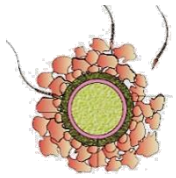
CHAPTER 2



HUMAN REPRODUTION

(A) NCERT QUESTIONS & SOLUTIONS

1. Fill in the blanks :

(a) Humans reproduce ----------. (asexually/sexually)

Ans. Sexually

(b) Human are ----------. (oviparous, viviparous, ovoviviparous)

Ans. Viviparous

(c) Fertilization is----------in human. (external/internal)

Ans. Internal

(d) Male and female gametes are--------.(diploid/haploid)

Ans. Haploid

(e) Zygote is----------. (diploid/haploid).

Ans. Diploid

(f) The process of release of ovum from a mature follicle is called ----------.

Ans. Ovulation

(g) Ovulation is induced by a hormone called ----------.

Ans. Luteinising hormone (LH)

(h) The fusion of male and female gametes is called ----------.

Ans. Fertilisation

(i) Fertilisation takes place in ----------.

Ans. Ampulla of the oviduct

(j) Zygote divides to form ---------- which is implanted in uterus.

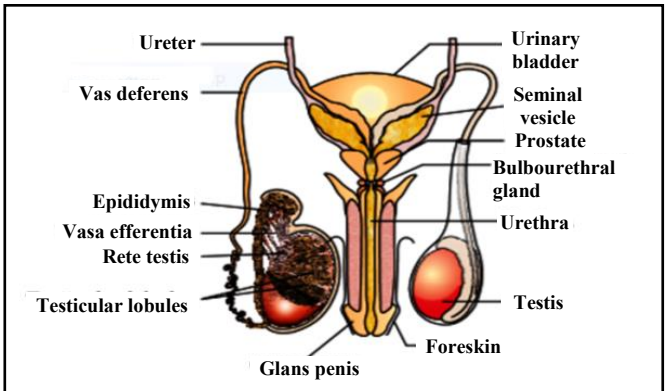
Ans. Blastocyst

(k) The structure which provides vascular connection between foetus and uterus is called ----------.

Ans. Placenta

2. Draw a labelled diagram of male reproductive system.

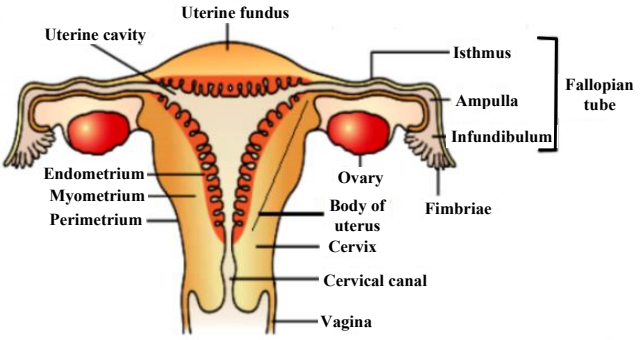
Ans.



Diagrammatic view of male reproductive system

3. Draw a labelled diagram of female reproductive system.

Ans.



Diagrammatic view of female reproductive system

4. Write two major functions each of testis and ovary.

Ans. (1) Functions of the Testis :

- ☛ They produce male gametes (sperm) by the process of called spermatogenesis.
- ☛ The leydig cells of the seminiferous tubules secrete the male sex hormone called testosterone.

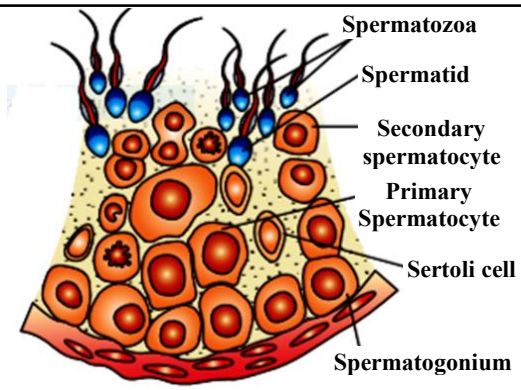
(2) unctions of the ovary :

- ☛ They produce female gametes (ovum) by the process of oogenesis.
- ☛ The growing Graafian follicles secrete the female sex hormone called estrogen.

5. Describe the structure of a seminiferous tubule. [IMP.]

Ans.

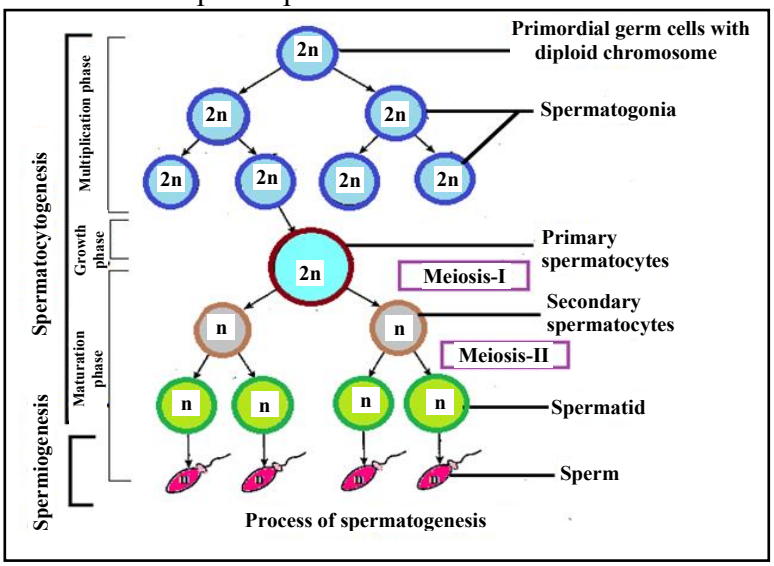
- ☛ A seminiferous tubule is made up of layer of male germ cells and large Sertoli cells (nurse cell).
- ☛ The male germ cells undergo spermatogenesis to produce spermatocytes, spermatids and sperms.
- ☛ The regions outside the seminiferous tubules called interstitial spaces have connective tissue which included blood vessels and leydig cell.
- ☛ Leydig cells synthesise and secrete the male sex hormones called androgens, of which testosterone is the principle one.



Diagrammatic sectional view of a seminiferous tubule

6. What is spermatogenesis? Briefly describe the process of spermatogenesis.

Ans. It is the process of formation of haploid sperms in seminiferous tubules of testes.



Process of spermatogenesis

7. Name the hormones involves in regulation of spermatogenesis.

Ans. GnRH (Gonadotropin releasing hormone), LH (Luteinising hormone), FSH (Follicle stimulating hormone), androgens.

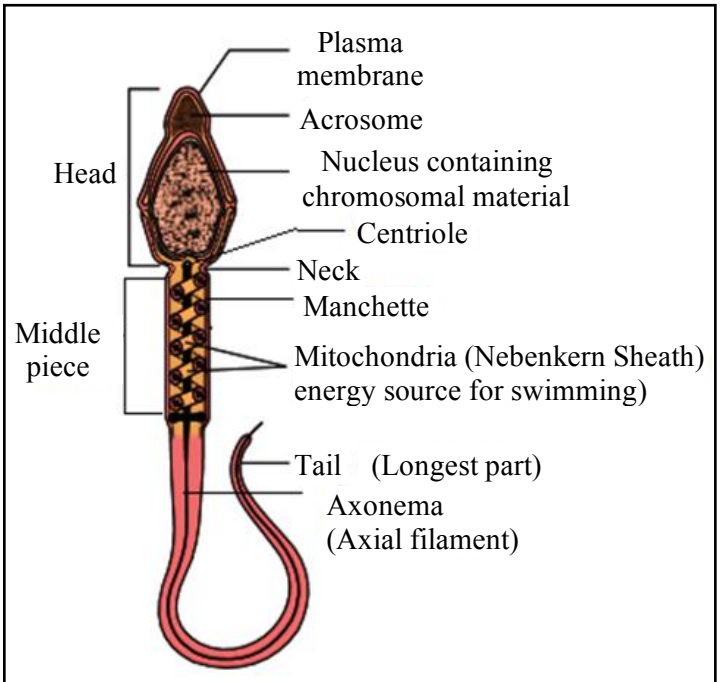
8. Define spermiogenesis and spermiation.

Ans. (1) Spermiogenesis : The process of transformation of spermatids into spermatozoa in seminiferous tubules, is called spermiogenesis.

(2) Spermiation : Sperm are finally released from the seminiferous tubules by the process called spermiation.

9. Draw a labelled diagram of sperm. **[IMP.]**

Ans.



Structure of a sperm

10. What are the major components of seminal plasma?

Ans. The major components of seminal plasma are :

Secretions of the accessory sex glands of males – prostate gland, seminal vesicles, bulbourethral glands.

Mainly composed of – calcium, fructose, and other enzymes

11. What are the major functions of male accessory ducts and glands?

Ans. The major functions of the male accessory ducts and glands are as follows:

☛ **Male accessory ducts**

(a) Vasa efferentia : Conducts sperms from the rete testis to the epididymis.

(b) Rete testis : Stores sperms that are produced by seminiferous tubules.

(c) Epididymis : Physiological maturation of sperms, storage and nourishment.

(d) Vas deferens : Conducts sperms from epididymis to the urethra.

☛ **Male accessory glands**

(a) Seminal vesicles : Activates and provides energy to facilitate sperm motility after ejaculation.

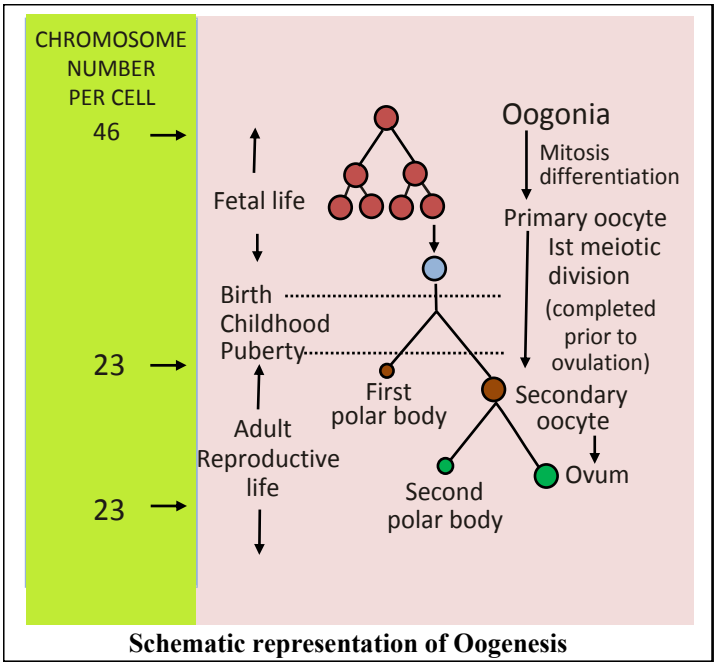
(b) Prostate gland : Nourishes and activates sperms, enhances sperm motility.

(c) Cowper's gland : It enhances mobility & survival potentiality of sperms in the genital tract of female reproductive system and neutralizes the activity of acidic female vaginal secretions.

12. What is oogenesis? give a brief account of oogenesis. [IMP.]

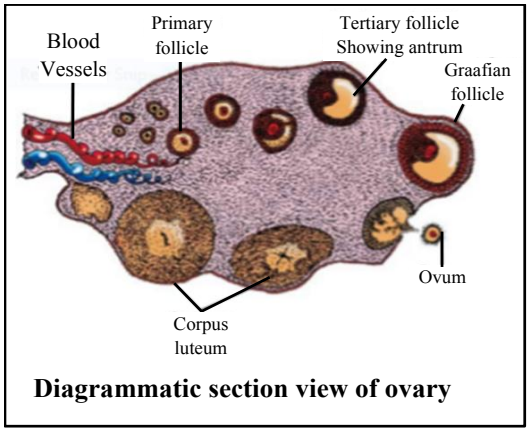
Ans. Oogenesis is the phenomenon of formation of haploid female gametes known as ova from diploid oogonia in the ovary is called as oogenesis. Oogenesis can be explain through following flow chart.

13. Draw a labelled diagram of a section through ovary.



Schematic representation of Oogenesis

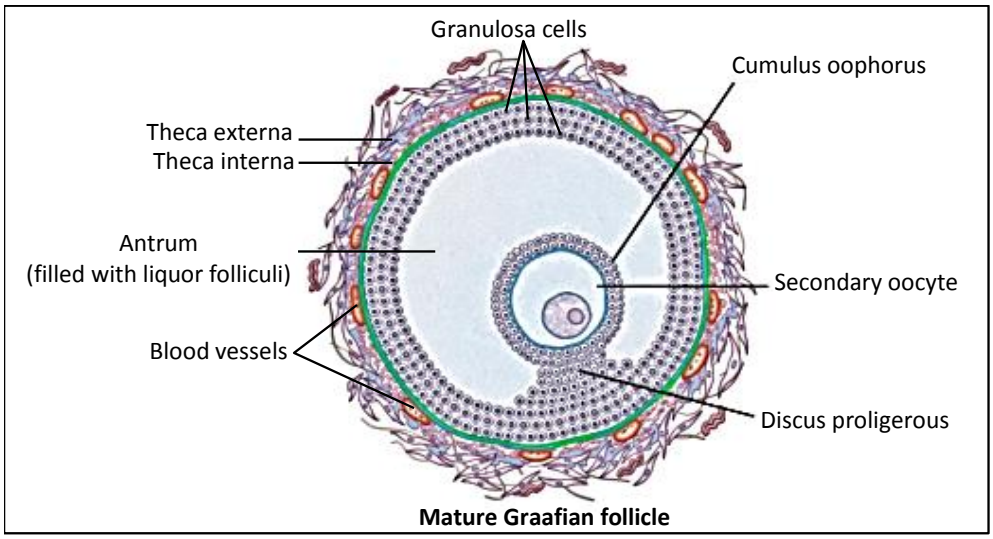
Ans. The diagram of a section of an ovary is as follows -



Diagrammatic section view of ovary

14. Draw a labelled diagram of a Graafian follicle.

Ans. The diagram of a Graafian follicle is as follows :



Mature Graafian follicle

15. Name the functions of the following :

(a) Corpus luteum **(b) Endometrium** **(c) Acrosome**

(d) Sperm tail **(e) Fimbriae**

Ans. The functions of each are as follows :

(a) Corpus luteum – The corpus luteum secretes the hormone progesterone during the luteal phase of the menstrual cycle.

(b) Endometrium –The endometrium is the innermost layer of the uterus comprising of glands that undergoes cyclic changes during different stages of the menstrual cycle in order to prepare itself for the embryo-implantation process.

(c) Acrosome - It consists of the sperm lysin enzyme that helps in penetration of the outer membrane of the egg by sperm which facilitates the sperm to perforate through the egg during fertilization.

—

(d) Sperm tail – The sperm tail makes up for the longest part of the sp e movement of the sperm, once it has entered the female reproductive tract.

(e) Fimbriae – Towards the ovarian end of the fallopian tube, finger-like projections emerge, these are the fimbriae which assist in collection of the ovum after the ovulation.

16. Identify True/False statements. Correct each false statement to make it true.

(a) Androgens are produced by Sertoli cells. **(True/False)**

Ans. False, Correct statement : Androgens are produced by the Leydig cells.

(b) Spermatozoa get nutrition from Sertoli cells. **(True/False)**

Ans. True

(c) Leydig cells are found in ovary. **(True/False)**

Ans. False, Correct statement : Leydig cells are found in testes.

(d) Leydig cells synthesise androgens. **(True/False)**

Ans. True

(e) Oogenesis takes place in corpus luteum. **(True/False)**

Ans. False, Correct statement : Oogenesis takes place in ovary.

(f) Menstrual cycle ceases during pregnancy. **(True/False)**

Ans. True

(g) Presence or absence of hymen is not a reliable indicator of virginity or sexual experience.

(True/False)

Ans. True

17. What is menstrual cycle ? Which hormones regulate menstrual cycle?

Ans. It is a reproductive cycle in the female primates (e.g. monkeys, apes and human beings), in females menstruation is repeated at an average interval of about 28/29 days, the cycle of events starting from one menstruation till the next one is called the menstrual cycle.

The different hormones that regulate the menstrual cycle are LH – Luteinising hormone, FSH – Follicle stimulating hormone, progesterone, estrogen.

18. What is parturition? Which hormones are involved in induction of partur

Ans. Parturition is the process wherein a fully developed foetus from the mother's womb is expelled out after the completion of the gestation period. The two critical hormones are involved in the induction of parturition are :

Oxytocin – It directs the full-term foetus towards the birth canal, as it causes the contraction of the smooth muscles of the myometrium of the uterus leading the baby to be expelled out.

Relaxin – It relaxes the pelvic ligaments, widening the pelvis to assist in an easier child birth.

19. In our society the women are often blamed for giving birth to daughters. Can you explain why this is not correct? [IMP.]

Ans. This is not correct to blame women for giving birth to daughter.

- ☛ The male sperm contain either X or Y chromosome whereas the female egg contain only X chromosome.
- ☛ At the time of fertilization, sperm with Y chromosome combine with egg containing X chromosome formed which would be male.
- ☛ Thus scientifically sex of the baby is determined by the father and not by the mother as blamed in our society.

20. How many eggs are released by a human ovary in a month? How many eggs do you think would have been released if the mother gave birth to identical twins? Would your answer change if the twins born were fraternal?

Ans. Typically in a month, human ovaries release only one egg, rarely two. In case of identical twins or monozygotic twins one egg is released by the ovary which splits into two post fertilization. This is why identical twins exhibit the same genetic features.

On the other hand in fraternal twins or dizygotic twins, two eggs are released which are fertilized by two different sperms causing the fraternal twins to exhibit different genetic characters.

21. How many eggs do you think were released by the ovary of a female dog which gave birth to 6 puppies?

Ans. In order to have given birth to six puppies, the ovary of the female dog released six eggs. Hence, six zygotes were formed for each to develop into a puppy.

(B) PREVIOUS YEAR QUESTIONS

1. Given below are structural details of a human mammary gland : **[CBSE 2023]**

(i) The glandular tissue in the breast has 15-20 clusters of cells called alveoli.

(ii) The milk is stored in the lumen of alveoli.

(iii) The alveoli join to form the mammary ducts.

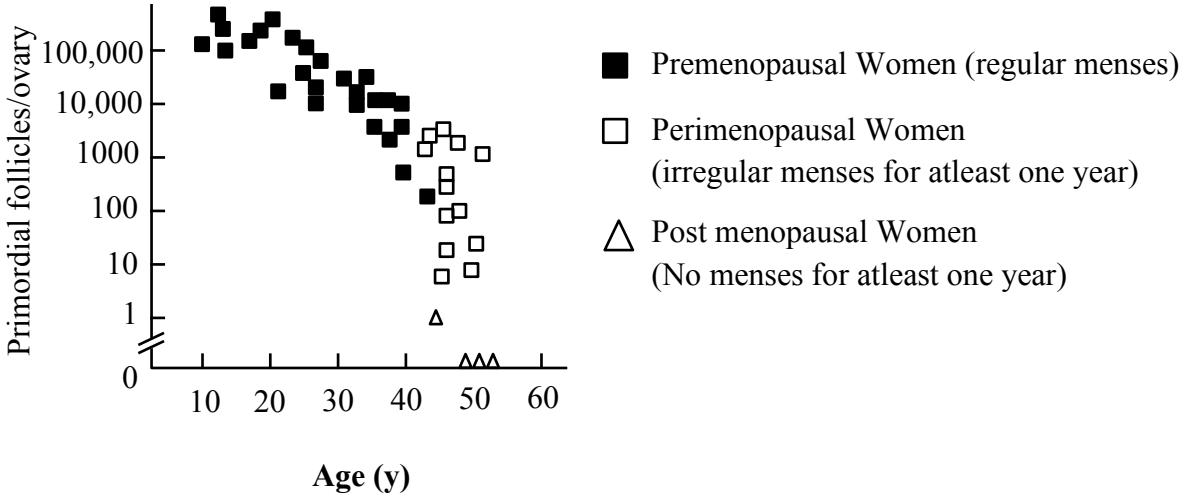
(iv) Mammary ampulla is connected to lactiferous ducts.

Choose the option that gives the correct detail of human mammary gland.

(1) (i) and (ii) (2) (ii) and (iii) (3) (ii) and (iv) (4) (i) and (iii)

Ans. (3) (ii) and (iv)

2. The graph given below shows the number of primordial follicles per ovary in women at different ages. Study. the graph and answer the questions that follow. **[CBSE 2023]**



(a) What is the average age of the women at the onset of menopause?

(b) At what age are maximum primordial follicles present in the ovary, according to the given graph?

Ans. (a) 45-50 year (b) 0-10 year

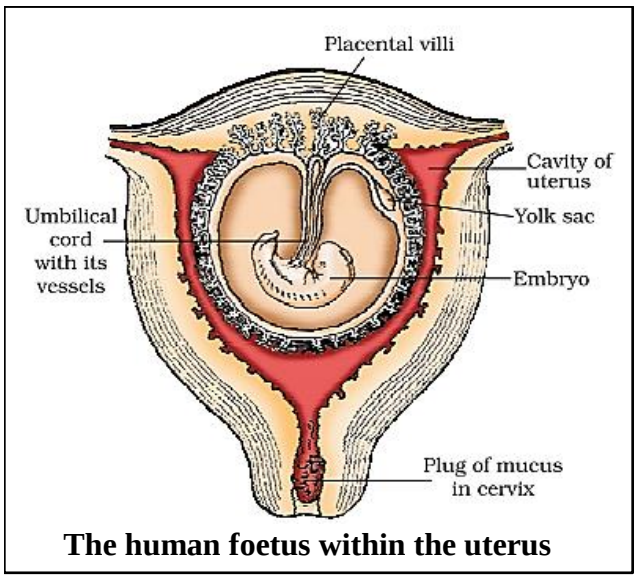
3. (i) Explain the formation of placenta after the implantation in a human female.

(ii) Draw a diagram showing human foetus within the uterus and label any four parts in its. **[CBSE 2023]**

Ans. (i) After implantation, finger-like projections appear on the trophoblast called chorionic villi which are surrounded by the uterine tissue and maternal blood.

- The chorionic villi and uterine tissue become interdigitated with each other and jointly form a structural and functional unit between developing embryo (foetus) and maternal body called placenta

man foetus within the uterus.



The human foetus within the uterus

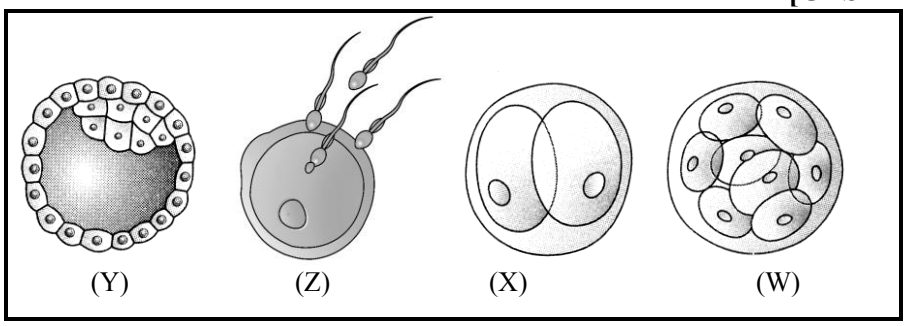
4. Breast-feeding the baby acts as a natural contraceptive for the mother because it prevents: **[CBSE Term-I 2022]**

(i) Ovulation (ii) Menstruation (iii) Insemination (iv) Fertilisation

(1) (ii) and (iv) (2) (i) and (iii) (3) (i) and (iv) (4) (i) and (ii)

Ans. (4) (i) and (ii)

5. The given figure shows the different stages of human embryo **[CBSE Term-I 2022]**



Identify the correct labelings for W, X, Y and Z and choose the correct option from the table below.

	W	X	Y	Z
(1)	Cleavage	Blastocyst	Morula	Fertilisation
(2)	Blastocyst	Morula	Cleavage	Fertilisation
(3)	Morula	Cleavage	Blastocyst	Fertilisation
(4)	Morula	Blastocyst	Cleavage	Fertilisation

Ans. (3)

W-Morula X-Cleavage Y-Blastocyst Z-Fertilisation

6. During human embryonic development the external genital organs are well developed in the foetus by the end of – **[CBSE Term-I 2022]**

(1) 6 weeks of pregnancy (2) 12 weeks of pregnancy

(3) 18 weeks of pregnancy (4) 24 weeks of pregnancy

Ans. (2) 12 weeks of pregnancy

7. The accessory ducts in the human male reproductive system consists of **[CBSE Term – I 2022]**

(1) Epididymis, Prostate, Rete testis (2) Rete testis, Vas efferentia, Seminal vesicles

(3) Vas efferentia, Bulbourethral, Epididymis (4) Rete testis, epididymis, Vas deferens

Ans. (4) Rete testis, epididymis, Vas deferens

8. The source of gonadotropin LH and its corresponding function is: **[CBSE Term-I 2022]**

(1) Anterior pituitary, ovulation (2) Anterior pituitary, Graafian follicle formation

(3) Hypothalamus, Ovulation (4) Hypothalamus, Graafian follicle formation

Ans. (1) Anterior pituitary, ovulation

CASE BASED QUESTIONS

9. A women of 35 years age with a married life of eight years and having normal reproductive cycles visits a doctor along with her husband for consultation for infertility. They were not using any contraceptive methods. They have no child. The doctor advises them after a detailed physical examination of both of them to undergo following investigations:

– Seminal analysis of the husband.

– Follicular study of the wife.

– Blood test for follicle Stimulating Hormone (FSH) estimation for both

With your basic knowledge of human embryology and the case given above, answer the following questions:

(i) Seminal analysis of the husband was done for determining **[CBSE Term-I 2022]**

(i) Sperm morphology

(ii) Quantity and pH of semen

(iii) Rate of sperm release into the Vagina

(1) (i) only (2) (i) and (ii) (3) (ii) and (iii) (4) (ii) only

Ans. (2) (i) and (ii)

(ii) An ultrasound – guided follicular study was done for the wife for determining the size and physical appearance of the **[CBSE Term-I 2022]**

(1) Ovary (2) Oogonia (3) Antral follicles (4) Corpus Luteum

Ans. (1) Ovary

(iii) The blood test report of the wife showed low FSH value, which is indicative of – **[CBSE Term-I 2022]**

(1) low rate of formation of ovarian follicles (2) high rate of formation of ovarian follicles

(3) low rate maturation of ovarian follicles (4) high rate of maturation of ovarian follicles

Ans. (1) low rate of formation of ovarian follicles

(iv) In the above case if the husband is found to have sperm count of less than 20 million/mL and the wife is diagnosed with blockage in the oviduct, the couple would be advised for: **[CBSE Term-I 2022]**

(i) ZIFT (ii) AI (iii) IVF (iv) ICSI

(1) (i) and (iii) (2) (ii) and (iii) (3) (iii) and (iv) (4) (i) and (iv)

Ans. (1) (i) and (iii)

(v) The high level of which gonadotropin/ovarian hormone in the blood sample of the wife taken on day 20 of her reproductive (menstrual) cycle would indicate the letual phase of the ovarian cycle? **[CBSE Term-I 2022]**

(1) FSH (2) LH (3) Estrogens (4) Progesterone

Ans. (4) Progesterone

(vi) In which phase of the menstrual cycle is the blood sample of a women take it shows high levels of L.H. and estrogen? **[CBSE Term-I 2022]**

(1) Ovulatory phase (2) Menstrual phase (3) Secretory phase (4) Follicular phase

Ans. (1) Ovulatory phase

10. Name the glands that contribute to human seminal plasma. [CBSE IMP-Question]

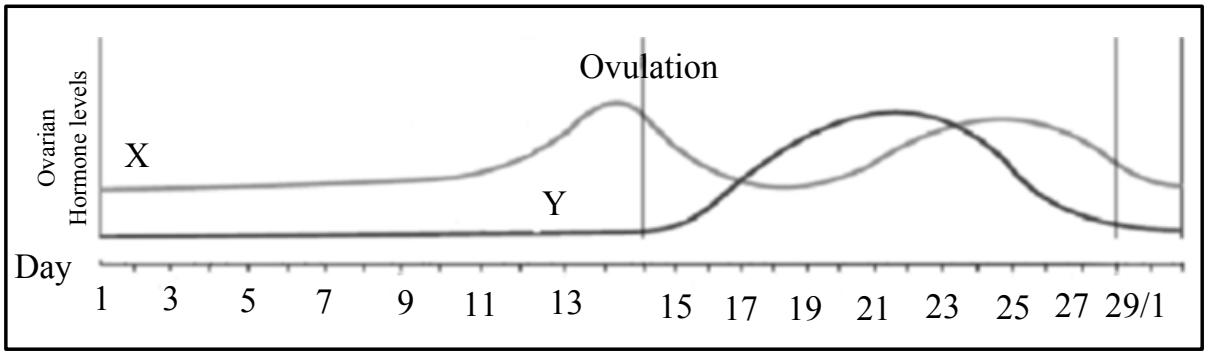
Ans. Prostate, Seminal vesicle and Bulbourethral gland. (any two)

11. A fully developed foetus initiates its delivery from the mother's womb. Justify the statement. [CBSE IMP-Question]

Ans.
- The signals for parturition originate from the fully developed foetus and the placenta which induce mild uterine contractions called foetal ejection reflex.
- This triggers the release of oxytocin from the maternal pituitary.
- Oxytocin acts on the uterine muscle and causes stronger uterine contractions, which in turn stimulates further secretion of oxytocin.
- The stimulatory reflex between the uterine contraction and oxytocin secretion continues resulting in stronger and stronger contractions.
- Parturition is induced by a complex neuroendocrine mechanism involving cortisol, oestrogens and oxytocin.
- This leads to expulsion of the baby out of the uterus through the birth canal – parturition.

12. Study the graph given below related with menstrual cycle in females:[CBSE IMP-Question]

a. Identify ovarian hormones X and Y mentioned in the graph and specify their source.



b. Correlate and describe the uterine events that take place according to the ovarian hormone levels X and Y mentioned in the graph on -

i. 6 – 15 days

ii. 16 – 25 days

iii. 26 – 28 days (when ovum is not fertilized)

Ans. a. X- Estrogen secreted by growing follicles;
Y – Progesterone secreted by corpus luteum

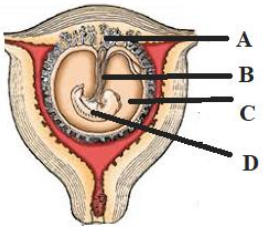
b. Uterine events that take place according to the ovarian hormone levels X and Y on -

(i) 6 – 15 days: Endometrium of the uterus regenerates by proliferation under the influence of estrogen.

(ii) 16 – 25 days: Under the influence of Progesterone the endometrium of the uterus is maintained for implantation of fertilised ovum and other events of pregnancy.

(iii) 26 – 28 days (when ovum is not fertilized): in the absence of fertilisation, corpus luteum degenerates which causes disintegration of endometrium leading to menstruation, marking a new cycle.

13. The following figure shows a foetus within the uterus. On the basis of the given figure, answer the questions that follow: [CBSE IMP-Question]



(a) In the above figure, choose and name the correct part (A, B, C or D) that act as a temporary endocrine gland and substantiate your answer. Why is it also called the functional junction?

(b) Mention the role of B in the development of the embryo.

(c) Name the fluid surrounding the developing embryo. How is it misused for sex-determination?

Ans. (a) Part labeled A -Placenta. It acts as an endocrine tissue as it produces several hormones like human chorionic gonadotropin (hCG), human placental lactogen (hPL),estrogens, progestogens, etc. It is also called the *functional junction* because it facilitates the supply of oxygen and nutrients to the embryo and removes carbon dioxide and excretory/waste materials produced by the embryo.

(b) The placenta is connected to the embryo through an umbilical cord which helps in the transport of substances to the embryo.

(c) Amniotic fluid; a foetal sex determination test is based on the chromosomal pattern of the cells in the amniotic fluid surrounding the developing embryo.

14. Study the given diagram where A is an embryonic stage that gets transformed into B, which in turn gets implanted in the endometrium in human females. [CBSE 2020]

(a) Identify A, B and its parts C and D.

(b) Write the name of cavity present in the stage B.

e fate of C and D in the course of embryonic development in human.

Ans. (a) A - Morula,

B - Blastocyst,

C - Inner cell mass,

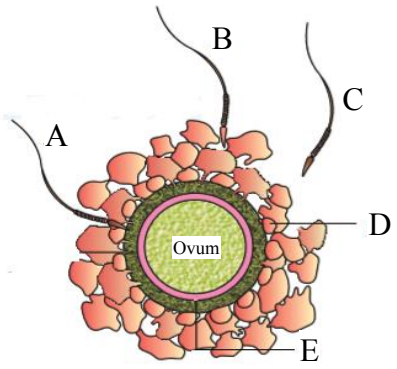
D - Trophoblast

(b) Blastocoel

(c) C-It differentiated as the embryo.

D-It helps in implantation and further develop into placenta.

15. Given below is the diagram of a human ovum surrounded by a few sperms. Study the diagram and answer the following questions: [CBSE 2019]



(a) Which one of the sperms would reach the ovum earlier?

(b) Identify 'D' and 'E'.

(c) Mention what helps the entry of sperm into the ovum and write the changes occurring in the ovum during the process.

(d) Name the specific region in the female reproductive system where the event represented in the diagram takes place.

Ans. (a) Sperm 'A'

(b) D = Cells of corona radiata, E = zona pellucida,

(c) The secretion of acrosome (enzymes) helps the entry of sperm into the ovum, induces the completion of meiotic division of secondary oocyte.

(d) Ampulla /ampullary - isthmic junction of the fallopian tube

16. Medically it is advised to all young mothers that breast feeding is the best for their newborn babies. Do you agree ? Give reasons in support of your answer. [CBSE 2018]

Ans. Yes, The milk produced during the initial few days of lactation is called colostrum.

The colostrum contains several antibodies **(IgA)** absolutely essential to develop resistance for the new-born babies. Breast-feeding during the initial period of infant growth is recommended by doctors for bringing up a healthy baby.

17. State from where do the signals for parturition originate in human females. [CBSE 2017]

Ans Fully developed foetus, and the placenta.

(C) MULTIPLE CHOICE QUESTIONS

1. Semen is constituted of –

(1) Sperm (2) Spermatogonia (3) Seminal Plasma (4) Both (1) & (3)

Ans. (4) Both (1) & (3)

2. Seminiferous tubules are composed of

(1) Spermatogonia (2) Glandular epithelium

(3) Sensory epithelium (4) Germinal epithelium

Ans. (4) Germinal epithelium

3. Cells of Leydig occur in

(1) Liver (2) Ovary (3) Testis (4) Spleen

Ans. (3) Testis

4. Which piece of a sperm is called power house ?

(1) Head piece (2) Neck piece (3) Middle piece (4) Tail piece

Ans. (3) Middle piece

5. Which is not a secondary sex organ ?

(1) Vagina (2) Penis (3) Prostate (4) Mammary gland

Ans. (4) Mammary gland

6. At puberty woman start producing

(1) Sperms (2) Urine (3) Young ones (4) Ovum

Ans. (4) Ovum

7. Release of sperm from testes is called :-

(1) Spermiation (2) Semination (3) In semination (4) Ejaculation

Ans. (2) Semination

8. Which part of the spermatid forms acrosome of sperm?

(1) Mitochondria (2) Golgi body (3) Nucleus (4) Lysosome

Ans. (2) Golgi body

9. Polar body is produced during the formation of :

(1) Sperm (2) Secondary oocyte (3) Oogonium (4) Spermatocyte

Ans. (2) Secondary oocyte

10. First meiotic division during oogenesis occurs in :

(1) First polar body (2) Second polar body (3) Primary oocytes (4) Secondary polar

Ans. (3) Primary oocyte

11. Humans are ____ and ____ organisms.

(1) Sexually reproducing, oviparous (2) Asexually reproducing, ovoviviparous

(3) Asexually reproducing, viviparous (4) Sexually reproducing, viviparous

Ans. (4) Sexually reproducing, viviparous

12. The formation of gametes is termed as

(1) Gametogamy (2) Syngamy (3) Gametogenesis (4) Gestation

Ans. (3) Gametogenesis

13. The transfer of sperms into the female genital tract is called

(1) Insemination (2) Gametogenesis (3) Fertilization (4) Gestation

Ans. (1) Insemination

14. The fusion of male and female gametes is known as

(1) Insemination (2) Fertilization (3) Implantation (4) Parturition

Ans. (2) Fertilization

15. The following statements are true except

(1) In an individual, reproductive changes occur after puberty.

(2) Sperm formation occurs even in old men.

(3) Formation of ovum continues in women after fifty years.

(4) Humans are sexually producing and viviparous

Ans. (3) Formation of ovum continues in women after fifty years.

16. The testes are situated ____ the abdominal cavity within a pouch called ____.

(1) inside, testicular lobules (2) outside, scrotum

(3) outside, vas deferens (4) inside, scrotum

Ans. (2) outside, scrotum

17. The scrotum helps in maintaining a temperature ____ lower than the internal body temperature.

(1) 1 to 1.5°C (2) 2 to 2.5°C (3) 3 to 3.5°C (4) 4 to 4.5°C

Ans. (2) 2 to 2.5°C

18. Male germ cells are known as

(1) Sperms (2) Spermatogonia (3) Spermatid (4) Sertoli cells

Ans. (2) Spermatogonia

19. Seminiferous tubules contain ____ for providing nutrition to sperm cells.

(1) Leydig cells (2) Interstitial cells (3) Sertoli cells (4) Germ cells

Ans. (3) Sertoli cells

20. The cells which secrete androgens are

(1) Spermatozoa (2) Interstitial cells (3) Sertoli cells (4) Germ cells

Ans. (2) Interstitial cells

(D) ASSERTION – REASON QUESTIONS

Directions: In the following questions, a statement of assertion is followed by a statement of reason. Mark the correct choice as:

(1) If both Assertion and Reason are true and Reason is the correct explanation of Assertion.

(2) If both Assertion and Reason are true but Reason is not the correct explanation of Assertion.

(3) If Assertion is true but Reason is false.

(4) If both Assertion and Reason are false.

1. **Assertion :** In human male, testes are extra abdominal and lie in scrotal sacs.
Reason : Scrotum acts as thermo regulator and keeps testicular temperature lower by 2-2.5°C for normal spermatogenesis.

Ans (1)

2. **Assertion :** Testicular lobules are the compartments present in testes.
Reason : These lobules are involved in the process of fertilization.

Ans (3)

3. **Assertion :** Interstitial cell is present in the region outside the seminiferous tubule called interstitial spaces.
Reason : Interstitial cells provide nutrition to the sertoli cells.

Ans. (3)

4. **Assertion:** The testes are situated outside the abdominal cavity within the scrotum.
Reason: Muscles in scrotum helps to maintain low temperature of testes, necessary for spermatogenesis.

Ans (1)

5. **Assertion:** The bulbourethral gland is a male accessory gland.
Reason: Its secretion helps in the lubrication of the penis, thereby facilitating reproduction.

Ans (1)

6. **Assertion:** Human male ejaculates about 200 to 300 million sperms during coitus.
Reason: Only few reach the isthmus ampullary junction for process of fertilisation.

Ans (1)

7. **Assertion:** Epididymis is divided into three parts.
Reason: Epididymis is the organ that stores spermatozoa

Ans (2)

8. **Assertion:** Graafian follicle ruptures at the mid of menstrual cycle releasing the ovum.
Reason: Both LH and FSH attain a peak level at the middle of cycle.

Ans (1)

9. **Assertion:** Progesterone is required for maintenance of the endometrium.
Reason: Endometrium is essential for implanation of embryo.

Ans (2)

10. **Assertion:** The endometrium undergoes cyclical changes during menstrual cycle.
Reason: The myometrium exhibits strong contractions during delivery of the baby.

Ans (2)

(E) VERY SHORT ANSWER QUESTIONS

1. Write the function of FSH.

Ans FSH acts on sertoli cells and stimulates the secretion of some factors like ABP = androgen binding protein which helps in spermatogenesis.

2. Write names of enzymes present in the secretion of prostate gland.

Ans Fibrinolysin, spermin, fibrinogenase.

3. How is 'oogenesis' markedly different from 'spermatogenesis' with respect to the growth till puberty in the humans?

Ans. Oogenesis is initiated at the embryonic stage.

Spermatogenesis begins only at puberty.

4. Where is acrosome present in humans? Write its function?

Ans It is present at the tip or head of the sperm. It helps to penetrate through the zona pellucida in human ovum.

5. Write the function of each one of the following:

(a) (Oviducal) Fimbriae

(b) Oxytocin

Ans (a) Collection of ovum released by ovary.

(b) Causes uterine contraction for parturition/promotes milk ejection.

6. What is the number of chromosomes in the following cells? Primary oocyte, secondary oocyte, ootid and follicle.

Ans. The number of chromosome in the cells is as follows:

Primary oocyte: 23 pairs. Secondary oocyte: 23. Ootid: 23. Follicle: 23 pairs.

7. What is corpus luteum. How dose it functions as endocrine gland ?

Ans. After ovulation, the Graafian follicle ruptures & forms corpus luteum. Corpus luteum functions as endocrine glands as they secrete progesterone & estrogen in large quantities.

(F) SHORT ANSWER QUESTIONS

1. Give the function of

(a) Corpus luteum (b) Endometrium

Ans. Corpus luteum : It secretes progesterone which prepares endometrium of uterus for implantation and normal development of foetus.

Endometrium : It undergoes cyclic changes during menstrual cycle and prepares itself for implantation of blastocyst.

2. Give reason for the following :

(a) The first half of the menstrual cycle is called follicular phase as well as proliferative phase.

(b) The second half of the menstrual cycle is called luteal phase as well as secretory phase.

Ans. (a) During this phase, primary follicles transform into Graafian follicle under FSH stimulation. Graafian follicles secrete estrogens with stimulate enlargement of Endometrium of uterus.

(b) During this phase, Corpus luteum is fully formed and secretes large quantity of Progesterone.

3. What is meant by L.H. Surge ? Write the role of L.H.

Ans. LH surge refers to maximum level of luteinising hormone middle of menstrual cycle. LH cause ovulation.

4. Explain significance of the condition in which the testes remain suspended in scrotum outside the abdomen.

Ans. Human sperm cells cannot develop at body temperature. Spermatogenesis and maintenance of the seminiferous tubules requires a temperature slightly lower than that of the body. This is provided by the scrotum, which lies outside the abdominal cavity.

5. Describe the structure of a sperm with a diagram.

Ans. The human sperm is a microscopic structure with a head, middle piece and a tail. The head has the haploid nucleus and an anterior acrosome that contains the enzymes required for the fertilization of the egg. The middle piece has numerous mitochondria to produce the energy for the mobility of the tail of the sperm.

6. Enlist any two functions of a female placenta.

Ans. The structural and the functional unit between the developing embryo and the mother called placenta facilitates the supply of nutrients, oxygen to the embryo and also the removal of carbon dioxide and other excretory products produced by the embryo. It also acts as endocrine tissue and produces several hormones.

(G) LONG ANSWER QUESTIONS

1. (a) Explain the menstrual phase in a human female. State the levels of ovarian and pituitary hormones during this phase.

(b) Why is follicular phase in the menstrual cycle also referred as proliferative phase? Explain.

(c) Explain the events that occur in a Graafian follicle at the time of ovulation and there after.

Ans. (a) Menstrual phase occurs when released ovum not fertilized, break down of endometrial lining (of the uterus) and its blood vessel form the liquid that comes out through the vagina, lasts for 3 to 5 days,

Note - Low level of ovarian and pituitary hormones.

(b) In the ovary follicular development takes place and in the same phase the regeneration of endometrium through proliferation takes place inside uterus.

(c) Graafian follicle ruptures to release the ovum (secondary oocyte), remaining parts of the Graafian follicle transform into corpus luteum.

2. Mention the name and role of hormones which are involved in regulation of gamete formation in human male.

Ans. GnRH : Stimulates adenohypophysis to secrete gonadotropins.

GSH : Stimulates Sertoli cells to secrete factors while help in spermatogenesis.

ICSH : Stimulates interstitial cells to secrete testosterone.

3. Differentiate between spermatogenesis and oogenesis.

Ans. Spermatogenesis :

1. It occurs inside the testes.

2. All the stages are completed inside the testes.

3. Spermatogonia develop from the germinal epithelium lining in the seminiferous tubules.

4. All spermatogonia give rise to spermatocytes.

5. Primary spermatocytes divide by meiosis I to give rise to two secondary spermatocytes.

6. Secondary spermatocyte divides by meiosis

Oogenesis :

1. It occurs inside the ovary.

2. Majority occurs inside the ovary but last stages occur in the oviduct.

3. Oogonia develop from the germinal epithelium overlying the ovary.

4. Only few oogonia give rise to oocytes.

5. Primary oocyte undergoes meiosis I to give rise to one secondary oocyte and a polar body.

4. Answer the following questions.

(i) State the levels of FSH, LH and Progesterone simply by mentioning high or low around 13^{th} and 14^{th} day and 21^{st} to 23^{rd} day.

(ii) In which of the above mentioned phases does egg travel to fallopian tube ?

(iii) Why there is no mensuration after fertilisation ?

Ans. (i) 13-14th day 21st -23rd day

FSH - High Low

LH - High Low

Progesterone - Low High

(ii) End of follicular or proliferative phase.

(iii) Menstruation does not occur during pregnancy upon fertilization due to high level of progesterone secreted by persisting corpus luteum and Placenta.

5. (a) Read the graph given below. Correlate the ovarian events that take place in the human female according to the level of the pituitary hormone during the following day.

(i) 10th - 14th days **(ii) 14th -15th days**

(iii) 16th - 23th days **(iv) 25th - 29th days**

If the ovum is not fertilised)

(b) What are the uterine events that follow beyond 29th day if the ovum is not fertilised ?

Ans. (a) (i) Gonadotropins and FSH increases

(ii) LH attains peak level but FSH decreases

(iii) LH and FSH level decreases

(iv) LH remains low and FSH increases.

(b) After 29th day there is a menstrual flow involving discharge of blood and cast off endometrium lining.

6. T.S. of mammalian testis revealing seminiferous tubules show different ty

(i) Name the two types of cells of germinal epithelium.

(ii) Name of cells scattered in connective tissue and lying between seminiferous tubules.

Differentiate between them on the basis of their functions.

Ans. (i) Germinal epithelium have two types of cell. (1) Spermatogonium (2) Sertoli cells

(ii) Leydig cells or Interstitial cells.

Functions

Spermatogonium undergoes meiotic division leading to sperm formation.

Sertoli cell : Nourishes germ cells

Leydig cell : Synthesise and Secrete hormone androgen.

7. What are the various male accessory glands ? Give their function.

Ans. The male accessory glands include paired seminal vesicles, a prostrate gland and paired bulbourethral glands.

These glands secrete seminal plasma rich in fructose, calcium and certain enzymes. Secretions of bulbourethral glands help in lubrication of the penis.

8. Explain the menstrual cycle with a diagram.

Ans. Menstrual cycle has three phases: menstrual, proliferative and secretory.

(a) Menstrual Phase: The phase lasts for 3-5 days in human females and during this period the endometrial lining of the uterus is cast off and is slowly passed out from vagina as a mixture of blood.

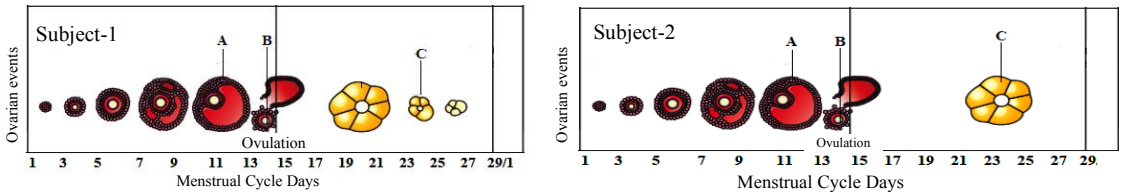
(b) Proliferative or Follicular Phase: It lasts for 11 days between 6th to 16th day of the cycle. During this phase one ovarian follicle is changed into Graafian follicle and the endometrial layer is rebuilt along with repair of the ruptured blood vessels. Estrogen increases. It ends with ovulation.

(c) Secretory Phase: It lasts for 12 days between 17-28 days. The Graafian follicle is converted to Corpus Luteum. The endometrium grows and thickens further. Progesterone increases. It end with the conversion of corpus luteum to corpus albicans.

(H) CASE BASED QUESTIONS

1. Study the following and answer the questions given below:

The following us the illustration of sequence of ovarian events during menstrual cycle in human female. Observe it and give the answer of question that follow:



(i) Which structure in subject-1 and subject-2 form corpus luteum?

Ans. Graafian Follicle

(ii) Ovulation takes place on which day of menstrual cycle?

Ans. About the 14^{th} day

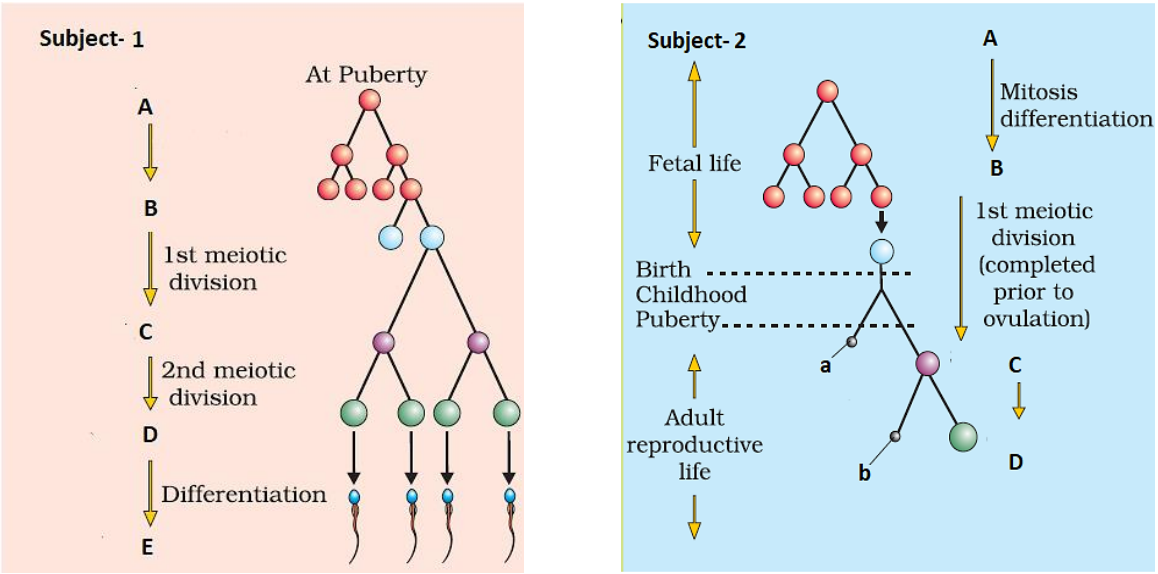
(iii) In subject-1 structure 'C' is?

Ans. Corpus albicans

(iv) Withdrawal of which hormone causes degeneration of corpus luteum in subject-1?

Ans. LH

2. To answer the questions, study the diagram below for Subject 1 and 2 showing different types of structure.



(i) At the end of first meiotic division in subject-1 the structure A differentiate into?

Ans. Secondary spermatocytes

(ii) Structure-A in subject-2 is produced during the formation of?

Ans. Secondary oocyte

(iii) What is the correct sequence of structure-E formation in subject-1?

Ans. Spermatogonia, spermatocyte, spermatid, spermatozoa

(iv) Polar bodies are formed during in which subject?

Ans. Subject-2

3. Read the following and answer the questions given below:

The female reproductive system consists of a pair of ovaries along with a pair of oviducts, uterus, cervix, vagina and the external genitalia located in the pelvic region. These parts of the system along with a pair of the mammary glands are integrated structurally and functionally to support the processes of ovulation, fertilisation, pregnancy, birth and child care. Each ovary is about 2 to 4 cm in length and is connected to the pelvic wall and uterus by ligaments. The oviducts which consist of 3 parts, uterus and vagina constitute the female accessory ducts. The uterus is single and it is also called the womb. The shape of the uterus is like an inverted pear. The wall of the uterus has three layers of tissue.

(i) Why ovaries consider as primary sex organs of FRS ?

Ans. They produce the female gametes (Ovum) and several steroid hormone.

(ii) Write the name of parts of fallopian tube .

Ans. Infundibulum, Ampulla, Isthmus

(iii) Write the name of external genitilia of FRS.

Ans. Mons pubis, Labia majora, Labia minora, Hymen and Clitoris.

(iv) Write the name of layers of uterus.

Ans. Perimetrium, Myometrium and Endometrium.

(v) "The presence or absence of hymen is not a reliable indicators of virginity or sexual experience''. Explain.

Ans. The hymen can also be broken by a sudden fall or jolt, insertion of a vaginal tampon, active participation in some sports like horseback riding, cycling, etc. In some women the hymen persists even after coitus.

4. Read the following and answer the questions given below:

The process of formation of a mature female gamete is called oogenesis which is markedly different from spermatogenesis. Oogenesis is initiated during the embryonic development stage when a couple of million gamete mother cells (oogonia) are formed within each fetal ovary; no more oogonia are formed and added after birth. These cells start division and enter into prophase-I of the meiotic division and get temporarily arrested at that stage, called primary oocytes. Each primary oocyte then gets surrounded by a layer of granulosa cells and then called the primary follicle A large number of these follicles degenerate during the phase from birth to puberty. Therefore, at puberty only 60,000-80,000 primary follicles are left in each ovary. The primary follicles get surrounded by more layers of granulosa cells and a new theca and called secondary follicles.

(i) Differentiate between primary oocytes and primary follicle.

Ans. Primary oocytes: - These cells start division and enter into prophase-I of the meiotic division and get temporarily arrested at that stage, called primary oocytes.

Primary follicle: - Each primary oocyte then gets surrounded by a layer of granulosa cells and then called the primary follicle.

(ii) Where and when the oogenesis initiated in female.

Ans. In the fetal ovary during embryonic development stage.

(iii) Name the ovarian hormone that induced the oogenesis process.

Ans. Estrogen

(iv) Write the name of stage in which the gametes mother cell get temporarily arrested?

Ans. Dictyotene of prophase-I of meiosis- I.

(v) How many primary follicles there are left in ovaries at puberty?

Ans. At puberty only 120,000-1600,000 primary follicles are left in ovaries.