

Previous IPE
SOLVED PAPERS

MARCH -2020 (TS)

PREVIOUS PAPERS**IPE: MARCH-2020(TS)****Time : 3 Hours****SR.ZOOLOGY****Max.Marks : 60****SECTION-A****I. Answer ALL the following VSAQ:****10 × 2 = 20**

1. Define the terms layer and broiler.
2. Distinguish between Cortical and Juxta medullary nephrons.
3. What is triad system?
4. What do you know about arbor vitae?
5. What are the functions of sertoli cells of the seminiferous tubules and the Leydig cells in man?
6. What is 'amniocentesis'? Name any two disorders that can be detected by amniocentesis.
7. Define Atavism with an example.
8. What is meant by genetic load? Give an example.
9. Explain the term 'hypophysation'.
10. Distinguish between absorption and assimilation.

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

11. What are the functions of Liver?
12. Describe disorders of Respiratory system.
13. Draw a neat labelled diagram of pelvic girdle.
14. Write a note on Addison's disease and Cushing's syndrome.
15. Write short notes on B-Cells.
16. Write a salient features of 'HGP'.
17. What is meant by genetic drift? Explain genetic drift citing the example of Founder effect.
18. Discuss in brief about 'Avian Flu'.

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 a neat labelled diagram.
20. Describe female reproductive system of a woman with the help of a labelled diagram.
21. Describe chromosomal theory of sex determination.

ipe TS MARCH-2020

SOLUTIONS

1. Define the terms layer and broiler. [TS 19,20,22] [AP 15, 17,19]

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.

2. Distinguish between cortical and juxta medullary nephrons. [TS 20]

A: 1) **Cortical nephrons** have renal corpuscle in the superficial renal cortex. They have short loop of Henle but without vasa recta.
2) **Juxta medullary** nephrons are located near the renal medulla. They have long loop of Henle with Vasa recta.

3. What is triad system? [TS 15,16,17, 19, 20,22]

A: 1) **Triad System:** Each T tubule is flanked on either side by several terminal cisternae of the sarcoplasmic reticulum.
2) T tubule and the two terminal cisternae at its sides form the triad system.

4. What do you know about arbor vitae? [AP,TS MAR-20]

A: **Arbor vitae:** Arbor vitae is characteristic arrangement of white matter in the form of a tree in cerebellum of human brain. It is surrounded by grey matter (cerebellar cortex)

5. What are the functions of Sertoli cells of the seminiferous tubules and the Leydig cells in man? [TS MAR-15,20]

A: 1) **Sertoli cells are nourishing cells.** They nourish the spermatozoa and also produce a hormone called inhibin. It stops the production of FSH. They are present along with sperm mother cells.
2) **Leydig cells** are interstitial cells present between columns of seminiferous tubules. They secrete **androgens (male hormones)** of which **Testosterone is important.**

6. What is 'amniocentesis'? Name any two disorders that can be detected by amniocentesis. [TS 18, 19,20][AP 16,17,18,19,20]

A: 1) **Amniocentesis** is a diagnostic procedure to detect genetic defects in the unborn baby.
2) The disorders that can be detected are
(i) Down syndrome (ii) Edward's syndrome and (iii) Turner's syndrome.
3) In this procedure, Amniotic fluid is drawn and foetal cells are tested.
4) But, it is misused and has become a practice to know the sex of the child.

7. Define atavism with an example.

[TS 16, 17,20]

A: 1) **Atavism:** Sudden reappearance of some vestigial organs in a better developed condition is called atavism.

2) **Ex:** Human baby born with tail

8. What is meant by genetic load? Give an example.

[TS 20]

A: 1) **Genetic load:** Existence of deleterious genes with in a population is called genetic load.

Ex: Sickle cell anaemia.

2) People with homozygous (both recessive genes) condition of this gene die early due to anaemia.

3) People with heterozygous (one dominant and one recessive) condition live some more years and exhibit resistance to malaria.

9. Explain the term hypophysation.

[AP 16][TS 15,20]

A: 1) Hypophysation (or) induced breeding is an artificial breeding.

2) Pituitary extract or ovaprim is injected into brood fish which are induced for seed production.

10. Distinguish between absorption and assimilation.

A:	Absorption	Assimilation
	1) The movement of digested food from the digestive system into blood system is called Absorption.	1) After absorption, the uptake of nutrients into cells and tissues is called assimilation.
	2) It occurs in small intestine.	2) It occurs in every cell of the body.

SECTION-B**11. What are the functions of liver?****[TS 15, 19,20]****A: Important Functions of liver:** Secretion, Synthesis, Storage, Detoxification, T-Regulation.

- 1) Liver secretes **Bile juice**. (It helps in the emulsification and digestion of fats).
- 2) Liver helps in the synthesis of **Carbohydrates**.
- 3) Liver helps in the synthesis of **Lipids** (cholesterol, triglycerides).
- 4) Liver helps in the synthesis of **Plasma proteins**
(like albumin, globulin and blood clotting factors).
- 5) Liver stores **excess Glucose**, some vitamins & minerals.
- 6) Liver detoxifies '**Toxic substances**' that enter the gut along with food.
- 7) Liver removes unwanted substances and microbes through Kupffer cells present in sinusoids.
- 8) Liver acts as a '**Thermo regulatory organ**' (keeps the same temperature in the body).
- 9) Liver performs **Deamination** and **formation of urea** via ornithine cycle.
- 10) Liver acts as a **Haemopoietic organ** (produces RBC) in foetus .
- 11) Liver acts as **Erythroclastic organ** (destructs aged RBC) in adults.

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

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.

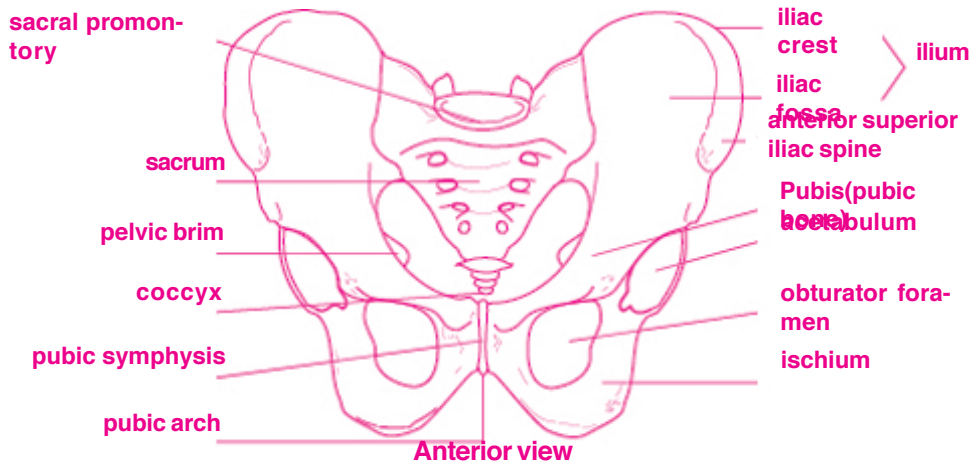
E) Occupational disorders:

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. Draw a neat labelled diagram of pelvic girdle.

A:

**14. Write a note on Addison's disease and Cushing's syndrome. [TS 17,18,19,19,22]**

A: 1) Addison's disease: Addison's disease is due to hyposecretion of glucocorticoids by adrenal cortex. The symptoms are loss of weight, muscle weakness, fatigue, reduced blood pressure and darkening of skin colour. They cannot respond to stress.

2) Cushing's syndrome: It is due to hypersecretion of glucocorticoids.

The symptoms are Spindle like arms and legs, Round moon face, Buffalo hump on the back, Pendulous abdomen, Poor wound healing, Hyper glycemina, Rapid gain of weight.

15. Write short notes on B-cells.**[AP 22][TS 17,19,22]****A: B-cells:**

- 1) B-cells are lymphocytes capable of producing antibodies . They can capture circulating antigens.
- 2) They are produced from the bone marrow of adult mammals, and from the **liver of foetus**.
- 3) Mature B cells produce various types of antibodies which are carried on their plasma membrane.
- 4) As these antibodies can take antigens, the mature B cells are also called immuno competent B cells.
- 5) The MBC cells reach secondary lymphoid organs and develop into functional immune cells.
- 6) Functional immune cells transform into long lived memory cells and effector plasma cells.
- 7) Plasma cells produce antibodies specific to antigens.
- 8) Memory cells store information about the specific antigens and show quick response when the same antigen attacks the body infuture.

16. Write the salient features of 'HGP'.**A: Salient features of Human Genome Project:**

- 1) The human genome consists of chromosomes which are made up of three billion nucleotide pairs.
- 2) The average gene has 3000 bases with different sizes. The large gene codes for protein dystrophin.
- 3) The total number of genes estimated is 30,000. 99.9% nucleotide base pairs are exactly same in all people.
- 4) The function is not known for 50% of genes discovered.
- 5) Less than 2% of genome codes for protein.
- 6) A large part of genome consists of repeated sequences.
- 7) The repeated sequence are thought to have no direct coding function. They may shed light on chromosome structure dynamics and evolution.
- 8) Chromosome I has highest number of genes (2968) Y-chromosome has fewgenes(231).
- 9) There are 1.4 million locations where single base differences (SNPs) occur in humans. This information helps to know the disease associated sequences and tracing human history.

17. What is meant by genetic drift? Explain genetic drift citing the example of Founder Effect.

[TS 18][AP 19,16]

- A:**
- 1) **Genetic Drift:** The change in the frequency of a gene that occurs merely by chance and not by selection in small populations, is called genetic drift.
 - 2) A gene is with two alleles. If the frequency of a particular gene is 1%, the probability of losing that allele by chance from the small population is more. The end result is either fixation or loss of that allele. The probability of reaching the end point depends on the size of population.
 - 3) Genetic drift tends to reduce the amount of genetic variation within the population, mainly by removing the alleles with low frequencies. Genetic drift can be exemplified by the founder effect.
 - 4) **Founder effect:** If a small group of individuals from a population start a new colony in an isolated region, those individuals are called the founders of the new population. The allelic frequency of their descendants are similar to those of the founders rather than to either ancestral parent population.

Ex: Presence of O^{+ve} blood group is nearly 100% in Red Indians.

18. Discuss in brief about 'Avian Flu'.

[AP MAR-20][TS 22]

- A:**
- 1) **Avina Flu:** It is an important and dangerous viral disease affecting poultry birds and also man.
 - 2) **Causative Organism:** Bird flue is caused by avian flu virus H5N1. It can start a world wide epidemic (pandemic disease).
 - 3) **Mode of Infection:** Simply by touching contaminated surfaces. Infected birds release the virus through saliva and faeces for about 10 days.
 - 4) **Symptoms:** Humans infected by H5N1 show typical flu like symptoms, dry cough with phlegm diarrhoea, breathing difficulty, fever, headache sore throat and body pains.
 - 5) **Prevention:**
 - (i) Consumption of undercooked chicken to be avoided.
 - (ii) Poultry people use protective clothes and wear masks.
 - (iii) Complete culling (elimination) of infected birds either by burning or burying.

SECTION-C

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

[AP 18,22][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) Each atrium has small ear lobe like projection called auricular appendix.

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

IV) Internal structure: It consists of 4 parts.

(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)

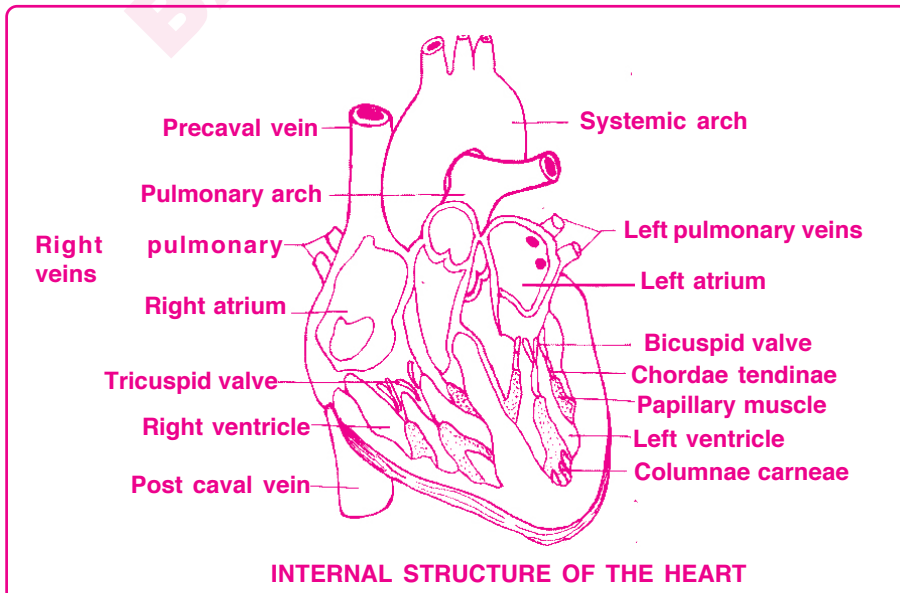
- (ii) The two ventricles are separated by an **interventricular septum**.
- (iii) The wall of the left ventricle is thicker than the right ventricle
- (iv) The inner surface of the ventricles is raised into muscular ridges called **columnae carnae**.
- (v) Some of these ridges are large and conical, 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 :

- (i) It is a **modified heart muscle**. It consists of **two nodes** and **fibres**.
- (ii) A patch of this tissue is present in **SAN**(sinoatrial node). It is located in the right upper corner of right atrium, close to the opening of superior venacava.
- (iii) Another mass of this tissue called **AVN** (atrioventricular node) is seen 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.



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

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

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) and also several steroid hormones.
- (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**. The outer part of stroma is **cortex** and inner part is **medulla**. This is made up of blood vessels, lymphatics and nerve fibres.

II) Fallopian tubes:

- (1) Each fallopian tube extends from the **periphery of each ovary to the uterus**.
- (2) Each fallopian tube has **funnel shaped infundibulum**.
- (3) The edge of infundibulum has **finger like folds** called **fimbriae**.
- (4) Fimbriae collect ovum after ovulation.
- (5) Infundibulum leads to wide ampulla.
- (6) Isthmus is the last part which joins the uterus.
- (7) Fallopian tube is the site of fertilization. It conducts the ovum towards the uterus by peristalsis.
- (8) Fallopian tube is attached to body wall by **mesosalpinx** (fold of peritoneum).

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 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 the upper external urethral orifice of the urethra and the lower vaginal orifice of vagina.
- (3) Vaginal orifice is often **covered partially by a membrane** called **hymen**.
- (4) Clitoris is a sensitive, erectile structure, which lies at the upper junction of the two labia

minora above the urethral opening.

- (5) Clitoris is **homologous to the penis of a male** as both are supported by corpora cavernosa.
 (6) **Mons pubis** is a cushion of fatty tissue covered by skin and pubic hair present above labia majora.

VI) Accessory reproductive glands of female:

1) Bartholin's glands:

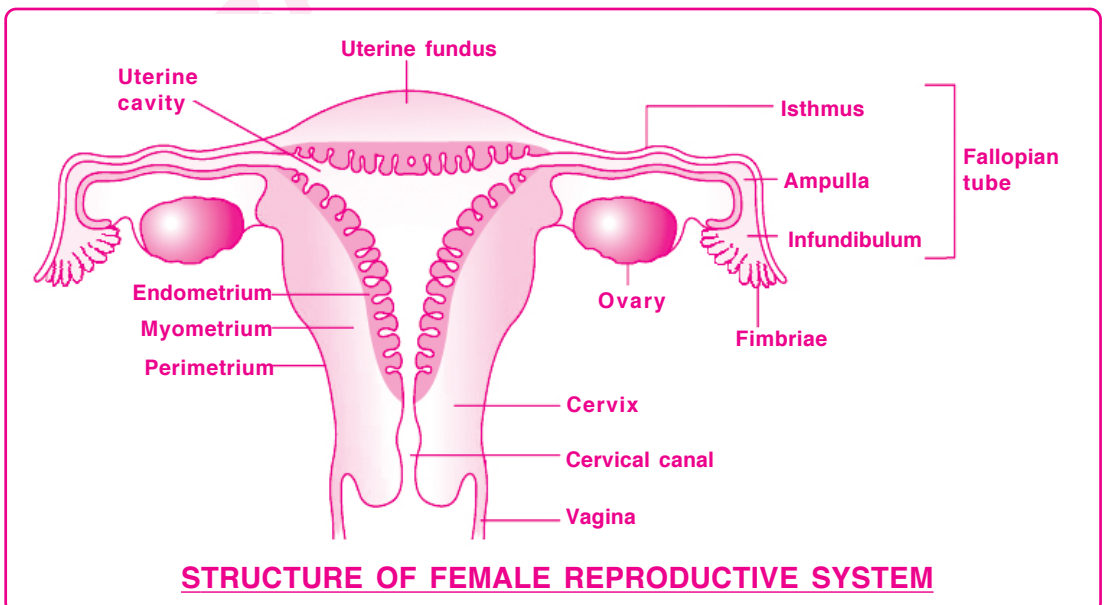
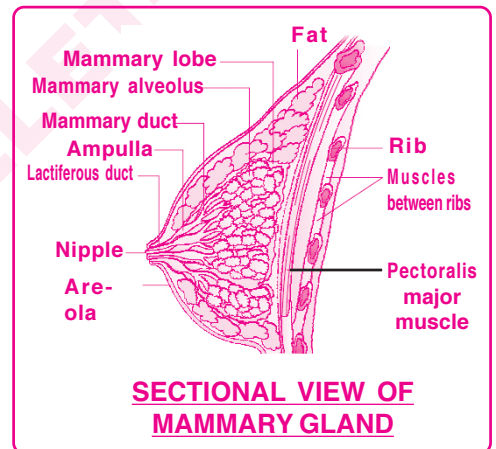
- (i) **Position:** The Bartholin's glands are two glands located **slightly posterior and to the left and right** of the opening of the **vagina**
 (ii) **Function:** They secrete **mucus to lubricate the vagina** and are homologous to the bulbourethral glands of the male reproductive system.

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.



21. Describe chromosomal theory of sex determination.

[TS 17, 17, 19,20]

A: Chromosomal theory of Sex determination:

In most of the animals, a pair of chromosomes are responsible for the determination of sex. These two chromosomes are called **sex chromosomes (or allosomes)**.

The two different chromosomes in the pair are X-chromosome & Y- chromosome

There are two types of sex chromosomal mechanism methods:

I) Male Heterogametic method

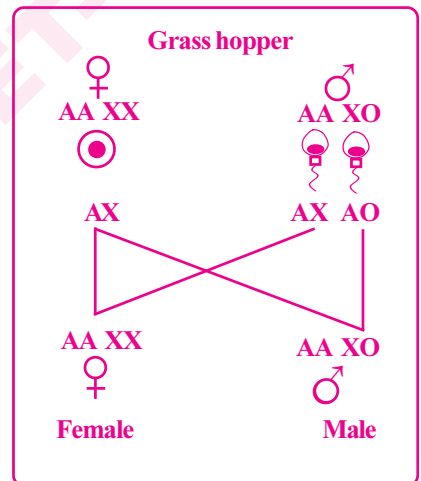
II) Female Heterogametic method

I) Male Heterogametic method: In this type, the female has two 'X' chromosomes and the male has only a single 'X' chromosome.

This is of two types: (1) XX-XO (2) XX-XY

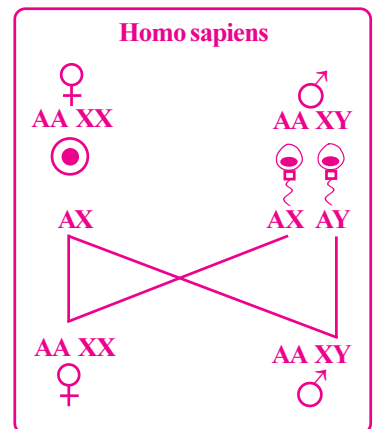
1) XX-XO type:

- (i) It is found in grass hoppers.
- (ii) Karyotype of female is AAXX and Karyotype of male is AAXO.
- (iii) Females have two X chromosomes and males have only one X chromosome.
- (iv) Unpaired X chromosome determines the sex of offspring.
- (v) The sperms are two types. 50% of sperms have AX complement and other 50% have only A complement.
- (vi) All the ova contains AX chromosomes.
- (vii) The sex of the offspring is decided by the sperm that fertilizes the ovum.
- (viii) If AX sperm is fertilised the child will be female
- (ix) If AO sperm is fertilised the child will be male.



2) XX-XY type:

- (i) It is found in human beings .
- (ii) Female is homogametic with Karyo type AAXX Male is hetero gametic with Karyotype AAXY
- (iii) Females have 2 'X' chromosomes & Males have 1'X' chromosome & 1 'Y' chromosome.
- (iv) 'Y' chromosome determines the sex of offspring.
- (v) 50% of sperms are AX and other 50% are AY.
- (vi) All the ova contains AX chromosomes.
- (vii) The sex of the offspring is determined by the sperm that fertilizes the ovum.
- (viii) If AX sperm is fertilized the child will be female (AAXX)
- (ix) If AY sperm is fertilized the child will be male (AAXY)



II) Female heterogametic Method: In this type, female produces two types of ova and male produces only one type of sperms.

This of two types. (1) ZO-ZZ type and(2) ZW-ZZ type.

1) ZO-ZZ type:

(i) It is found in Fumea (moths).

(ii)Karyo type of female is AAZO and

Karyo type of male is AAZZ

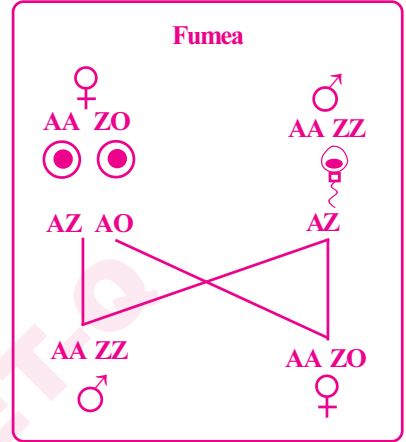
(iii)Female is heterogametic with one Z chromosomes and

Male is homogametic with two Z chromosomes.

(iv)The sex of the offspring is determined by the ovum that is fertilized.

(v)If AO ovum is fertilized, it will be female.

(vi)If AZ ovum is fertilized,it will be male.



2) ZW-ZZ type:

(i)It is found in birds.

(ii)Karyo type of female is AAZW and

Karyo type of male is AAZZ.

(iii)Female is heterogametic with Z and W chromosomes and

Male is homogametic with ZZ chromosomes.

(iv)The sex of the offspring is determined by the ovum that is fertilized.

(v) If AZ ovum is fertilies it will be male.

(vi) If AW ovum is fertilised it will be female.

