla oblongata (c) Right cerebral hemisphere (d) Left cerebral hemisphere		
8. The sense of hearing is concerned with:		

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ETEA-MCQs

17. Which of the following is correct about speed of nerve impulse...?

- a) Thicker the nerve fiber - less resistance to flow of current - faster the nerve impulse
- b) Thicker the nerve fiber - more resistance to flow of current - slower the nerve impulse
- c) Thinner the nerve fiber - less resistance to flow of current - slower the nerve impulse
- d) None of the above

18. A slowly progressive disease of the brain that is characterized by the impairment of memory and eventually by disturbance in reasoning, planning, language and perception is one of the following?

- a) Alzheimer's disease
- b) Meningitis
- c) Cerebrovascular accident
- d) Malignant

19. C.S.F is found in between.....

- a) Pia mater and dura mater
- b) Pia mater and arachnoid mater
- c) Pia mater and neural canal
- d) Dura mater and arachnoid mater

20. Sense of test is called.

- a) Gustation
- b) Tactition
- c) Nociception
- d) Olfaction

2017 ETEA

21. If medulla oblongata of a person brain is damaged which of the following processes will be disturbed?

- (a) Thinking
- (b) Sleep
- (c) Thirst
- (d) Swallowing

22. Nervous system that prepares body for fight or flight.

- (a) Para Sympathetic
- (b) Sympathetic

- (c) Somatic
- (d) Peripheral

2018 ETEA

23. Depolarization of neuron is characterized by:

- (a) Na⁺ into the axon and K⁺ out of the axon
- (b) K⁺ into the axon and Na⁺ out of the axon
- (c) Na⁺ and K⁺ within the axon toward the axon terminal
- (d) None of the above

24. Vomit centre is located in:

- (a) Pons
- (b) Mid brain
- (c) Cerebellum
- (d) Medulla

2019 ETEA

25. The number of human spinal nerves is:

- a) 60
- b) 62
- c) 64
- d) 66

26. _____ is considered as chief structural and functional unit of nervous system.

- a) Cell
- b) Neuron
- c) Nephron
- d) Brain

27. Functionally _____ pairs of cranial nerves are sensory in nature and _____ pairs are mixed in nature.

- a) 3,4 and 5
- b) 4,5 and 3
- c) 3,5 and 4
- d) 4,3 and 5

2020 ETEA

28. _____ is a junction between two neurons or between a motor neuron and a muscle cell

- a. Impulse
- b. Synapse
- c. Axon
- d. Cleft

Key: -

1.c	2.b	3.a	4.d	5.a	6.d
7.d	8.a	9.c	10.a	11.d	12.a
13.b	14.c	15.b	16.a	17.a	18.a
19.b	20.a	21.d	22.b	23.a	24.b
25.b	26.b	27.c	28.b		

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