



MARCH -2026(AP)

PREVIOUS PAPERS**IPE: MARCH-2026 (AP)****Time : 3 Hours****JR. BIOLOGY****Max.Marks : 85****PART I: BOTANY****SECTION-A****I. Answer ALL the following questions.****5 × 1 = 5**

- Diatomaceous Earth is indestructible due to cell walls embedded by
1) Calcium 2) Silica 3) Zinc 4) Phosphorous
- Identify the secondary metabolite
1) Amino acid 2) Nucleic acids 3) Carbohydrates 4) Rubber
- The stage between meiosis -I and meiosis-II is _____
- _____ is the major limiting factor for photosynthesis.
- In glucose, how many carbon molecules are present?

SECTION-B**II. Answer ALL the following questions****7 × 2 = 14**

- Give the main criteria used for classification by Whittaker.
- Differentiate actinomorphic from zygomorphic flower.
- What is meant by parthenocarpic fruit?
- What is middle lamella made of? What is its functional significance?
- Starch, Cellulose, Glycogen, Chitin are polysaccharides found among the following.
Choose the one appropriate and write against each. a) Cotton fibre _____
b) Exo skeleton of cockroach _____ c) Liver _____ d) Peeled Potato _____
- Name the processes which take place in the grana and stroma regions of chloroplast.
- What is apical dominance? Name the growth hormone that causes it.

SECTION-C**III. Answer ANY FOUR of the following questions.****4 × 4 = 16**

- Differentiate between red algae and brown algae.
- Explain the different types of phyllotaxy with examples.
- Classify the chromosomes on the basis of centromere location.
- In which phase of meiosis are the following formed? Choose the answers from hint points given below.

- | | |
|---|------------------------------------|
| a) Synaptonemal complex..... | b) Recombination nodules..... |
| c) Functioning of the Enzyme recombinase..... | d) Termination of chiasmata |
| e) Interkinesis..... | f) Formation of dyad of cells..... |

Hints: i) Pachytene ii) After Telophase -I / before meiosis -II iii) Zygotene
iv) Telophase-I/ After meiosis-I v) Pachytene vi) Diakinesis

17. Differentiate between C_3 and C_4 plants.
18. Write the physiological responses of gibberellins in plants.

SECTION-D

IV. Answer ANY ONE of the following questions.

$1 \times 8 = 8$

19. Describe the internal structure of dorsiventral leaf with the help of labelled diagram.
20. Give an account of glycolysis. Where does it occur? What are the end products?
Trace the fate of these products in both aerobic and anaerobic respiration.

PART II : ZOOLOGY

SECTION-E

I. Answer ALL the following questions.

$4 \times 1 = 4$

21. Biological names are printed in
 - 1) bold letters
 - 2) capital letters
 - 3) Italics
 - 4) small letters
22. Which of the following is a pseudocoelomate?
 - 1) Hydra
 - 2) Periplaneta
 - 3) Ascaris
 - 4) Pheretima
23. _____ is known as graveyard of RBC.
24. Name the process of releasing urine from the bladder.

SECTION-F

II. Answer ALL the following questions

$7 \times 2 = 14$

25. What is binomial nomenclature? Give an example.
26. What are the excretory cells of flatworms called? What is the other important function of these cells?
27. Draw a diagram of oxygen dissociation curve
28. Name the heart sounds. When are they produced?
29. Write the difference between actin and myosin.
30. What is a synapse?
31. Which hormone is called anti-diuretic hormone? Write the name of the gland that secretes it.

SECTION-G

III. Answer ANY FOUR of the following questions.

$4 \times 4 = 16$

32. Write short notes on the salient features of the phylum Porifera.
33. Describe the male reproductive system of frog.
34. Describe the disorders of respiratory system.
35. Write short notes on the ribs of human being.
36. Describe the structure of a multipolar neuron with a labeled diagram.
37. Explain how hypothyroidism and hyperthyroidism can affect the body.

SECTION-H

IV. Answer ANY ONE of the following questions.

$1 \times 8 = 8$

38. Write notes on the working of the heart of man.
39. Describe the excretory system of man, giving the structure of a nephron.

IPE AP MARCH - 2026

SOLUTIONS

PART I: BOTANY

SECTION-A

1. **Diatomaceous Earth is indestructible due to cell walls embedded by**
1) Calcium ✓2) **Silica** 3) Zinc 4) Phosphorous
 2. **Identify the secondary metabolite**
1) Amino acid 2) Nucleic acids 3) Carbohydrates ✓4) **Rubber**
 3. The stage between meiosis -I and meiosis-II is **Interkinesis**
-
4. **CO₂** is the major limiting factor for photosynthesis.
-

5. **In glucose, how many carbon molecules are present?**

A: 6 carbons

SECTION-B

6. **Give the main criteria used for classification by Whittaker.**

A: **Whittaker's classification criteria :** Cell structure, thallus organisation, mode of nutrition, reproduction and phylogenetic relations.

7. **Differentiate actinomorphic from zygomorphic flower.**

A:	Actinomorphic flower	Zygomorphic flower
	1) It can be divided into two equal halves in any vertical plane.	1) It can be divided into two similar halves in one vertical plane.
	2) Ex: Mustard, Datura, Hibiscus.	2) Ex: Pea, Bean, Crotalaria.

8. **What is meant by parthenocarpic fruit?**

A: 1) A fruit formed without fertilization of ovary is called parthenocarpic fruit.
2) **Ex:** Banana.

9. **What is middle lamella made of ? What is its functional significance?**

A: 1) Middle lamella is made up of with calcium and magnesium pectate.
2) It holds the neighbouring cells together.

10. Starch, Cellulose, Glycogen, Chitin are polysaccharides found among the following. Choose the one appropriate and write against each.

- a) Cotton fibre _____ b) Exo skeleton of cockroach _____
c) Liver _____ d) Peeled Potato _____

- A: a) Cotton fibre - Cellulose b) Exo skeleton of cockroach - Chitin
c) Liver - Glycogen d) Peeled potato - Starch.

11. Name the processes which take place in the grana and stroma regions of chloroplast.

- A: 1) Light reaction takes place in grana of chloroplast.
2) Dark reaction (carbon fixation) takes place in stroma of chloroplast.

12. What is apical dominance? Name the growth hormone that causes it.

- A: 1) **Apical dominance:** Suppression of growth of lateral buds by the activity of terminal bud is known as apical dominance.
2) Auxins are responsible for apical dominance.

SECTION-C

13. Differentiate between red algae and brown algae.

A:	Red Algae	Brown Algae
	1) Red algae belongs to Rhodophyceae class.	1) Brown algae belongs to Phaeophyceae class.
	2) Their red colour is due to the red pigment called r-phycoerythrin .	2) Their brown colour is due to the brown pigment fucoxanthin .
	3) Major pigments in them are chlorophyll a,d and phycoerythrin .	3) Major pigments in them are chlorophyll a,c, carotenoids and xanthophylls
	4) Reserve food material is Floridian starch .	4) Reserve food material is laminarin (or) mannitol .
	5) Asexual reproduction is by non-motile spores .	5) Asexual reproduction is by biflagellate zoospores .
	6) Sexual reproduction is by non-motile gametes . Ex: Gracilaria, Gelidium	6) Sexual reproduction is by motile gametes . Ex: Ectocarpus, Laminaria, Fucus.

14. Explain different types of phyllotaxy with examples .

A: The mode of arrangement of leaves on the stem is called phyllotaxy. It is of three types.

- 1) Alternate Phyllotaxy 2) Opposite Phyllotaxy 3) Whorled Phyllotaxy

1) Alternate Phyllotaxy: In this type, single leaf arises at each node in alternate manner.

Ex: China rose, Mustard, Sunflower.

2) Opposite Phyllotaxy: In this type, a pair of leaves arise at each node and lie opposite to each other. **Ex:** Guava, Calotropis.

3) Whorled Phyllotaxy: In this type, more than two leaves arise at a node and form a whorl

Ex: Nerium, Alstonia.

15. Classify the chromosomes on the basis of centromere location.

A: Based on the position of centromere, chromosomes are four types.

1) Metacentric: This chromosome has a middle centromere with two equal arms.

2) Sub metacentric: The centromere is nearer to one end of the chromosome, resulting in one shorter arm and one longer arm.

3) Acrocentric: Centromere is close to its end forming one extremely short and one very long arm.

4) Telocentric: This chromosome has a terminal centromere.



Metacentric



Submetacentric



Acrocentric



Telocentric

Types of chromosomes based on the position of centromere

16. In which phase of meiosis are the following formed? Choose the answers from hint points given below.

a) Synaptonemal complex

b) Recombination nodules

c) Functioning of the enzyme recombinase

d) Terminalization of chiasmata

e) Interkinesis

f) Formation of dyad of cells

Hints:

i. Pachytene ii. After Telophase -I / before meiosis -II

iii. Zygotene iv. Telophase-I/ After meiosis-I v. Pachytene vi. Diakinesis

A: a) Synaptonemal complex- Zygotene

b) Recombination nodules - Pachytene

c) Functioning of the enzyme recombinase - Pachytene

d) Terminalization of chiasmata Diakinesis

e) Interkinesis - After telophase I / before meiosis II

f) Formation of dyad of cells - Telophase I/ After meiosis-I

17. Differentiate between C_3 and C_4 plants.**A:**

C_3 Cycles	C_4 Cycles
1) First stable product of carbon pathway is C_3 compound (PGA-Phospho glyceric acid)	1) First stable product of carbon pathway is C_4 compound (OAA-Oxalo acetic acid)
2) This occurs mostly in Temperate plants.	2) This occurs only in Tropical plants.
3) Leaves donot show Kranz anatomy.	3) Leaves show Kranz anatomy.
4) Chloroplast dimorphish is not seen.	4) Chloroplast dimorphish is seen.
5) In C_3 plants, transpiration is more.	5) In C_4 plants, transpiration is less.
6) Less efficient in utilising atmospheric CO_2 .	6) More efficient in utilising atmospheric CO_2 .
7) Ex: Almost all dicot plants	7) Ex: Maize, Sugarcane, Sorghum

18. Write the physiological responses of gibberellins in plants. [MAR-26] [AP 19,24]

- A:**
- 1) **Gibberellins** are Growth Hormones that stimulate Fruit repining , Stem elongation, Termination, Flowering, Sex expression, Enzyme induction, Leaf & Fruit senescence.
 - 2) Gibberellins are denoted by GA_1 , GA_2 , GA_3 and so on.
 - 3) GA hastens the maturity period of conifers thus leading to early seed production.
 - 4) GA_3 is used to speed up the malting process in brewing industry.
 - 5) Gibberellins increase the length of the axis, thus used to increase the length of grape's stalks.
 - 6) Gibberellins cause fruits like apple to elongate and improve their shape.
 - 7) They delay senescence.
 - 8) Spraying GA on sugarcane stems, increases the length of stem thus increasing the yield by 20 tonnes per acre.

SECTION-D

19. Describe the Internal Structure of dorsiventral leaf with the help of labelled diagram.

A: T.S (Transverse Section) of dorsiventral leaf (dicot leaf) shows three main parts.

They are I) Epidermis II) Mesophyll III) Vascular bundles.

I) Epidermis:

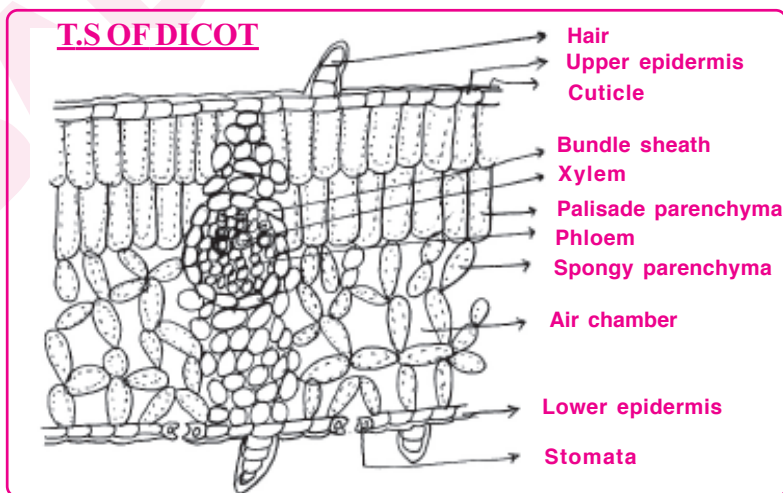
- 1) It consists of the upper surface and lower surface of the leaf.
- 2) It is made up of single layered, rectangular, compactly arranged cells.
- 3) It contains epidermal hairs (trichomes).
- 4) **Thick cuticle** is present in **upper surface** and **thin cuticle** in **lower surface**.
- 5) Stomata are present mostly on lower epidermis. They help in transpiration.
- 6) Epidermis gives protection to the inner tissues and helps in gaseous exchange.

II) Mesophyll:

- 1) Mesophyll tissue is present between the upper and lower epidermis.
- 2) It is divided into upper palisade parenchyma and lower spongy parenchyma.
- 3) Palisade parenchyma consists of vertically, elongated cells arranged in two layers.
- 4) Spongy parenchyma consists of loosely arranged oval shaped cells.
- 5) Mesophyll cells contain chloroplasts. They perform photosynthesis.
- 6) Mesophyll helps in the synthesis of food.

III) Vascular Bundles:

- 1) Vascular bundles are present in the mid vein region of mesophyll tissue.
- 2) They are conjoint, collateral and closed.
- 3) Each vascular bundle is surrounded by a bundle sheath.
- 4) Xylem lies towards the upper epidermis and phloem lies towards the lower epidermis.
- 5) Vascular bundles help in supplying water, mineral salts and food material.



20. Give an account of glycolysis. Where does it occur? What are the end products? Trace the fate of these products in both aerobic and anaerobic respiration.

A: 1) Glycolysis: Glycolysis is the first step of **respiration** in all living organisms. It takes place in cytoplasm of cells. During Glycolysis, Glucose molecules break down to **release energy**.

In Glycolysis one glucose molecule breaks down into two molecules of pyruvic acid.

The end products of Glycolysis are **pyruvic acid (PA), ATP, NADPH + H⁺**

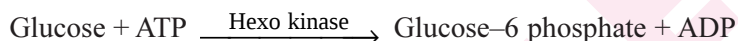
2) Fate of Pyruvic acid: In aerobic respiration, pyruvic acid will be completely oxidised into CO₂ and H₂O by **Krebs cycle**.

In anaerobic respiration, pyruvic acid will be converted into Ethylalcohol or Lactic acid by **Fermentation**.

Glycolysis involves a chain of '**10- step catalysed reactions**' by various enzymes.

3) Glycolysis Process:

Step-1 (Phosphorylation):



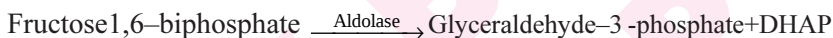
Step-2 (Isomerisation):



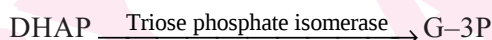
Step-3 (Phosphorylation):



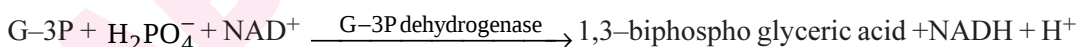
Step-4 (Cleavage):



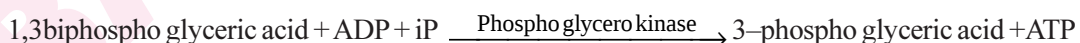
Step-5 (Isomerisation):



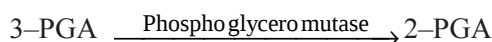
Step 6 (Oxidation) :



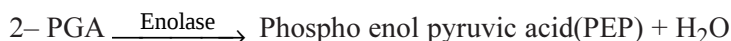
Step-7 (Dephosphorylation):



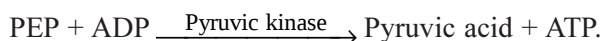
Step-8 (Intramolecular shift):



Step-9 (Dehydration):



Step-10 (Dephosphorylation):



PART II : ZOOLOGY**SECTION-E**

21. **Biological names are printed in**

- 1) bold letters 2) capital letters ✓3) **Italics** 4) small letters

22. **Which of the following is a pseudocoelomate?**

- 1) Hydra 2) Periplaneta ✓3) **Ascaris** 4) Pheretima

23. **Spleen** is known as graveyard of RBC.

24. **Name the process of releasing urine from the bladder.**

A: Micturition

SECTION-F

25. **What is binomial nomenclature? Give an example.**

A: 1) **Binomial nomenclature** is the system of scientific naming of organisms in two word format.

The **first word** represents the **genus**, and the **second word** represents the **specific epithet**.

2) **Ex 1:** *Mangifera indica* is the scientific name of Mango.

Ex 2: *Homo sapiens* is the scientific name of Human beings.

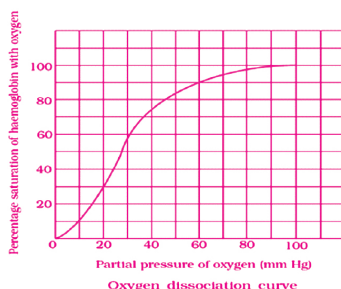
26. **What are the excretory cells of flatworms called?**

What is the other important function of these cells?

A: 1) The excretory cells of flatworms are called **flame cells** (or) **protonephridia**.

2) They help in **osmoregulation (ion balance)**, other than removing wastage.

27. **Draw a diagram of oxygen dissociation curve**



28. Name the heart sounds. When are they produced?

- A:**
- 1) The heart sounds are '**Lub**' and '**Dub**'.
 - 2) First heart sound is 'Lub' is produced in ventricular systole due to closure of the AV valves.
 - 3) Second heart sound is 'Dub' is produced in cardiac diastole due to closure of semilunar valves.

29. Write the difference between actin and myosin.

A:	Actin	Myosin
	1) Actin is a thin contractile protein 2) Actin is present in light bands called isotropic band, 3) Actin filaments are connected to Z line.	1) Myosin is thick contractile protein 2) Myosin is present in dark bands called anisotropic band. 3) Myosin filaments are connected to M line.

30. What is a synapse?

- A:**
- 1) **Synapse** is a junction between the membranes of a presynaptic neuron and a postsynaptic neuron, which may or may not be separated by a gap called synaptic cleft.
 - 2) There are two types of synapses, namely chemical synapses and electrical synapses.

31. Which hormone is called anti-diuretic hormone?

Write the name of the gland that releases it.

- A:**
- 1) **Vasopressin** is called anti-diuretic hormone.
 - 2) It is stored and released by neurohypophysis (posterior pituitary) which are actually synthesized by the hypothalamus (neuro secretion).

SECTION-G

32. Write short notes on the salient features of the phylum Porifera.

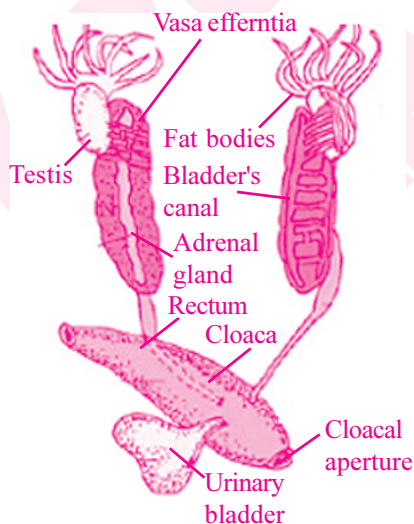
A: Salient features of the phylum Porifera:

[Porifera Ex : Sycon (Scypha), Spongilla (fresh water sponge), Euspongia (Bath sponge)]

- 1) **Common name:** Sponges.
- 2) **Habitat:** All sponges are aquatic, generally marine.
- 3) **Level of organisation:** These are multicellular animals with cellular level of organisation.
- 4) **Symmetry:** Mostly asymmetrical animals.
- 5) **Canal system:** Sponges have a water canal system. This pathway is helpful in food gathering, respiratory exchange and removal of waste.
- 6) **Digestion:** It is Intracellular.
- 7) **Skeletal system:** The body is supported by a skeleton made up of spicules or spongin fibers.
- 8) **Reproductive system:** Sexes are not separate (hermaphrodite-eggs and sperms are produced by the same individual). Sponges reproduce asexually by Fragmentation and sexually by formation of gametes. Fertilization is internal.
- 9) **Development:** It is indirect having a larval stage.

33. Draw a neat labeled diagram of the male reproductive system of frog.

A:



Male Reproductive system of frog

34. Describe disorders of respiratory system in man.

A: Disorders of Respiratory system:

A) Asthma B) Bronchitis C) Emphysema D) Pneumonia E) Occupational disorders

A) Asthma: Asthma is a difficulty in breathing caused due to **inflammation of bronchi and bronchioles**. The symptoms are wheezing, coughing, chest tightness and shortness of breath.

B) Bronchitis: It is the **inflammation of bronchi** with increased production of mucus.

The symptoms are chronic cough with thick mucus and phlem.

C) Emphysema: It is a type of chronic obstructive pulmonary disease. It is a progressive disease. The **lining of alveoli are damaged beyond repair**. Smoking is the major cause of the disease.

D) Pneumonia: It is the **infection of lungs by streptococcus pneumonia**.

Further infection takes place by virus, fungi, protozoans and mycoplasmas.

The symptoms are inflammation of lungs, accumulation of watery mucus in alveoli .

Asthma, bronchitis and emphysema are chronic obstructive pulmonary diseases.

E) Occupational disorders:

Long time exposure to certain industries causes various types of diseases. They are

1) **Asbestosis** to workers in Asbestos industry.

2) **Silicosis** to mining workers and workers in quarries.

3) **Siderosis** to workers of steel and iron industries.

4) **Black-lung disease** to workers in coal mines.

35. Write short notes on the ribs of human being.

A: Ribs:

1) Ribs form the thoracic cage present in the human chest.

2) There are 12 pair of ribs.

3) Dorsally the ribs articulate with vertebral column by two heads and hence called bicephalic (double headed)

4) The first seven pairs are true ribs. Ventrally they are connected to the sternum by hyaline cartilage.

5) 8th, 9th, 10th ribs are connected to cartilage of 7th rib. They are called vertebrochondral ribs.

6) The 11th and 12 pairs are not connected to sternum. They are called floating ribs.

7) The last five pairs are false ribs (8,9,10,11 &12).

8) Rib cage is formed by thoracic vertebrae, ribs and sternum.

36. Describe the structure of a multipolar neuron with a labeled diagram**A: Multipolar neurons** are the common neurons of the body.

Multipolar neuron consists of

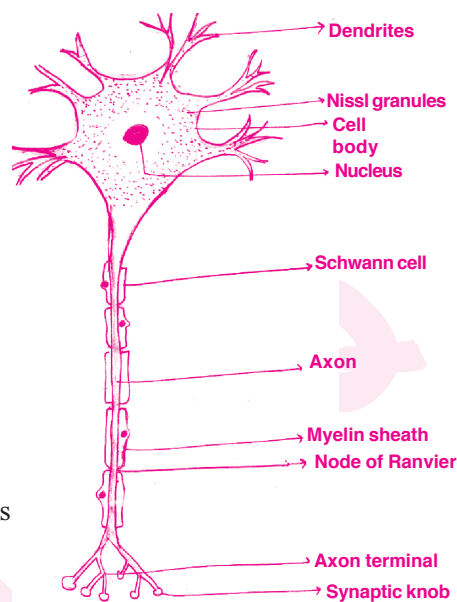
- 1) Dendrites 2) Cell body 3) Axon.

1) Dendrites:

- i) They are short branched processes which arise from cell body.
- ii) They contain Nissl granules and neurofibrils.
- iii) They conduct nerve impulse towards the cell body (afferent).

2) Cell body :

- i) It is also called cyton or soma or perikaryon.
- ii) It includes nissl granules (RER) for protein synthesis
- iii) It contains larger spherical nucleus, Neurofibrils & Lipofuscin granules.

**Multipolar Neuron****3) Axon:**

- i) It is a long cylindrical thread like structure which arises from cell body.
- ii) The junction between cell body and axon is called Axon hillock
- iii) The plasma lemma is called axolemma.
- iv) The cytoplasm is called axoplasm.
- v) Microfibrils are present. Nissl bodies are absent.

37. Explain how hypothyroidism and hyperthyroidism can affect the body.**A: I) Hypothyroidism:**

- 1) It is a condition in which production of thyroid hormones T_3 & T_4 decrease.
- 2) It is characterized by enlargement of the thyroid gland called as simple goiter.
- 3) Inadequate supply of iodine or impairment in the thyroid glands leads to this condition.
- 4) Untreated congenital hypothyroidism in pregnant women leads to thyroid dwarf-characterized by stunted growth, mental retardation, low IQ, abnormal skin, deafness, mutism etc.

II) Hyperthyroidism:

- 1) It is a condition in which production of thyroid hormones T_3 & T_4 abnormally increase.
- 2) Over activity of thyroid is also due to cancer of the gland or nodule development.
- 3) In adults, it causes exophthalmic goiter characterised by protruded eye balls.
- 4) It also effects the physiology of the body, like increased BMR etc.

SECTION-H

38. Write notes on the working of the heart of man.

A: Working of heart: It involves 4 phases.

I) Generation & Conduction of action potentials. II) Cardiac Cycle

III) Cardiac Output

IV) Double Circulation.

I) Generation & Conduction of action potentials: The contractions of heart chambers are due to the **action potential** generated by **nodal tissue SAN**. They cause the contraction of atria.

II) Cardiac Cycle: The cardiac events that occur from the beginning of one heart beat to the beginning of the next beat is called cardiac cycle. It lasts for about **0.8 seconds**

Cardiac cycle consists of 3 phases (1) atrial systole (2) ventricular systole (3) cardiac diastole

(1) Atrial systole: The SAN generates an action potential which stimulates both the atria and to contract simultaneously causing the 'atrial systole'.

(i) It lasts for about **0.1 s**.

(ii) This **increases the flow of blood** into the ventricles by about 30%.

(iii) The remaining blood flows into the ventricles before the atrial systole.

(2) Ventricular systole: The action potential reaches AVN. It is a **relay centre**. The electrical impulses pass through bundle of His and purkinjefibres. This causes ventricular systole.

(i) It lasts for about **0.3 s**.

(ii) The atria undergo relaxation along with the ventricular systole.

(iii) It increases the pressure causing the closure of the AV valves.

(iv) This **prevents the 'backflow'** of blood.

(v) It results in the production of the **first heart sound** known as '**Lub**'.

(vi) As the ventricular pressure increases further, the semilunar valves are open. This allows the blood to flow into the aortic arches.

(3) Cardiac diastole: The ventricles now relax and the ventricular pressure falls.

This causes the closure of the semilunar valves which prevents the back flow of blood.

(i) It lasts for about **0.4 s**.

(ii) This results in the production of the **second heart sound** known as '**Dup**'.

(iii) All the heart chambers are now again in a relaxed state (joint diastolic phase). Soon another cardiac cycle begins.

III) Cardiac Output: The volume of blood pumped out by each ventricle for each heart beat is known as stroke volume. The volume of blood pumped out by the heart from each ventricle per minute is called cardiac output.

Cardiac output = stroke volume(70ml) × No.of beats per minute(72 beats) = 5040 ml/min or approximately 5 liters.

IV) Double Circulation: There are 2 independent circulations.

(1) Pulmonary circulation: Blood from the right ventricle flows through pulmonary arteries to lungs. The blood is aerated and goes back to left atrium through pulmonary veins.

(2) Systemic Circulation: The left ventricle pumps the blood through systemic arch to various parts of the body through arteries. Blood collected from various parts of the body by veins is brought back to the right atrium through venaecavae.

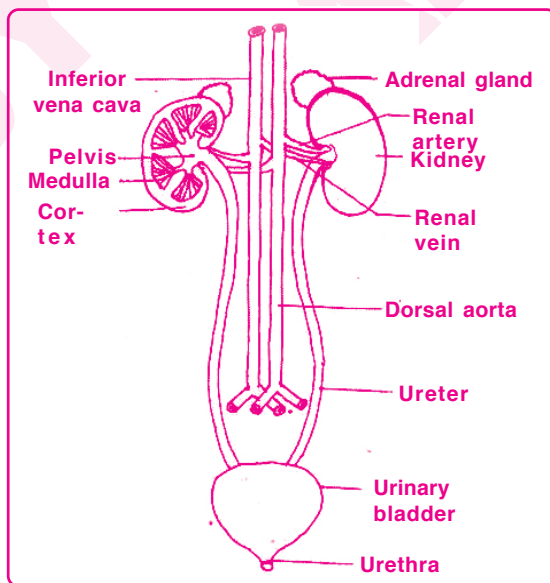
39. Describe the excretory system of man, giving the structure of a nephron.

A: I) Human excretory system: It consists of 4 parts.

- 1) A pair of Kidneys 2) A pair of Ureters 3) Urinary bladder 4) Urethra.

1) Kidneys:

- i) These are **reddish brown**, retroperitoneal **bean shaped** organs.
 - ii) These are located on either side of vertebral column at the level of anterior lumbar vertebrae.
 - iii) Outer surface of kidney is **convex** and inner surface is **concave** with a deep notch called hilum.
 - iv) Internally, kidney consists of two regions, the **outer cortex** and **inner medulla**.
 - v) The cortex contains the malpighian capsules, proximal and distal convoluted tubules of nephrons.
 - vi) The medulla is divided into multiple cone shaped masses of tissue called **renal pyramids**.
 - vii) Renal columns (Columns of Bertini) separate the renal pyramids. These are the projections of cortex into the medulla.
- 2) **Ureters:** There are two ureters which are **slender whitish** tubes emerging from the pelvis of the kidneys. They run downwards and open into the urinary bladder.
- 3) **Urinary bladder:** It is a median **storage sac**, situated in the lower abdominal cavity.
- 4) **Urethra:** The **neck of the bladder** leads into the urethra. It has an internal urethral sphincter and external urethral sphincter.



STRUCTURE OF HUMAN URINARY SYSTEM

II) Structure of Nephron: It consists of 2 parts. (1) Bowman's capsule (2) Renal tubule.

1) Bowman's capsule:

- i) It is present in cortex. (ii) It is a double walled cup.
- iii) The inner wall of the Bowman's capsule has certain unique cells called podocytes.
- iv) The podocytes are arranged so as to leave some minute spaces called filtration slits.
- v) The Bowman's capsule encloses a tuft of capillaries called glomerulus.
- vi) The glomerulus and **inner** wall of Bowman's capsule together form a sieve.
- vii) Blood enters the glomerulus through **afferent arteriole** and leaves by efferent **arteriole**.

2) Renal tubule: It consists of 3 segments (a) PCT (b) Henle's loop (c) DCT

(a) PCT (Proximal Convolved Tubule):

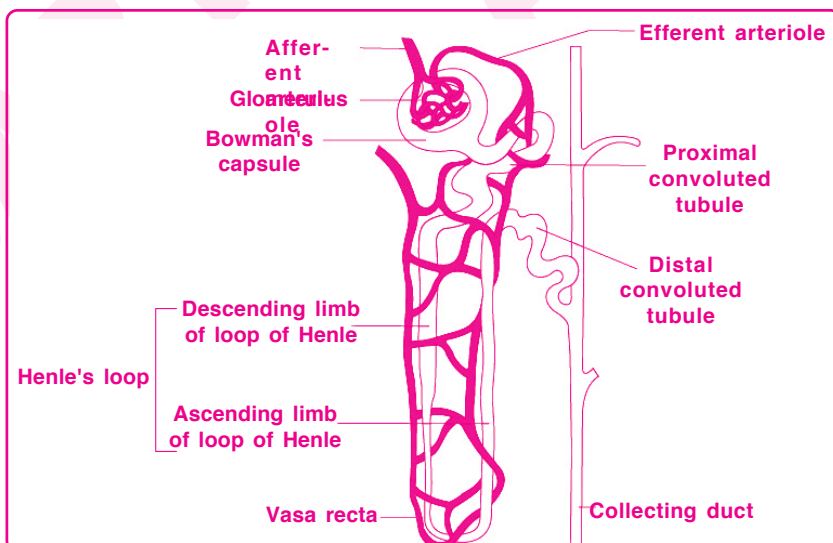
- i) It is present in cortex. (ii) It is **wide and highly coiled**.
- iii) It is lined by **simple cuboidal epithelium** with **brush border**.

(b) Henle's loop :

- i) It is present in medulla. (ii) It is hairpin shaped. It has descending and ascending limbs.
- iii) The **proximal part** of the ascending limb is **thin** and the **distal part is thick**.
- iv) The thick ascending limb continues into the DCT.

(c) Distal Convolved Tubule (DCT):

- i) It is present in cortex.
- ii) The DCT present in cortex continues as the 'initial collecting duct' in the cortex.
- iii) Some initial collecting ducts combine to form a straight collecting duct, which passes through the medullary pyramid.
- iv) In the medulla, the tubes of each pyramid join and form the **duct of Bellini**, which finally opens on the tip of the renal papilla.



STRUCTURE OF NEPHRON