

Section-II Questions With Answers

Q.1 List the structures of the male reproductive system.

Ans. The male reproductive system consists of the following:

- Gonads (testes)
- Accessory ducts (epididymis, ductus deferens, ejaculatory duct, and urethra)
- Accessory glands (seminal vesicles, prostate gland, bulbourethral glands)
- Copulatory organ (penis)

Q.2 Explain hormonal control of human male reproductive function.

Ans. The control involves hormones from the hypothalamus and anterior pituitary.

- Gonadotropin-releasing hormone (GnRH) from the hypothalamus stimulates the release of follicle-stimulating hormone (FSH) and luteinizing hormone (LH) from the anterior pituitary.
- FSH stimulates Sertoli cells in the testes which facilitate spermatogenesis.
- LH stimulates Leydig cells in the testes to produce testosterone.
- High levels of testosterone exert a negative feedback on the hypothalamus and anterior pituitary, reducing the release of GnRH, FSH, and LH.

Q.3 List the structures of the female reproductive system.

Ans. The female reproductive system consists of the following:

- Gonads (ovaries)
- Oviducts (Fallopian tubes)
- Uterus
- Vagina

Q.4 List the structure in order, through which a sperm passes on its way from the seminiferous tubules of the testis to the fallopian tubule of the female.

Ans.

- Seminiferous tubules
- Vasa efferentia
- Epididymis
- Ductus deferens
- Ejaculatory duct
- Urethra (male)
- Vagina (female)
- Cervix
- Uterus
- Fallopian tubes

Q.5 What changes occur in ovulation and menstruation during the gestation period.

Ans. During gestation, ovulation and menstruation are suppressed. The hormonal environment changes, primarily due to high levels of hormones like progesterone, which prevent the release of follicle-stimulating hormone (FSH) and luteinizing hormone (LH) thereby inhibiting the menstrual cycle and ovulation.

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Q.6 Name the three phases of the menstruation cycle and mention the characteristic days.

- Ans.**
- Menstrual phase (Days 1-5)
 - Proliferative phase (Days 6-14)
 - Secretory phase (Days 15-28)

Q.7 What is the role of the corpus luteum in a menstrual cycle?

- Ans.** The corpus luteum forms after ovulation and secretes progesterone. This hormone maintains the endometrial lining, supporting potential implantation of an embryo. If fertilization does not occur, the corpus luteum degenerates, leading to a drop in progesterone levels and the onset of menstruation.

Q.8 What are the actions of GnRH, FSH, and LH in the human reproductive functions?

- Ans.**
- GnRH stimulates the anterior pituitary to release FSH and LH.
 - FSH stimulates the Sertoli cells in males for spermatogenesis and ovarian follicle development in females.
 - LH stimulates testosterone production in males by Leydig cells and triggers ovulation and corpus luteum formation in females.

Q.9 Why are so many sperms produced in the male and so few ova produced in the female?

- Ans.** Males produce many sperms to increase the chances of fertilizing the ovum, considering the challenges of navigating the female reproductive tract. Females produce fewer ova because each ovum requires significant resources to develop and has a higher chance of fertilization due to its larger size and supportive environment.

Q.10 Why it is necessary for large numbers of sperms to be produced when only one sperm is required to bring about fertilization?

- Ans.** The high number of sperms compensates for the fact that not all sperms will survive the journey to reach the ovum. More sperms increase the likelihood of successful fertilization as they need to overcome various physical and chemical challenges within the female reproductive tract.

Q.11 Enlist the reasons of human male infertility?

- Ans.** Common reasons for male infertility include low sperm production, abnormal sperm function, blockages that prevent sperm delivery, illnesses, injuries, chronic health problems, lifestyle choices, and environmental factors.

Q.12 Write the differences between:

- (a) **Human male and female reproductive system**
- **Structure:** Male reproductive system includes external genitalia (penis, scrotum) and internal organs (testes, epididymis, ductus deferens, seminal vesicles, prostate gland). Female reproductive system mainly comprises internal structures (ovaries, Fallopian tubes, uterus, vagina).
 - **Function:** Male system primarily produces and delivers sperm, while the female system produces ova, receives sperm, facilitates fertilization, and supports gestation.
- (b) **Spermatogenesis and Oogenesis**
- **Process:** Spermatogenesis results in four viable sperm cells from each primary spermatocyte, while oogenesis produces one viable ovum and polar bodies from each primary oocyte.
 - **Location:** Spermatogenesis occurs in the seminiferous tubules of the testes; oogenesis occurs in the ovaries.
 - **Duration:** Spermatogenesis is a continuous process after puberty, whereas oogenesis begins prenatally, pauses, and completes only if fertilization occurs.
- (c) **Primary and Secondary Spermatocytes**
- **Developmental stage:** Primary spermatocytes are diploid cells that undergo the first meiotic division to form two haploid secondary spermatocytes.
 - **Chromosomal content:** Primary spermatocytes have a full set of chromosomes (46, XY), whereas secondary spermatocytes have half the number of chromosomes (23, X or Y).
- (d) **Sertoli Cell and Leydig Cell**
- **Location:** Sertoli cells are located within the seminiferous tubules, whereas Leydig cells are found in the interstitial space between the tubules.
 - **Function:** Sertoli cells support and nourish developing sperm cells and regulate spermatogenesis through hormonal feedback. Leydig cells produce testosterone, which is crucial for the development of male secondary sexual characteristics and spermatogenesis.
- (e) **Spermatids and Sperms**
- **Maturity:** Spermatids are immature sperm cells that arise from the meiotic division of secondary spermatocytes. Sperms are the mature, motile male gametes.

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- **Structure:** Spermatids undergo transformation during spermiogenesis, losing excess cytoplasm and developing a tail to become spermatozoa, capable of fertilization.
- (f) **Perimetrium and Endometrium**
 - **Location:** The perimetrium is the outermost layer of the uterus, while the endometrium is the innermost lining where implantation of an embryo occurs.
 - **Function:** The perimetrium serves as a protective layer; the endometrium undergoes cyclical changes to prepare for potential implantation of a fertilized egg and is shed during menstruation if implantation does not occur.
- (g) **Primary Oocyte and Secondary Oocyte**
 - **Developmental Stage:** Primary oocytes are formed before birth, enter prophase I, and remain arrested until puberty. Secondary oocytes result from the division of primary oocytes, completing meiosis I.
- **Chromosomal Content:** Primary oocytes are diploid; secondary oocytes are haploid and paused at metaphase II until fertilization.
- (h) **Menarche and Menopause**
 - **Definition:** Menarche is the first menstruation. It is the beginning of reproductive capability in females. It usually occurs around the age of 12-15.
Menopause is the end of menstrual cycles and reproductive capability. It typically occurs between ages 45 and 55.
 - **Biological Changes:** Menarche signifies the start of ovulatory cycles and reproductive hormones stabilizing. Menopause involves the cessation of ovarian function and a significant decrease in estrogen and progesterone levels, leading to the end of menstrual cycles.