

## HUMAN REPRODUCTION

### MCQ

Question 1.

Ovulation in the human female normally takes place during the menstrual cycle

- (a) at the mid secretory phase
- (b) just before the end of the secretory phase
- (c) at the beginning of the proliferative phase
- (d) at the end of the proliferative phase.

Question 2.

After ovulation Graafian follicle regresses into

- (a) corpus atresia
- (b) corpus callosum
- (c) corpus luteum
- (d) corpus albicans

Question 3.

Immediately after ovulation, the mammalian egg is covered by a membrane known as

- (a) chorion
- (b) zona pellucida
- (c) corona radiata
- (d) vitelline membrane.

Question 4.

Which part of the sperm plays an important role in penetrating the egg membrane?

- (a) Allosome
- (b) Tail
- (c) Autosome
- (d) Acrosome

Question 5.

Which among the following has 23 chromosomes?

- (a) Spermatogonia
- (b) Zygote
- (c) Secondary oocyte
- (d) Oogonia

Question 6.

Which of the following hormones is not secreted by human placenta?

- (a) hCG
- (b) Estrogens
- (c) Progesterone
- (d) LH

Question 7.

The nutritive cells found in seminiferous tubules are

- (a) Leydig's cells
- (b) atretic follicular cells
- (c) Sertoli cells
- (d) chromaffin cells.

Question 8.

Sertoli cells are regulated by the pituitary hormone known as

- (a) LH
- (b) FSH
- (c) GH
- (d) prolactin.

Question 9.

In human adult females oxytocin

- (a) stimulates pituitary to secrete vasopressin
- (b) causes strong uterine contractions during parturition
- (c) is secreted by anterior pituitary
- (d) stimulates growth of mammary glands.

Question 10.

At what stage of life is oogenesis initiated in a human female?

- (a) At puberty
- (b) During menarche
- (c) During menopause
- (d) During embryonic development

Question 11.

Delivery of developed foetus is scientifically called

- (a) parturition
- (b) oviposition
- (c) abortion
- (d) ovulation.

### **ASSERTION-REASON QUESTIONS**

In the following questions a statement of assertion and reason is correct explanation for assertion correct answer out of the following choices.

- a. Both assertion and reason are true, and reason is the correct explanation of assertion
- b. Both assertion and reason are true, but reason is not the correct explanation of assertion
- c. Assertion is true but reason is false
- d. Both assertion and reason are false.

1. Assertion-The uterus is shaped like an inverted pear.

Reason- The inner glandular layer lining the uterine cavity is called as myometrium.

2. Assertion-The middle piece of the sperm is called is powerhouse.

Reason- Numerous mitochondria in the middle piece produce energy for the movement of the tail.

3. Assertion-All sperms released at a time do not fertilise the ovum.

Reason-Fertilisation occur only when ovum and sperm fuse at the ampullary-isthmic junction.

4. Assertion-The embryo with 8 to 16 blastomeres is called a morula.

Reason-The morula continuously divides to transform into trophoblast.

5. Assertion-The endometrium undergoes cyclic changes during the menstrual cycle.

Reason- Perimetrium contracts strongly during delivery of the baby.

6. Assertion- Signals for parturition originate from placenta and the developed foetus.

Reason- Relaxin is released by the placenta.

7. Assertion-the female gamete is produced at the time of puberty.

Reason- gonadotropin releasing hormone controls the process of oogenesis.

8. Assertion- the fertilized egg contains 23 pairs of chromosomes

Reason-zygote is formed by the fusion of egg and the sperm.

9. Assertion-Colostrum produced in first 2-3 days after parturition is rich in nutrients.

Reason-placenta induces the signals for expulsion of the fully developed.

**Short Answer type (2 or 3 marks)**

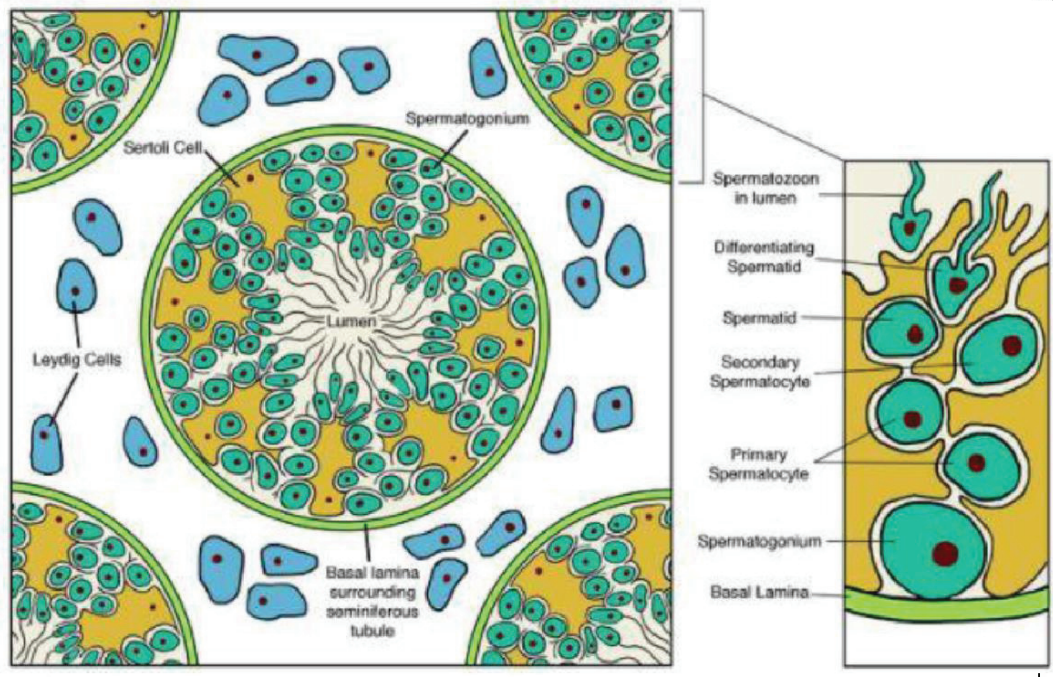
1. At what stage of life is oogenesis initiated in a human female? When does the oocyte complete oogenesis?
2. Give a scientific term for the following:
  - a) Layer of follicle cells that envelops the egg outside the zona pellucida.
  - b) The finger-like projection appearing on the trophoblast after implantation.
3. a) How many lobules are found in each testis?  
b) What is the function of Bulbourethral glands?
4. What is pregnancy hormone? Why is it so called? Name two sources of this hormone in a human female.
5. Name the hormone which stimulates the secretion of ovarian hormones. What would happen if the blood concentration of ovarian hormones increases?
6. Explain the formation of placenta after implantation in a human female.
7. What is the role of following hormones in the female reproductive cycle:
  - 1) FSH
  - 2) LH
  - 3) Progesterone
8. a) In which part of the human female reproductive system do the following events take place.
  - I. Release of 1st polar body
  - II. Release of 2nd polar body
  - III. Fertilization
  - IV. Implantation
 b) From where do the signals for parturition originate and what does maternal pituitary release for stimulating uterine contractions for childbirth.
9. Define spermatogenesis. Where does it occur?
10. Write the location and functions of Sertoli cells in humans?
11. Differentiate between spermiogenesis and spermiation.
12. How does colostrum provide initial protection against diseases to new born infants? Give one reason.
13. State the fate of the trophoblast of a human blastocyst at the time of implantation and that of the inner cell mass immediately after implantation.
14. What is ovulation? What happens to the Graafian follicle after ovulation?

**Long Answer (5marks)**

1. What is spermatogenesis? Briefly describe the process of spermatogenesis.
2. Briefly describe the process of oogenesis.
3. Describe the roles of pituitary and ovarian hormones during the menstrual cycle in a human female.
4. Explain in detail the various developmental stages of the zygote until implantation with suitable diagrams.

**Diagram based/case based/passage-based questions**

**Q1**



Study the figure given and answer the questions that follows: (answer any four) 1x4

i) The function of Sertoli cell is:

- a) Nutrition to the sperms
- b) Nutrition to the Leydig cell
- c) Nutrition to the basal lamina
- d) Excretion from sperm

ii) Cross section of testes shows:

- a) Seminiferous tubules with different stages of development of sperm
- b) Development of Sertoli cells
- c) Many testicular lobules
- d) Many spermatogonia

iii) Pick out and name the cells that undergo spermiogenesis.

- a) Spermatogonia undergo spermiogenesis
- b) Spermatids undergo spermiogenesis
- c) Secondary spermatocytes undergo spermiogenesis
- d) Primary spermatocytes undergo spermiogenesis.

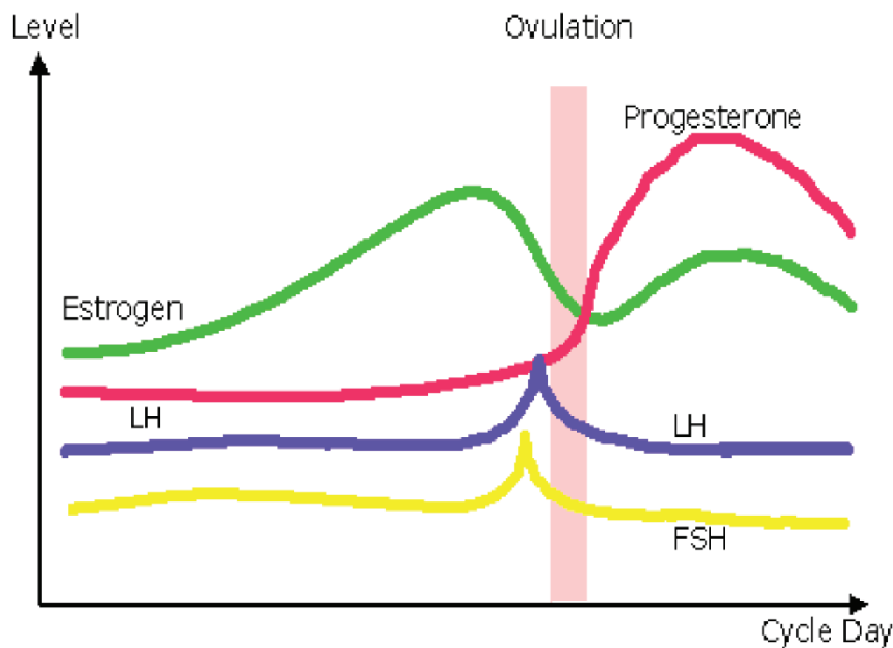
iv) How many sperms will be produced from 50 primary spermatocytes?

- a) 400 sperms
- b) 1000 sperms
- c) 200sperms
- d) 100sperms

v) Testosterone is secreted which cell:

- a) Sertoli cell
- b) Spermatids
- c) Leydig cells
- d) Spermatogonia

Q2



Study the graph given and answer any four questions: 1x4

i) Name the ovarian and pituitary hormones that are responsible for development of follicles.

- a) Estrogen and LH
- b) Estrogen and progesterone
- c) FSH and LH
- d) Progesterone and FSH

ii) In which phase of menstrual cycle corpus luteum is formed and names the hormone it secretes.

- a) Ovulatory phase and progesterone
- b) Luteal phase and progesterone
- c) Follicular phase and progesterone
- d) Menstrual phase and progesterone

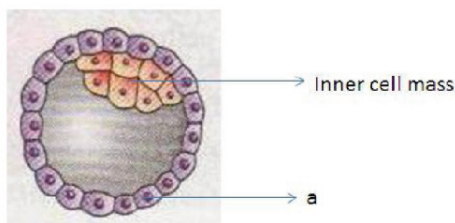
iii) What are the three phases of oogenesis?

- a) Multiplication phase, growth phase and reproductive phase
- b) Multiplication phase, growth phase and maturation phase
- c) Growth phase, maturation phase and secretory phase
- d) Secretory phase, growth phase and maturation phase

iv) The phase in woman's life when ovulation and menstruation stops is called:

- a) Menarche
  - b) Puberty
  - c) Menopause
  - d) Reproduction
- v) Withdrawing of which hormone causes menstruation?
- a) Estrogen
  - b) Progesterone
  - c) FSH
  - d) LH

**Q3** Study the diagram and answer any four questions:1x4



i) Name the stage of human embryo the figure represents.

- a) Gastrula
- b) Blastocyst
- c) Oocyte
- d) Primary oocyte

ii) Where are the stem cells located in this embryo?

- a) Inner cell mass
- b) Blastocoel
- c) Blastomeres
- d) Blastocyst

iii) Write the name of "a"

- a) Blastomere
- b) Trophoblast
- c) Morula
- d) Gastrula

iv) Which layer gets attached to the cells of endometrium and names the part which develops into embryo?

- a) Trophoblast and inner cell mass
  - b) Trophoblast and ectoderm
  - c) Ectoderm and endoderm
  - d) Trophoblast and mesoderm
- v) How is the placenta connected to the embryo?
- a) By chorionic villi
  - b) By umbilical cord
  - c) By inner layer
  - d) By trophoblast

### **Answer key**

#### **MCQ**

1. (d) at the end of the proliferative phase.
2. (c) corpus luteum
3. (c) corona radiata
4. (d) Acrosome
5. (c) Secondary oocyte
6. (d) LH
7. (c) Sertoli cells
8. (b) FSH
9. (b) causes strong uterine contractions during parturition
10. (d) During embryonic development
11. (a) parturition

#### **ASSERTION-REASON QUESTIONS**

1. Ans. c
2. Ans. a
3. Ans. b
4. Ans. c
5. Ans. c
6. Ans. b
7. Ans. d
8. Ans. a
9. Ans. b

#### **Short Answer type ( 2 or 3 marks)**

1. Ans. Embryonic life. When the sperm enters the egg
2. (a). Ans. corona radiata (b). Ans. Chorionic villi
3. (a). Ans. 250 (b). Ans. Secretion of alkaline fluid. They also secrete mucus that lubricates the end of the penis and the lining of the urethra.



4. Ans. Human chorionic gonadotropin(hcG) chorionic thyrotropin, chorionic corticotropin and relaxin are secreted by placenta. The hcG stimulates and maintains the corpus luteum to secrete progesterone. Progesterone maintains endometrium throughout the pregnancy. These hormones are associated with pregnancy and therefore known as pregnancy hormone.
5. Ans. FSH and LH stimulate the ovarian hormones. A feedback system becomes operative when the level of estrogen increases. The anterior pituitary is inhibited from secreting FSH and stimulated to secrete LH.
6. Ans. Trophoblast forms finger-like projections called chorionic villi that are surrounded by uterine tissue and maternal blood. The chorionic villi and uterine tissue become interdigitated with each other to form placenta.
7. Ans. 1. FSH- Stimulates growth of Graafian follicle and maturation of ovum in it. Stimulates secretion of estrogen from follicle cells.  
2. LH- Stimulates ovulation and induces the formation of corpus luteum. Stimulates secretion of progesterone from corpus luteum.  
3. Progesterone- brings about uterine growth, facilitates the implantation of embryos and formation of the placenta. Prevents other Graafian follicles from maturing.
8. Ans. a) I) Ovary II) In the isthmus- ampullary junction of fallopian tube III) Isthmus- ampullary junction of fallopian tube. IV) In the uterus  
b) Fully developed foetus and placenta, oxytocin
9. Answer: The transformation of non-motile spermatids into motile spermatozoa is called spermiogenesis. It occurs inside seminiferous tubules of testes.
10. Answer: Sertoli cells. These are present in the seminiferous tubules of the testis. They provide nutrition to germ cells. They play a vital role in the maturation of spermatids into motile sperms.
11. Answer: Difference between spermiogenesis and Spermiation: Spermiogenesis is the process of transformation of non-motile spermatids into mature motile sperms (male-gametes) whereas spermiation is the release of sperms from Sertoli cells of seminiferous tubules.
12. Answer: The colostrum provides antibodies that are essential to developing resistance for new born babies.
13. Answer: The trophoblast layer of the human blastocyst gets attached to the endometrium and the inner cell mass gets differentiated into an embryo. After attachment, the uterine cells divide rapidly and cover the blastocyst. As a result, the blastocyst becomes embedded in the endometrium of the uterus. It is termed Implantation.
14. Answer: Ovulation: The release of eggs (at secondary oocyte stage) after rupturing of Graafian follicle is called ovulation. After the ovulation, the granulosa cells as well as the stroma cells from theca Interna rapidly multiply to fill the cavity of the Graafian follicle which becomes the corpus luteum. If fertilization occurs, the corpus luteum grows further and secretes hormones. If fertilization does not take place, the corpus luteum regresses and forms a yellow body.

### **LONG ANSWER QUESTIONS ( 5marks)**

1. Answer:

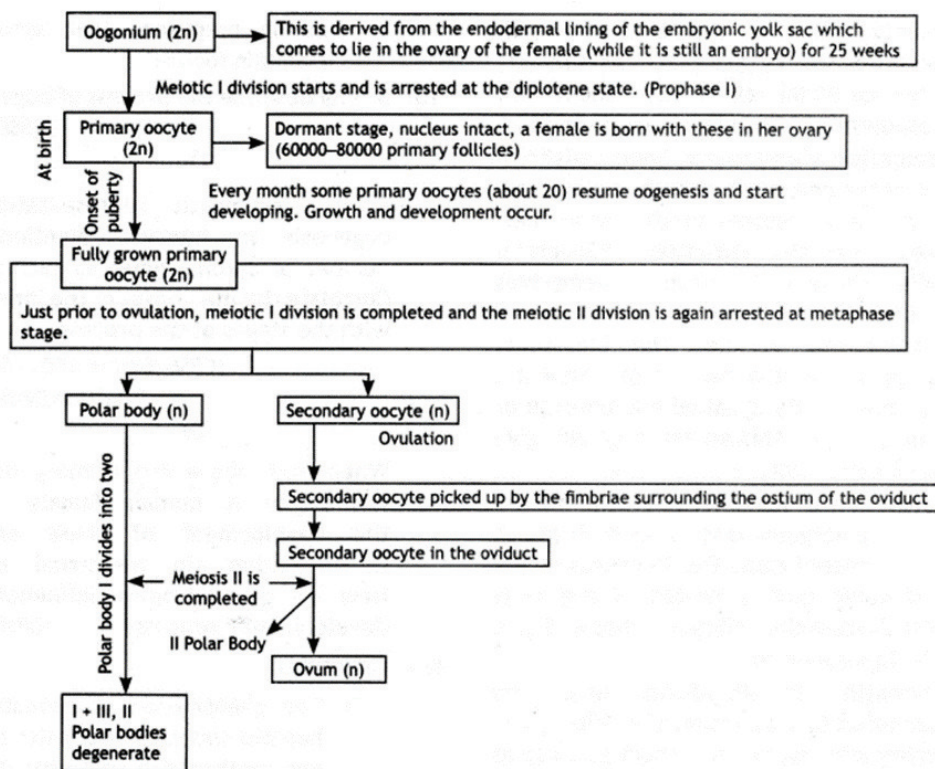
Spermatogenesis. The process of sperm formation from the sperm mother cells of testis (male gonad) is called spermatogenesis. It is completed in four phases, viz. spermatocytogenesis, meiosis I, meiosis II, and spermiogenesis. Spermatocytogenesis, Meiosis I and Meiosis II. The sperms are formed from the sperm mother cells present in the germinal layer of seminiferous tubules of the testis. Some of the mother cells enlarge to divide mitotically to form spermatogonia.

Growth phase: Some of them enter a period of growth and are called primary spermatocytes which are diploid.

Maturation phase: These cells divide meiotically to form two haploid secondary spermatocytes. Each secondary spermatocyte again divides mitotically. Thus, one primary spermatocyte forms haploid spermatids.

Spermiogenesis: These develop into complete spermatozoan. These possess head which is embedded in the nourishing cells called Sertoli cells. The process of conversion of spermatid into spermatozoan is called spermiogenesis.

2. Answer.



Flow chart of oogenesis in female

3. Answer:

The cycle of events starting from one menstruation till next in female primates is called menstrual cycle. It comprises of four phases which are regulated by both pituitary (LH and FSH) and ovarian (oestrogen and progesterone) hormones that affect ovaries and uterus, respectively. The events occurring in a menstrual cycle are as follows

**Menstrual phase** (from 3rd-5th day in a 28-day cycle) Initiated by reduced secretion of LH, progesterone and oestrogen. The endometrium breaks down and blood along with unfertilised ovum constitutes menstrual flow.

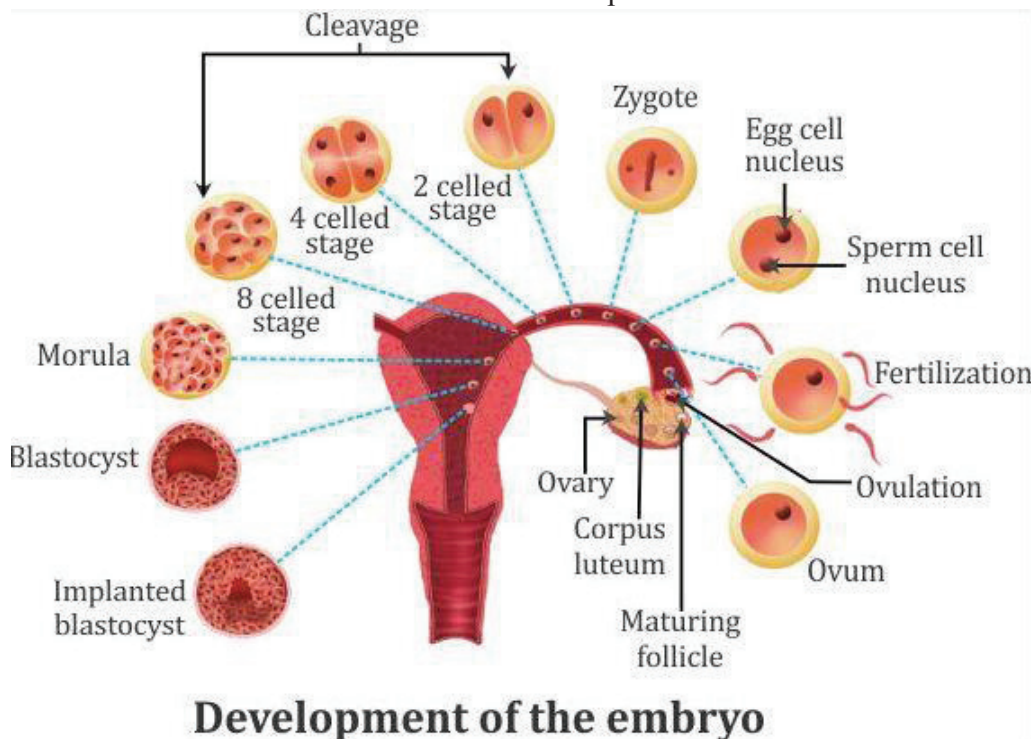
**Follicular phase** (from 6th-13th day in a 28-day cycle) The FSH (Follicle Stimulating Hormone) secreted by anterior pituitary stimulates ovarian follicle to secrete oestrogens. These oestrogens stimulate proliferation of uterine walls as a result of which endometrium gets thickened (due to rapid cell division and increase in uterine glands and blood vessels).

**Ovulatory phase** (14th day in 28-day cycle) -Pituitary hormones, i.e. LH and FSH reach the highest level in middle of the cycle. Rapid secretion of LH causes ovulation thus, inducing the rupture of Graafian follicle to release secondary oocyte and a polar body.

**Luteal or secretory phase** (from 15th-28th day in a 28-day cycle) The pituitary hormone LH stimulates the remaining cells of ovarian follicles to develop into corpus luteum. This corpus

luteum secretes large amount of progesterone and maintains endometrium thickening for the implantation of fertilised ovum during pregnancy. In the absence of fertilisation, the hormone levels are reduced (LH and progesterone) and endometrium disintegrates leading to onset of another menstrual cycle.

4. When the zygote moves through the isthmus of the oviduct, the mitotic division is initiated and is called the cleavage towards the uterus to form 2,4,8,16 daughter cells called blastomeres. It is an embryo containing 8 to 16 blastomeres from the morula. It continues to transform and divide into blastocysts as it further approaches the uterus. In the blastocyst, the blastomeres are organized into an outer layer referred to as the trophoblast and the inner cell mass, which is an inner collection of cells attached to the trophoblast. This layer gets attached to the endometrium and the inner cell mass transforms into the embryo. After attachment, the cells of the uterus rapidly divide and covers up the entire blastocyst. This causes the blastocyst to implant in the endometrium of the uterus which leads to conception.



### ANSWER KEY

**Diagram based/case based/passage-based questions.**

Q.NO.1

1. Ans. a
2. Ans. a
3. Ans. b
4. Ans c
5. Ans c

Q.NO.2

1. Ans. a
2. Ans. b
3. Ans. B

4. Ans. c
5. Ans. b

Q.NO.3

1. Ans. b
2. Ans. a
3. Ans. b
4. Ans. a
5. Ans. b