Very Short Answer Questions (PY)

[1 Mark]

Q.1. Write the location and function of the Sertoli cells in humans.

Ans. Sertoli cells are present in seminiferous tubules. They provide nutrition to the germ cells or sperms.

Q.2. Mention the location and the function of Leydig cells in humans.

Ans. Leydig cells are present in the regions called interstitial spaces outside the seminiferous tubules. They synthesise and secrete androgens (testosterone).

Q.3. Name the hormones produced only during pregnancy in a human female. Mention their source organ.

Ans. During pregnancy, placenta produces hormones like human chorionic gonadotropin and human placental lactogen and ovary produces relaxin.

Q.4. List the changes that the primary ooctye undergoes in the tertiary follicular stage in the human ovary.

Ans. The primary oocyte within the tertiary follicle grows in size and completes its first meiotic division to form secondary oocyte and first polar body.

Q.5. Name the embryonic stage that gets implanted in the uterine wall of a human female.

Ans. Blastocyst/blastula.

Q.6. When and where do chorionic villi appear in humans? State their functions.

Ans. Chorionic villi appear after implantation on the trophoblast. It becomes interdigitated with uterine tissue to form the placenta and increases the surface area for exchange of materials between the mother and the embryo.

Q.7. How is the entry of only one sperm and not many ensured into an ovum during fertilisation in humans?

Ans. During fertilisation a sperm head comes in contact with zona pellucida layer of ovum and induces changes in the membrane that block the entry of additional sperms.

Q.8. Mention the function of mitochondria in sperm.

Ans. Provide energy for the movement of sperm tail.

Q.9. Mention the difference between spermiogenesis and spermiation.

Ans. Spermiogenesis: It is the transformation of spermatids into spermatozoa or sperms.

Spermiation: It is the release of sperms from seminiferous tubules.

Q.10. When do the oogenesis and the spermatogenesis initiate in human females and males respectively?

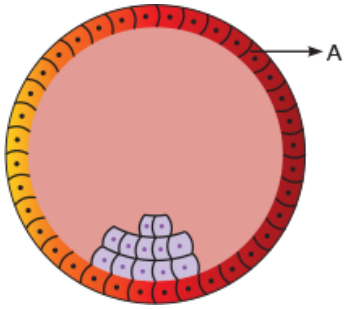
Ans. Oogenesis in human females initiate at the foetal/embryonic stage.

Spermatogenesis in human males starts at puberty.

Q.11. Mention the function of trophoblast in human embryo.

Ans. Trophoblast is the outer layer of blastocyst which helps in the attachment of blastocyst to the endometrium of the uterus.

Q.12. Identify the figure given below and the part labelled "A".



Ans. The figure is of blastula/blastocyst.

A—Trophoblast.

Q.13. Explain the function of umbilical cord.

Ans. Umbilical cord transports nutrients and respiratory gases and metabolic wastes to and from mother and foetus.

Very Short Answer Questions (OIQ)

[1 Mark]

Q.1. What is the function of bulbourethral glands?

Ans. The secretions of the bulbourethral glands help in the lubrication of the penis.

Q.2. How many chromosomes are present in a human male sperm?

Ans. 23.

Q.3. Name the term used for metamorphosis of spermatids?

Ans. Spermiogenesis

Q.4. What is urethral meatus?

Ans. The urethra originates from the urinary bladder and extends through penis to its external opening called urethral meatus.

Q.5. What is acrosome?

Ans. It is a cap-like structure present in the anterior of the head of a sperm.

Q.6. Define spermiogenesis. Where does it occur?

Ans. Spermiogenesis is the formation of haploid, microscopic and functional spermatozoa (male gametes) from the spermatids. It takes place in the testes (male reproductive organ).

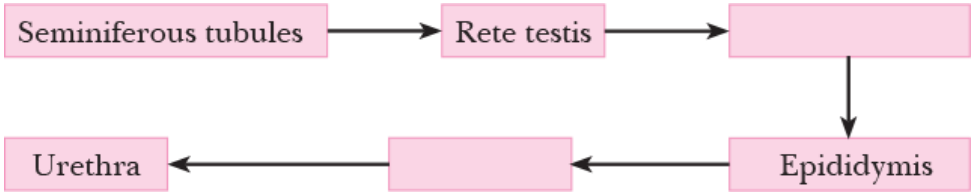
Q.7. Males in whom testes fail to descend to the scrotum are generally infertile. Why?

Ans. If the testes fail to descend to the scrotum, gametogenesis could be inhibited. The process of spermatogenesis requires a marginally lesser ambient temperature than that in the abdominal cavity.

Q.8. How many sperms will be produced from 50 primary spermatocytes?

Ans. 200 sperms.

Q.9. The path of sperm transport is given below. Provide the missing steps in blank boxes.



Ans. Vasa efferentia, Vas deferens.

Q.10. What is corpus luteum?

Ans. It is the remaining part of Graafian follicle after ovulation in the luteal phase which acts as an endocrine gland.

Q.11. Where does fertilisation normally take place in a human female?

Ans. Oviduct (Fallopian tube/ampullary–isthmic junction).

Q.12. Name the three layers of uterine wall.

Ans. Perimetrium, myometrium and endometrium.

Q.13. Name the fluid which protects an embryo.

Ans. Amniotic fluid.

Q.14. What is Graafian follicle?

Ans. It is a mature ovarian follicle in the ovary.

Q.15. Name the tissue which lines the inner surfaces of fallopian tube.

Ans. Ciliated epithelial tissue.

Q.16. Name the process of the rupture of Graafian follicle and the subsequent release of the egg from the ovary.

Ans. Ovulation.

Q.17. Name the part of the genital tract of human female which acts as 'womb'.

Ans. Uterus.

Q.18. Female reproductive organs and associated functions are given below in column A and B. Fill in the blank boxes.

Column A	**Column B**
Ovaries	Ovulation
Oviduct	A
B	Pregnancy
Vagina	Birth

Ans.

A—Fertilisation

B—Uterus

Q.19. What is endometrium?

Ans. It is the innermost glandular layer of uterus which lines the uterine cavity. Here, implantation of blastocyst takes place. It undergoes cyclical changes during menstrual cycle.

Q.20. During reproduction, the chromosome number (2n) reduces to half (n) in the gametes and again resume the original number (2n) in the offspring, what are the processes through which these events take place?

Ans. Halving of chromosomal number takes place during gametogenesis by meosis and regaining the 2n number occur as a result of fertilisation by fusion of male and female gametes.

Q.21. What name is given to the cells of inner cell mass, that have the potential to give rise to all tissues and organs in a human being?

Ans. Stem cells

Q.22. Name the scientific term used for the membrane that surrounds an ovum.

Ans. Zona pellucida.

Q.23. Mention the importance of LH surge during menstrual cycle.

Ans. LH surge is essential for the events leading to ovulation.

Q.24. What is corona radiata?

Ans. The follicle cells that envelope the egg outside zona pellucida are called corona radiata.

Q.25. Which part of the blastula is destined to form the germ layers of the developing embryo in humans?

Ans. Inner cell mass

Q.26. Menstrual cycles are absent during pregnancy. Why?

Ans. The high levels of progesterone and estrogens during pregnancy suppress the release of gonadotropins required for the development of new follicles. Therefore, new cycle cannot be initiated.

Q.27. Given below are the stages in human reproduction. Write them in correct sequential order.

Insemination, Gametogenesis, Fertilisation, Parturition, Gestation, Implantation

Ans. Gametogenesis, Insemination, Fertilisation, Implantation, Gestation, Parturition.

Q.28. What is the role of cervix of the human female system in reproduction?

Ans. Cervix helps in regulating the passage of sperms into the uterus and forms the birth canal to facilitate parturition.

Q.29. Name the important mammary gland secretions that help in resistance of the new born baby.

Ans. Colostrum

Q.30. What do you mean by foetal ejection reflex?

Ans. These are mild uterine contraction induced by the signals for parturition originated from fully developed foetus and placenta.

Short Answer Questions-I (PYQ)

[2 Marks]

Q.1. Write the location and functions of the following in human testes:

Q. Sertoli cells

Ans. Location: Lines inside the seminiferous tubules.

Functions: Provide nutrition to the germ cells sperms.

Q. Leydig cells

Ans. Location: Outside seminiferous tubules in interstitial.

Functions: Synthesise or secrete male hormones or androgens.

Q.2. Give reasons why the human testes are located outside the abdominal cavity.

Ans. The human testes are located outside the abdominal cavity to maintain the temperature (2–2.5°C) lower than the normal internal body temperature. This is essential for spermatogenesis.

Q.3. Why are the human testes located outside the abdominal cavity? Name the pouch in which they are present.

Ans. The human testes need lower temperature, 2 – 2.5°C less than the body temperature, for the formation of sperms which is provided outside the body.

Testes are present in scrotal sac or scrotum.

Q.4. Study the sectional view of human testis showing seminiferous tubules given below. Answer the questions that follow.

Q. Identify a, b and c.

Ans.

a—Spermatogonia

b—Interstitial cells

c—Spermatozoa

Q. Write the functions of a and d.

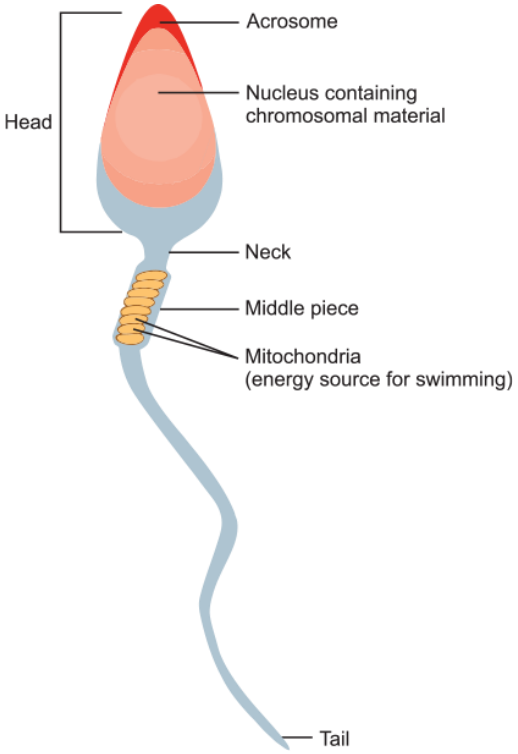
Ans.

a: The spermatogonia or male germ cells undergo meiotic divisions leading to sperm formation.

d: Sertoli cells provide nutrition to the germ cells.

Q.5. Draw a diagram of a human sperm. Label only those parts along with their functions, that assist the sperm to reach and gain entry into the female gamete.

Ans.



Structure of a sperm

Q.6. Where is acrosome present in humans? Write its function.

Ans. Acrosome is present on the sperm head. It has enzymes to dissolve the follicles of ovum and facilitate entry of sperm nucleus for fertilisation.

Q.7. Write the function of each of the following:

Q. Middle piece in human sperm.

Ans. Provides energy for movement.

Q. Luteinising hormone in human males.

Ans. Stimulates synthesis and secretion of androgens or male hormones for spermatogenesis.

Q.8. Write the function of each of the following:

Q. Seminal vesicle

Ans. It is responsible for storage and transport of sperms. It provides secretions for motility and nourishment of sperms.

Q. Acrosome of human sperm.

Ans. It helps the sperm to enter into the cytoplasm of the ovum through the zona pellucida and provides enzymes for fertilisation.

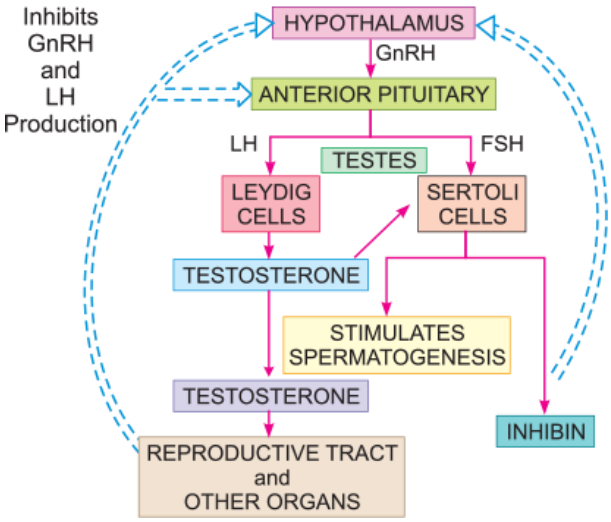
Q.9. Spermatogenesis in human males is a hormone regulated process. Justify.

Ans. Hormonal control of spermatogenesis

Spermatogenesis is initiated at the age of puberty by the gonadotropin releasing hormone (GnRH) secreted by the hypothalamus.

The increased levels of GnRH stimulate the anterior pituitary which then secretes the FSH (follicle stimulating hormone) and LH (luteinising hormone). FSH stimulates Sertoli cells to secrete some factors which help in spermiogenesis.

LH acts on the Leydig cells and causes the secretion of testosterone from the testes.



Flow chart showing the hormonal control of the human male reproductive system

Q.10. Write the location and functions of myometrium and endometrium.

Ans.

Endometrium is the inner layer of uterus. It assists in cyclic changes during menstruation and implantation of embryo.

Myometrium is the middle layer of uterus. It assists in contractions of the uterus during parturition.

Q.11. Where are fimbriae present in a human female reproductive system? Give their function.

Ans. The fimbriae are the finger-like projections present on the edges of infundibulum (fallopian tubes). They help in collection of ovum after ovulation.

Q.12. Differentiate between major structural changes in the human ovary during the follicular and luteal phase of the menstrual cycle.

Ans.

S. No.	**Follicular phase**	**Luteal phase**
(*i*)	During this, primary follicles grow to become fully mature Graafian follicle.	During this, remaining part of Graafian follicle transforms into corpus luteum.
(*ii*)	Endometrium regenerates through proliferation.	Endometrium further thickens secreting progesterone for implantation after fertilisation. If fertilisation does not occur, corpus luteum degenerates.

Q.13. Mention the fate of corpus luteum and its effect on the uterus in absence of fertilisation of the ovum in a human female.

Ans. In the absence of fertilisation, corpus luteum degenerates and this causes disintegration of the endometrium of ovary, leading to menstruation.

Q.14. Explain the events that follow up to fertilisation when the sperms come in contact with the ovum in the fallopian tube of a human female.

Ans. The secretion of the acrosome help the sperm enter into the cytoplasm of ovum through zona pellucida and the plasma membrane. This induce the completion of second meiotic division of the secondary oocyte, forming second polar body and a haploid ovum. Soon the haploid nucleus of the sperm and that of the ovum fuse together to form a diploid zygote.

Q.15. Differentiate between menarche and menopause.

Ans. Menarche is the beginning of menstrual cycle at puberty. It starts at the age of 13−15 years. Menopause is the cessation of menstrual cycle. It happens around 50 years of age.

Q.16. Mention the target cells of luteinising hormone in human males and females. Explain the effect and the changes which the hormone induces in each case.

Ans. The target cells of luteinising hormone (LH) in males are the Leydig cells and in females are the mature growing follicles.

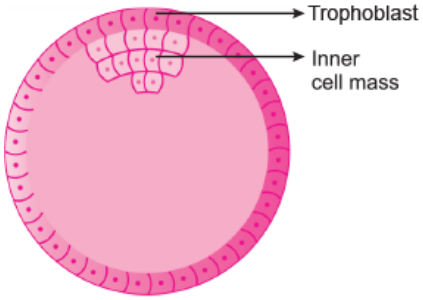
LH in males stimulates the Leydig cells (interstitial cells) of testes to synthesise and secrete androgens which in turn stimulate the process of spermatogenesis. LH in females stimulate the ovulation (release of ovum) and transformation of Graafian follicle into corpus luteum to secrete progesterone which prepares the endometrium to receive and implant blastocyst.

Q.17. Write the effect of the high concentration of LH on a mature Graafian follicle.

Ans. In high conventration of LH, the mature Graafian follicle ruptures to release the secondary oocyte or ovum from the ovary by the process of ovulation.

Q.18. Draw a labelled diagram of a human blastocyst. How does it get implanted in the uterus?

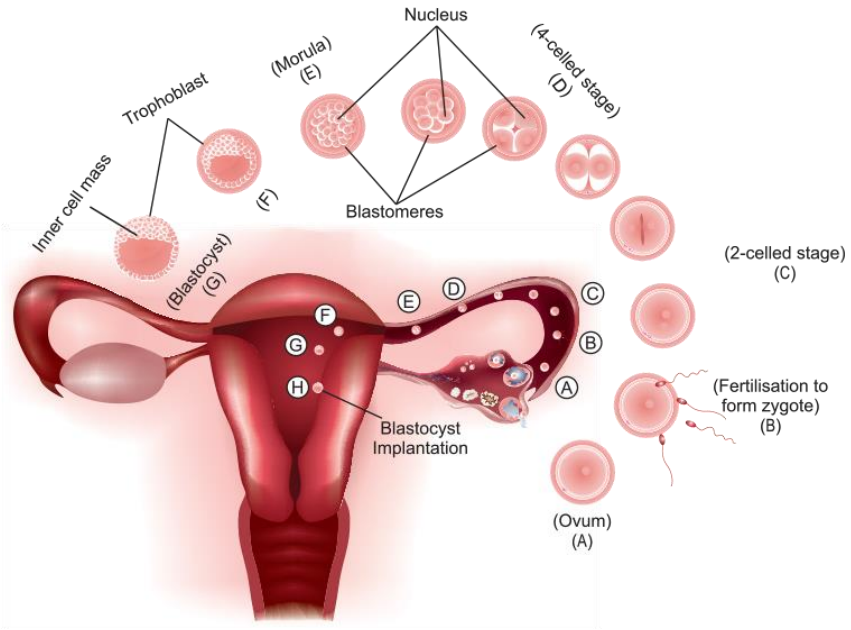
Ans. Human blastocyst



The trophoblast layer of the blastocyst gets attached to the cells of the endometrium and the inner cell mass gives rise to the embryo. The cells of endometrium divide rapidly and cover the blastocyst. So, the blastocyst gets embedded in the endometrium of the uterus.

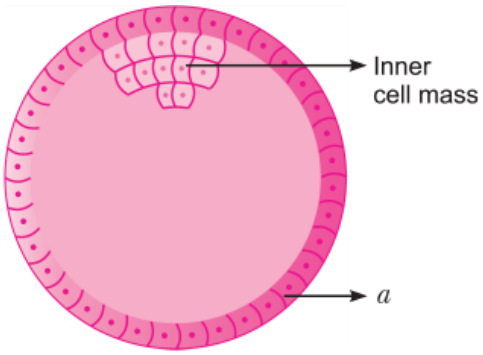
Q.19. Differentiate with the help of diagrams only between morula and blastocyst of a human.

Ans.



Transport of ovum, fertilisation and passage of growing embryo through fallopian tube

Q.20. Study the figure given below and answer the questions that follow:



Q. Name the stage of human embryo the figure represents.

Ans. Blastocyst

Q. Identify 'a' in the figure and mention its function.

Ans. 'a' is trophoblast. The trophoblast layer gets attached to endometrium and later forms extraembryonic membrane namely chorionic villi.

Q. Mention the fate of the inner cell mass after implantation in the uterus.

Ans. The inner cell mass differentiates into an outer layer of ectoderm and an inner layer of endoderm.

Q. Where are the stem cells located in this embryo?

Ans. Inner cell mass.

Q.21. Write the function of each one of the following:

Q. (Oviducal) Fimbriae

Ans. Collection of ovum released by ovary.

Q. Oxytocin

Ans. Cause uterine contraction for parturition; promotes milk ejection.

Q.22. Placenta acts as an endocrine tissue. Justify.

Ans. Placenta produces several hormones like human chorionic gonadotropin (hCG), human placental lactogen (hPL), estrogens, progesterones that are essential to maintain pregnancy. This way placenta acts as an endocrine tissue.

Q.23. State the role of oxytocin in parturition. What triggers its release from the pituitary?

Ans. Oxytocin acts on uterine muscle and cause stronger uterine contraction. This leads to expulsion of the foetus or baby out of uterus.

Q.24. Why is breast-feeding recommended during the initial period of an infant's growth? Give reasons.

Ans. The milk produced during the initial few days of lactation is called colostrum. It contains several antibodies absolutely essential, to develop resistance for the new-born babies. It is the most hygienic food for the baby and it also develops a bond between mother and child.

Q.25. What stimulates pituitary to release the hormone responsible for parturition? Name the hormone.

Ans. The signal from the fully developed foetus and placenta or the foetal ejection reflex induces mild uterine contraction. The hormone released is oxytocin.

Q.26. Describe the process of parturition in humAns.

Ans. Parturition

The average duration of human pregnancy is about 9 months which is called the gestation period.

The act of expelling the full term foetus from the mother's uterus at the end of gestation period is called parturition.

It is induced by a complex neuroendocrine mechanism.

Parturition signals 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 induces stronger uterine muscle contractions which lead to expulsion of the baby from the uterus through the birth canal.

Q.27. Answer the following questions:

Q. Where do the signals for parturition originate from in humans?

Ans. Signals for parturition originate from the fully developed foetus/placenta/foetal ejection reflex

Q. Why is it important to feed the newborn babies on colostrum?

Ans. Colostrum contains antibodies (IgA), to (passively) immunise the baby.

Short Answer Questions-I (OIQ)

[2 Mark]

Q.1. Name the organs which comprise the male reproductive system.

Ans. The organs comprising the male reproductive system are testes, rete testis, vasa efferentia, epididymis, vas deferens, seminal vesicle, prostate gland, Cowper's gland and penis.

Q.2. Who discovered Sertoli cells? Mention their role in spermatogenesis.

Ans. Enrico Sertoli discovered the Sertoli cells. Sertoli cells provide nutrition to the male germ cells during spermatogenesis.

Q.3. What is seminal plasma? What are its components?

Ans. The accessory glands of a male reproductive system secrete a fluid mixture called seminal plasma. It is rich in fructose, calcium and certain enzymes.

Q.4. Which organs together form the female reproductive system?

Ans. The organs which together form the female reproductive system are ovaries, fallopian tubes, uterus, cervix, vagina, mammary gland and vulva.

Q.5. hat is ovulation? What happens to the Graafian follicle after ovulation?

Ans. The process of release of ovum by the rupture of mature Graafian follicle is called ovulation. Graafian follicle is transformed into corpus luteum after ovulation.

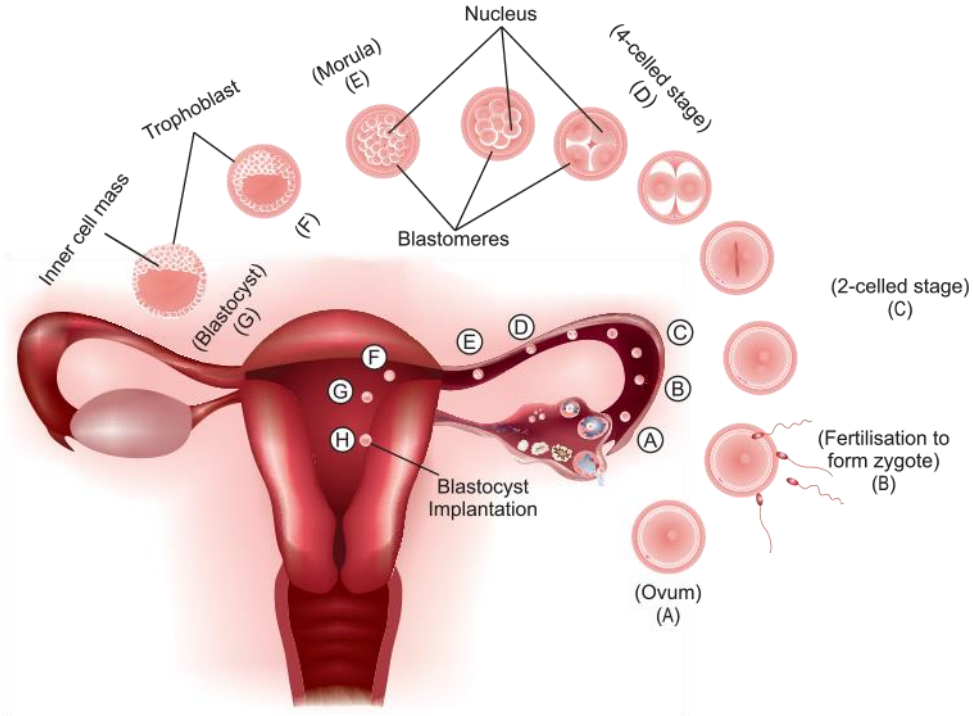
Q.6. A sperm has just fertilised a human egg in the fallopian tube. Trace the events that the fertilised egg will undergo up to the implantation of the blastocyst in the uterus.

Ans. Implantation

Zygote divides rapidly by mitotic division as it moves through isthmus of oviduct towards uterus. This is called **cleavage**. As a result, 2, 4, 8, 16 daughter cells are produced which are termed as **blastomeres**.

The morula (Embryo with 8-16 blastomeres) continues to divide and transforms into a large mass of cells called **blastocyst**, which passes further into the uterus.

Blastomeres in the blastocyst are arranged into an outer layer called **trophoblast** and an inner group of cells attached to trophoblast called **inner cell mass**.



Transport of ovum, fertilisation and passage of growing embryo through fallopian tube

The trophoblast layer gets attached to the cells of the endometrium and the inner cell mass gives rise to the embryo.

After attachement, the cells of endometrium divide rapidly and cover the blastocyst.

So, the blastocyst gets embedded in the endometrium of the uterus. This is called **implantation**, which leads to pregnancy.

Q.7. How does the female gamete reach the uterus from ovary?

Ans. The ovary releases the female gamete around the 14th day of menstrual cycle into the abdominal cavity. From here it is collected by the fimbriae of the fallopian tube. The uterine tubes have an internal lining of ciliated cells which push the collected gamete towards the uterus.

Q.8. What function do fallopian tubes perform?

Ans.

(i) It has fimbria which collect ova from ovary after ovulation.

(ii) They provide a site for fertilisation.

Q.9. What is corpus luteum? Under what conditions does it undergo degeneration?

Ans. It is a yellow coloured body formed from remaining parts of the Graafian follicle after ovulation and acts as an endocrine gland. Corpus luteum degenerates in the absence of fertilisation and implantation of fertilised ovum.

Progesterone is the hormone essential for the maintenance of the endometrium.

Q.10. Women experience two major events in their life time, one at menarche and the second at menopause. Mention the characteristics of both the events.

Ans. Menarche represents the beginning of menstrual cycle which is an indication of attainment of sexual maturity. Menopause, on the other hand, refers to the cessation of menstruation which in turn means stoppage of gamete production, i.e., it marks the end of reproductive or fertile life of the female.

Q.11. Mention the number of cells in the following stages:

S. No.	**Embryonic stages**	**No. of cells**
(i)	Zygote	_____
(ii)	Morula	_____
(iii)	Blastocyst	_____

Ans.

(i) 1

(ii) 2, 4, 8, 16

(iii) more than 16

Q.12. Spermatids possess haploid chromosome number. Explain.

Ans. Spermatids are produced by meiosis in the primary spermatocytes and thus possess haploid number of chromosome.

Q.13. Where do sperms mature and become motile?

Ans. The sperms mature in epididymis. The mature spermatozoa from epididymis pass into the vas deferens. Here, they partly swim and are mainly moved by muscular action of the vas deferens.

Q.14. Why does meiosis and mitosis occur in germ cells?

Ans. Meiosis or reductional division occurs in germ cells in order to produce haploid gametes. Gametes cannot function on their own and they have to fuse again to form a diploid (2n) zygote which eventually gives rise to the offspring. So, if the germ cells are diploid, the chromosome numbers will keep on increasing in the successive generations. Mitosis occurs to produce large no of germ mother cells.

Q.15. Mention the sites of action of the hormones GnRH and FSH during spermatogenesis in human males. Give one function of each of the hormones.

Ans. The gonadotropin releasing hormone (GnRH) is secreted by hypothalamus. The increased level of GnRH stimulates the anterior pituitary which then secretes the FSH (follicle stimulating hormone) and LH (luteinising hormone). FSH acts on the Sertoli cells and stimulates secretion of some factors which help in spermiogenesis. LH secretes testosterone that stimulates spermatogenesis.

Q.16. First half of the menstrual cycle is called proliferative phase as well as follicular phase. Explain.

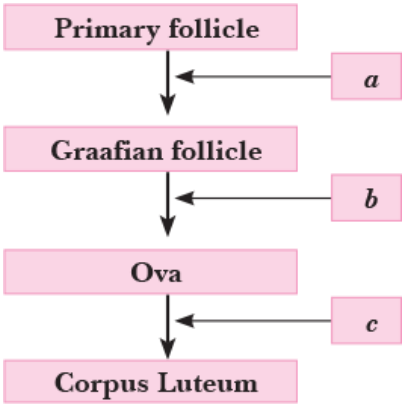
Ans. During first half of menstrual cycle, the primary follicles in the ovary grow to become a fully mature Graafian follicle and simultaneously the endometrium of uterus regenerates through proliferation. These changes in the ovary and the uterus are induced by changes in the levels of pituitary and ovarian hormones. The secretion of gonadotropins (LH and FSH) increases gradually during the follicular phase and stimulates follicular development as well as secretion of estrogens by the growing follicles.

Q.17. Name the muscular and the glandular layers of human uterus. Which one of these layers undergoes cyclic changes during menstrual cycle? Name the hormone essential for the maintenance of this layer.

Ans. The muscular layer of uterus is myometrium (middle thick layer of smooth muscle) and the glandular layer that lines the uterine cavity is endometrium (innermost layer).

The endometrium undergoes cyclic changes during the menstrual cycle.

Q.18. Given below is a flow chart showing ovarian changes during menstrual cycle. Fill in the spaces with the hormonal factor(s) responsible for the events shown.



Ans.

(a) FSH and estrogen

(b) LH

(c) Progesterone

Q.19. Differentiate between morula and blastula.

Ans.

S. No.	**Morula**	**Blastula**
(*i*)	It is a solid mass of daughter cells (blastomeres) formed by cleavage of zygote.	It is a hollow mass of cells having a central cavity called blastocoel.
(*ii*)	It has 16 identical cells (blastomeres).	It has an outer cell layer, trophoblast, and an inner cell mass.

Q.20. After implantation interdigitation of maternal and foetal tissues takes place. Identify the tissues involved and justify their role.

Ans. After implantation interdigitation of maternal and foetal tissues results in formation of structural and functional unit between embryo and maternal body called placenta.

It facilitates supply of oxygen and nutrients to the embryo, removal of carbon dioxide and excretory material and also acts as an endocrine tissue and produces hormones like HCG, hPL, estrogen, progesterone and relaxin.

Q.21. How is the milk production regulated by hormones in human female? Explain.

Ans. Prolactin hormone controls the synthesis of milk proteins in the mammary gland. Progesterone controls the development of alveoli of mammary glands and the release of milk during lactation is stimulated by the rise in the level of oxytocin.

Q.22. What are the events taking place in the ovary and uterus during follicular phase of the menstrual cycle?

Ans.

(i) The primary follicles grow and become fully mature Graafian follicles.

(ii) Secretion of estrogen hormone.

(iii) Endometrium of uterus regenerates through proliferation.

Q.23. What is the number of chromosomes in the following cells of a human male?

Q. Spermatogonial cells

Ans. 46

Q. Spermatids

Ans. 23

Q. Primary spermatocytes

Ans. 46

Q. Sertoli cells

Ans. 46

Q.24.

(i) How many spermatozoa are formed from one secondary spermatocyte?

(ii) Where does the first cleavage division of zygote take place?

Ans.

(i) Two

(ii) During the passage of zygote from fallopian tube to the uterus.

Q.25. What is the number of chromosomes in the following cells of a human female?

Q. Primary oocyte

Ans. 46

Q. Ootid

Ans. 23

Q. Secondary oocyte

Ans. 23

Q. Follicle cells

Ans. 46

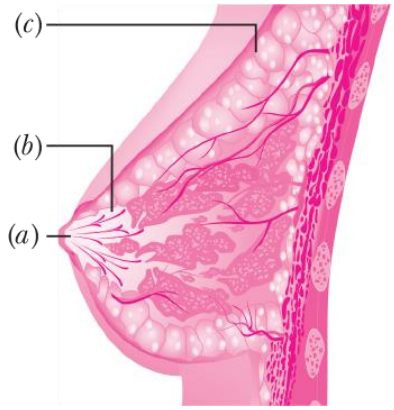
Q.26. Corpus luteum in pregnancy has a long life. However, if fertilisation does not take place it remains active only for 10−12 days. Why?

Ans. This is because of a neural signal given by the maternal endometrium to its hypothalamus in presence of a zygote to sustain the gonadotropin (LH) secretion, so as to maintain the corpus luteum as long as the embryo remains there. In the absence of a zygote, therefore, the corpus luteum degenerates.

Q.27. Why does corpus luteum secrete large amount of progesterone during luteal/secretory phase of the menstrual cycle?

Ans. The hormone progesterone is essential for the maintenance of endometrium of the uterus. It maintains the endometrial lining of uterus so that the foetus may get implanted in the uterus. So, corpus luteum secretes large amounts of progesterone during the luteal phase of menstrual cycle.

Q.28. Label a, b, c in the following diagram.



Ans.

(a) Nipple

(b) Ampulla

(c) Fat

Q.29. Name two hormones that can be found only in the blood of a pregnant woman. Mention the source organ/tissue that secretes each of them.

Ans. Human chorionic gonadotropin (hCG)—Placenta.

Human placental lactogen (hPL) — Placenta.

Relaxin (towards the end of pregnancy)—Ovary.

Short Answer Questions-II (PY)

[3 Marks]

Q.1. (i) Draw a sectional view of seminiferous tubule of a human. Label the following cells in the seminiferous tubule:

(a) Cells that divide by mitosis to increase their number.

(b) Cells that undergo Meiosis I.

(c) Cells that undergo Meiosis II.

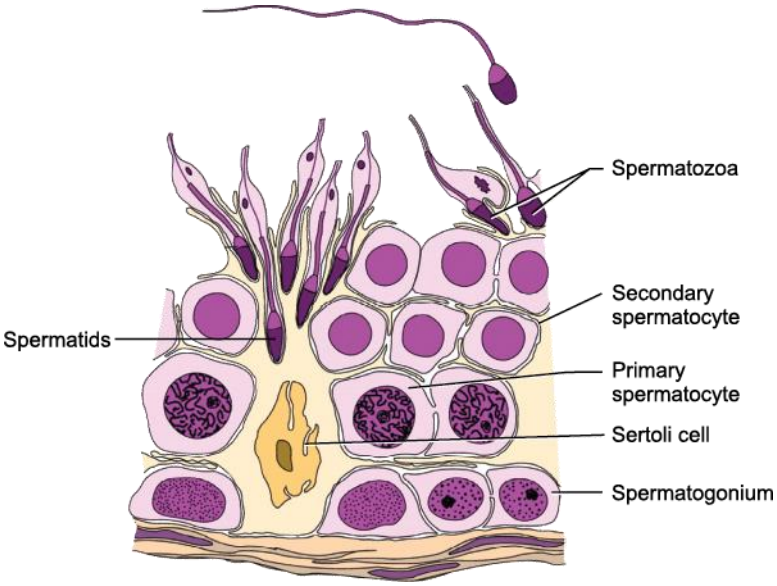
(d) Cells that help in the process of spermiogenesis.

(ii) Mention the role of Leydig cells.

OR

Draw a labelled sectional view of seminiferous tubule of a human male.

Ans. (i)



Diagrammatic sectional view of a seminiferous tubule (enlarged)Hormonal control of spermatogenesis

(a) Cells that divide by mitosis to increase their number—Spermatogonia

(b) Cells that undergo Meiosis I—Primary spermatocytes

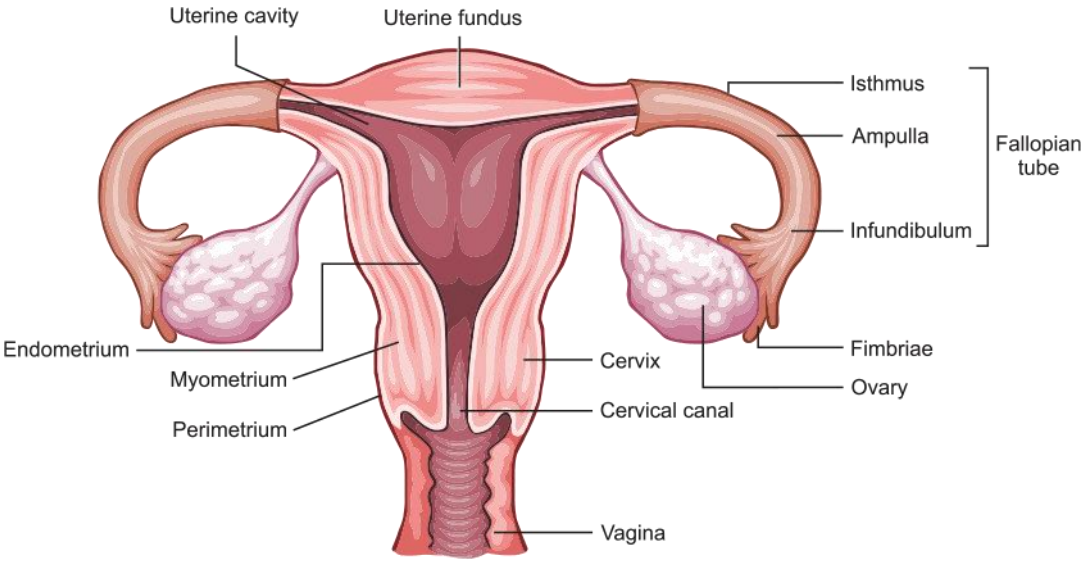
(c) Cells that undergo Meiosis II—Secondary spermatocytes

(d) Cells that help in the process of spermiogenesis—Sertoli cells

(ii) Role of Leydig cells: They synthesise and secrete testicular hormones called androgens.

Q.2. Draw a labelled diagram of the reproductive system in a human female.

Ans.



Diagrammatic sectional view of the female reproductive system

Q.3. Draw a diagram of the microscopic structure of human sperm. Label the following parts in it and write their functions.

(i) Acrosome

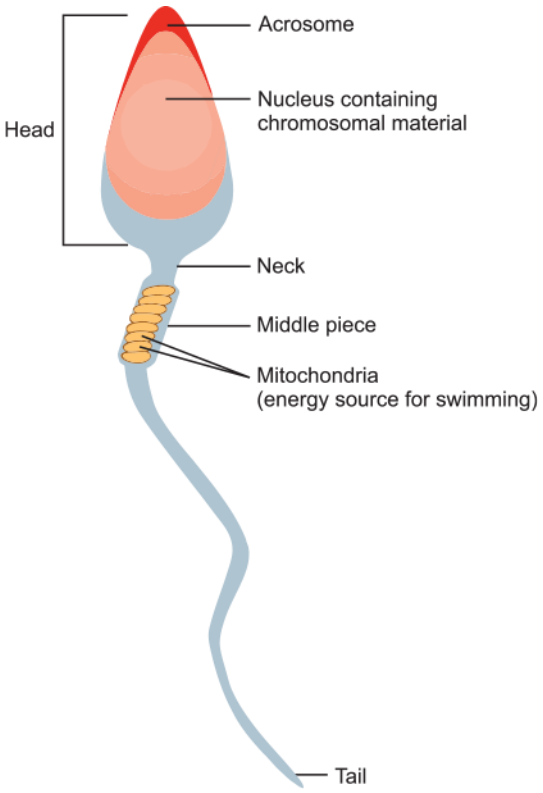
(ii) Nucleus

(iii) Middle piece

OR

Draw a diagram of a human sperm. Label only those parts along with their functions, that assist the sperm to reach and gain entry into the female gamete.

Ans.



Structure of a sperm

(i) Acrosome: Contains hydrolytic enzymes that help in dissolving membranes of the ovum for fertilisation.

(ii) Nucleus: Carries genetic material of male.

(iii) Middle piece: Contains a number of mitochondria that provide energy for the movement of the tail that facilitate sperm motility.

Q.4. (i) Draw a sectional view of human ovary and label

(a) Primary follicle

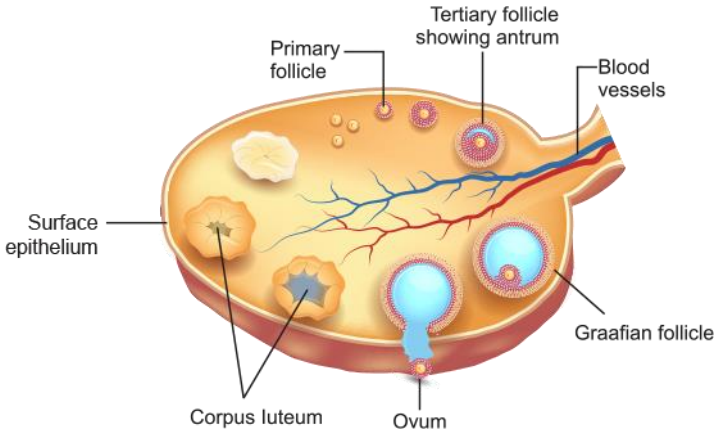
(b) Graafian follicle

(c) Corpus luteum

(ii) Mention the effect of pituitary hormones on the parts labelled.

Ans.

(i)



Sectional view of ovary

(ii) The pituitary hormones FSH and LH effect the growth and development of primary follicle, Graafian follicle and corpus luteum.

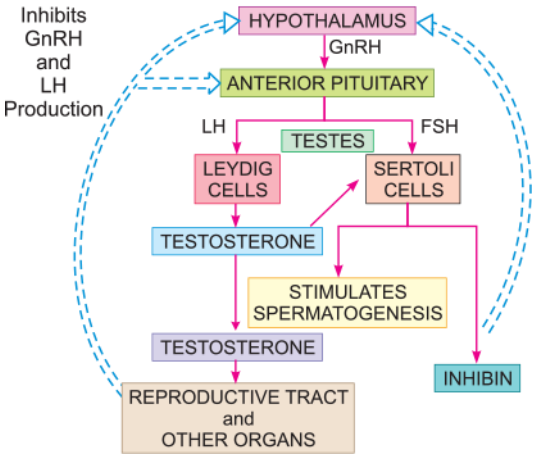
Q.5. Explain the hormonal control of spermatogenesis in humans.

Ans. Hormonal control of spermatogenesis

Spermatogenesis is initiated at the age of puberty by the gonadotropin releasing hormone (GnRH) secreted by the hypothalamus.

The increased levels of GnRH stimulate the anterior pituitary which then secretes the FSH (follicle stimulating hormone) and LH (luteinising hormone). **FSH** stimulates Sertoli cells to secrete some factors which help in spermiogenesis.

LH acts on the Leydig cells and causes the secretion of testosterone from the testes.



Flow chart showing the hormonal control of the human male reproductive system

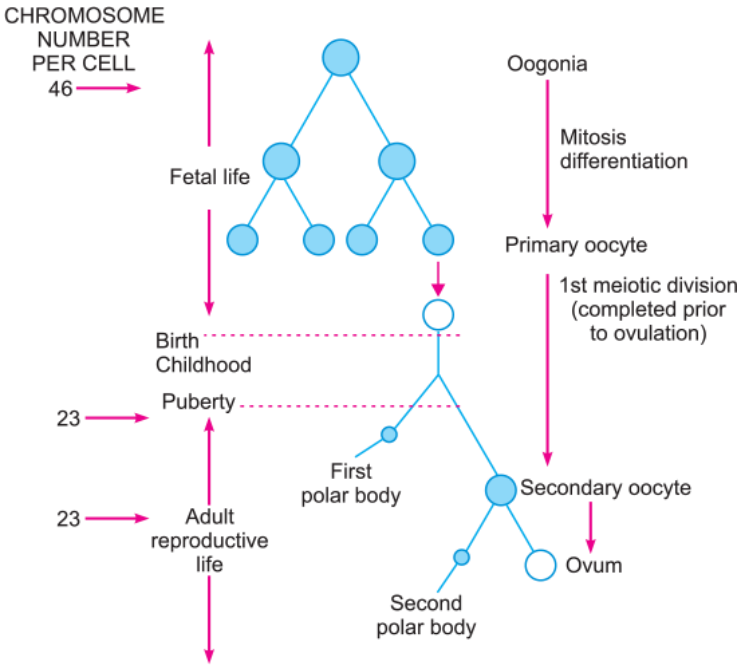
Q.6. Explain the steps in the formation of an ovum from an oogonium in humans.

Ans. Oogenesis

The process of formation of a mature female gamete is called oogenesis. It occurs in the ovaries. It consists of the following three phases:

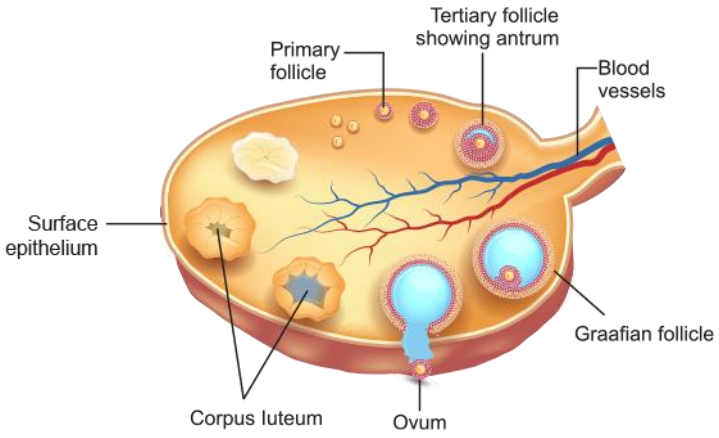
(a) Multiplication phase: Oogenesis is initiated during the embryonic development stage when a couple of million gamete mother cells (oogonia) are formed within each foetal ovary. No more oogonia are formed and added after birth. These cells start division and enter into prophase-I of the meiotic division. They get temporarily arrested at this stage and are called primary oocytes.

(b) Growth phase: Each primary oocyte then gets surrounded by a layer of granulosa cells. This structure is called the primary follicle. A large number of these follicles degenerate during the phase from birth to puberty. At puberty, only 60,000 to 80,000 primary follicles are left in each ovary. The primary follicles get surrounded by more layers of granulosa cells and a new theca to form secondary follicles.



Systematic representation of oogenesis

(c) Maturation phase: In the first maturation phase, the secondary follicle soon transforms into a tertiary follicle. The primary oocyte within the tertiary follicle grows in size and completes its first meiotic division to form a large, haploid, secondary oocyte and a tiny first polar body. The tertiary follicle changes into a mature follicle—the Graafian follicle—which ruptures to release the **secondary oocyte** (ovum) from the ovary by a process called **ovulation**. The second maturation phase occurs after fertilisation when the meiotic division of the secondary oocyte is complete. This second meiotic division results in the formation of a second polar body and a haploid ovum (ootid).



Sectional view of ovary

***** Oogenesis is completed when the sperm penetrates the ovum.

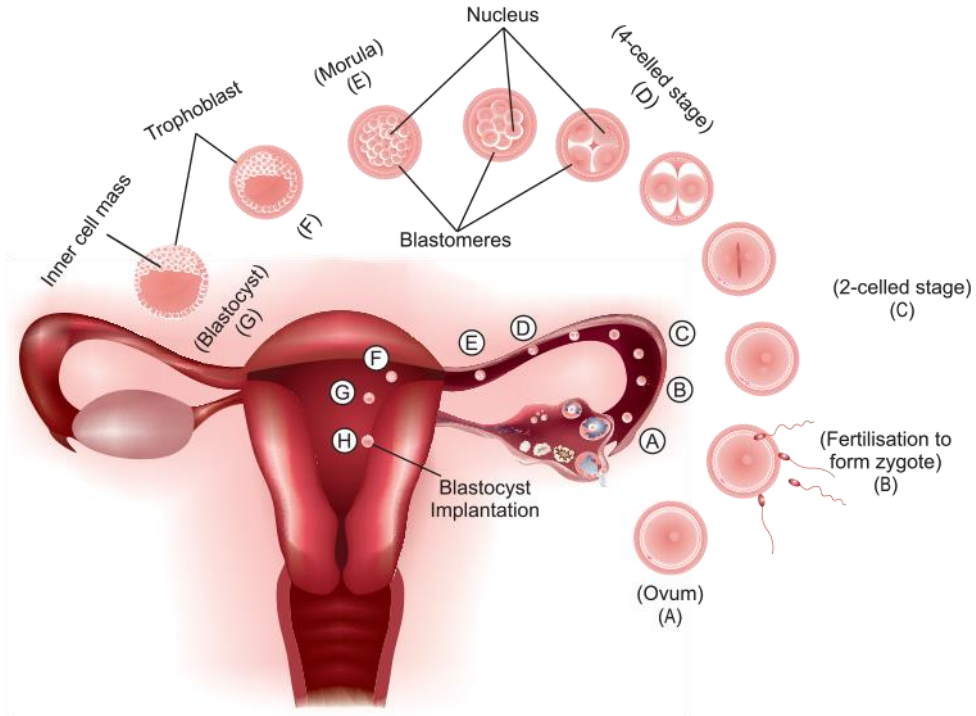
Q.7. Draw the following diagrams related to human reproduction and label them.

(i) The zygote after the first cleavage division

(ii) Morula stage

(iii) Blastocyst stage (sectional view)

Ans.



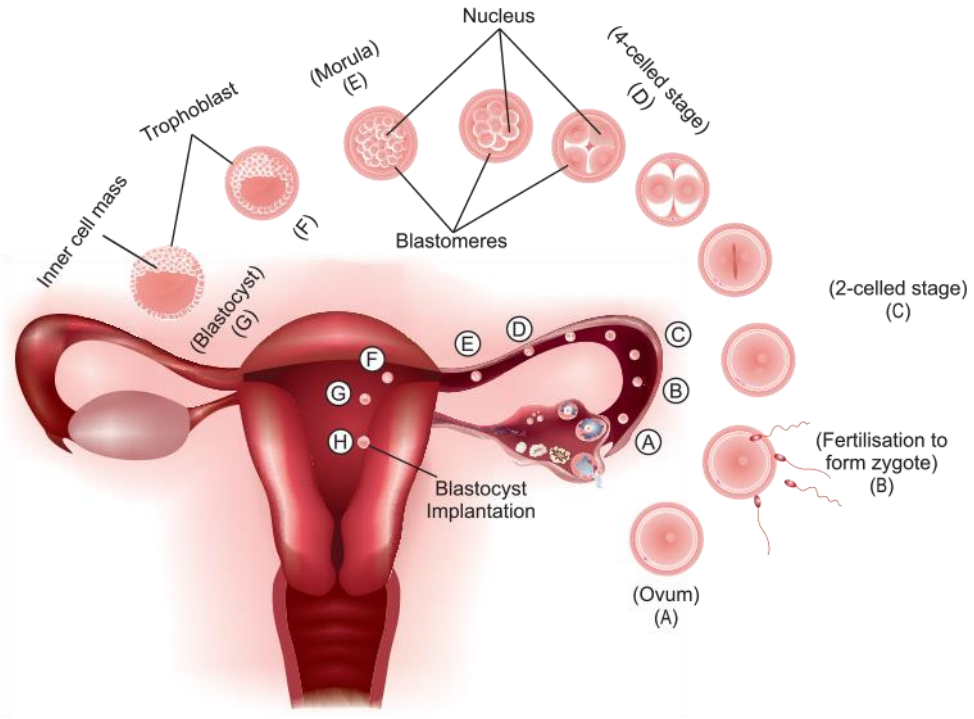
Transport of ovum, fertilisation and passage of growing embryo through fallopian tube

Q.8. Name the stage of human embryo at which it gets implanted. Explain the process of implantation.

OR

Draw a labelled diagram of a human blastocyst. How does it get implanted in the uterus?

Ans.

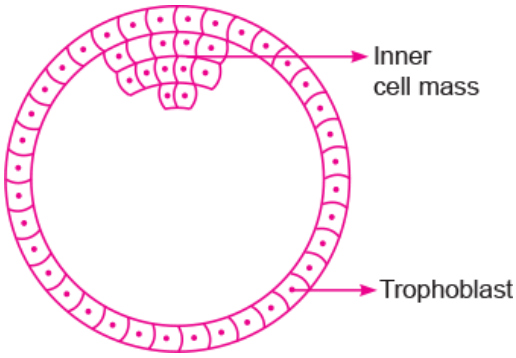


The human embryo gets implanted at blastocyst.

The trophoblast layer of the blastocyst get attached to the endometrium and the inner cell mass gets differentiated as the embryo. After attachment the uterine cell divides rapidly and covers the blastocyst. As a result the blastocyst becomes embedded in the endometrium of the uterus.

Q.9. Draw a labelled diagram of the embryonic stage that gets implanted in the human uterus. State the functions of the two parts labelled.

Ans.



Trophoblast helps in implantation or attachment to endometrium.

Inner cell mass gets differentiated into an embryo.

Q.10. Name the source of gonadotropins in human females. Explain the changes brought about in the ovary by these hormones during menstrual cycle.

OR

Describe how the changing levels of FSH, LH and progesterone during menstrual cycle induce changes in the ovary and the uterus in human female.

Ans. Gonadotropins (LH and FSH) are secreted by the anterior lobe of pituitary gland.

Gonadotropins (LH and FSH) increase gradually during the follicular phase (proliferative phase) of menstrual cycle and stimulate follicular development as well as secretion of estrogen by the growing follicles.

LH and FSH attain a peak level in the middle of the cycle (about 14th day) and rapid secretion of LH induces rupture of Graafian follicle followed by ovulation (release of ovum).

LH stimulates transformation of Graafian follicle into corpus luteum.

Q.11. When and where do chorionic villi appear in humans? State their function.

Ans. Chorionic villi appear after implantation on the trophoblast.

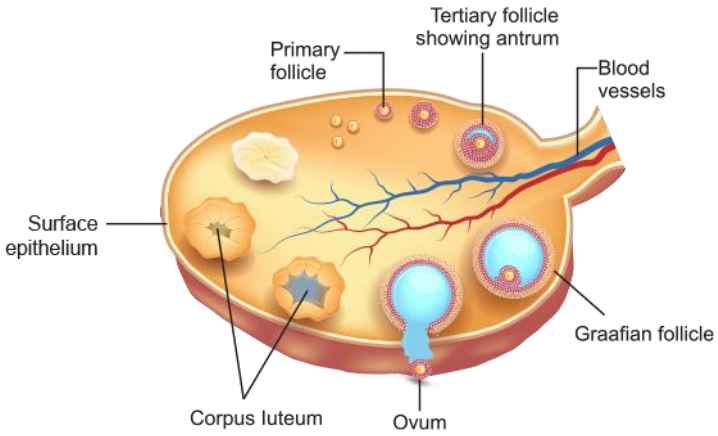
It becomes interdigitated with uterine tissue to form the placenta and increases the surface area for exchange of materials between the mother and the embryo.

Q.12. Answer the following questions.

Q. Draw a sectional view of human ovary. Label the following parts:

(a) Primary follicle
(b) Ovum
(c) Graafian follicle
(d) Corpus luteum

Ans.



Q. Name the hormones influencing (i) ovulation, (ii) development of corpus luteum.

Ans.

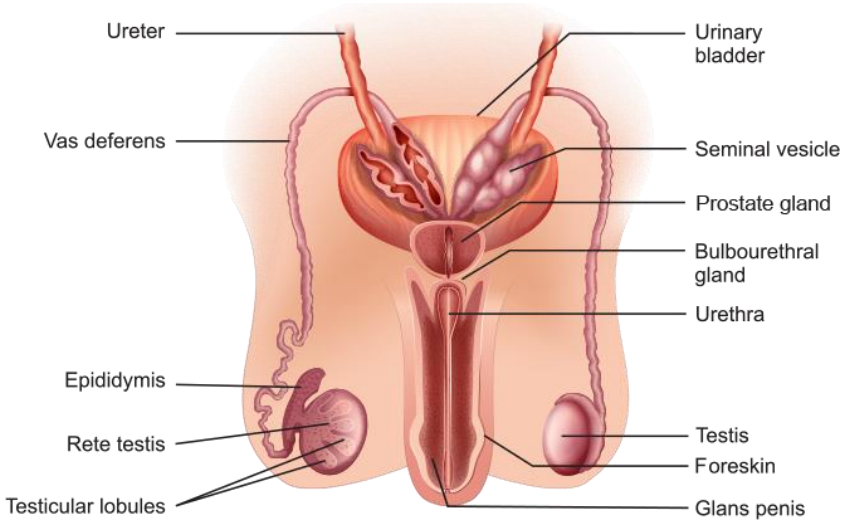
(a) Ovulation: Gonadotropins like luteinising hormone and follicular stimulating hormone, and estrogen.

(b) Development of corpus luteum: Luteinising hormone and progesterone.

Q.13. Answer the following questions.

Q. Draw a labelled diagrammatic view of human male reproductive system.

Ans.



Q. Differentiate between:

(a) Vas deferens and vas efferentia

(b) Spermatogenesis and spermiogenesis

Ans.

(a)

S.No.	Vas deferens	Vas efferentia
(i)	Carries sperm from epididymis to urethra.	Carries sperm from testis to epididymis.
(ii)	One in number from each testis.	Many in number.

(b)

Spermatogenesis	Spermiogenesis
Production of sperms (by meiosis).	Spermatids are transformed to spermatozoa.

Q.14. (i) Draw a diagram of the structure of a human ovum surrounded by corona radiata. Label the following parts:

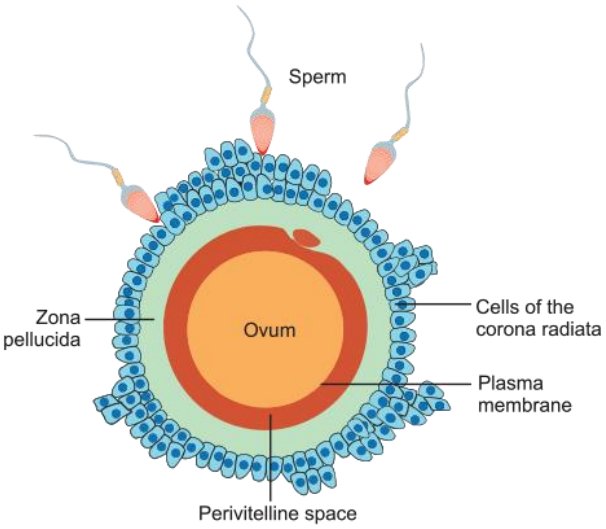
(a) Ovum

(b) Plasma membrane

(c) Zona pellucida

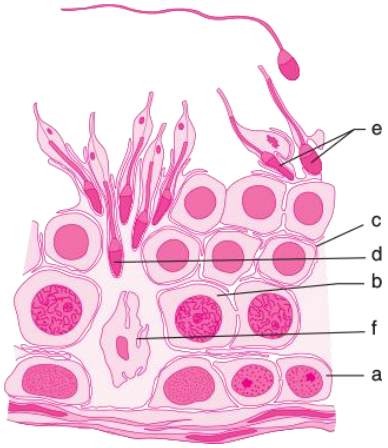
(ii) State the function of zona pellucida.

Ans. (i)



(ii) Zona pellucida allows the entry of one sperm into the cytoplasm of the ovum and then undergoes changes to prevent entry of additional sperms.

Q.15. Study the figure given:



(i) Pick out and name the cells that undergo spermiogenesis.

(ii) Name ‘a’ and ‘b’ cells. What is the difference between them with reference to the number of chromosomes?

(iii) Pick out and name the motile cells.

(iv) What is ‘f’ cell? Mention its function.

(v) Name the structure of which the given diagram is a part.

Ans.

(i) d—Spermatids

(ii) a—Spermatogonium, b—Primary spermatocyte

They both are diploid and have 46 chromosomes each.

(iii) e—Spermatozoa

(iv) f—Sertoli cell. It provides nutrition to the germ cells.

(v) Seminiferous tubule.

Q.16. (i) How is placenta formed in the human female?

(ii) Name any two hormones which are secreted by it and are also present in a non-pregnant woman.

Ans.

(i) The chorionic villi and uterine tissue become interdigitated with each other and jointly form a structural and functional unit called placenta.

(ii) Estrogen and progestogens.

Q.17. It is commonly observed that parents feel embarrassed to discuss freely with their adolescent children about sexuality and reproduction. The result of this parental inhibition is that the children go astray sometimes.

(i) Explain the reasons that you feel are behind such embarrassment amongst some parents to freely discuss such issues with their growing children.

(ii) By taking one example of a local plant and animal, how would you help these parents to overcome such inhibitions about reproduction and sexuality?

Ans. (i) The reasons behind this embarrassment are illiteracy, their conservative attitude, misconceptions and social myths.

(ii) It can be seen in animals such as honey bee and plants such as orchid ophrys flower that sexual attraction is a natural phenomenon. The male honey bee assumes the petal of orchid as its female partner and pseudocopulates with it. So, sexuality is a natural phenomenon and parents should speak to their children about it.

Short Answer Questions-II (OIQ)

[3 marks]

Q.1. Name and write the functions of the paired accessory glands in human male reproductive system.

Ans.

S. No.	**Paired accessory glands**	**Functions**
(*i*)	It consists of follicle cells.	Secretions of this gland constitutes seminal plasms which is rich in fructose, calcium and certain enzymes
(*ii*)	Bulbourethral gland/Cowper's gland	Help in lubrication of the penis

Q.2. Write a brief account of the structure and functions of placenta.

Ans. Placenta connects the foetus to the uterus through an umbilical chord. Both the foetal and the maternal tissues contribute to its formation. The foetal part is the chorionic villi and the maternal part is the uterine mucosa.

The functions of placenta are:

(i) Provides nutrients and oxygen to the developing embryo.

(ii) Removes CO2 and waste materials from the embryo.

(iii) Acts as an endocrine tissue and produces several hormones like human chorionic gonadotropin (hCG), human placental lactogen (hPL), estrogens, progesterones that are essential to maintain pregnancy.

Q.3. What is pregnancy hormone? Why is it so called? Name two sources of this hormone in a human female.

Ans. Progesterone is known as the pregnancy hormone. It is called so because it prepares the uterus for implantation of the blastocyst to the uterine wall and helps in the formation of placenta. Corpus luteum and placenta are the two sources of this hormone.

Q.4. What is meant by each of the following:

Q. Primary follicle

Ans. Primary follicle: It is an ovarian follicle in which the primary oocyte is surrounded by a layer of granulosa cells.

Q. Secondary follicle and

Ans. Secondary follicle: When a primary follicle becomes surrounded by more layers of granulosa cells and a new theca, it is called a secondary follicle.

Q. Tertiary follicle

Ans. Tertiary follicle: When a fluid-filled cavity called antrum develops in the secondary follicle, it is called tertiary follicle.

Q.5. Distinguish between:

Q. Corona radiata and Zona pellucida

Ans.

S. No.	**Corona radiata**	**Zona pellucida**
(*i*)	It consists of follicle cells.	It is a single membrane.
(*ii*)	It envelops the egg outside the zona pellucida.	It is above the vitelline membrane making the membrane thick
(*iii*)	The cells provide nourishment to the egg at the time of release from the ovary.	It protects the egg.

Q. Blastula and Gastrula

Ans.

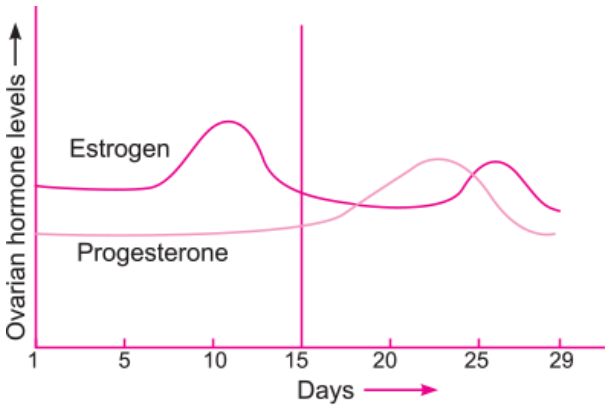
S. No.	**Blastula**	**Gastrula**
(*i*)	It is a single-layered embryo.	It is a three-layered embryo.

(*ii*)	The cavity of the blastula is known as theblastocoel.	The cavity of the gastrula is known as archenteron.
(*iii*)	It results after the cleavage.	It is formed from blastula due to the movement of cells into 3 germ layers.

Q.6. What happens to the blastocyst immediately after implantation?

Ans. After implantation, finger-like projections appear on the trophoblast called chorionic villi which surround 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 and maternal body called placenta. The placenta is connected to the embryo through an umbilical cord which helps in the transport of substances to and from embryo. The inner cell mass differentiates into the three germ layers—outer ectoderm, middle mesoderm and inner endoderm. These primary germ layers give rise to all the tissues and organs, starting as the primordia.

Q.7.



Read the graph given above showing the levels of ovarian hormones during menstruation and correlate the uterine events that take place according to the hormonal levels on:

(i) 6–15 days

(ii) 16–25 days

(iii) 26–28 days (if the ovum is not fertilised)

Ans.

(i) Regeneration of endometrium.

(ii) Uterus gets highly vascularised, ready for embryo implantation.

(iii) Disintegration of the endometrium leading to menstruation.

Long Answer Questions (PYQ)

[5 Marks]

Q.1.

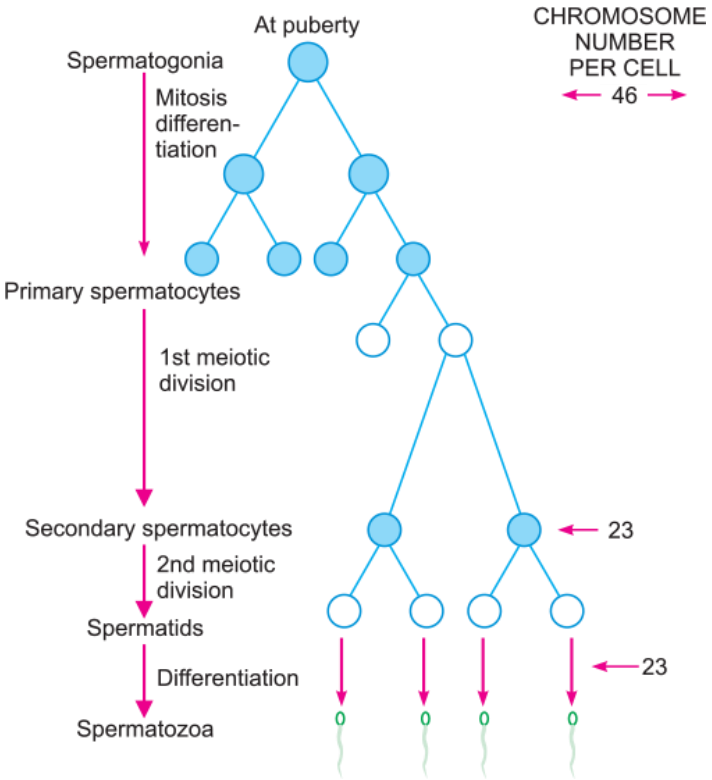
(a) Where does spermatogenesis occur in human testes? Describe the process of spermatogenesis upto the formation of spermatozoa.

(b) Trace the path of spermatozoa from the testes upto the ejaculatory duct only.

OR

Schematically represent and explain the events of spermatogenesis in humans.

Ans. (a) Spermatogenesis occur in seminiferous tubules.

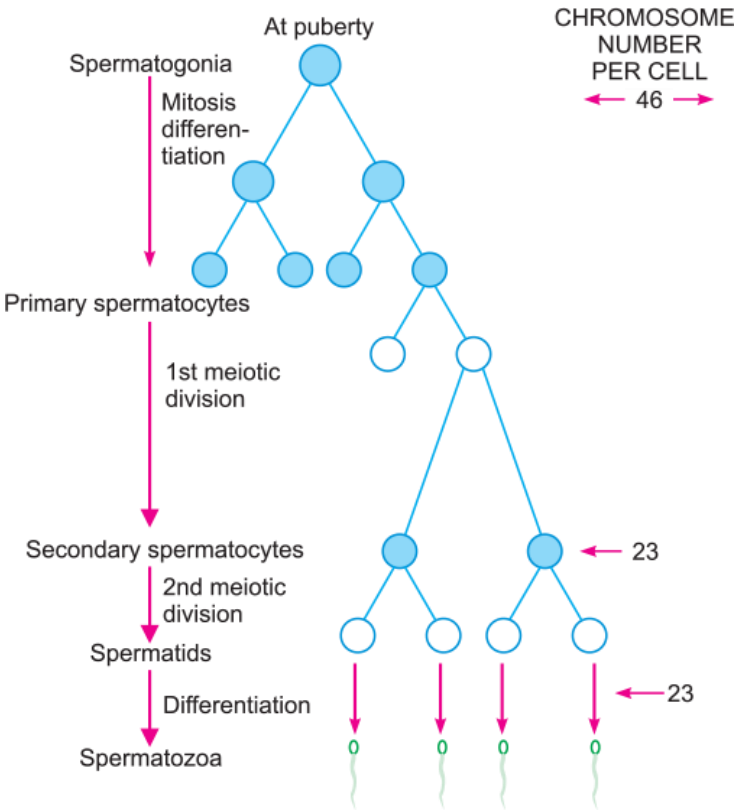


Schematic representation of spermatogensis

(b) The path of spermatozoa is as follows:

Seminiferous tubules → Rete testis → Vasa efferentia → Epididymis → Vas deferens → Ejaculatory duct

OR



Schematic representation of spermatogensis

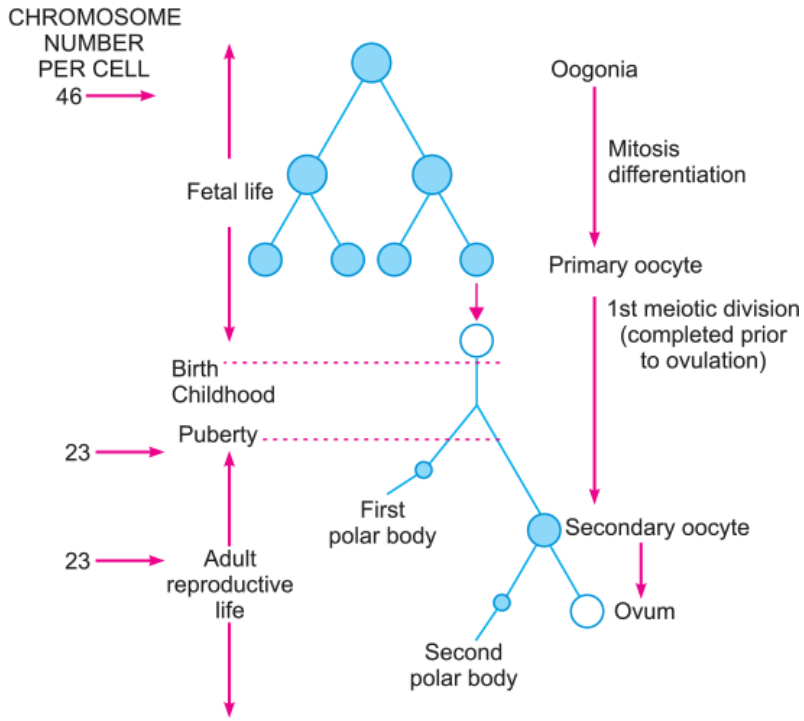
Q.2. Explain the different stages of oogenesis in humans starting from foetal life till its completion. When and where in the body is oogenesis completed?

Ans. Oogenesis

The process of formation of a mature female gamete is called oogenesis. It occurs in the ovaries. It consists of the following three phases:

(a) Multiplication phase: Oogenesis is initiated during the embryonic development stage when a couple of million gamete mother cells (oogonia) are formed within each foetal ovary. No more oogonia are formed and added after birth. These cells start division and enter into prophase-I of the meiotic division. They get temporarily arrested at this stage and are called primary oocytes.

(b) Growth phase: Each primary oocyte then gets surrounded by a layer of granulosa cells. This structure is called the primary follicle. A large number of these follicles degenerate during the phase from birth to puberty. At puberty, only 60,000 to 80,000 primary follicles are left in each ovary. The primary follicles get surrounded by more layers of granulosa cells and a new theca to form secondary follicles.Systematic representation of oogenesis



(c) Maturation phase: In the first maturation phase, the secondary follicle soon transforms into a tertiary follicle. The primary oocyte within the tertiary follicle grows in size and completes its first meiotic division to form a large, haploid, secondary oocyte and a tiny first polar body. The tertiary follicle changes into a mature follicle—the Graafian follicle—which ruptures to release the secondary oocyte (ovum) from the ovary by a process called ovulation. The second maturation phase occurs after fertilisation when the meiotic division of the secondary oocyte is complete. This second meiotic division results in the formation of a second polar body and a haploid ovum (ootid).

Q.3. When and where are primary oocytes formed in a human female? Trace the development of these oocytes till ovulation (in menstrual cycle). How do gonadotropins influence this developmental process?

Ans. Oogenesis

The process of formation of a mature female gamete is called oogenesis. It occurs in the ovaries. It consists of the following three phases:

(a) Multiplication phase: Oogenesis is initiated during the embryonic development stage when a couple of million gamete mother cells (oogonia) are formed within each foetal ovary. No more oogonia are formed and added after birth. These cells start division and enter into prophase-I of the meiotic division. They get temporarily arrested at this stage and are called primary oocytes.

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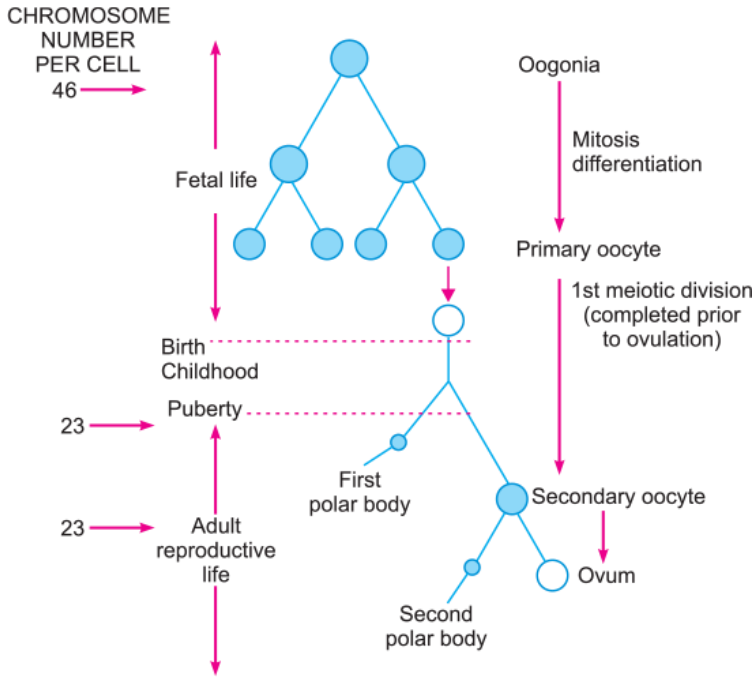


Systematic representation of oogenesis

(c) Maturation phase: In the first maturation phase, the secondary follicle soon transforms into a tertiary follicle. The primary oocyte within the tertiary follicle grows in size and completes its first meiotic division to form a large, haploid, secondary oocyte and a tiny first polar body. The tertiary follicle changes into a mature follicle—the Graafian follicle—which ruptures to release the secondary oocyte (ovum) from the ovary by a process called ovulation. The second maturation phase occurs after fertilisation when the meiotic division of the secondary oocyte is complete. This second meiotic division results in the formation of a second polar body and a haploid ovum (ootid).

Q.4. Describe the change that occur in ovaries and uterus in human female during the reproductive cycle.

Ans. Menstrual Cycle:

● The rhythmic series of changes that occur in the reproductive organs of female primates (monkeys, apes and human beings) is called menstrual cycle.

● It is repeated at an average interval of about 28/29 days.

● The first appearance of menstruation at puberty is called menarche.

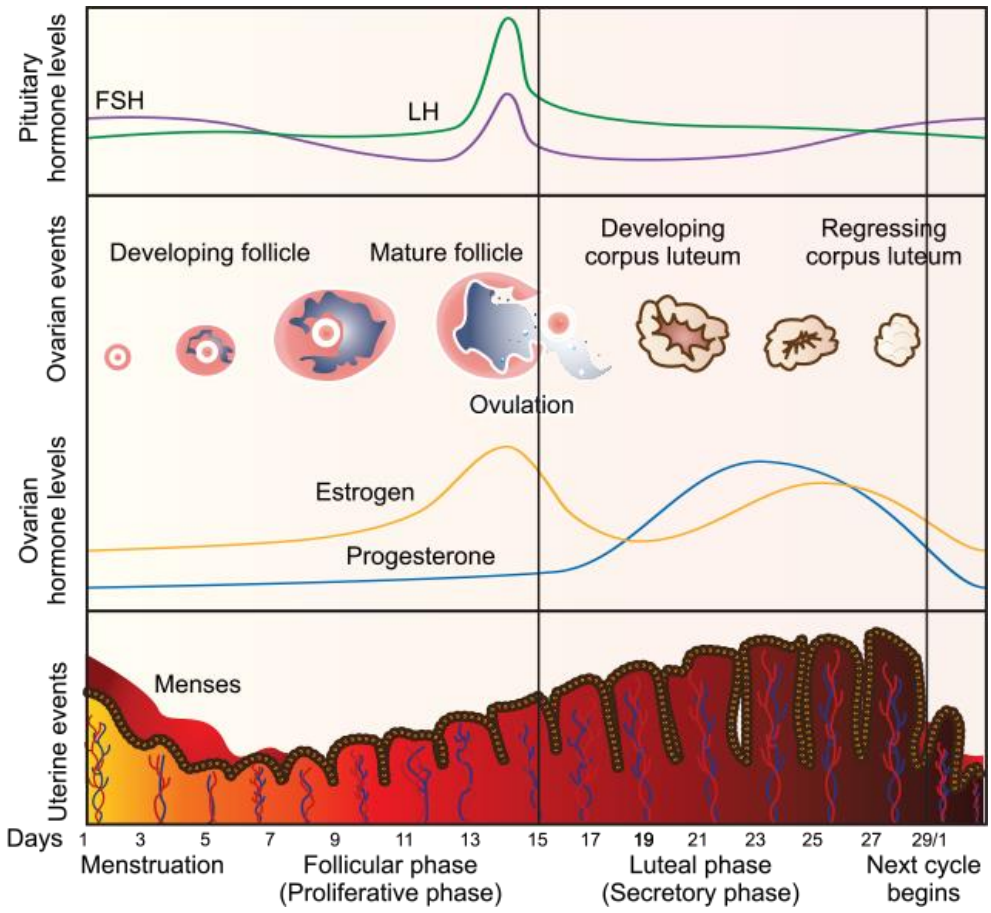
● The menstrual cycle has four phases. These are:

(i) Menstrual Phase:

● The soft tissue of endometrial lining of the uterus disintegrates causing bleeding.

● The unfertilised egg and soft tissues are discharged.

● It lasts for 3–5 days.



Diagrammatic presentation of various events during a menstrual cycle

(ii) Follicular Phase/Proliferative Phase:

● The primary follicles in the ovary grow and become a fully mature Graafian follicle.

● The endometrium of the uterus is regenerated due to the secretion of LH and FSH from anterior pituitary and ovarian hormone, estrogen.

● It lasts for about 10 to 14 days.

(iii) Ovulatory Phase:

● Rapid secretion of LH (LH surge) induces rupture of Graafian follicle, thereby leading to ovulation (release of ovum).

● It lasts for only about 48 hours.

(iv) Luteal Phase/Secretory Phase:

● In this phase the ruptured follicle changes into corpus luteum in the ovary and it begins to secrete the hormone progesterone.

● The endometrium thickens further and their glands secrete a fluid into the uterus.

● If ovum is not fertilised, the corpus luteum undergoes degeneration and this causes disintegration of the endometrium leading to menstruation.

● Estrogen and progesterone levels rise during this phase.

● It lasts for only 1 day.

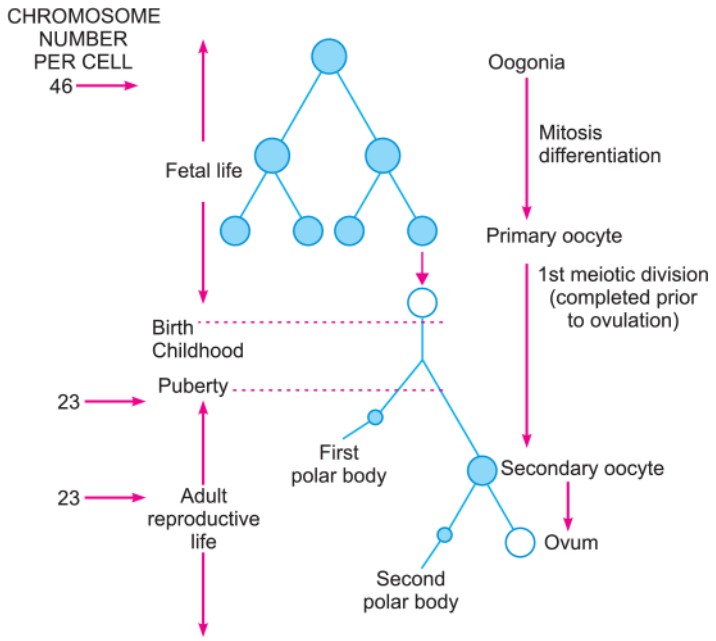
● During pregnancy all events of the menstrual cycle stop and there is no menstruation. The menstrual cycle permanently stops in females at the age of around 50 years. This is called menopause.

Q.5. Explain the ovarian and uterine events that occur during a menstrual cycle in a human female, under the influence of Pituitary and Ovarian hormones respectively.

Ans. Release of gonodotropins (FSH and LH) from pituitary, during follicular phase or 5-14 days of menstrual cycle leads to growth of primary follicle to Graafian follicle (GF.) in the ovary. estrogen from growing follicle helps proliferation of uterine endometrium or its repair. High level of LH at middle 14th day of the menstrual cycle leads to rapture of GF causing release of ovum. This is called ovulation. The remaining cells of GF transform into corpus luteum (CL) under the influence of LH. CL secretes progesterone that maintains endometrium in preparation for pregnancy. Level of FSH and LH fall due to rise of progesterone and estrogen (25th day of the cycle), leading to degeneration of CL. Level of progesteron falls, leading to disintegration of uterine endometrium and menstruation starts (0-5 day of the cycle).

Q.6. Explain the development of a secondary oocyte (ovum) in human female from the embryonic stage upto its ovulation. Name the hormones involved in this process.

Ans.



Systematic representation of oogenesis

Hormones involved are:

LH/Luteinising hormone.

FSH/Follicle stimulating hormone.

Estrogen.

Q.7. Explain the process of fertilisation in human female, and trace the post-fertilisation events in a sequential order up to implantation of the embryo.

OR

Explain the process of fertilisation and implantation in humans.

Ans. Fertilisation

● The process of fusion of a sperm (male gamete) with an ovum (female gamete) is called **fertilisation**.

● During coitus, semen is released by the penis into the vagina **(insemination).**

● The motile sperms swim rapidly through the cervix, enter into the uterus and reach the ampullary–isthmic junction of the oviduct.

● A sperm comes in contact with the zona pellucida layer of the ovum and induces changes in the membrane to block the entry of additional sperms.

● The enzymes of the acrosome of sperm help to dissolve zona pellucida and plasma membrane of the ovum and sperm head is allowed to enter into the cytoplasm of the ovum, i.e., secondary oocyte.

● Ultimately diploid zygote is produced by the fusion of a sperm and an ovum.

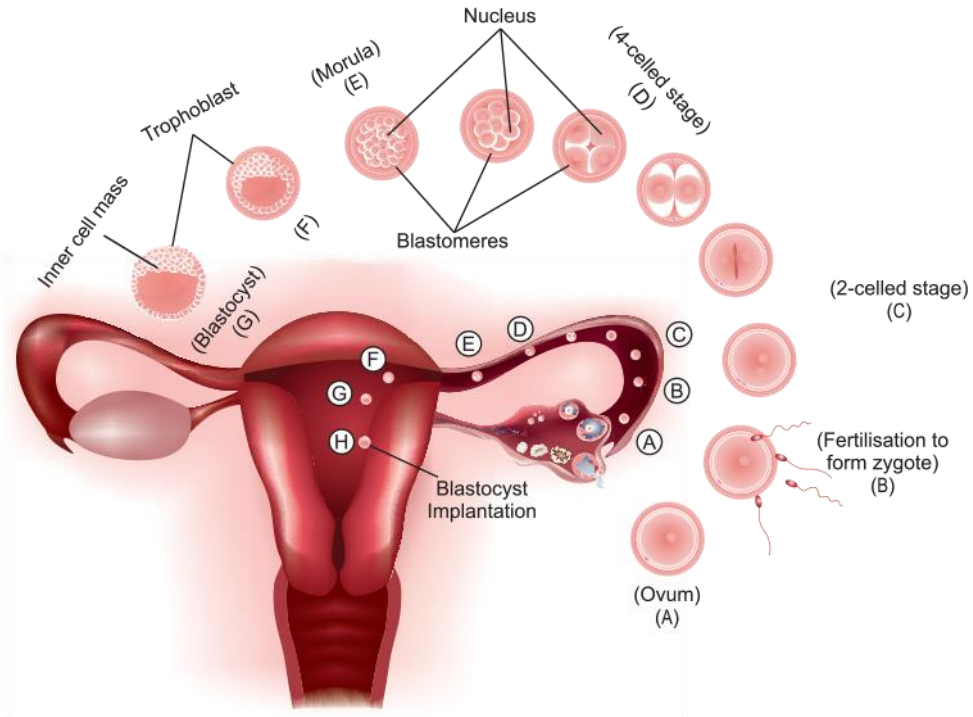
Implantation:

● Zygote divides rapidly by mitotic division as it moves through isthmus of oviduct towards uterus. This is called **cleavage**. As a result 2, 4, 8, 16 daughter cells are produced which are termed as **blastomeres**.

● Embryo with 8–16 blastomeres is called a **morula**.

● The morula continues to divide and transforms into a large mass of cells called **blastocyst**, which passes further into the uterus.

● Blastomeres in the blastocyst are arranged into an outer layer called **trophoblast** and an inner group of cells attached to trophoblast called **inner cell mass**.



● Transport of ovum, fertilisation and passage of growing embryo through fallopian tube

● The trophoblast layer gets attached to the cells of the endometrium and the inner cell mass gives rise to the embryo.

● After attachement, the cells of endometrium divide rapidly and cover the blastocyst.

● So, the blastocyst gets embedded in the endometrium of the uterus. This is called **implantation**, which leads to pregnancy.

Q.8. Describe the post-zygotic events leading to implantation and placenta formation in humans. Mention any two functions of placenta.

OR

(a) Briefly explain the events of fertilisation and implantation in an adult human female.

(b) Comment on the role of placenta as an endocrine gland.

Ans.

Fertilisation:

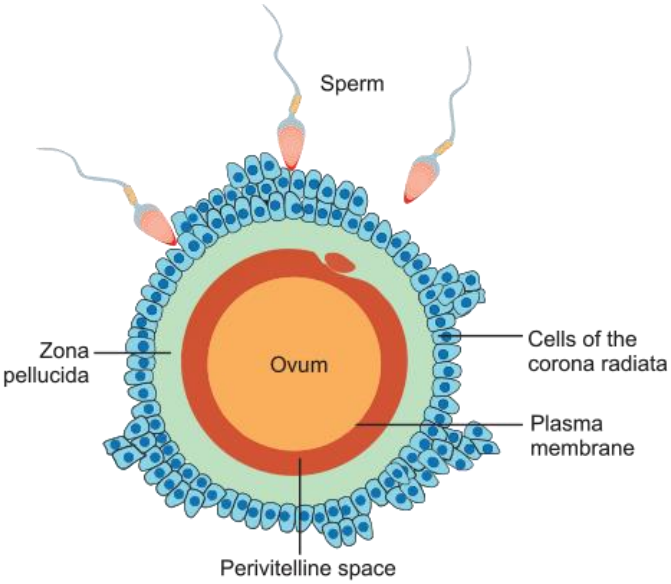
● During coitus, semen is released by the penis into the vagina **(insemination).**

● The motile sperms swim rapidly through the cervix, enter into the uterus and reach the ampullary–isthmic junction of the oviduct.

● A sperm comes in contact with the zona pellucida layer of the ovum and induces changes in the membrane to block the entry of additional sperms.

● The enzymes of the acrosome of sperm help to dissolve zona pellucida and plasma membrane of the ovum and sperm head is allowed to enter into the cytoplasm of the ovum, i.e., secondary oocyte.

● Ultimately diploid zygote is produced by the fusion of a sperm and an ovum.



Ovum surrounded by few sperms

Implantation:

● Zygote divides rapidly by mitotic division as it moves through isthmus of oviduct towards uterus. This is called **cleavage**. As a result 2, 4, 8, 16 daughter cells are produced which are termed as **blastomeres**.

● Embryo with 8–16 blastomeres is called a **morula**.

● The morula continues to divide and transforms into a large mass of cells called blastocyst, which passes further into the uterus.

● Blastomeres in the blastocyst are arranged into an outer layer called **trophoblast** and an inner group of cells attached to trophoblast called **inner cell mass**.

● Transport of ovum, fertilisation and passage of growing embryo through fallopian tube

● The trophoblast layer gets attached to the cells of the endometrium and the inner cell mass gives rise to the embryo.

● After attachement, the cells of endometrium divide rapidly and cover the blastocyst.

● So, the blastocyst gets embedded in the endometrium of the uterus. This is called **implantation**, which leads to pregnancy.

Functions of placenta:

(i) Transports substances like nutrients, O_2 and CO_2 to and from the embryo.

(ii) Acts as an endocrine tissue and produces hormones like human chorionic gonadotropin (hCG), human placental lactogen (hPL), estrogens and progesterones to maintain pregnancy.

Q.9. Study the following flow chart. Name the hormones involved at each stage. Explain their functions.

Hypothalamus → Pituitary → Testes → Sperms

Ans.

$$\text{Hypothalamus} \xrightarrow{\text{GnRH}} \text{Pituitary} \xrightarrow{\text{LH and FSH}} \text{Testes} \xrightarrow[\text{(Testosterone)}]{\text{Androgen}} \text{Sperms}$$

Hypothalamus secretes gonadotropin releasing hormone (GnRH) which stimulates the anterior lobe of pituitary gland to secrete LH (Luteinising hormone) and FSH (Follicle stimulating hormone).

LH stimulates Leydig cells for the secretion of testosterone from the testes.

FSH stimulates Sertoli cells of the testes to secrete an androgen-binding protein (ABP) that concentrates testosterone in seminiferous tubules. It also causes the secretion of some factors which help in spermiogenesis.

Q.10. Describe the roles of pituitary and ovarian hormones during the menstrual cycle in a human female.

Ans. Pituitary hormones:

FSH: Secreted by the anterior lobe of pituitary gland, it stimulates follicular development as well as secretion of estrogens by the growing follicles.

LH:

(a) It induces rupture of Graafian follicle and thereby release of ovum (ovulation).

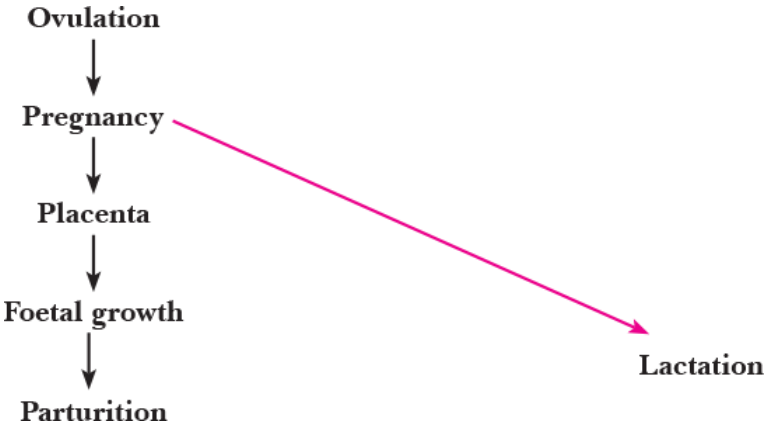
(b) Its secretion also stimulates follicular development along with FSH.

Ovarian hormones:

Estrogen: It stimulates the proliferation of the endometrium of the uterine wall.

Progesterone: It is essential for maintenance of the endometrium for implantation of fertilised ovum and other events of pregnancy. It is secreted by corpus luteum.

Q.11. Study the flow chart given below. Name the hormones involved at each stage and explain their role.



Ans.

● Rapid release of luteinising hormone ruptures Graafian follicle and release ovum (ovulation).

● Corpus luteum secretes large amount of progesterone hormone that is essential for maintenance of the endometrium required for implantation of blastocyst leading to pregnancy.

● Placenta produces several hormones like human chorionic gonadotropin (hCG), human placental lactogen (hPL). Relaxin is also produced during later phase of pregnancy. Level of other hormones like estrogens, progestogens, cortisol, prolactin and thyroxine also increases which is essential for supporting fetal growth, metabolic changes in mother and maintenance of pregnancy.

● Parturition signals originate from the fully developed foetus and the placenta induce mild uterine contractions which triggers release of oxytocin from pituitary. Oxytocin acts on the uterine muscle causing stronger uterine contractions.

Q.12. During the reproductive cycle of a human female, when, where and how does a placenta develop? What is the function of placenta during pregnancy and embryo development?

Ans. After implantation, uterus, chorionic villi and uterine tissue become interdigitated (physically fused) to form a structural and functional unit between the developing embryo and the maternal body called placenta.

Functions:

(i) Placenta facilitates supply of oxygen and nutrients to the embryo.

(ii) Removes carbon dioxide, waste material and excretory material produced by the embryo.

(iii) Produces hCG/hPL, estrogens and progestrogens.

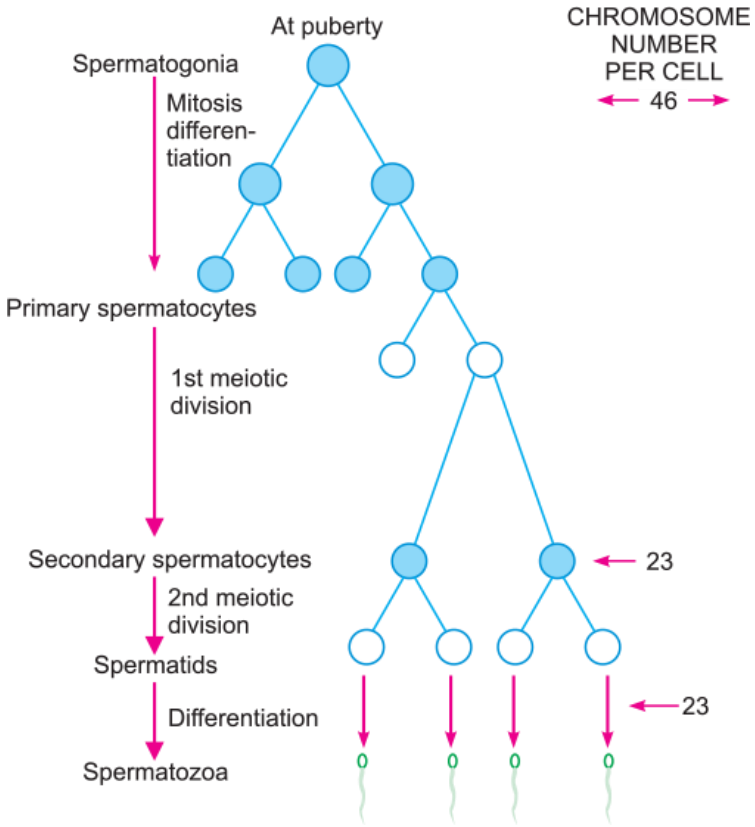
Q.13.

(a) Describe the events of spermatogenesis with the help of a schematic representation.

(b) Write two differences between spermatogenesis and oogenesis.

Ans.

(a)



(b)

S.No.	Spermatogenesis	Oogenesis
(*i*)	It is the process of formation of haploid spermatozoa from diploid male germ cells of the testes.	It is the process of formation of haploid ova from the gamete mother cells (oogonia) in the ovary
(*ii*)	It occurs in testes.	It occurs in ovaries.
(*iii*)	Spermatogonia changes to primary spermatocyte.	Oogonia changes to primary oocyte.
(*iv*)	A primary spermatocyte divides to form two secondary spermatocytes by meiosis I.	A primary oocyte divides by meiosis I to form one secondary oocyte and a polar body
(*v*)	A secondary spermatocyte divides to form two spermatids by meiosis II.	A secondary oocyte divides by meiosis II to form ovum and a polar body.
(*vi*)	No polar body is formed.	Polar bodies are formed.
(*vii*)	Four spermatozoa are produced from one primary spermatocyte.	One ovum/egg is produced from 1 primary oocyte.

Q.14. The following is the illustration of the sequence of ovarian events (a – i) in a human female.

Q. Identify the figure that illustrates corpus luteum and name the pituitary hormone that influences its formation.

Ans. Corpus luteum is illustrated by ‘g’ and the hormone influencing its formation is luteinising hormone (LH).

Q. Specify the endocrine function of corpus luteum. How does it influence the uterus? Why is it essential?

Ans. Produces the hormone progesterone, causes proliferation of the endometrium which gets highly vascularised. It is essential for the implantation of the fertilised ovum and maintains the same during pregnancy.

Q. What is the difference between “d” and “e”?

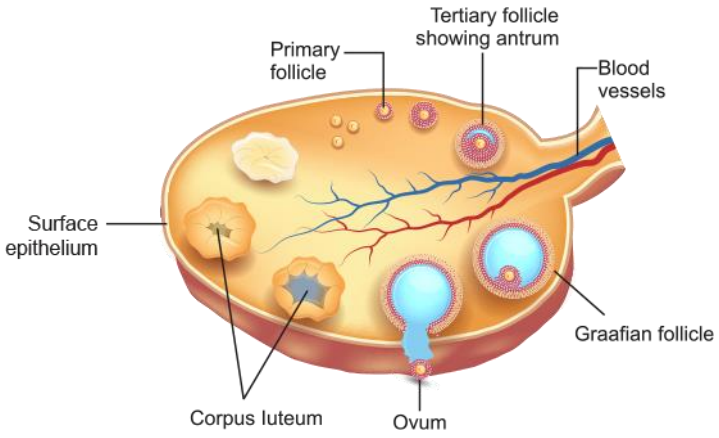
Ans.

“d” is the developing tertiary follicle.

“e” is the Graafian follicle.

Q. Draw a neat labelled sketch of Graafian follicle.

Ans.

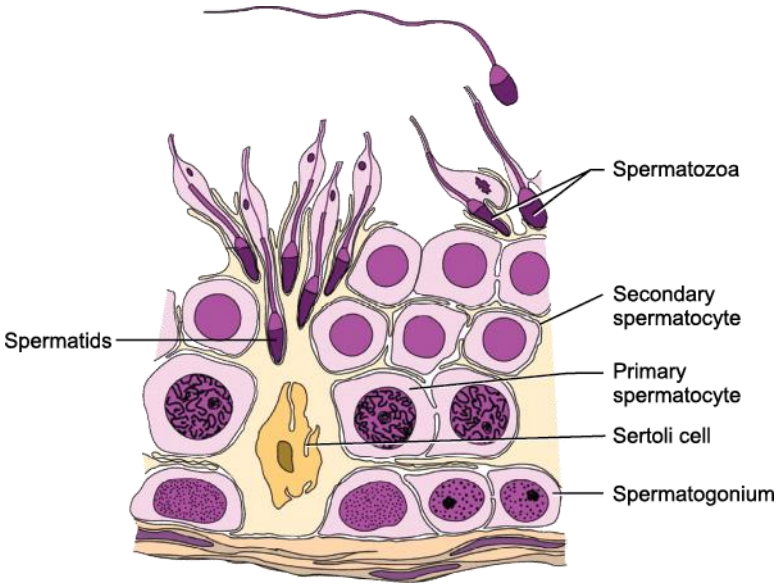


Sectional view of ovary

Q.15. Answer the following questions:

Q. Draw a diagrammatic sectional view of a human seminiferous tubule, and label Sertoli cells, primary spermatocyte, spermatogonium and spermatozoa in it.

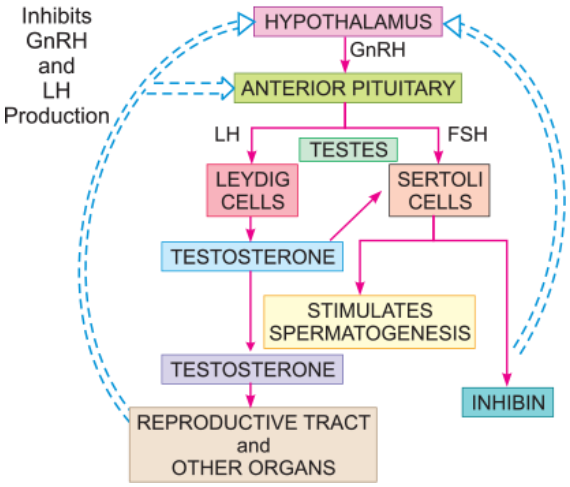
Ans.



Diagrammatic sectional view of a seminiferous tubule (enlarged)Hormonal control of spermatogenesis

Q. Explain the hormonal regulation of the process of spermatogenesis in humans.

Ans.



Flow chart showing the hormonal control of the human male reproductive system

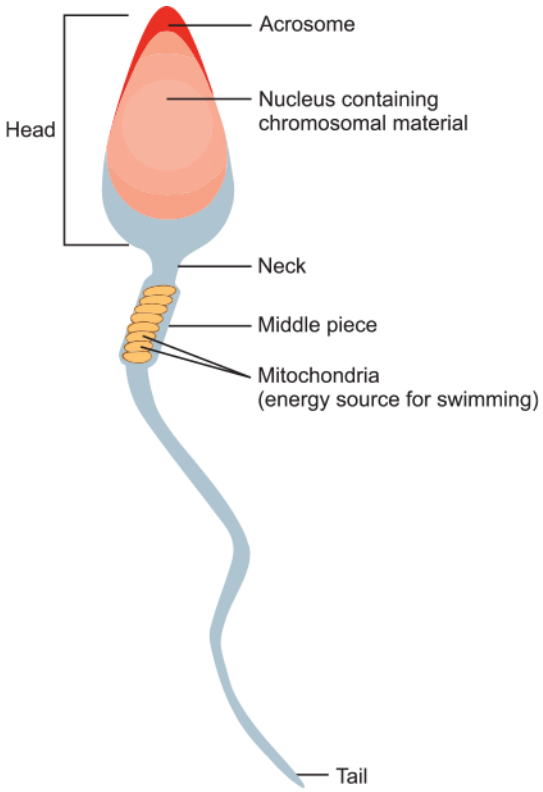
Q.16. Answer the following questions:

Q. When and where does spermatogenesis occur in a human male?

Ans. Spermatogenesis occurs at puberty in testes.

Q. Draw a diagram of a mature human male gamete. Label the following parts: Acrosome, nucleus, middle piece and tail.

Ans.



Structure of a sperm

Q. Mention the functions of acrosome and middle piece.

Ans.

Acrosome: Acrosome contains hydrolytic enzymes that help in dissolving membranes of the ovum for sperm entry ensuring fertilisation.

Middle Piece: It contains a number of mitochondria that provide energy for the movement of the tail and provides motility to sperm.

Q.17. Answer the following questions:

Q. Draw a schematic diagram of a human sperm and label the cellular components. Give the functions of any three parts.

Ans. Structure of a sperm (Spermatozoa)

It consists of four parts—head, neck, middle piece and tail—enveloped by a plasma membrane.

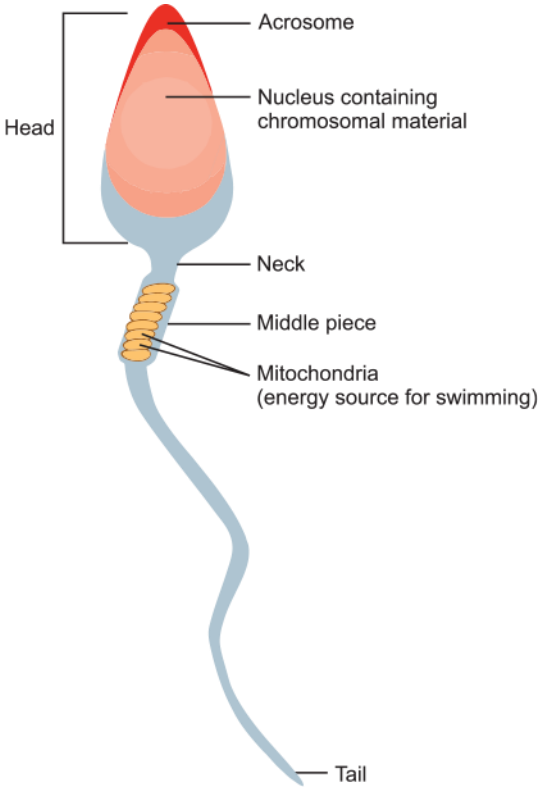
Head: It is the enlarged end of a sperm, containing the large haploid nucleus, i.e., condensed chromatin body and is capped by acrosome. The acrosome contains hydrolytic enzymes that help in dissolving membranes of the ovum for fertilisation.

Neck: It contains proximal centriole which is necessary for the first cleavage division of zygote and the distal centriole that is connected to the tail filament.

Middle Piece: It contains a number of mitochondria that provide energy for the movement of the tail that facilitate sperm motility, essential for fertilisation.

Tail: It consists of axial filaments surrounded by the plasma membrane. It helps the sperms to swim in a fluid medium.

A human male ejaculates about 200–300 million sperms during a coitus. Seminal plasma along with the sperms constitute the **semen**.



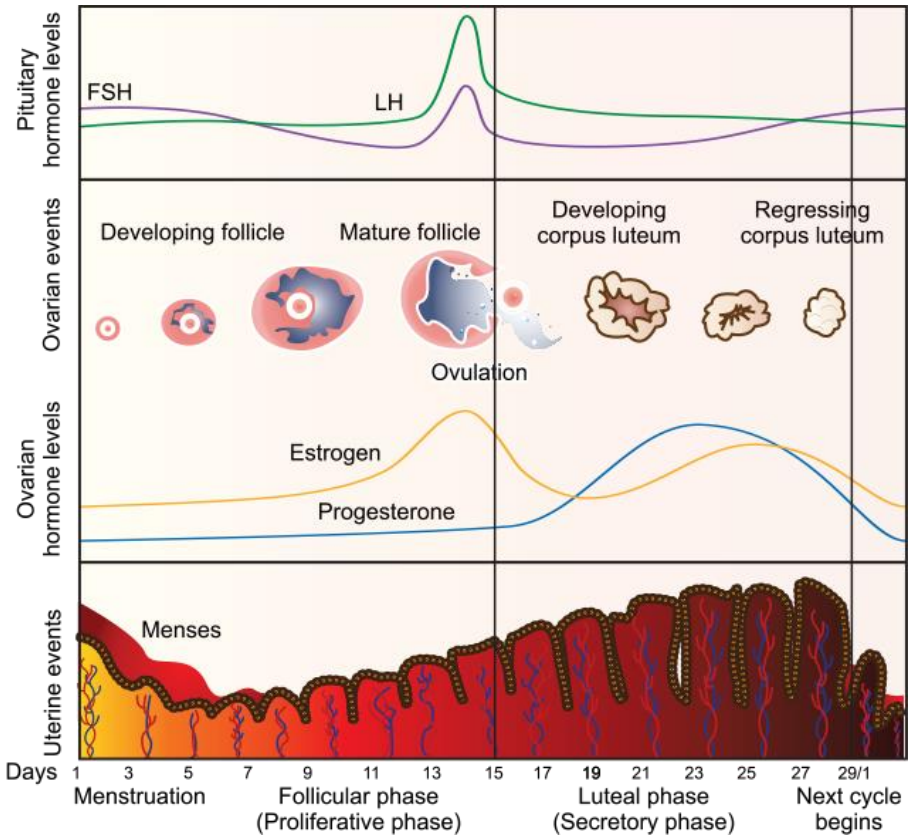
Structure of a sperm

Q.18. Answer the following questions:

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

Ans. Menstrual Phase

- The soft tissue of endometrial lining of the uterus disintegrates causing bleeding.
- The unfertilised egg and soft tissues are discharged.
- It lasts for 3–5 days.



Diagrammatic presentation of various events during a menstrual cycle

Q. Why is follicular phase in the menstrual cycle also referred as proliferative phase? Explain.

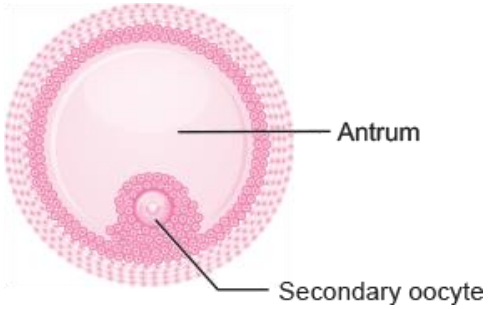
Ans. Primary follicle grows into Graafian follicle under the influence of LH and FSH leading to regeneration of endometrium (under the influence of estrogen).

Q. Explain the events that occur in a graafian follicle at the time of ovulation and thereafter.

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

Q. Draw a Graafian follicle and label antrum and secondary oocyte.

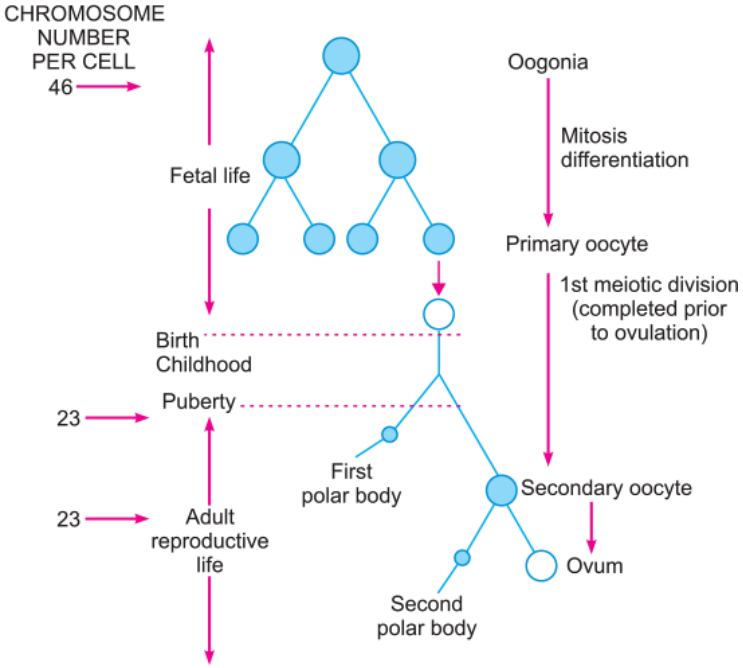
Ans.



Q.19. Answer the following questions:

Q. Give a schematic representation of oogenesis in human female indicating the chromosomal number at each step. Mention at what stage of female life does each phase occur.

Ans. Schematic representation of oogenesis:



Systematic representation of oogenesis

Q. Explain the role of ovarian hormones in inducing changes in the uterus during menstrual cycle.

Ans. Rapid release of luteinising hormone ruptures Graafian follicle and release ovum (ovulation).

Corpus luteum secretes large amount of progesterone hormone that is essential for maintenance of the endometrium required for implantation of blastocyst leading to pregnancy.

Q.20. Answer the following questions:

Q. Name the hormones secreted and write their functions:

(i) by corpus luteum and placenta (any two).

(ii) during Follicular phase and parturition.

Ans.

	Hormones Secreted	**Their functions**
(i) By corpus luteum	1. Progesterone 2. Estradiol	Essential for maintaining endometrium for implantations of fertilised ovum. Also inhibits release of FSH.
By placenta	1. Human Placental lactogen	Ensures supply of energy to foetus. It has anti-insulin property.
	2. hCG (Human chorionic gonadotropin)	Maintains corpus luteum in pregnancy and stimulates release of progesterone.
(ii) During Follicular Phase	1. LH 2. FSH	Stimulates follicular development as well as secretion of estrogen by growing follicles.
During parturition	Oxytocin	Leads to contraction of smooth muscles of myometrium of the uterus during child birth.

Q. Name the stages in a human female where:

(i) Corpus luteum and placenta co-exist.

(ii) Corpus luteum temporarily ceases to exist.

Ans.

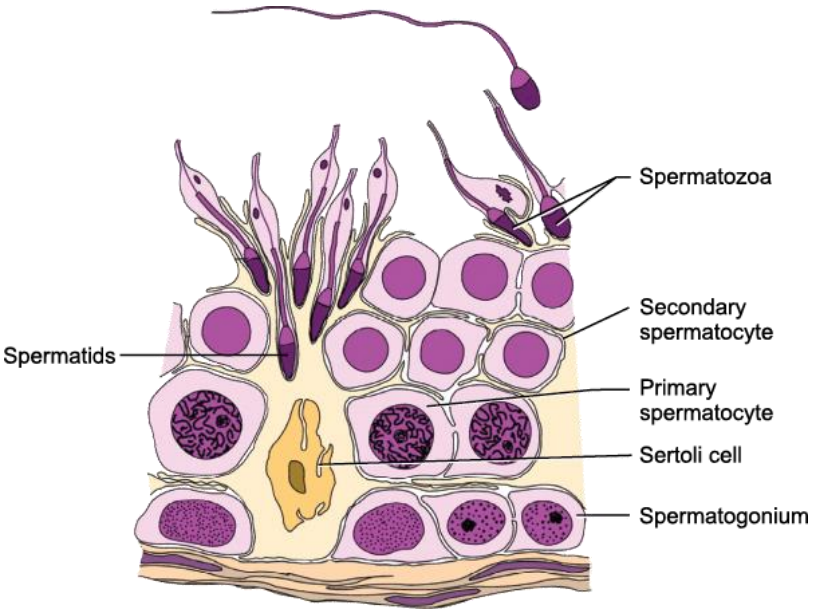
(i) During pregnancy

(ii) During menstruation.

Q.21. Answer the following questions:

Q. Draw a labelled diagram of a sectional view of human seminiferous tubule.

Ans.



Diagrammatic sectional view of a seminiferous tubule (enlarged)Hormonal control of spermatogenesis

Q. Differentiate between gametogenesis in human males and females on the basis of:

(i) time of initiation of the process.

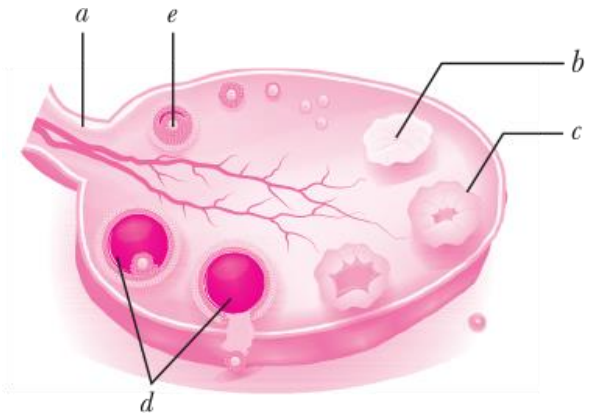
(ii) products formed at the end of the process.

Ans.

S. No.	**Process of gametogenesis**	**Males**	**Females**
(*i*)	Time of initiation of the process	Puberty	Embryonic development at foetal stage
(*ii*)	Products formed at the end of the process	Four spermatozoa are produced from one primary spermatocyte.	One ovum and two polar bodies are produced from one primary oocyte.

Q.22. Answer the following questions:

Given below is the T.S. of human ovary. Identify the following in the diagram:



(i) Corpus luteum

(ii) Secondary oocyte

(iii) Antrum

(iv) Primary follicle

(v) Blood vessels

Ans.

(i) Corpus luteum—d

(ii) Secondary oocyte—c

(iii) Antrum—b

(iv) Primary follicle—e

(v) Blood vessels—a

Q. Explain the changes the primary oocyte undergoes while in different follicular stages before ovulation.

Ans. Changes in the primary oocyte:

● Each primary oocyte gets surrounded by a single layer of granulosa cells and is known as primary follicle.

● Primary follicle get surrounded by more layers of granulosa cells and a new theca and form secondary follicle.

● A secondary follicle transforms into tertiary follicle characterised by a fluid-filled space, the antrum.

● Primary oocyte undergoes first meiotic division and produces two unequal haploid cells—a large haploid secondary oocyte and a tiny first polar body.

● The tertiary follicle further changes into the mature Graafian follicle.

● The secondary oocyte forms a new membrane called zona pellucida around it.

Q.23. Answer the following questions.

Q. Explain the events taking place at the time of fertilisation of an ovum in a human female.

Ans. Fertilisation:

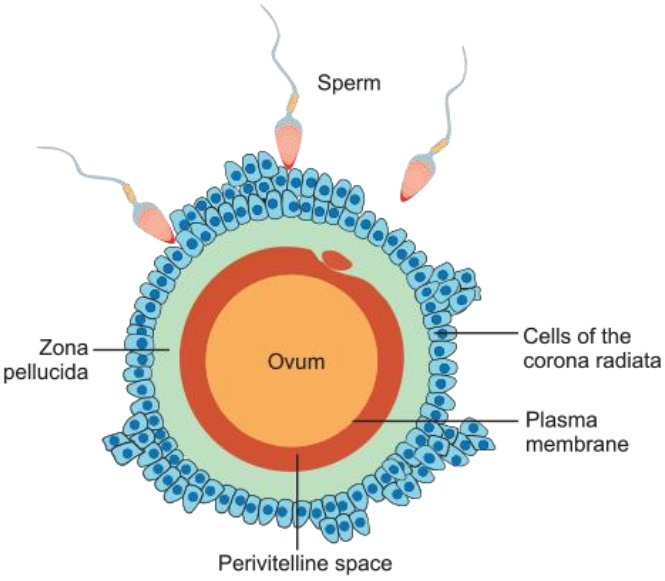
The process of fusion of a sperm (male gamete) with an ovum (female gamete) is called fertilisation.

During coitus, semen is released by the penis into the vagina (insemination).

The motile sperms swim rapidly through the cervix, enter into the uterus and reach the ampullary–isthmic junction of the oviduct.

A sperm comes in contact with the zona pellucida layer of the ovum and induces changes in the membrane to block the entry of additional sperms.

The enzymes of the acrosome of sperm help to dissolve zona pellucida and plasma membrane of the ovum and sperm head is allowed to enter into the cytoplasm of the ovum, i.e., secondary oocyte.



Ovum surrounded by few sperms

Ultimately diploid zygote is produced by the fusion of a sperm and an ovum.

Q.24. Answer the following questions.

Q. Write the specific location and the functions of the following cells in human males:

(i) Leydig cells

(ii) Sertoli cells

(iii) Primary spermatocyte.

Ans.

	Cells	**Location**	**Function**
1	Leydig cells	Outside seminiferous tubules in interstitial space	Synthesis and secretion of testicular hormones called androgens.
2	Sertoli cells	Inside the seminiferous tubules	Provide nutrition to the germ cells.
3	Primary spermatocyte	Inner wall of seminiferous tubules	Undergo meiotic divisions to form secondary spermatocyte and then haploid sperms.

Q. Explain the role of any two accessory glands in human male reproductive system.

Ans. The two accessory glands are:

(i) Prostate gland: It surrounds the urethra and produces a milky secretion which forms a considerable part of semen. This secretion contains citric acid, lipids and enzymes. The secretion nourishes and activates the spermatozoa to swim.

(ii) Seminal vesicles: These secrete mucous and a watery alkaline fluid that contains fructose which provides energy to the sperms.

Q.25. Answer the following questions.

Q. Draw a diagrammatic sectional view of the female reproductive system of human and label the parts

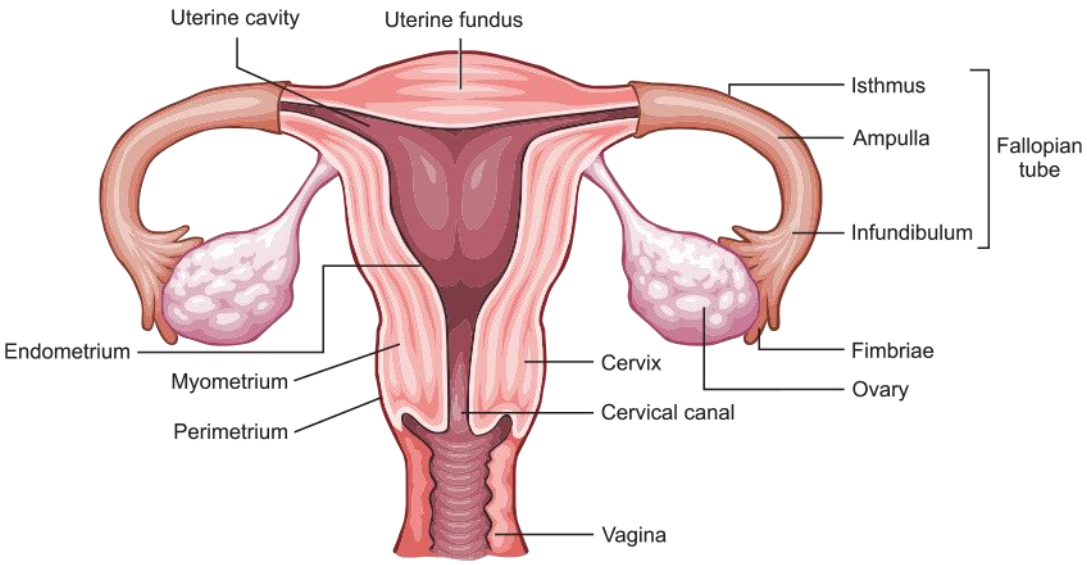
a. where the secondary oocytes develop

b. which helps in collection of ovum after ovulation

c. where fertilisation occurs

d. where implantation of embryo occurs.

Ans.



Q. Explain the role of pituitary and the ovarian hormones in menstrual cycle in human females.

Ans.

(i) Pituitary hormone:

a. FSH stimulates maturation of follicle.

b. Rapid secretion of LH (LH surge) induces rupture of Graafian follicle, thereby leading to ovulation (release of ovum).

(ii) Ovarian hormone:

a. Estrogen stimulates follicular development.

b. Progesterone produced by corpus luteum helps to maintain endometrium.

In the absence of fertilisation corpus luteum degenerates and the endometrium disintegrates leading to menstruation.

Q.26. Answer the following questions.

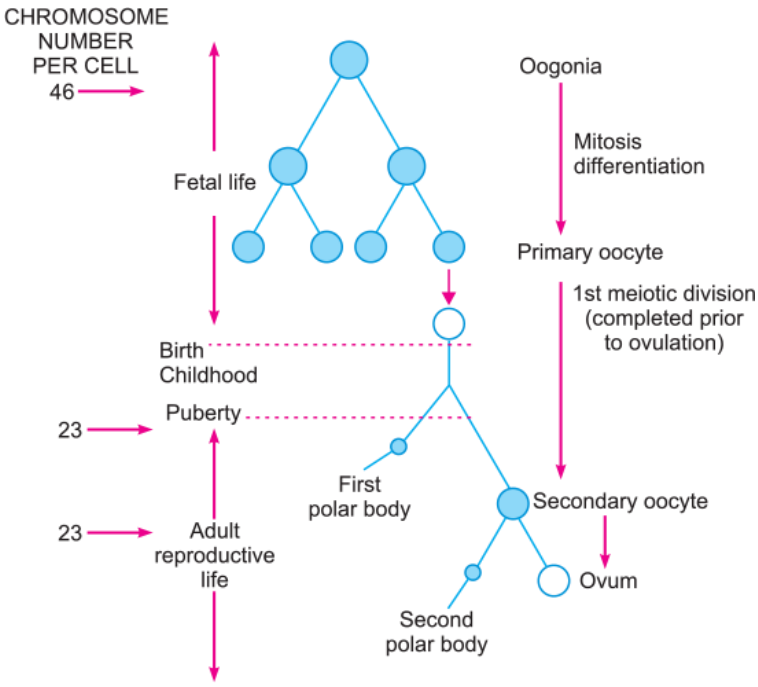
Q. Describe the stages of oogenesis in human females.

Ans. Oogenesis

The process of formation of a mature female gamete is called oogenesis. It occurs in the ovaries. It consists of the following three phases:

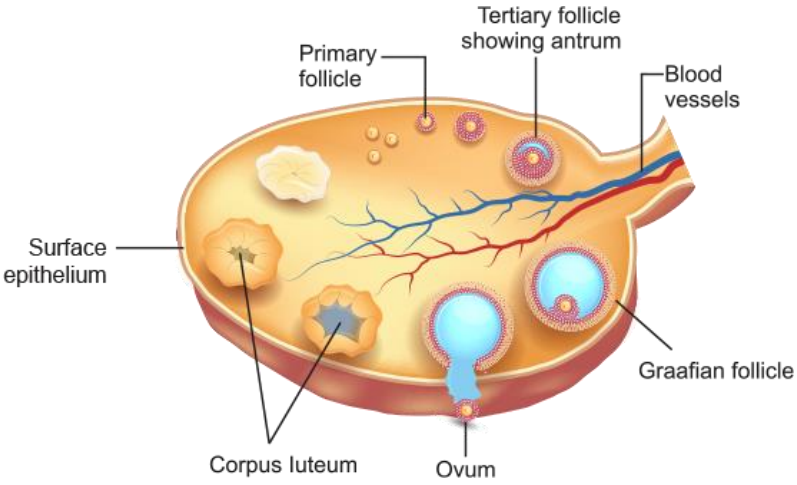
(a) Multiplication phase: Oogenesis is initiated during the embryonic development stage when a couple of million gamete mother cells (oogonia) are formed within each foetal ovary. No more oogonia are formed and added after birth. These cells start division and enter into prophase-I of the meiotic division. They get temporarily arrested at this stage and are called primary oocytes.

(b) Growth phase: Each primary oocyte then gets surrounded by a layer of granulosa cells. This structure is called the primary follicle. A large number of these follicles degenerate during the phase from birth to puberty. At puberty, only 60,000 to 80,000 primary follicles are left in each ovary. The primary follicles get surrounded by more layers of granulosa cells and a new theca to form secondary follicles.



Systematic representation of oogenesis

(c) Maturation phase: In the first maturation phase, the secondary follicle soon transforms into a tertiary follicle. The primary oocyte within the tertiary follicle grows in size and completes its first meiotic division to form a large, haploid, secondary oocyte and a tiny first polar body. The tertiary follicle changes into a mature follicle—the Graafian follicle—which ruptures to release the **secondary oocyte** (ovum) from the ovary by a process called **ovulation**. The second maturation phase occurs after fertilisation when the meiotic division of the secondary oocyte is complete. This second meiotic division results in the formation of a second polar body and a haploid ovum (ootid).



Sectional view of ovary Oogenesis is completed when the sperm penetrates the ovum.

Q. Draw a labelled diagram of a human ovum released after ovulation.

Ans.

Ovum

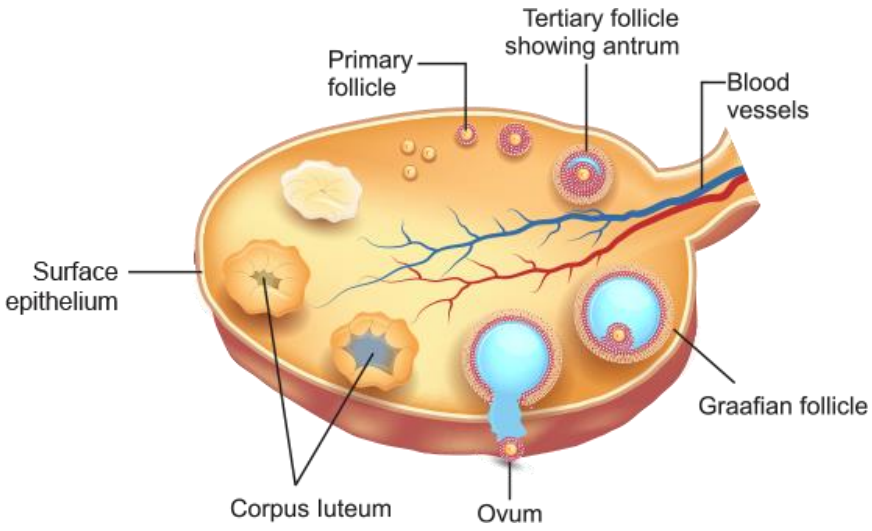
Q.27. Answer the following questions.

Q. 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 whereas spermatogenesis begins only at puberty.

Q. Draw a sectional view of human ovary and label the different follicular stages, ovum and corpus luteum.

Ans.

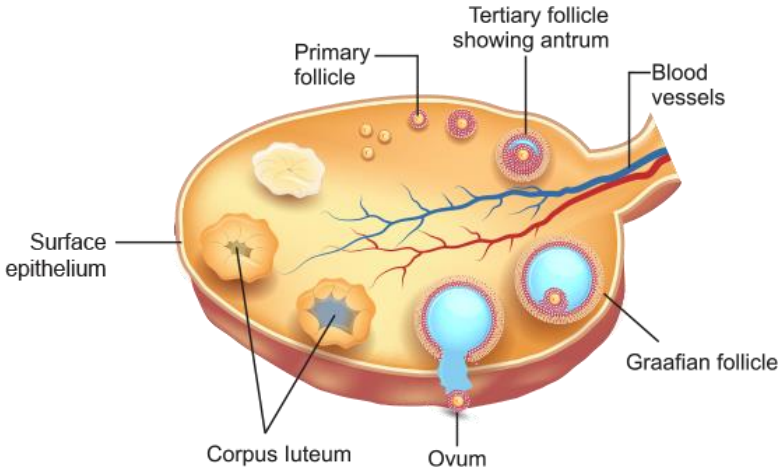


Sectional view of ovary

Q.28. Answer the following questions.

Q. Draw a diagrammatic sectional view of human ovary showing different stages of oogenesis along with corpus luteum.

Ans.



Sectional view of ovary

Q. Where is morula formed in humans? Explain the process of its development from zygote.

Ans. Morula is formed in the upper portion of oviduct, i.e., isthmus. The haploid nucleus of the sperms and that of the ovum fuse together to form a diploid zygote. Zygote divides rapidly as it moves through the isthmus of the oviduct by mitotic division called cleavage and as a result 2, 4, 8,16 daughter cells are produced, which are termed as blastomeres. The embryo with 8−16 blastomeres is called a morula.

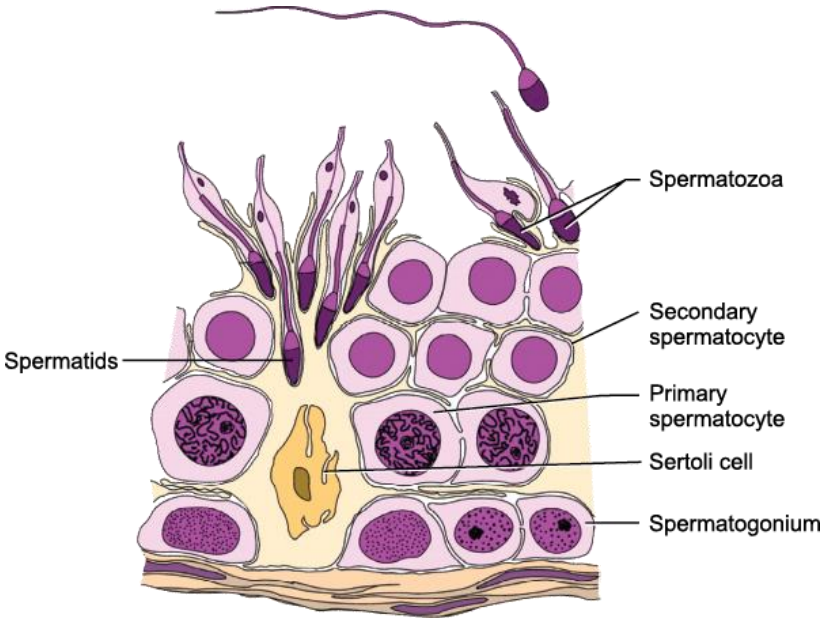
Q.29.

(i) Draw a diagrammatic labelled sectional view of a seminiferous tubule of a human.

(ii) Describe in sequence the process of spermatogenesis in humans.

Ans.

(i)



Diagrammatic sectional view of a seminiferous tubule (enlarged)Hormonal control of spermatogenesis

(ii) Spermatogenesis

The process of formation of spermatozoa (sperms) from diploid spermatogonia is called spermatogenesis.

It includes the following phases:

(a) Multiplication phase: The male germ cells (spermatogonia) present on the inside wall of seminiferous tubules multiply by mitotic division and increase in numbers.

(b) Growth phase: Spermatogonia grow and increase in size and form primary spermatocytes. Each spermatogonium is diploid and contains 46 chromosomes.

(c) Maturation phase or formation of spermatids: Some of the spermatogonia called primary spermatocytes periodically undergo meiosis. A primary spermatocyte completes the first meiotic division (reduction division) leading to formation of two equal haploid cells called secondary spermatocytes, which have only 23 chromosomes each. The secondary spermatocytes undergo the second meiotic division to produce four equal haploid spermatids.

(d) Differentiation phase: The spermatids are transformed into spermatozoa (sperms) by the process of spermiogenesis. The sperm's head gets attached to Sertoli cells to draw nourishment and are finally released from the seminiferous tubules by the process called spermiation.

Q.30. Enumerate the events in the ovary of a human female during:

(i) Follicular phase

(ii) Luteal phase of menstrual cycle.

Ans.

(i) In the follicular phase, following events occur:

1. The primary follicles in the ovary grow to form a fully mature Graafian follicle.

2. The endometrium of uterus regenerates through proliferation.

3. The secretion of gonadotropins (LH and FSH) gradually increases.

(ii) In the luteal phase, following events occur:

1. The parts of Graafian follicle remaining after the rupture, transform into the corpus luteum.

2. The corpus luteum secretes large amounts of progesterone.

Q.31.

(a) When and how does placenta develop in human female?

(b) How is the placenta connected to the embryo?

(c) Placenta acts as an endocrine gland. Explain.

Ans.

(a) Placenta develops after implantation of embryo in human female in the uterus. After implantation, finger-like projections called chorionic villi are surrounded by the uterine tissue and maternal blood. The chorionic villi and uterine tissue become interdigitated with each other and together form a structural and functional unit between developing embryo and maternal body called placenta.

(b) An umbilical cord connects placenta with the embryo.

(c) The placenta also acts as an endocrine gland as it secretes the following hormones:

i. Human chorionic gonadotropin (hCG)

ii. Human placental lactogen (hPL)

iii. Progestogens

iv. Estrogens

The increased production of these hormones during pregnancy is essential for supporting the fetal growth and metabolic changes in the mother.

Q.32.

(a) Arrange the following hormones in sequence of their secretion in a pregnant woman.

(b) Mention their source and the function they perform:

hCG, LH, FSH, Relaxin

Ans.

(a) The sequence of secretion of hormones is:

(i) FSH

(ii) LH

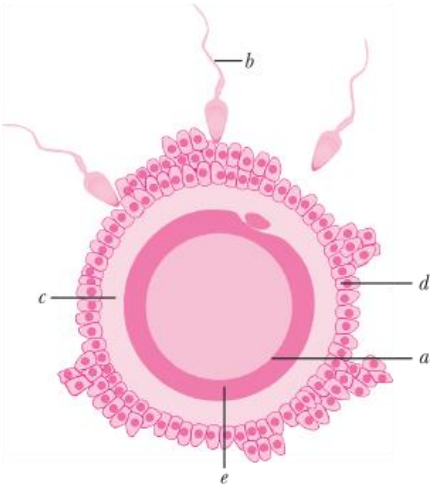
(iii) hCG

(iv) Relaxin

(b)

Hormone	**Source**	**Function**
(i) FSH	Anterior pituitary lobe.	Stimulates growth of ovarian follicles and maturation of primary oocytes.
(ii) LH	Anterior pituitary lobe.	Induces ovulation and maintains corpus luteum.
(iii) hCG	Chorionic cells of placenta	Maintains the corpus luteum and stimulates it to secrete progesterone.
(iv) Relaxin	Ovary	Helps during child birth by relaxing the pelvic muscles as well as muscles of the cervix.

Q.33. Study the illustration given and answer the questions that follow:



i. Identify ‘a’.

ii. Name and state the function of ‘c’.

iii. Identify ‘d’.

iv. Explain the role of hormones in the formation and release of ‘a’.

v. Draw a diagram of ‘b’ separately and label the parts:

— that help its entry into ‘a’;

— that carry genetic material;

— that help in its movement.

Ans.

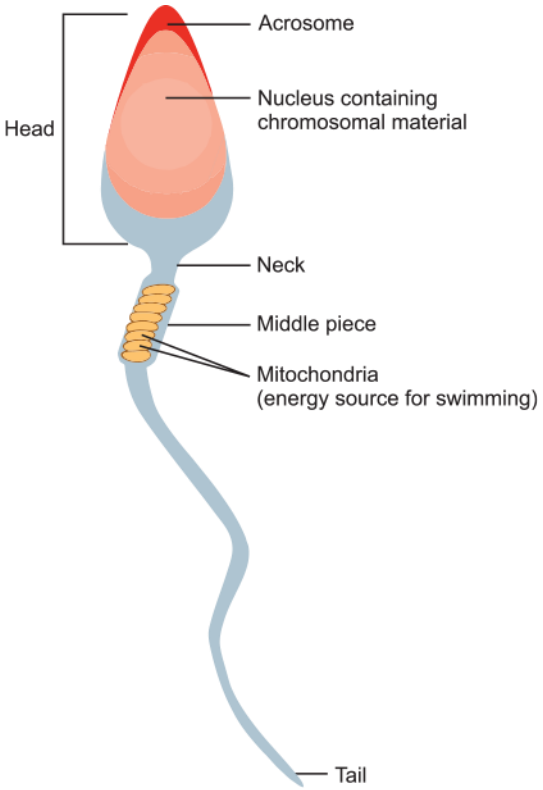
i. a—ovum.

ii. c—zona pellucida. It protects ovum and regulates interaction between ovum and sperms during fertilisation.

iii. d—cells of corona radiata.

iv. Follicular stimulating hormone (FSH) stimulate follicular development. Luteinising hormone (LH) ruptures Graafian follicle and thereby release ovum.

v.



Q.34. The following is the illustration of the sequence of ovarian events (a – i) in a human female.

(i) Identify the figure that illustrates ovulation and mention the stage of oogenesis it represents.

(ii) Name the ovarian hormone and the pituitary hormone that have caused the above-mentioned event.

(iii) Explain the changes that occur in the uterus simultaneously in anticipation.

(iv) Write the difference between ‘c’ and ‘h’.

(v) Draw a labelled sketch of the structure of a human ovum prior to fertilisation.

Ans.

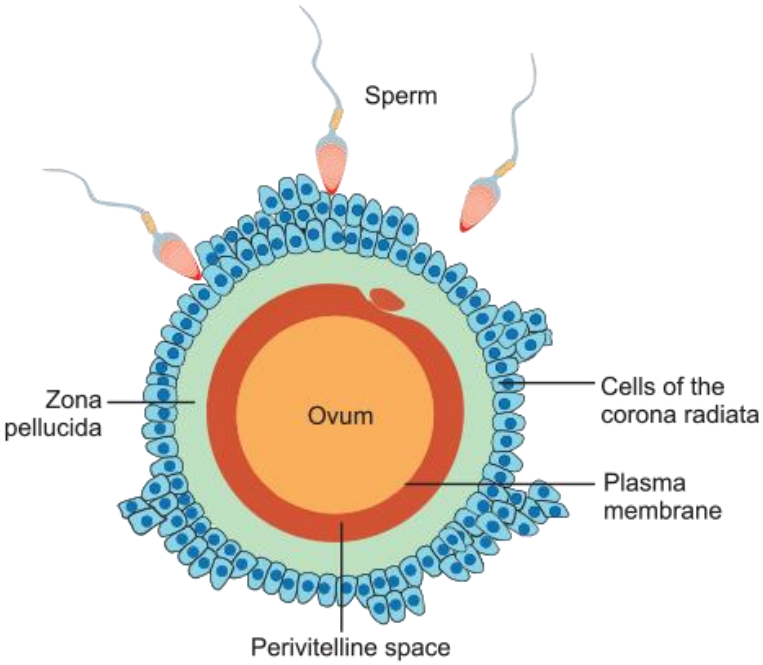
i. f; secondary oocyte.

ii. Estrogen and luteinising hormone (LH)

iii. Endometrium proliferate (glands become cork-screw shaped) highly vascularised, high regeneration anticipating implantation of the fertilised ovum.

iv. c—developing follicle; h—regressing corpus luteum.

v.



Long Answer Questions (OIQ)

[5 Marks]

Q.1. Describe the functions of the following:

Q. Epididymis

Ans. Epididymis: Maturation of spermatids to functional spermatozoa takes place here and the sperms are stored temporarily till ejaculation.

Q. Vas deferens

Ans. Vas deferens: It stores and transports the sperms from the testes to the outside through urethra.

Q. Seminiferous tubules

Ans. Seminiferous tubules: Sperms are produced here by the process of spermatogenesis.

Q. Vagina

Ans. Vagina: It receives the semen from the male during coitus. It serves as the birth canal during parturition.

Q. Trophoblast

Ans. Trophoblast: It is the outer layer of blastocyst which sends finger-like projections called chorionic villi into uterine stroma. Chorionic villi and uterine tissues jointly form the placenta.

Q. Scrotum

Ans. Scrotum: Testes are situated in scrotum where the temperature remains 2–2.5°C less than the internal body temperature, which is essential for the formation of sperms.

Q.2. What functions do the female reproductive system perform?

Ans. The female reproductive system perform the following functions:

(i) It forms the female gamete, i.e., the egg.

(ii) It receives the male gamete, i.e., sperm, for fertilisation.

(iii) It provides the site for fertilisation.

(iv) It provides suitable conditions for the development of foetus.

(v) It produces hormones that control the stages of ovulation and maintain pregnancy.

Q.3. Write a short note on uterus.

Ans. Uterus (Womb)

● It is a single, hollow, muscular, pear-shaped structure supported by ligaments and attached to the pelvic wall.

● It is present between the urinary bladder and the rectum.

● The lower part of the uterus is very narrow and is called cervix. The cavity of the cervix is called cervical canal, which forms the birth canal along with vagina.

● The wall of the uterus has three layers of tissue:

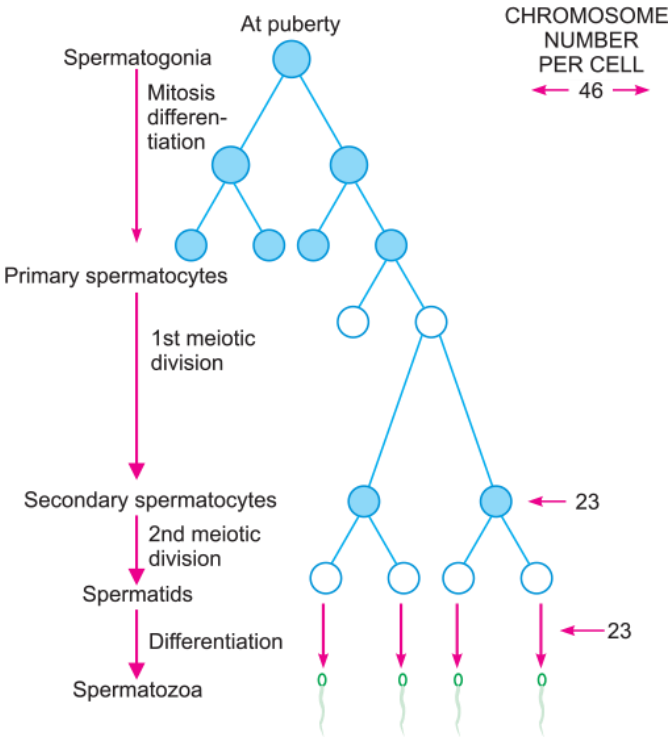
● Perimetrium: outer, thin covering of the uterus wall.

● Myometrium: middle, thick layer of smooth muscle fibres which contracts strongly during delivery of the baby.

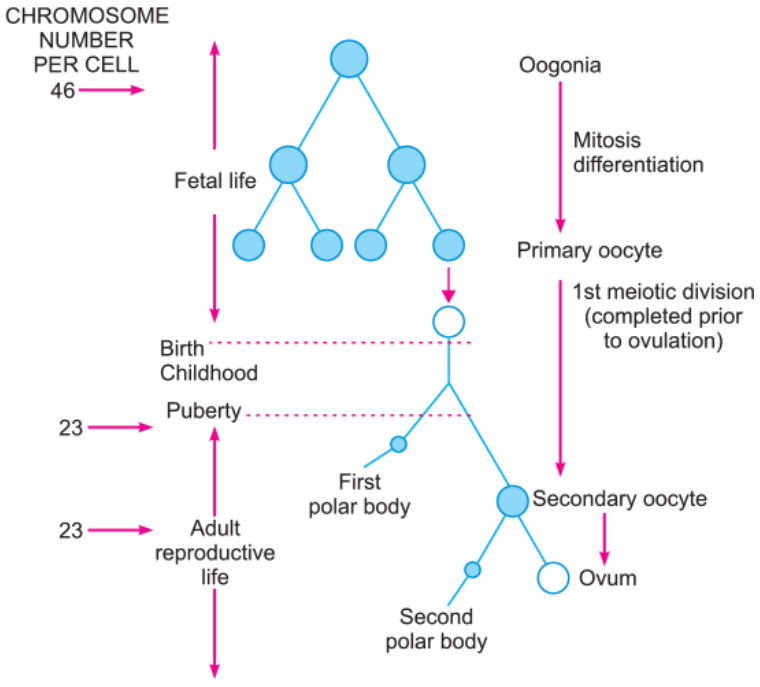
● Endometrium: inner layer, that contains glands and many blood vessels. It undergoes cyclical changes during the menstrual cycle.

Q.4. Human female is not fertile after menopause whereas males can produce gametes at any age after puberty. Analyse the statement and schematically represent a comparison between gametogenesis in males and females.

Ans.



Schematic representation of spermatogensis



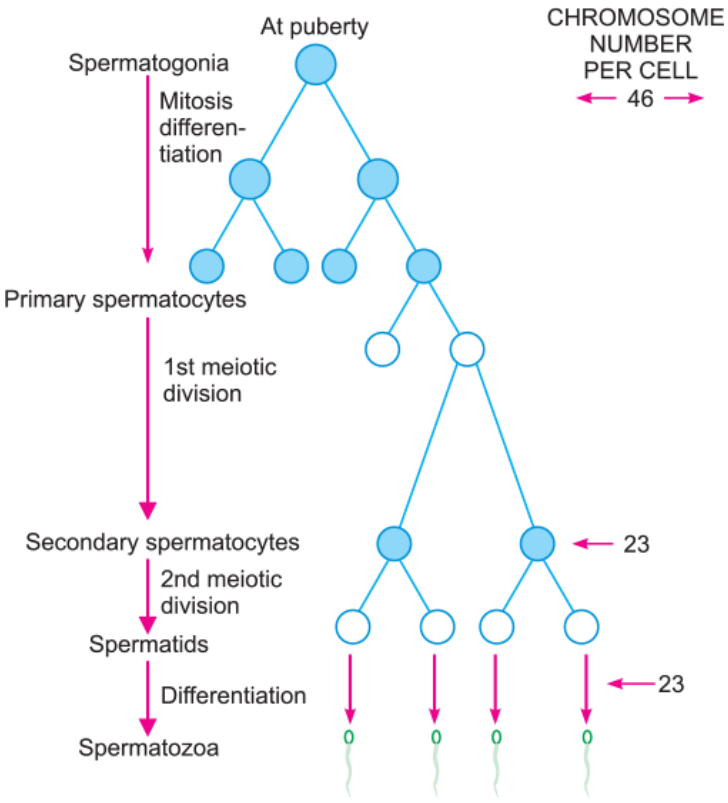
Systematic representation of oogenesis

Q.5. What role does pituitary gonadotropins play during follicular and ovulatory phases of menstrual cycle and also explain the shift in steroidal secretions.

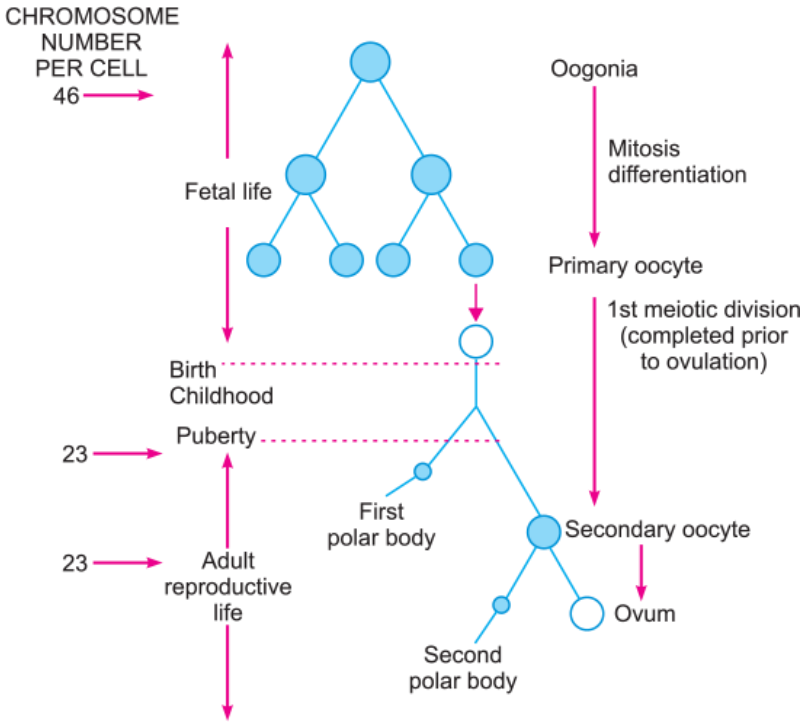
Ans. Menstrual cycle is regulated by hypothalamus through the pituitary gland. At the end of menstrual phase, the pituitary FSH gradually increases resulting in follicular development within the ovaries. As the follicles mature, estrogen secretion increases resulting in a surge in FSH and LH. The surge of LH is responsible for ovulation and formation of corpus luteum that secretes progesterone which helps in maintaining the endometrium for implantation.

Q.6. Meiotic division during oogenesis is different from that in spermatogenesis. Explain how and why?

Ans. Unequal cytoplasmic division of the oocyte is to ensure the retention of bulk of cytoplasm in one cell called secondary oocyte instead of sharing it with two. It has to provide nourishment for the developing embryo during early stages, so it is essential to retain as much cytoplasmic materials it could in a single daughter cell.



Schematic representation of spermatogensis



Systematic representation of oogenesis

Q.7. Give the term/reason:

Q. Mechanism responsible for parturition.

Ans. The complete neuro-endocrine mechanism.

Q. Role of oxytocin during expulsion of the baby out of uterus

Ans. Oxytocin acts on uterine muscle for stronger contraction.

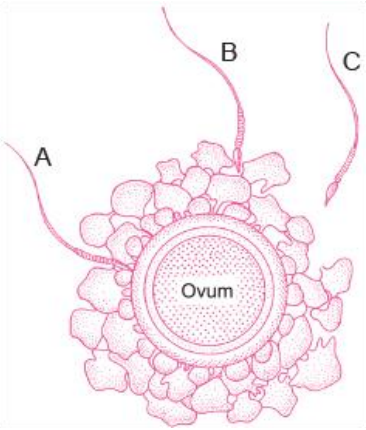
Q. Why does zona pellucida layer block the entry of additional sperms?

Ans. To ensure the fusion of one sperm.

Q. Sperm cannot reach ovum without seminal plasma.

Ans. Seminal plasma is a liquid medium which helps the sperm to move and nourishes it.

Q.8. Given below is the diagram of a human ovum surrounded by a few sperms. Observe the diagram and answer the following questions:



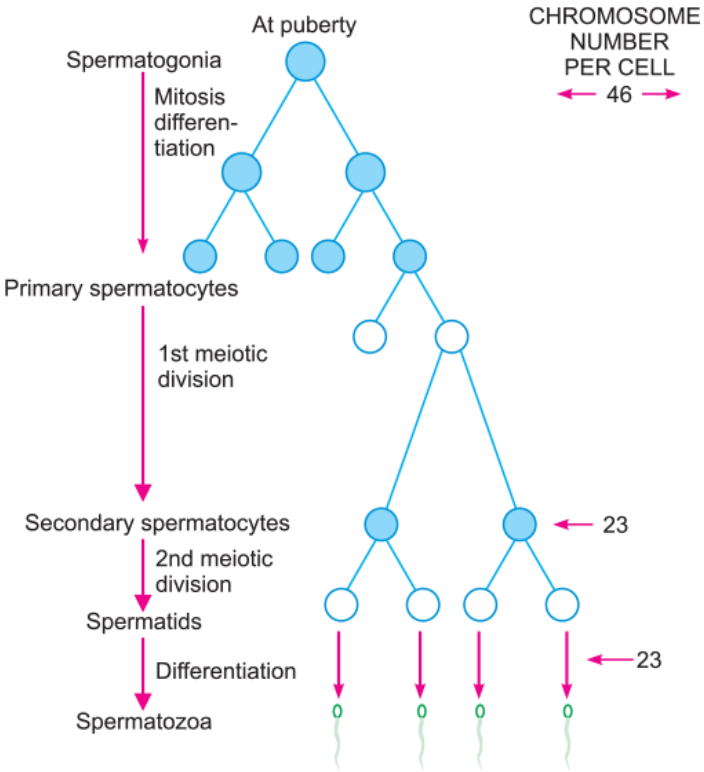
Q. Compare the fate of sperms shown in the diagram.

Ans. A is able to penetrate/fertilize the ovum, whereas B and C are unable to penetrate/fertilise B and C will degenerate.

Q.9. Answer the following questions.

Q. Give a schematic representation of spermatogenesis in humans.

Ans.



Schematic representation of spermatogensis

Q. At which stage of life does gametogenesis begin in human male and female respectively?

Ans. Gametogenesis, i.e., spermatogenesis in males starts at puberty and oogenesis in females, start during embryonic development at foetal stage.

Q. Name the organs where gametogenesis gets completed in human male and female, respectively.

Ans. In human males, the process is completed in the testes (seminiferous tubules) whereas in females, it is completed in the fallopian tube (oviduct).

Q.10. Write briefly the changes in the following organs in the different phases of the menstrual cycle:

a. Ovaries

b. Uterus

c. Fallopian tube

Ans.

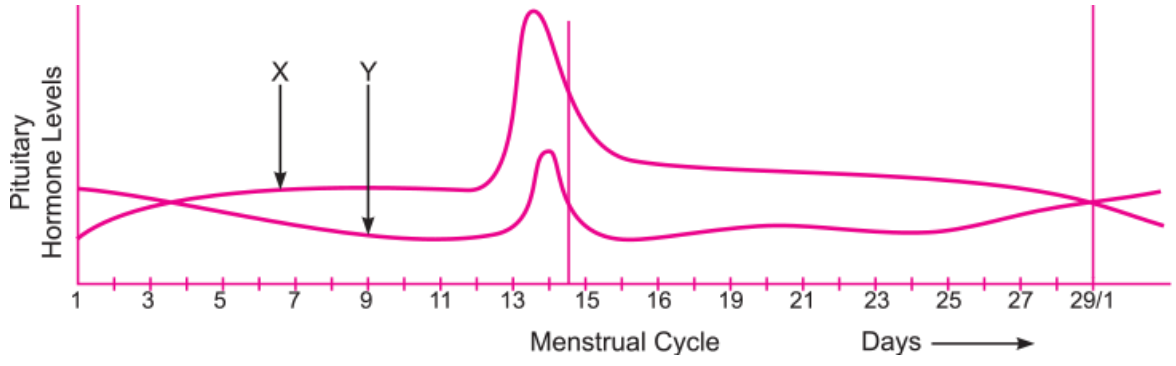
(a) Ovaries: During the first phase of menstrual cycle, growth of follicles occur and primary oocyte matures in the follicle. The mature Graafian follicle bursts to release the ovum. In luteal phase, the remaining follicle forms corpus luteum, an endocrine gland that produces progesterone.

(b) Uterus: The inner walls of the uterus are highly vascularised and muscular in nature and is known as endometrium. This wall takes active part in menstrual cycle because it breaks down due to the lack of progesterone. As a result, bleeding occurs. In the follicular phase, uterus enlarges in size.

(c) Fallopian tube: The wall of the fallopian tubes thickens and its cilia and their movements are increased.

Q.11. Study the graph given below and answer the questions that follow:

Ans.



(a) Name the hormones ‘X’ and ‘Y’.

(b) Identify the ovarian phases during a menstrual cycle.

(i) 5th day to 12th day of the cycle.

(ii) 14th day of the cycle.

(iii) 16th day to 25th day of the cycle.

(c) Explain the ovarian events (i), (ii) and (iii) under the influence of hormones 'X' and 'Y'.

Ans.

(a) Hormone 'X': Luteinising hormone.

Hormone 'Y': Follicle stimulating hormone.

(b)

(i) 5th day to 12th day of the cycle: Follicular phase (Proliferative phase).

(ii) 14th day of the cycle: Ovulatory phase (release of ovum) followed by luteal phase.

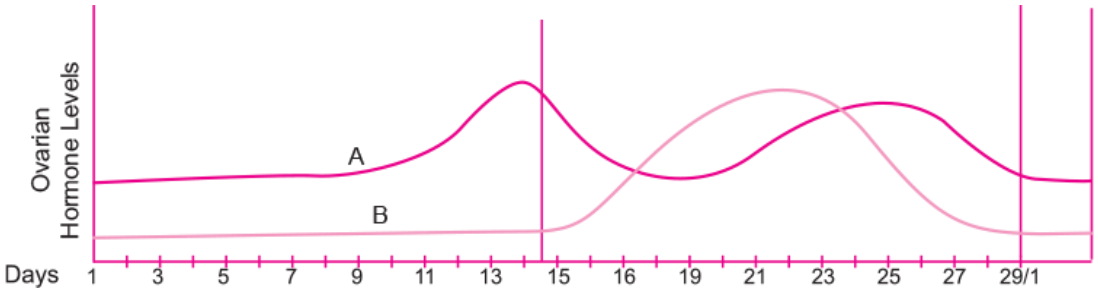
(iii) 16th day to 25th day of the cycle: Luteal phase.

(iv) FSH is secreted by the anterior pituitary which stimulates the ovarian follicle to secrete estrogen, which in turn stimulates the proliferation of the endometrium of the uterine wall.

(c) Both LH and FSH attain a peak level in the middle of cycle (about 14th day). Rapid secretion of LH leading to its maximum level during the mid-cycle called LH surge induces rupture of Graafian follicle and thereby the release of ovum (ovulation).

(d) The remaining cells of ovarian follicles are stimulated by the LH to transform into corpus luteum. The corpus luteum secretes large amount of progesterone which is essential for maintenance of the endometrium.

Q.12. The graph given below shows the variation in the levels of ovarian hormones during various phases of menstrual cycle:



(a) Identify 'A' and 'B'.

(b) Specify the source of the hormone marked in the diagram.

(c) Reason out why A peaks before B.

(d) Compare the role of A and B.

Ans.

(a)

A – Estrogen

B – Progesterone

(b)

A – Maturing ovarian follicle/Graafian follicle

B – Corpus luteum

(c) Formation of Graaffian follicle (releases estrogen) is followed by the formation of corpus luteum (releases progesterone)

(d) Role of A (Estrogen): leads to changes in the ovary and uterus / regeneration of endometrium through proliferation Role of B (Progesterone): Maintenance of endometrium for implantation of the fertilized ovum/maintenance of other events of pregnancy

(e) In case of pregnancy