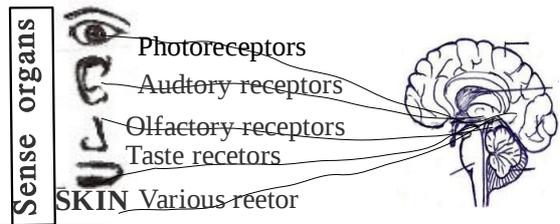


1. BEYOND THE SENSES

Major Idea

Sense is possible only when impulses from sense organs [eye, ear, nose, tongue and skin] reach at the brain through the sensory nerves.



1. The protective measures of human eyes.

- Ans:**
- * Eyes are situated in the bony eye-socket of the skull.
 - * Eyelids with eyelash protect from dust and other particles.
 - Tears keep eyes wet , washes away the dust particles and prevent microbial infections.
 - The conjunctiva covers the front portion of the eye, except cornea.

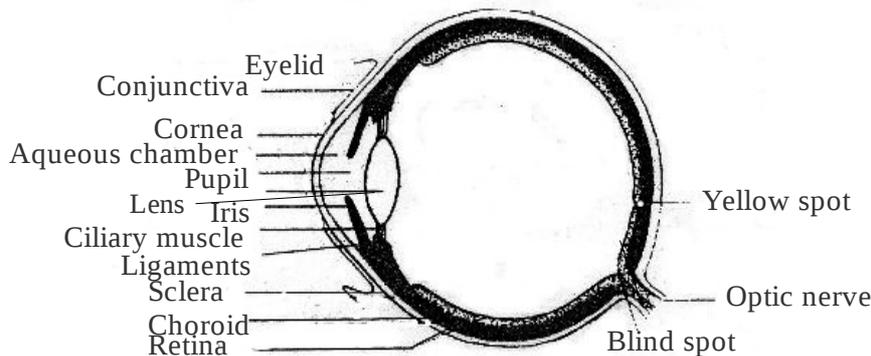
2. The structure of eye.

Ans: Human eye is made up of three distinct layers, viz. Sclera, Choroid and Retina. Chambers filled with aqueous humour and Vitreous humour are seen on either sides of the eye lens.

Sclera, the outermost layer, (except its front transparent portion – cornea) is opaque and white in colour.

Choroid is the middle layer made up of blood capillaries to supply nutrients and oxygen. Its anterior dark screen with pupil is the iris. Behind the iris, a convex lens is placed in the middle of the ciliary muscles by a number of ligaments.

Retina is the innermost layer on which the image forms. The nerve endings of the optic nerve fibres are spread throughout this layer. Two types of modified nerve cells or photoreceptors are seen in the retina. These are known as the rod cells and cone cells.



3. Cornea : Sclera; Iris :

Ans: Choroid

4. The pigment which gives colour to iris is

Ans: Melanin.

5. The aperture seen at the centre of iris?

Ans: Pupil

6. When bright light falls, the eye pupil, (Constricts / Dilates / No change) ?

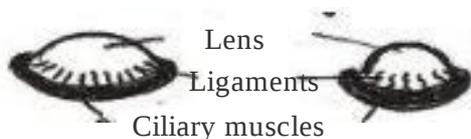
Ans: Constricts, due to the constriction of circular muscles in the iris.

7. How can our lens adjust its focal length according to the distance from objects?

[How is power of accommodation possible?]

Ans: When we look at a distant object, the ciliary muscles are in a relaxed position so as to keep the ligaments tight. Therefore the curvature of lens decreases to fix the image on retina [figure-1].

When we look at a near object, the ciliary muscles contract to loosen the ligaments. When ligaments relax, the curvature of lens increases naturally ,to focus the image on retina. [figure-2].



	Viewing distant objects	Viewing near objects
Ciliary muscles	Relaxes	Contracts
Ligaments	tightens	loosen
Curvature of lens	Decreases	Increases
Focal length	Increases	Decreases

8. Which are the 3 layers of human eye ? Give their functions.

Sclera –The outermost, strong layer, that gives shape.

Choroid- Middle layer of blood capillaries, which supply nutrients and oxygen.

Retina- The innermost layer on which, the image forms.

9. The fluids filled in the chambers of eye , position and function ?

Ans: * **Aqueous humour** – A watery fluid seen in the aqueous chamber [between cornea and lens] , oozes from the blood. This fluid supplies nutrients and oxygen to cornea and lens.

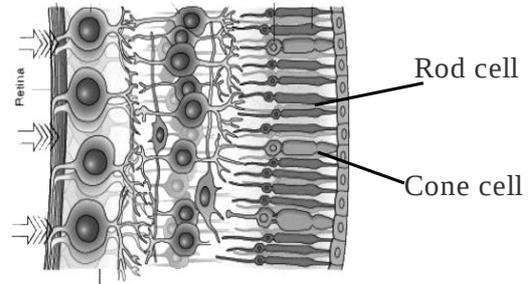
* **Vitreous humour** - A jelly like fluid filled with in the vitreous chamber [between lens and retina], helps to maintain the shape of eyeball.

10. Given below is a section of retina. Compare and contrast between the photo receptors seen on it.

Ans: Rod cells and cone cells are modified nerve cells.

Receptor region of the rod cells is rod shaped and contain the pigment rhodopsin, which will be stimulated under dim light. Receptor region of the cone cells is cone shaped and contain the pigment photopsin, which will be stimulated under intense light.

Under dim light, rhodopsin dissociates to form retinal and opsin to produce impulses from rod cells. Under intense light, photopsin dissociates to form retinal and opsin to produce impulses from cone cells.



11. Differentiate between blind spot and yellow spot.

Ans: **Blind spot** is a part of retina from where the optic nerve begins. No photoreceptors at this spot, hence no vision. **Yellow spot** is the point of highest vision in the retina, where more cone cells seen. Images form in and around the yellow spot.

12. What are the characteristics of images formed on retina ?

Ans: Real, Small, Inverted and Accommodated.

13. Describe that how vision is possible.

Ans: When light rays from the object passes through cornea and pupil fall on the lens, a small, real inverted image forms on the retina. When the image is formed under dim light, rhodopsin in the rod cells dissociate to produce impulses and when the image is formed under intense light, photopsin in the cone cells dissociate to produce impulses. These impulses are transmitted through the optic nerve. The brain coordinates the images from both eyes to feel perfect vision.

14. Experience of vision - Flow chart.

Ans: Light rays from the object → cornea → Aqueous humour (pupil) → lens → vitreous humour → image on retina → stimulation in the photo receptors → dissociation of rhodopsin / photopsin → impulses → optic nerve → coordination of images by cerebrum → perfect vision.

15. Though images of object are formed in both eyes, we can see only one object. Give reason.

Ans: Cerebrum coordinates the two images and hence get a three dimensional view of the object.

16. Define binocular vision.

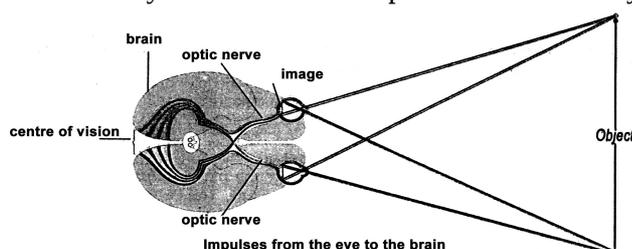
Ans: The ability of both the eyes to focus on the same object is known as binocular vision.

Binocular vision help us to get a three dimensional image of the object. This help us to calculate the correct distance, depth, height and width of the object.

16. What is the need of closing one eye while shooting an object ?

Ans: When aiming an object, we need to get correct line instead of common focus through binocular vision.

17. Carefully observe the above picture and make any two inferences we get from this picture.



Ans: * The process of seeing object through the coordination of impulses by the cerebrum.

- Binocular vision.

18. Vitamin A help us for better vision. Give reason.

Ans: Retinal,(found in rhodopsin and photopsin), is formed from vitamin A.

19. The bird, owl has no vision in day time. Why?

Ans: Owl's retina is devoid of cone cells and hence no vision in day time.
 20. Certain colours cannot recognize : Colour blindness : Hereditary defect;
 Decreased vision in dim light : ----- : Deficiency disease.
Ans: Night blindness.

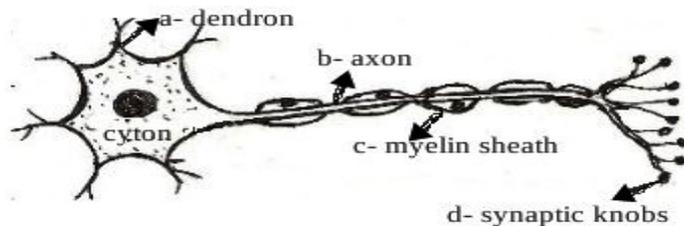
21. The structural and functional unit of the nervous system ?

Ans: Neuron (Nerve cell)

22. How does a nerve cell differ from an ordinary cell?

Ans: Unlike other cells, nerve cell never divides.

23. The structure of a model neuron.



Ans: A neuron has mainly the following parts; a cyton (cell body), impulse receiving dendrons, impulse transmitting axon and synaptic knobs for secreting neurotransmitter.

In certain neurons, the nerve fibres are covered by white myelin sheath.

Dendrons :- Carry impulses to the cell body of the neuron.

Cell body (cyton) :- Passes impulses to the axon.

Axon :- Transmits impulses from the cell body.

Synaptic knobs :- Secrete neurotransmitter when impulse reaches.

Myelin sheath :- Protects the nerve fibre (axon) and increases the speed of impulse.

24. Define a nerve and ganglion.

Ans: Nerve is a collection of enveloped nerve fibres /axons [even elongated dendrons are called as 'axons'].

Ganglion is the enveloped spherical collection of cytons .

25. The protective covering of nerve fibres (axons) ? Mention its function.

Ans: Myelin sheath.

To provide nutrients, function as an insulator and protects the nerve fibre, increases the speed of impulse transmission and gives white appearance ('white matter').

26. Differentiate between the grey matter and white matter.

Ans: The part of nerve, made up of myelinated nerve fibres, is seen in white and is called as white matter.

The part of nerve, made up of non-myelinated cytons, is grey coloured and called as grey matter.

27. How is a myelinated neuron differ from non-myelinated neuron?

Ans: The speed of impulse transmission will be faster in myelinated neuron than non-myelinated neuron.

28. Name the swollen ends of axon . How is it important in the transmission of impulse ?

Ans: Synaptic knobs, from which neurotransmitter secretes. The impulses are transmitted across the synaptic cleft only through a chemical (neurotransmitter), secreted from the synaptic knobs.

29. Give example for neurotransmitter.

Ans: Acetyl choline (Dopamine is another example)

30. Define synapse.

Ans: The junction between neurons or between neurons and muscles or glands is known as the synapse.

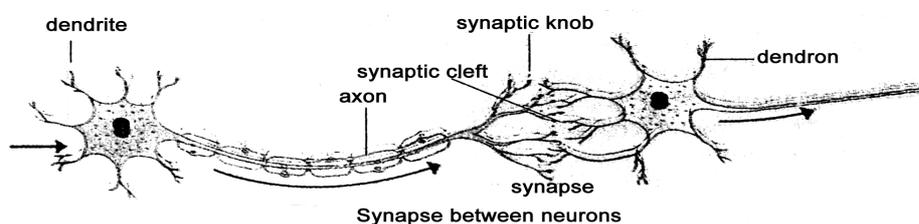
31. The electro-chemical messages flowing through nerves.

Ans: Impulses.

32. What are stimuli ?

Ans: The changes, that result the formation of impulses of reaction, are known as stimuli. Eg:- heat, cold...

33. Observe the illustration carefully and make a flow chart that shows the transmission of impulses



Ans: Impulse due to stimulus → dendrites → dendrons → cyton → axon → axonites
 → synaptic knob → secretion of neurotransmitter to the synaptic cleft → impulse to the adjacent dendrites.

34. The protective measures for human brain ?

Ans: Cranium (the bony covering), Three layered outer covering, known as meninges, that filled with the cerebro spinal fluid (CSF).

35. The outer covering of brain and spinal cord ? **Ans:** Meninges.

36. How is the CSF form? Give its function ?

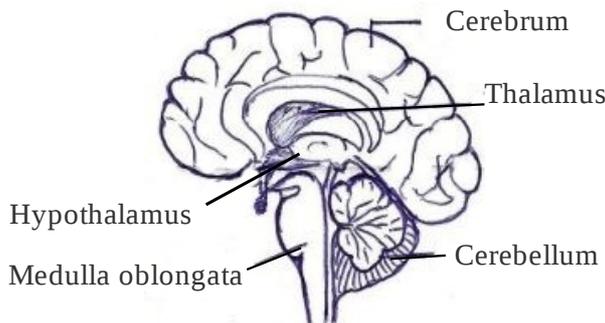
Ans: Cerebro spinal fluid is a fluid formed from the blood and re absorbed to the blood. It provides nutrients and oxygen. It protects brain from external shocks.

37. Which are the sites where cerebro spinal fluid seen ?

Ans: CSF seen in between the inner layers of meninges, in cerebral ventricles and in the central canal of spinal cord.

38. Describe the structure of human brain.

Ans: Human brain has outer cerebrum, cerebellum and medulla oblongata and inner thalamus and hypothalamus.



39. Compare Cerebrum with Cerebellum and Medulla oblongata.

Ans: Cerebrum, the largest part of the brain, is seen as two large hemispheres of foldings and groves in its cortex. Cerebral cortex is seen as grey matter and inner part is as white matter. Cerebrum is the centre of voluntary movements, feeling senses and also the centre of qualities like thought, imagination, intelligence and memory.

Cerebellum, the second largest part, is the centre of equilibrium of the body through muscular coordination. Cerebellar cortex is also seen as grey matter and inner part is as white matter.

Medulla oblongata controls involuntary actions like heart beat and breathing. Its outer part is seen as white matter while the inner is seen as grey matter.

Thalamus, the seat of cerebrum, retransmits impulses to and fro the cerebrum.

Hypothalamus, seen below the thalamus, is the centre of homeostasis and hormone secretion.

40. There are many folds and grooves in the cerebral cortex. What is the advantage of this ?

Ans: This is an adaptation to include more number of neurons and there by increase the efficiency of cerebrum.

41. Any mild injury to the medulla oblongata may lead to sudden death. Why ?

Ans: Medulla oblongata controls involuntary actions like heart beat and breathing. Any mild injury to it results disfunctioning of breathing and heartbeat and may lead to death.

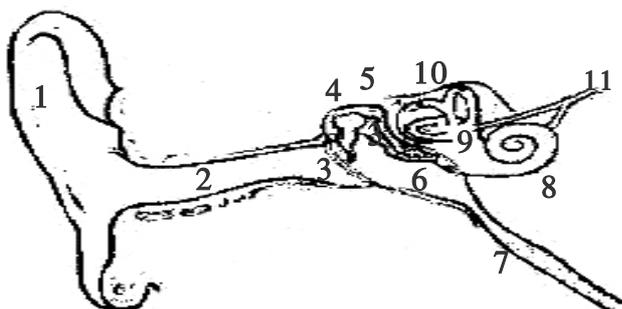
42. A person could not walk easily after drinking alcoholic beverage. Can you say why ?

Ans: Alcohol is affected the normal functioning of his cerebellum, which maintains equilibrium of the body.

43. The functions of human ear ?

Ans: Hearing, body balance.

44. What are the main parts of human ear ?



EXTERNAL EAR

- 1. ear pinna 2. ear canal
- 3. ear drum / tympanum

MIDDLE EAR

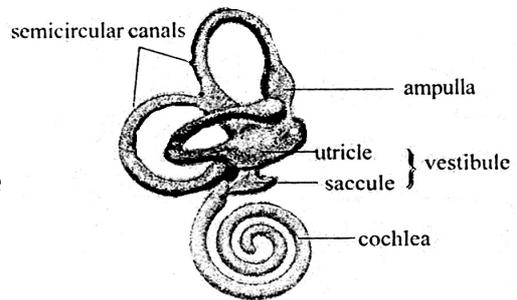
- 4. malleus 5. incus 6. stapes
- 7. eustachian tube

INTERNAL EAR

- 8. cochlea
- 9. vestibule [sacule, utricle]
- 10. semicircular canals
- 11. auditory nerve

45. Name the bones of ear ossicles. **Ans:** Malleus, Incus, Stapes.
 46. The smallest bone in the human body. **Ans:** Stapes.
 47. The tube that connects the middle ear to the pharynx ? What is its function ?
Ans: **Eustachian tube.** It helps to regulate the pressure inside the middle ear.
 48. The structure of internal ear.

Ans: Internal ear constitutes 3 regions. **Cochlea** (looks like a snail shell), **Vestibule** having sacule (lower sac) and utricle (upper sac) and three **Semicircular canals** with swollen end,-ampulla.



These are filled with a fluid, endolymph and receptors are seen immersed in it. All receptors are connected with the brain by the Auditory nerve.

Cochlea has 3 chambers, of which, only the middle chamber is filled with endolymph and contain the Organ of Corti with auditory receptors. The outer chambers are filled with perilymph.

Receptors seen inside the ampulla of semicircular canals and vestibule are stimulated according to the movement of head. But the impulses thus created reach in the cerebellum, to maintain the equilibrium.

49. Cochlea : Hearing ; ---- , ----- :Equilibrium of the body.

Ans: Vestibule, semicircular canals.

50. The swollen end of semicircular canals ?

Ans: Ampulla.

- 51 . The auditory receptors are seen in the ----- of cochlea.

Ans: Organ of Corti.

52. Cochlea : Auditory nerve : Cerebrum;

Vestibule & semicircular canals : Auditory nerve : ? **Ans:** Cerebellum.

53. Hearing. Flowchart.

Ans: Sound waves → ear pinna → ear canal → ear drum (tympanum) vibrates → malleus, incus and stapes (ear ossicles) → oval window → cochlear perilymph → endolymph → stimulation in auditory receptors of th Organ of Corti → impulse transmitted through auditory nerve → auditory centre of the brain → hearing.

54. What is the role of ear in maintaining the equilibrium of the body ? How is it possible ?

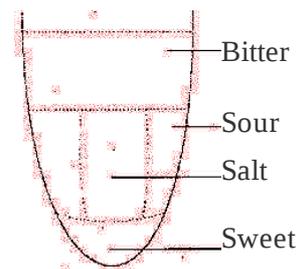
Ans: Receptors seen inside the ampulla of semicircular canals, sacule and utricle are stimulated according to the movement of head. The impulses formed thus will be transmitted to the cerebellum through the auditory nerve. Cerebellum functions so as to maintain the equilibrium of body.

55. Why giddiness is felt when you turn round and round ?

Ans: When we turn round continuously, the endolymph inside the semicircular canals and vestibule also moves and there will be continuous stimulation of the receptors and passing of impulses to the cerebellum. Hence cerebellum can not coordinates the muscular activities properly and we feel giddiness.

56. How do we sense taste ?

Ans: The **receptors in the taste buds** get stimulated when the food particles dissolve in the saliva. The impulses thus formed are carried through the nerve to the centre of taste in the brain , which helps in the perception of taste.



57. The arrangement of taste receptors.

Ans: Sweet, Salt, Sour and bitter.

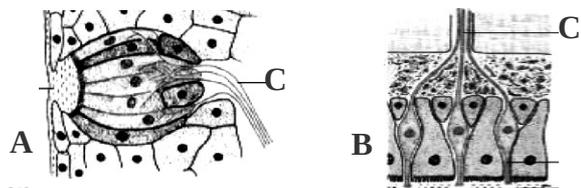
58. How can we feel smell ?

Ans: The **olfactory receptors** seen in the mucus membrane of the nasal cavity get stimulated when particles enter the nose along with air. The impulses thus formed are carried through the olfactory nerve to the centre of smell in the brain , which helps in the perception of smell.

59. Recognize the figure **A** and **B**. What is **C** ?

Ans: A. Taste bud B. Olfactory receptors.

C in both are sensory nerve fibres.



60. There are four type of primary taste receptors are seen in our tongue. Then how can we feel the taste of sambar ?

Ans: Other tastes are created by the brain from the primary tastes.

61. We are unable to recognize smell when we have cold. Can you say the reason ?

Ans: During cold, excess mucus will be produced in the nasal cavity. This will obstruct the normal stimulation of olfactory receptors and hence, we are unable to recognize smell and feel the food tasteless.

62. The largest sense organ ? **Ans:** Skin.

63. The stimuli that can be received by our skin ?

Ans: Heat, Cold, Touch, Pressure and pain.

64. How skin work as a sense organ ?

Ans: Heat, cold, touch, pressure and pain are felt by our skin. When these receptors are stimulated, impulses form and reach in the cerebrum for its perception.

65. disorders and diseases that affect on our eyes.

Disorder/Disease	Reason or Symptom	Remedy
Hyper metropia (long sight)	Due to shortened eyeball images form behind retina. Cannot see nearby objects clearly	Convex lens
Myopia (short sight)	Due to elongated eyeball images form in front of retina. Cannot see distant objects clearly	Concave lens
Presbyopia	Due to the loss of elasticity of lens, nearby objects are not clearly seen	Convex lens
Cataract	Gradual decrease in the power of lens due to decreasing of transparency of lens	Surgical replacement of lens
Glaucoma	Defective vision due to increased pressure when the re-absorption of aqueous humour obstructed	Early treatment
Squint	Both eyes are not able to focus on the same object	Surgery

66. Hyper metropia, Myopia, Presbyopia, Cataract, glaucoma

Select correct answer from the box.

a. Disorders related to the eye lens. **Ans:** Presbyopia and cataract.

b. Disorder related to the aqueous humour **Ans:** Glaucoma

c. Disorders due to the difference in the size of eyeball **Ans:** Hyper metropia and myopia

d. Disorders that can be rectified by convex lens. **Ans:** Hyper metropia and presbyopia.

67. Different kinds of nerves.

Ans: * **Sensory nerves** [carries impulses from sense organs to the brain and spinal cord]

* **Motor nerves** [carries impulses from brain and spinal cord to different organs]

* **Mixed nerves** [nerves composed of both sensory and motor fibres]

68. Name of a few fluids are given below. Find out the site and function of each fluid.

[Aqueous humour , Vitreous humour , Perilymph, Endolymph, Cerebrospinal fluid.]

69. Table which shows the sense organs, receptors and function

Ans:

Eye	Photo receptors in the retina (Rod cells & Cone cells)	Vision
Ear	Auditory receptors in the Organ of Corti	Hearing
Nose	Olfactory receptors	Smelling
Tongue	Taste receptors in the taste buds	Tasting
Skin	Receptors for heat, cold, touch, pressure and pain	Heat, cold, touch, pressure and pain