

Previous IPE  
**SOLVED PAPERS**

**MARCH -2025 (AP)**

**PREVIOUS PAPERS****IPE: MARCH-2025(AP)**

Time : 3 Hours

**SR ZOOLOGY**

[Max. Marks: 60]

SECTION-A**I. Answer ALL the following VSAQ:****10 × 2 = 20**

1. What is chyme?
2. What are the columns of Bertin?
3. Distinguish between red muscle fibers and white muscle fibers.
4. Name the keystone bone of the cranium. Where is it located?
5. Which hormone is called anti-diuretic hormone? Write the name of the gland that secretes it.
6. Which hormone is commonly known as fight and flight hormone?
7. Define spermiogenesis and spermiation.
8. What are the measures one has to take to prevent contracting STDs?
9. Define the terms layer and broiler.
10. MRI scan is harmless-justify.

SECTION-B**II. Answer any SIX of the following SAQs:****6 × 4 = 24**

11. Draw a neat labelled diagram of L.S. of a tooth.
12. Describe disorders of respiratory system.
13. Give an account of synaptic transmission.
14. Write short notes on immunoglobulins.
15. How is sex determined in human beings?
16. Distinguish between homologous and analogous organs.
17. Explain Darwin's theory of Natural Selection with industrial melanism as an experimental proof.
18. Honey bees are economically important-justify.

SECTION-C**III. Answer any TWO of the following LAQs:****2 × 8 = 16**

19. Describe the structure of the heart of man with the help of neat labelled diagram.
20. Describe female reproductive system of a woman with the help of a labelled diagram.
21. What is crisscross inheritance? Explain the inheritance of one sex linked recessive character in human beings.

# IPE AP MARCH-2025

## SOLUTIONS

### SECTION-A

1. **What is chyme?** [TS 17,19][AP 15, 17,23,25]

**A:** 1) **Chyme:** It is the **acidic semi digested fluid food** formed in the stomach.  
2) It is formed by the **churning movements** of the stomach muscles.

2. **What are the columns of Bertin?** [TS 17, 19,22][AP 15,19,22,25]

**A:** **Columns of Bertin:** These are the projections of the cortex into the medulla that separate the renal pyramids in the human kidney.

3. **Distinguish between red muscle fibers and white muscle fibers.** [AP 18,25]

Red muscle fibers	White muscle fibers
1) Red muscle fibre have more myoglobin and more mitochondria.	1) White muscle fibres have less quantity of myoglobin and very few mitochondria.
2) They are called <b>aerobic muscles</b> .	2) They are called <b>anaerobic muscles</b> .
3) They utilise oxygen stored in mitochondria.	3) They depend on anaerobic process for release of energy.

4. **Name the keystone bone of the cranium. Where is it located?** [AP 25][TS 18, 19,23]

**A:** 1) Sphenoid bone is the keystone bone present in the base of cranium.  
2) It articulates with most of cranial bones.

5. **Which hormone is called anti-diuretic hormone? Write the name of the gland that secretes it.** [TS 22] [AP 19,25]

**A:** 1) **Vasopressin** is called anti-diuretic hormone(ADH).  
2) It is secreted by **neurohypophysis** (posterior pituitary)

6. **Which hormone is commonly known as fight and flight hormone?** [AP 25][TS 15,22]

**A:** 1) **Epinephrine** and **norepinephrine** are called **fight** and **flight** hormones.  
2) They are secreted by adrenal medulla in response to stress and emergency of adrenal glands.

7. **Define spermiogenesis and spermiation.** [AP 25] [TS 18, 23]

**A:** 1) **Spermiogenesis** is the process in which **spermatids transform into spermatozoa**.  
2) **Spermiation** is the process in which spermatozoa (sperm heads) are released from seminiferous tubules.

**8. What are the measures one has to take to prevent contracting STDs?**

**A: Measures to prevent STDs:**

[AP 17,18, 23,24,25] [TS 19]

- 1) Avoiding sex with unknown partner or multiple partners.
  - 2) Using condoms compulsorily during intercourse.
  - 3) Consulting qualified doctor for early detection of STDs.
  - 4) Getting complete treatment in case of infection.
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**9. Define the terms layer and broiler.**

[TS 19,20,22] [ AP 15, 17,19,24,25]

- A:**
- 1) Layers are birds which are exclusively raised for the production of eggs.
  - 2) Broilers are birds which are raised only for their meat. They are raised only upto 8 or 10 week and sent to market.
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**10. MRI scan is harmless-justify.**

[AP 18,23,25] [TS 18,24]

**A: 1) MRI Scan:** MRI means **Magnetic Resonance Imaging.**

It uses magnetism, radio waves and computer to produce body images.

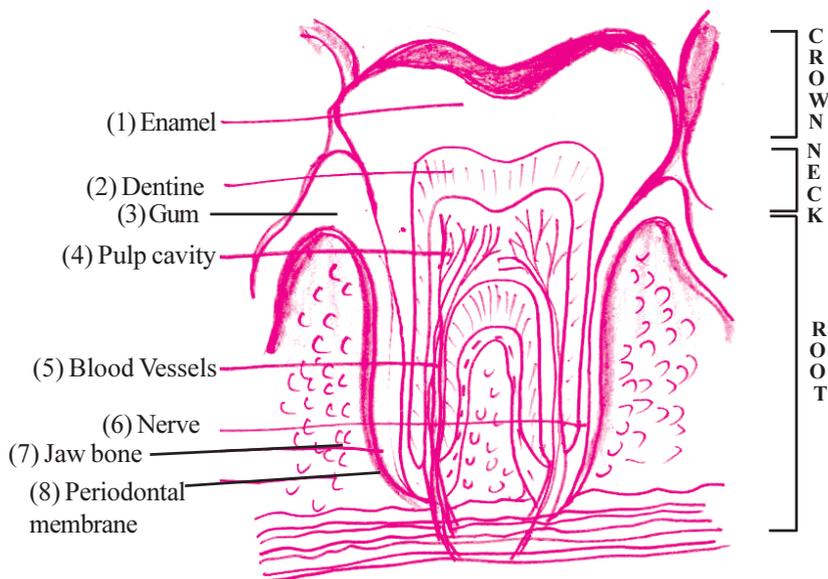
2) MRI does not use ionising radiation as used in X-rays.

So MRI scanning is a very **safe procedure.**

**SECTION-B**

11. Draw a neat labelled diagram of L.S. of a tooth. [TS 17,18,24,25] [ AP 16,17,18,19,20,23,24]

A:



L.S.of tooth

12. Describe disorders of respiratory system. [ AP 15,16,17,18,22,25] [TS 16,17,18, 19,22]

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.

**13. Give an account of synaptic transmission.**

[ AP 16,18,22,24,25] [TS 17]

**A: Synaptic transmission:**

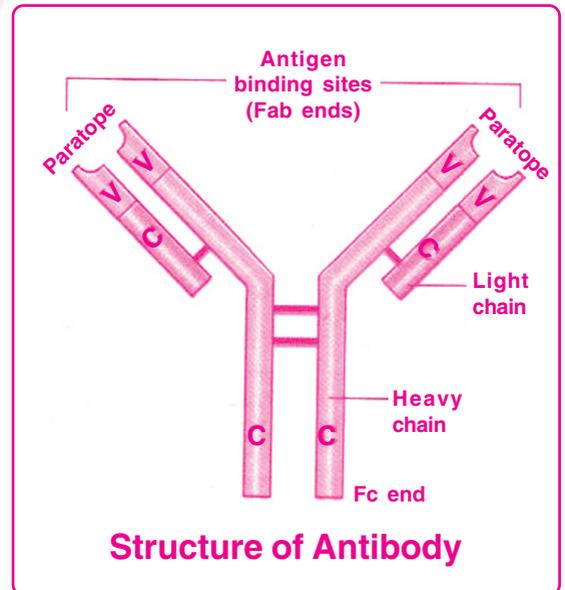
- 1) Synapse is a junction between two successive neurons.
- 2) It transmits nerve impulses from one neuron to other neuron.
- 3) There are two types of synapses. They are (i) Electrical synapse (ii) Chemical synapse
  - (i) In electrical synapses, the membranes of pre and post synaptic neurons are in very close proximity. These synapses are electrically conductive links between two neurons
  - (ii) In chemical synapses, the membranes of the pre and post-synaptic neurons are separated by a fluid-filled space called synaptic cleft.
- 4) Chemical messengers called neurotransmitters are involved in the transmission of impulses at these synapses.
- 5) Neuro transmitters are released from the synaptic vesicles of axon terminals.
- 6) When an impulse (action potential) arrives at the axon terminal, it gets depolarized . Then voltage gated calcium channels are opened.
- 7) Calcium ions stimulate the movement of the synaptic vesicles towards the membrane. Here they fuse with the plasma membrane and release their neurotransmitters in the synaptic cleft by **exocytosis**.
- 8) The released neurotransmitters (mostly Acetyl choline) bind to their specific receptors, present on the post-synaptic membrane.
- 9) The post synaptic membrane has ligand gated channels.
- 10) The entry of ions generate a new potential in the post-synaptic neuron.

**14. Write short notes on immunoglobulins.**

[AP 19,19,24,25][TS 15]

**A: Immunoglobulins(Antibodies):**

- 1) **Antibodies are produced by B lymphocytes** when pathogens enter the body.
- 2) Antibodies are antigen specific.
- 3) Based on the mobility, there are two types of antibodies ; free antibodies and surface antibodies.
- 4) Circulating antibodies are present in blood and lymph.
- 5) Surface antibodies are present on the surface of B cells and memory cells.
- 6) **Structure:** Antibody is **Y shaped** molecule with **four polypeptide chains**.
- 7) Two of them are long and identical heavy chains (H) and the other two small light chains (L). It is represented by  $H_2L_2$ .
- 8) The two chains are linked by disulfide bonds. One end of the molecule is called Fab end to which the antigen is attached. The other end is Fc end, by which it may be attached to B-cells.
- 9) Based on the structure, the antibodies are five types namely IgD, IgE, IgG, IgA and IgM.



15. How is sex determined in human beings? [AP 18, 23,24,25][ TS 15,22,24]

**A:** Sex determination in human beings:

- 1) The sex determining mechanism in case of humans is XX-XY type.
- 2) Out of 23 pairs of chromosomes present, 22 pairs are exactly same in both males and females.
- 3) The **female's Karyotype is 44XX**; The **male's Karyotype is 44XY**
- 4) Female produces same type of gametes. Male produces two types of gametes.
- 5) Gametes produced by female are 22X and Gametes produced by male are 22X and 22Y
- 6) When 22X sperm fertilizes 22X ovum, the result is a female child 44XX.  
When 22Y sperm fertilizes 22X ovum, the result is a male child 44XY.
- 7) So, it is clear that, it is the **genetic makeup of the sperm that determines the sex of the child.**
- 8) It is also clear that in each pregnancy there is always 50 percent probability for either a male or a female child.

16. Distinguish between homologous and analogous organs.

**A:** Homologous and Analogous organs are evidences of evolution from comparative anatomy.

Homologous organs	Analogous organs
1) The organs which have similar structure and origin but not necessarily the same function are called homologous organs.	1) The organs which have different origin but have same function are analogous organs.
2) They suggest divergent evolution.	2) They suggest convergent evolution.
3) <b>Ex:</b> The forelimbs of vertebrates, Flipper of Whale, wings of birds, hand of man and wings of bat	3) <b>Ex:</b> Wings of butterfly and wings of birds.
4) All these organs have same arrangement of bones but their functions vary to suit their mode of life.	4) When the animals live in same habitat and lead a similar mode of life they tend to have same body form.

**17. Explain Darwin's theory of Natural Selection with industrial melanism as an experimental proof. [AP 16,17,18,23,24,25] [TS 15,16,17,19]**

- A:**
- 1) Darwin's theory of natural selection explains that nature has its own way to eliminate the organisms which cannot survive.
  - 2) 'Natural selection of darker forms' due to Industrial pollution is known as 'industrial melanism'.
  - 3) 'Peppered moth' is taken as a scientific example to explain this.
  - 4) These moths were available in two colours grey and black.
  - 5) Grey moths were abundant before industrial revolution in all over England.
  - 6) Pollution from industries in the form of soot turned barks of trees into black.
  - 7) So grey moths were easily identified and were more predated by birds.
  - 8) Thus grey moths decreased in number, black moths increased in the population.

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**18. Honey bees are economically important-justify. [TS 22] [AP 16,25]**

**A: Economic Importance of Honey bees:**

Honey bees produce honey, beeswax, propolis, venom. They are best pollinators.

- 1) **Honey:** It is a rich source of fructose, glucose, vitamins, minerals and water.
- 2) **Bees wax** is used in the preparation of cosmetics, polishes and candles.
- 3) Propolis is used in the treatment of wounds and burns.
- 4) Bees' venom is used in treatment of arthritis.
- 5) Bees are the pollinators of our crop plants such as sunflower, Brassica, apple and pear.

In view of the above aspects, we claim that Honey bees are economically important insects.

## SECTION-C

19. Describe the structure of the heart of man with the help of neat labelled diagram.

[AP 18,22,23,24,25][TS 17,16,19,20,22]

**A:** **Structure of the Human heart:** Human heart is a hollow muscular, cone shaped and pulsating organ situated between lungs. Its size is about a clenched fist.

**Human heart consists of 4 parts:**

I) Pericardium II) Heart wall III) External Structure IV) Internal Structure

**I) Pericardium:** Heart is covered by **double walled pericardium**. The outer layer is fibrous pericardium and inner layer is serous pericardium. In between these two layers, there is **pericardial fluid** which reduces friction and allows free movement of the heart.

**II) Heart wall:** It consists of 3 layers.

(1) Outer epicardium (2) Middle myocardium (3) Inner endocardium.

**III) External Structure :** Human heart has four chambers.

(1) Two small upper chambers are called **atria** (L.A & R.A)

(2) Two large lower chambers are called **ventricles** (L.V & R.V)

(3) Atria and ventricles are separated by a deep transverse groove called **coronary sulcus**.

(4) The ventricles are separated by two inter ventricular grooves, in which the coronary arteries and their branches are located.

**IV) Internal structure:** 1) Atria 2) Ventricles 3) Nodal tissue 4) Aortic arches.

**(1) Atria:**

(i) Atria are thin walled **blood receiving chambers**. The right one is larger than the left.

(ii) The two atria are separated by thin **inter-atrial septum**.

(iii) Atria and ventricles are separated by a membrane called atrio -ventricular septum.

(iv) In the foetal heart, the atrial septum has a small pore called **foramen ovale**.

(v) In adults, **fossa ovalis** is present in the inter atrial septum

(vi) Bicuspid valve is in between L.A & L.V.

(vii) Tricuspid valve is in between R.A & R.V.

**(2) Ventricles :**

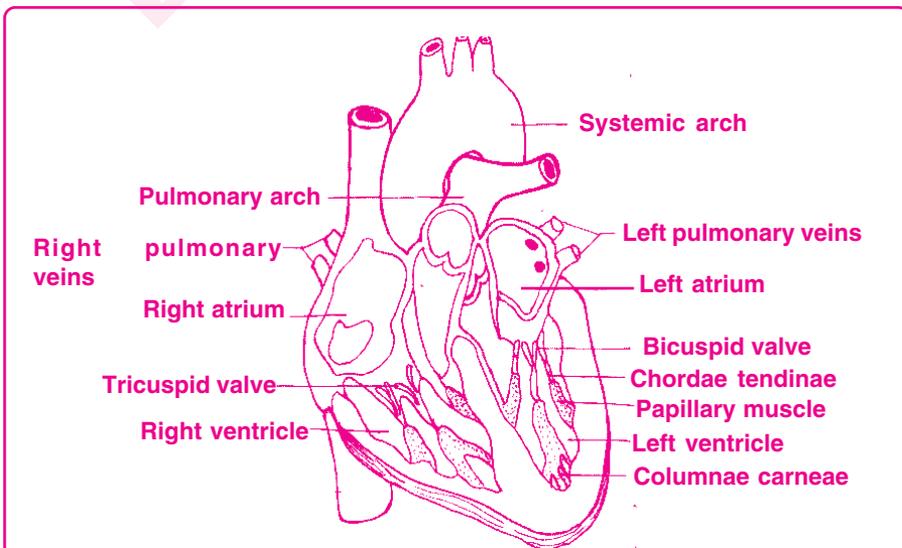
- (i) These are thick walled blood 'pumping chambers' (lower chambers)
- (ii) The two ventricles are separated by an **interventricular septum**.
- (iii) The wall of the left ventricle is thicker than the right ventricle
- (iv) The inner surface of the ventricles is raised into muscular ridges called **columnae carnae**.
- (v) Some of these ridges are large and conical, and are called **papillary muscles**.
- (vi) **Chordae tendineae** are collagenous cords that connect papillary muscles to the tricuspid valve and the bicuspid valve in the heart .

**(3) Nodal tissue ( Pacemaker):**

- (i) It is a **modified heart muscle**. It consists of **two nodes SAN, AVN** and **fibres**.
- (ii) **SAN(SinoAtrial Node)** is located in the 'right upper corner of right atrium', (close to the opening of superior venacava.)
- (iii) **AVN (AtrioVentricular Node)** is located in the 'lower left corner of the right atrium', (close to the opening of coronary sinus.)
- (iv) AVN forms AV bundle or "His" bundle. It is divided into right and left bundle branches.

**(4) Aortic arches:** There are two aortic arches in man.

- (i) **Pulmonary Arch:** It arises from the left anterior angle of the right ventricle. Its opening is guarded by the pulmonary valve and it carries deoxygenated blood to the lungs.
- (ii) **Systemic Arch:** It arises from the left ventricle. Its opening is guarded by the aortic valve. It transports oxygenated blood to different parts of the body through its branches.

**INTERNAL STRUCTURE OF THE HEART**

20. Describe female reproductive system of a woman with the help of a labelled diagram.

A: **FEMALE REPRODUCTIVE SYSTEM:** [AP 15,19,22,24,25] [TS 15, 17,19,20,23]

**Female Reproductive System consists of 6 parts.**

I) Ovaries II) Fallopian tubes III) Uterus IV) Vagina V) Vulva VI) Accessory glands

**I) Ovaries:**

- (1) Ovaries are the **primary female sex organs** that produce female gametes (ova).
- (2) A pair of ovaries are located one on each side of the **lower abdomen**.
- (3) Ovary is connected with the wall of abdominal cavity by a **fold of peritoneum called mesovarium**.
- (4) Ovaries are covered by **germinal (ovarian) epithelium** and **tunica albuginea**.
- (5) The main body of ovary is called **stroma**.
- (6) The outer part of stroma is **cortex** and inner part is **medulla**.

**II) Fallopian tubes:**

- (1) Each fallopian tube extends from the **periphery of each ovary to the uterus**.
- (2) Fallopian tube is the site of fertilization.
- (3) Fallopian tube is attached to the body wall by mesosalpinx.
- (4) **Parts of Fallopian tube:** i) Isthmus ii) Ampulla iii) Infundibulum iv) Fimbriae

**III) Uterus:**

- (1) Uterus is single and is also called **womb**. It is present **between urinary bladder and rectum**.
- (2) It is a large **pear shaped sac**. It is highly **muscular** and **vascular**.
- (3) It is connected to body wall by **mesometrium** (peritoneal fold).
- (4) The narrow part by which the uterus is connected to vagina is cervix.
- (5) The **cervical canal and vagina** together form **birth canal**.
- (6) The wall of the uterus is made up of outer **Perimetrium**, middle **Myometrium** and inner **Endometrium**.
- (7) Endometrium undergoes regular cyclic changes called **menstrual cycle**.

**IV) Vagina:**

- (1) It is a large **fibro muscular tube** that extends from cervix to vaginal orifice.
- (2) It is lined by **non keratinized stratified squamous epithelium**. It is highly vascular.

**V) Vulva :**

- (1) The term vulva refers to the **external genitals** of the female.
- (2) The vestibule has two apertures.
- (3) One is the upper external urethral orifice of the urethra and the other is lower vaginal orifice
- (4) Vaginal orifice is often **covered partially by a membrane called hymen** .
- (5) Clitoris is a sensitive, erectile structure, which lies at the upper junction of the two labia minora
- (6) Clitoris is **homologous to the penis of a male** as both are supported by corpora cavernosa.
- (7) **Mons pubis** is a cushion of fatty tissue covered by skin and pubic hair present above labia majora.

## VI) Accessory glands ( Reproductive glands of female) :

### 1) Bartholin's glands:

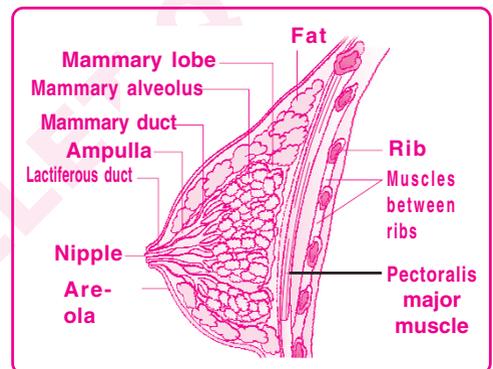
- (i) **Position:** The Bartholin's glands are two glands located **slightly posterior and to the left and right** of the opening of the **vagina**.
- (ii) **Function:** They secrete **mucus to lubricate the vagina** and are homologous to the bulbourethral glands of the male reproductive system.

### 2) Skene's glands:

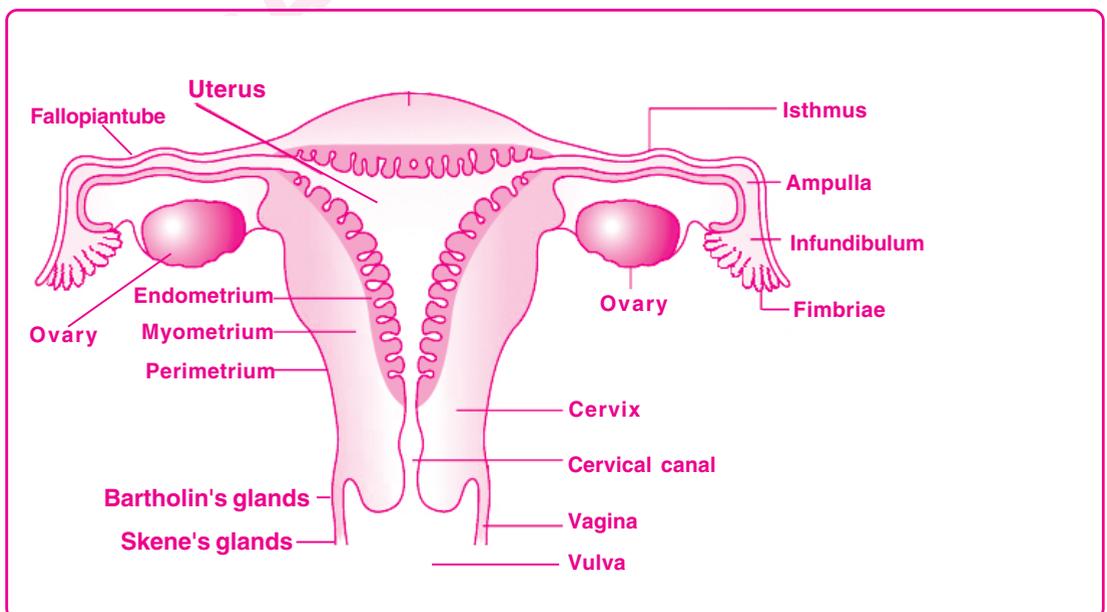
- (i) **Position:** The Skene's glands are located on the anterior wall of the vagina, around the lower end of the urethra.
- (ii) **Function:** They secrete a **lubricating fluid** when stimulated.

### 3) Mammary glands:

- (i) The mammary glands are paired structures (breasts) that contain glandular tissue and variable amount of fat.
- (ii) Mammary glands contain alveoli which secrete milk after the birth of child.
- (iii) The Alveoli open into mammary tubules. The tubules of each lobe join to form a mammary duct.
- (iv) Several mammary ducts join to form a wider mammary ampulla which is connected to lactiferous duct through which milk is sucked out by the baby.



**SECTIONAL VIEW OF MAMMARY GLAND**



**STRUCTURE OF FEMALE REPRODUCTIVE SYSTEM**

**21. What is crisscross inheritance? Explain the inheritance of one sex linked recessive character in human beings.** [AP 15,17,19,23,25][TS 15,16,19]

**A: I) Criss Cross inheritance:** T.H.Morgan observed sex linked inheritance in Drosophila melanogaster.

The X-linked recessive character present in a man is inherited to his grandson through his daughter. This type of inheritance is called criss-cross inheritance.

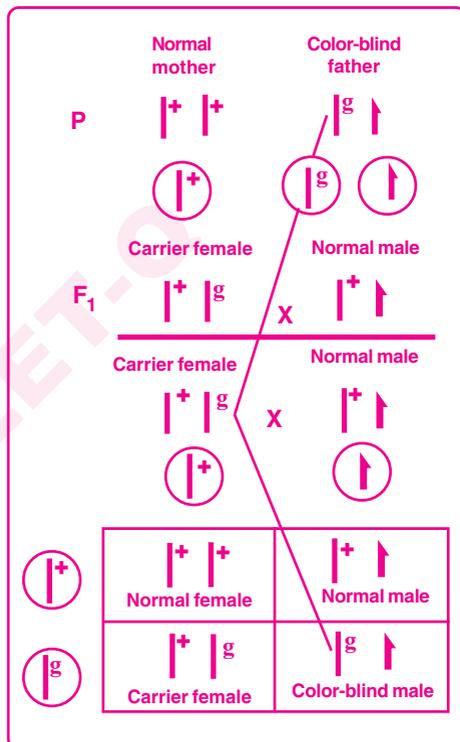
Two best examples of criss-cross inheritance are Colour blindness and Haemophilia.

**II) Explanation:**

- (1) Every gene whether dominant or recessive is expressed phenotypically.
- (2) Males have only one X chromosome.
- (3) Males are more prone to X-linked recessive gene expression.
- (4) Females have two X chromosome. There are more than 50% of chances of having a dominant gene. So females are less prone to X-linked recessive gene expression.

**III) Colour Blindness:**

- (1) The retina of eye is made up of rods and cone cells.
- (2) The cone cells are responsible for colour vision.
- (3) **A recessive gene present on X chromosome causes colour blindness (Red-green ).**
- (4) The dominant gene influences normal colour vision.



- (5) When a woman ( $AAX^{C}X^{C}$ ) with normal vision marries a 'colour-blind' man ( $AAX^{cb}Y$ ), all the daughter will be the carriers. Their Karyotype is ( $AAX^{C}X^{cb}$ ) with normal vision. Hence all the sons have normal vision. Their Karyotype is ( $AAX^{C}Y$ ).
- (6) When the carrier daughter marries a man with normal colour vision, 50% of sons gets colour blindness. All others will have normal vision, of which 50% of daughters are carriers. Here the colour blind character of the parent is inherited by grandson through the carrier daughter.

**IV) Other possible inheritances:**

- (1) When both parents are colour blind all their children will be colour blind.
- (2) When mother is colour blind and father has normal vision, all their sons inherit colour blindness from mother. All the daughter will be carriers because they get a dominant gene from father and recessive gene from mother.
- (3) When mother is a carrier and father is colour blind, 50% of daughters and 50% of sons get colour blindness.
- (4) So, the X-linked characters are inherited by daughters from father, by sons from their mother.