

25

Human Reproduction

TOPIC 1

Human Reproductive System

- 01** Match the following columns and select the correct option.

[NEET (Sep.) 2020]

Column I	Column II
A. Placenta	1. Androgens
B. Zona pellucida	2. Human Chorionic Gonadotropin (hCG)
C. Bulbourethral glands	3. Layer of the ovum
D. Leydig cells	4. Lubrication of the penis

	A	B	C	D
(a)	1	4	2	3
(b)	3	2	4	1
(c)	2	3	4	1
(d)	4	3	1	2

Ans. (c)

The correct option is (c). It can be explained as follows.

Placenta secretes human chorionic gonadotropin (hCG).

Zona pellucida is a primary egg membrane secreted by the secondary oocyte. The secretions of Bulbourethral glands help in lubrication of the penis.

Leydig cells synthesise and secrete testicular hormones called androgens.

- 02** Select the correct sequence for transport of sperm cells in male reproductive system.

[NEET (National) 2019]

- (a) Seminiferous tubules → Rete testis → Vasa efferentia → Epididymis → Vas deferens → Ejaculatory duct → Urethra → Urethral meatus

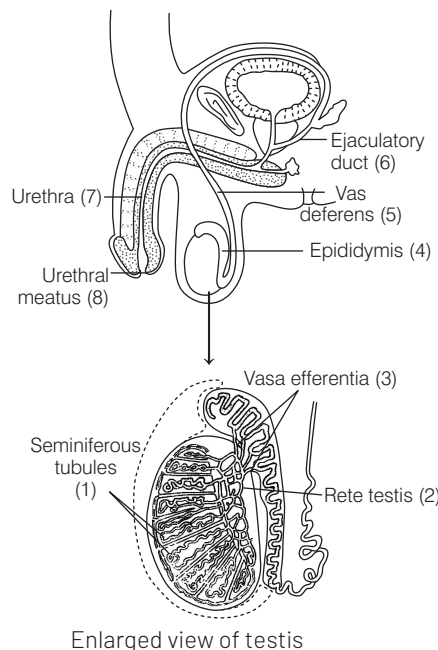
- (b) Seminiferous tubules → Vasa efferentia → Epididymis → Inguinal canal → Urethra

- (c) Testis → Epididymis → Vasa efferentia → Vas deferens → Ejaculatory duct → Inguinal canal → Urethra → Urethral meatus

- (d) Testis → Epididymis → Vasa efferentia → Rete testis → Inguinal canal → Urethra

Ans. (a)

The correct sequence of sperm transport in male reproductive system is seminiferous tubules → Rete testis → Vasa efferentia → Epididymis → Vas deferens → Ejaculatory duct → Urethra → Urethral meatus. The pathway of sperm transport is shown in the diagram below



- 03** Which of the following depicts the correct pathway of transport of sperms? [NEET 2016, Phase II]

- (a) Rete testis → Efferent ductules → Epididymis → Vas deferens
 (b) Rete testis → Epididymis → Efferent ductules → Vas deferens
 (c) Rete testis → Vas deferens → Efferent ductules → Epididymis
 (d) Efferent ductules → Rete testis → Vas deferens → Epididymis

Ans. (a)

The sperms are produced in the seminiferous tubules. The rete testis is connected to these tubules at one end and transfers sperms to vasa efferentia (small tubular structures between rete testis and epididymis).

The sperms reach to epididymis through vasa efferentia where they are temporarily stored for maturation and then transferred to seminal vesicle through vas deferens.

Thus, the correct route is

Rete testis → Efferent ductules → Epididymis → vas deferens.

- 04** The shared terminal duct of the reproductive and urinary system in the human male is

[CBSE AIPMT 2014]

- (a) urethra (b) ureter
 (c) vas deferens (d) vasa efferentia

Ans. (a)

In the human male, urethra provides an exit for urine from the urinary bladder as well as semen from vasa differentia during ejaculation. Thus, it is also known as urogenital duct.

In males, it is about 8 inches (20 cm) long and opens at the end of the penis.

Vas deferens and vasa efferentia are the male sex accessory ducts.

Ureters are the tubes that carry urine from the kidney to urinary bladder.

05 The Leydig cells as found in the human body are the secretory source of [CBSE AIPMT 2012]

- (a) progesterone (b) intestinal mucus
(c) glucagon (d) androgens

Ans. (d)

Interstitial cells or cells of Leydig are present in the connective tissue lying in between seminiferous tubules. These cells secrete oestradiol-steroid androgens, e.g. testosterone. Androgens stimulate male characters, influence male sexual behaviour (libido) and regulate the development, maturation and functions of male accessory sex organs.

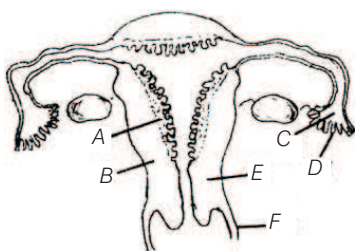
06 If for some reason, the vasa efferentia in the human reproductive system get blocked, the gametes will not be transported from [CBSE AIPMT 2011]

- (a) epididymis to vas deferens
(b) ovary to uterus
(c) vagina to uterus
(d) testes to epididymis

Ans. (d)

Vasa efferentia (ductuli efferentia) are 10-20 fine tubules which connect rete testis with an epididymis (ductus epididymis). The latter is a pair of ducts from each testis which is formed by union of its vasa efferentia. If the vasa efferentia get blocked, the sperms will not be transported from testes to epididymis.

07 The figure given below depicts a diagrammatic sectional view of the female reproductive system of humans. Which one set of three parts out of A-F have been correctly identified? [CBSE AIPMT 2011]



- (a) C-Infundibulum, D-Fimbriae, E-Cervix
(b) D-Oviducal funnel, E-Uterus, F-Cervix
(c) A-Perimetrium, B-Myometrium, C-Fallopian tube
(d) B-Endometrium, C-Infundibulum, D-Fimbriae

Ans. (a)

The Fallopian tube is about 10-12 cm long and extends from the periphery of each ovary to the uterus. The part closer to the ovary is funnel shaped and is called infundibulum. The edges of the infundibulum possess finger-like projections called fimbriae, which help in collection of the ovum after ovulation. The uterus opens into vagina through a narrow cervix.

08 The testes in humans are situated outside the abdominal cavity inside a pouch called scrotum. The purpose served is for [CBSE AIPMT 2011]

- (a) escaping any possible compression by the visceral organs
(b) providing more space for the growth of epididymis
(c) providing a secondary sexual feature for exhibiting the male sex
(d) maintaining the scrotal temperature lower than the internal body temperature

Ans. (d)

The testes in humans are situated outside the abdominal cavity in scrotal sacs. This is because the temperature of scrotal sacs is 2-2.5°C which is less than internal body temperature.

09 Sertoli cells are found in [CBSE AIPMT 2010]

- (a) ovaries and secrete progesterone
(b) adrenal cortex and secrete adrenaline
(c) seminiferous tubules and provide nutrition to germ cells
(d) pancreas and secrete cholecystokinin

Ans. (c)

The epithelium of seminiferous tubule is made up of two types of cells, i.e. Sertoli cells and spermatogenic cells. Sertoli cells are elongated and pyramidal which partially envelope the spermatogenic cells. These nourish spermatozoa, act as nurse cells for differentiating spermatozoa. These secrete a glycoprotein hormone, called inhibin which is involved in the negative feedback control of sperm production.

10 Vasa efferentia are the ductules leading from [CBSE AIPMT 2010]

- (a) testicular lobules to rete testis
(b) rete testis to vas deferens
(c) vas deferens to epididymis
(d) epididymis to urethra

Ans. (b)

Rete testis is connected to epididymis by 12-20 fine tubules called vasa efferentia or ductuli efferens. These collect sperms from inside the testis and transfer them to the epididymis. Vasa deferens arises from caudal epididymis, conducts sperms from epididymis to urethra.

11 Seminal plasma in human males is rich in [CBSE AIPMT 2010, 09]

- (a) fructose and calcium
(b) glucose and calcium
(c) DNA and testosterone
(d) ribose and potassium

Ans. (a)

Seminal plasma is composed of the fluid and sperms from the vas deferens (about 10% of the total), fluid from the seminal vesicles (almost 60 percent), fluid from the prostate gland (about 30 percent) and small amount of mucous glands, especially the bulbourethral glands.

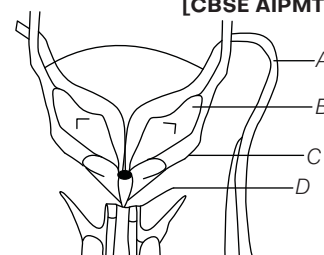
12 The part of Fallopian tube closest to the ovary is [CBSE AIPMT 2010]

- (a) isthmus (b) infundibulum
(c) cervix (d) ampulla

Ans. (b)

The Fallopian tubes, uterus and vagina constitute the female accessory ducts. Each Fallopian tube extends from the periphery of each ovary to the uterus. The part closer to the ovary is funnel-shaped infundibulum, which help in collection of the ovum after ovulation.

13 Given below is a diagrammatic sketch of a portion of human male reproductive system. Select the correct set of the names of the parts labelled A, B, C, D. [CBSE AIPMT 2009]



A	B	C	D
(a) Ureter	Prostate	Seminal vesicle	Bulbourethral gland
(b) Vas deferens	Seminal vesicle	Prostate	Bulbourethral gland
(c) Vas deferens	Seminal vesicle	Bulbourethral gland	Prostate
(d) Ureter	Seminal vesicle	Prostate	Bulbourethral gland

Ans. (b)

Option (b) is correct, A = Vas deferens.
B = Seminal vesicle, C = Prostate and
D = Bulbourethral gland.

14 Bartholin's glands are situated [CBSE AIPMT 2003]

- (a) on either side of vagina in humans
- (b) on either side of vas deference in humans
- (c) on the sides of the head of some amphibians
- (d) at the reduced tail end of birds

Ans. (a)

Bartholin's glands (Bulbovestibular glands) are one pair, small sized glands find just behind the labia minora, one on either sides of vaginal orifice. These lubricate the vagina during mating and parturition by secretion of mucus.

15 Location and secretion of Leydig's cells are [CBSE AIPMT 1991]

- (a) liver – cholesterol
- (b) ovary – estrogen
- (c) testis – testosterone
- (d) pancreas – glucagon

Ans. (c)

The endocrine part of testis is formed of groups of cells, called interstitial cells or Leydig's cells, scattered in connective tissue between the sperm producing seminiferous tubules of the testis.

These cells are stimulated to produce male sex hormones, called androgens by ICSH of anterior pituitary.

Testosterone is main androgen and is a steroid hormone.

TOPIC 2

Gametogenesis, Menstrual Cycle and its Hormonal Control

16 Select the correct option of haploid cells from the following groups. [NEET (Oct.) 2020]

- (a) Primary oocyte, secondary oocyte, spermatid

- (b) Secondary spermatocyte, first polar body, ovum
- (c) Spermatogonia, primary spermatocyte, spermatid
- (d) Primary spermatocyte, secondary spermatocyte, second polar body

Ans. (b)

Out of the given the option, the haploid cells are secondary spermatocyte, first polar body, ovum, secondary oocyte, spermatids and second polar body.

The diploid cells are primary oocyte and primary spermatocyte. Thus, option (b) is correct.

17 Match the following columns and select the correct option from the codes given belows [NEET (Oct.) 2020]

Column I	Column II
A. Ovary	1. Human chorionic gonadotropin
B. Placenta	2. oestrogen and progesterone
C. Corpus luteum	3. Androgens
D. Leydig cells	4. Progesterone only

Codes

- | | | | | |
|-----|---|---|---|---|
| | A | B | C | D |
| (a) | 4 | 3 | 2 | 1 |
| (b) | 1 | 2 | 3 | 4 |
| (c) | 1 | 3 | 2 | 4 |
| (d) | 2 | 1 | 4 | 3 |

Ans. (d)

The option (d) is the correct match which is as follows

Ovary produces oestrogen and progesterone.

Placenta produces Human Chorionic Gonadotropin (hCG).

Corpus luteum produces progesterone only.

Leydig cells produce androgens.

18 Which of the following hormone levels will cause release of ovum (ovulation) from the Graafian follicle? [NEET (Sep.) 2020]

- (a) High concentration of progesterone
- (b) Low concentration of LH
- (c) Low concentration of FSH
- (d) High concentration of oestrogen

Ans. (d)

High level of oestrogen will send positive feedback to anterior pituitary for release of ovum from Graafian follicle. FSH, LH and oestrogen are at peak level during mid of menstrual cycle (28 day cycle). LH surge leads to ovulation.

19 Meiotic division of the secondary oocyte completed [NEET (Sep.) 2020]

- (a) at the time of copulation
- (b) after zygote formation
- (c) at the time of fusion of a sperm with an ovum
- (d) prior to ovulation

Ans. (c)

Meiotic division of secondary oocyte is completed after the entry of sperm in secondary oocyte which lead to the formation of a large ovum and a tiny 11nd polar body.

20 No new follicles develop in the luteal phase of the menstrual cycle because [NEET (Odisha) 2019]

- (a) follicles do not remain in the ovary after ovulation
- (b) FSH levels are high in the luteal phase
- (c) LH levels are high in the luteal phase
- (d) both FSH and LH levels are low in the luteal phase

Ans. (d)

No new follicles develop in the luteal phase of menstrual cycle. It is because during this phase, Luteinising Hormone (LH) and Follicle Stimulating Hormone (FSH) levels decrease. Instead, the already ruptured follicle closes after releasing the egg and forms a corpus luteum during luteal phase, which produces progesterone.

21 What is the fate of the male gametes discharged in the synergid? [NEET (National) 2019]

- (a) All fuse with the egg
- (b) One fuses with the egg, other(s) fuse(s) with synergid nucleus
- (c) One fuses with the egg and other fuses with central cell nuclei
- (d) One fuses with the egg other(s) degenerate (s) in the synergid

Ans. (c)

Out of the male gametes discharged in the synergid, one fuses with the egg and other fuses with central cell nuclei. The fusion between male gamete and egg is

called syngamy or true fertilisation which forms zygote (2n). The fusion between male gamete and central cell nuclei is called triple fusion and it results in the formation of a triploid primary endosperm nucleus (3n).

22 Extrusion of second polar body from egg nucleus occurs
[NEET (National) 2019]

- (a) after fertilisation
- (b) before the entry of sperm into ovum
- (c) simultaneously with first cleavage
- (d) after the entry of sperm but before fertilisation

Ans. (d)

Extrusion of second polar body from egg nucleus occurs after the entry of sperm but before fertilisation. The entry of sperm into female egg causes the breakdown of Metaphase Promoting Factor (MPF) and turns on Anaphase Promoting Factor (APF). Hence, the secondary oocyte completes its meiotic division after fertilisation and is said to be activated.

23 The difference between spermiogenesis and spermiation is
[NEET 2018]

- (a) In spermiogenesis, spermatozoa from Sertoli cells are released into the cavity of seminiferous tubules, while in spermiation spermatozoa are formed
- (b) In spermiogenesis, spermatozoa are formed, while in spermiation spermatids are formed
- (c) In spermiogenesis, spermatids are formed, while in spermiation spermatozoa are formed
- (d) In spermiogenesis, spermatozoa are formed, while in spermiation spermatozoa are released from Sertoli cells into the cavity of seminiferous tubules

Ans. (d)

Spermiogenesis is the process of transformation of spermatids (n) into spermatozoa (n) or sperms. It involves the differentiation phase in which one spermatid develops into one spermatozoan.

Spermiation involves the release of sperms from seminiferous tubules through Sertoli cells.

24 Match the items given in Column I with those in Column II and select the correct option given below.
[NEET 2018]

	Column I		Column II
1.	Proliferative phase	i.	Breakdown of endometrial lining
2.	Secretory phase	ii.	Follicular phase
3.	Menstruation	iii.	Luteal phase

- | | | | |
|-----|-----|-----|----|
| | 1 | 2 | 3 |
| (a) | ii | iii | i |
| (b) | i | iii | ii |
| (c) | iii | ii | i |
| (d) | iii | i | ii |

Ans. (a)

During proliferative phase, the follicles start growing in size under the influence of Follicle stimulating Hormone (FSH). Hence, this phase is also called follicular phase.

During secretory phase, corpus luteum secretes progesterone that helps to thicken the endometrial lining. Due to the persistence of corpus luteum, this phase is also called luteal phase.

Menstruation or bleeding occurs due to the breakdown of endometrial lining in the absence of pregnancy. During this phase, corpus luteum regresses and progesterone level decreases.

25 A temporary endocrine gland in the human body is
[NEET 2017]

- (a) pineal gland
- (b) corpus cardiacum
- (c) corpus luteum
- (d) corpus allatum

Ans. (c)

Corpus luteum is a temporary endocrine gland in the human body. It secretes small amount of estradiol and significant amount of progesterone hormone. In the absence of fertilisation, the corpus luteum degenerates.

26 Select the incorrect statement.
[NEET 2016, Phase I]

- (a) LH and FSH triggers ovulation in ovary
- (b) LH and FSH decrease gradually during the follicular phase
- (c) LH triggers secretion of androgens from the Leydig cells
- (d) FSH stimulates the Sertoli cells which help in spermiogenesis

Ans. (b)

In follicular phase of menstrual cycle, LH and FSH increase gradually and stimulate follicular development as well as secretion of oestrogens by the growing follicles.

27 Identify the correct statement on 'inhibin'.
[NEET 2016, Phase I]

- (a) Is produced by granulosa cells in ovary and inhibits the secretion of FSH
- (b) Is produced by granulosa cells in ovary and inhibits the secretion of LH
- (c) Is produced by nurse cells in testes and inhibits the secretion of LH
- (d) Inhibits the secretion of LH, FSH and prolactin

Ans. (a)

Inhibin is produced by granulosa cells of ovarian follicles in the ovary and has negative feedback effect on the secretion of FSH.

28 Changes in GnRH pulse frequency in females is controlled by circulating levels of
[NEET 2016, Phase I]

- (a) oestrogen and inhibin
- (b) progesterone only
- (c) progesterone and inhibin
- (d) oestrogen and progesterone

Ans. (d)

High levels of oestrogen and progesterone give negative feedback to hypothalamus for the release of GnRH. Thus, inhibiting the gonadotropin release.

29 Which of the following layers in an antral follicle is acellular?
[CBSE AIPMT 2015]

- (a) Granulosa
- (b) Theca interna
- (c) Stroma
- (d) Zona pellucida

Ans. (d)

Follicles that form an antrum during maturation are called antral follicle or Graafian follicle.

During the development of the follicle, a glycoprotein polymer capsule called the zona pellucida which is acellular, forms around the oocyte, separating it from the surrounding granulosa cells.

This layer remains with the oocyte after ovulation, and contains enzymes that catalyse with sperm to allow penetration.

30 Which of the following events in not associated with ovulation in human female?
[CBSE AIPMT 2015]

- (a) Decrease in oestradiol
- (b) Full development of Graafian follicle
- (c) Release of secondary oocyte
- (d) LH surge

Ans. (a)

Oestradiol levels fall after ovulation and before menstruation while, its levels peak prior to ovulation. Oestradiol are not associated with ovulation. Decrease in oestradiol level result in the cessation of menstruation.

31 The main function of mammalian corpus luteum is to produce
[CBSE AIPMT 2014, 1995]

- (a) oestrogen only
- (b) progesterone
- (c) human chorionic gonadotropin
- (d) relaxin only

Ans. (b)

The main function of mammalian corpus luteum is the secretion of progesterone which is essential for the maintenance of endometrium. Endometrium is necessary for implantation of the fertilised ovum and other events of pregnancy.

Corpus luteum also secretes some amount of estrogen to maintain pregnancy.

hCG (human Chorionic Gonadotropin) is secreted by placenta for maintaining the corpus luteum.

Relaxin is secreted by corpus luteum during the end of gestation period.

32 What is the correct sequence of sperm formation? [NEET 2013]

- (a) Spermatid, Spermatocyte, Spermatogonia, Spermatozoa
- (b) Spermatogonia, Spermatocyte, Spermatozoa, Spermatid
- (c) Spermatogonia, Spermatozoa, Spermatocyte, Spermatid
- (d) Spermatogonia, Spermatocyte, Spermatid, Spermatozoa

Ans. (d)

Spermatogonia → Spermatocyte → Spermatid → Spermatozoa

Spermatogonia is present on the inside wall of seminiferous tubule which undergo mitotic division and increase their number. Spermatocytes are some of the spermatogonia, which periodically undergo meiosis. The secondary spermatocytes undergo the second meiotic division to produce four, equal haploid spermatids. The spermatids are transformed into spermatozoa (sperm).

33 Menstrual flow occurs due to lack of [CBSE AIPMT 2012]

- (a) progesterone
- (b) FSH
- (c) oxytocin
- (d) vasopressin

Ans. (a)

Menstrual flow occurs due to the lack of progesterone.

Progesterone is secreted by corpus luteum and is essential for the maintenance of endometrium. This endometrium is responsible for implantation of the fertilised ovum, i.e. pregnancy.

FSH Stimulates gonadal activity and also called as gonadotrophins.

Oxytocin Stimulates contraction in uterus during childbirth.

Vasopressin Stimulate resorption of water and electrolytes by the distal tubules, also called as Antidiuretic Hormone (ADH).

34 Which one of the following statements is false in respect of viability of mammalian sperm? [CBSE AIPMT 2012]

- (a) Sperm is viable for only up to 24 hrs
- (b) Survival of sperm depends on the pH of the medium and is more active in alkaline medium
- (c) Viability of sperm is determined by its motility
- (d) Sperms must be concentrated in a thick suspension

Ans. (a)

Viability of a sperm means the capability of a sperm, to fertilise an egg.

Sperms are viable for 24 h to 48 h, whereas the ovum is viable for only 24 h.

35 Which one of the following statements about human sperm is correct? [CBSE AIPMT 2010]

- (a) Acrosome has a conical pointed structure used for piercing and penetrating the egg, resulting in fertilisation
- (b) The sperm lysins in the acrosome dissolve the egg envelope facilitating fertilisation
- (c) Acrosome serves as a sensory structure leading the sperm towards the ovum
- (d) Acrosome serves no particular function

Ans. (b)

Penetration of human sperm is a chemical mechanism. In this, acrosome of sperm undergoes acrosomal reaction and releases certain sperm lysins, which dissolve the egg envelope locally and make the path for the penetration of sperm. Sperm lysins are acidic proteins.

These sperm lysins contain a lytic enzyme hyaluronidase (that dissolves the hyaluronic acid polymers in the intercellular spaces, which holds the granulosa cells of corona radiata together) corona penetrating enzyme and acrosin.

36 Which one of the following is the most likely reason of not occurring regular menstruation cycle in females? [CBSE AIPMT 2009]

- (a) Fertilisation of the ovum
- (b) Maintenance of the hypertrophical endometrial lining
- (c) Maintenance of high concentration of sex-hormones in the blood stream
- (d) Retention of well-developed corpus luteum

Ans. (a)

If fertilisation occurs and foetus is implanted in the endometrium, the trophoblast cells of the developing placenta secrete a hormone human Chorionic Gonadotrophic (hCG). This hormone like LH maintains the corpus luteum and the secretion of progesterone and estradiol by it. These two hormones check the breakdown of the endometrium of the uterus. The absence of menstrual bleeding is the earliest sign of pregnancy.

37 Which one of the following is the correct matching of the events occurring during menstrual cycle? [CBSE AIPMT 2009]

- | | |
|----------------------------------|--|
| (a) Ovulation | LH and FSH attain peak level and sharp fall in the secretion of progesterone |
| (b) Proliferative phase | Rapid regeneration of myometrium and maturation of Graafian follicle |
| (c) Development of corpus luteum | Secretory phase and increased secretion of progesterone |
| (d) Menstruation | Breakdown of myometrium and ovum not fertilised |

Ans. (b)

In secretory phase during ovulation, the follicle breaks and collapses under the continuous influence of Luteinising Hormone (LH).

It begins to enlarge and forms a yellowish structure, called the corpus luteum. The corpus luteum plays an important role in the preparation of the endometrium for the implantation of the fertilised egg by secreting oestrogens and progesterone.

38 Which one of the following statement is incorrect about menstruation? [CBSE AIPMT 2008]

- (a) During normal menstruation about 40 mL blood is lost
- (b) The menstrual fluid can easily clot
- (c) At menopause in the female, there is especially abrupt increase in gonadotropic hormones
- (d) The beginning of the cycle of menstruation is called menarche

Ans. (b)

During normal menstruation approximately 40 mL of blood and an additional 35 mL of serous fluid are lost. The menstrual fluid is normally non-clotting because a fibrinolysin is released along with necrotic endometrial material.

39 At the end of first meiotic division, male germ cell differentiates into [CBSE AIPMT 2008, 1994]

- (a) secondary spermatocyte
- (b) primary spermatocyte
- (c) spermatogonium
- (d) spermatid

Ans. (a)

First meiotic division takes place in diploid primary spermatocyte and it forms two haploid cells called secondary spermatocytes.

40 Which part of ovary in mammals acts as an endocrine gland after ovulation? [CBSE AIPMT 2007]

- (a) Graafian follicle
- (b) Stroma
- (c) Germinal epithelium
- (d) Vitelline membrane

Ans. (a)

During ovulation, the mature follicle or Graafian follicle bursts and the ovum is released. This is named as corpus luteum which serves as a temporary endocrine gland by releasing progesterone and oestrogen.

41 If mammalian ovum fails to get fertilised, which one of the following is unlikely?

- (a) Corpus luteum will disintegrate

- (b) Estrogen secretion further decreases
- (c) Primary follicle starts developing
- (d) Progesterone secretion rapidly declines

Ans. (b)

If mammalian ovum fails to get fertilized, the estrogen secretion does not decrease further, while corpus luteum will disintegrate. Primary follicle starts developing and progesterone secretion rapidly declines.

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

[CBSE AIPMT 2004]

- (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

Ans. (d)

Ovulation takes place under the influence of LH and FSH. It normally takes place at the end of proliferative i.e., 14th day or mid way during menstrual cycle. The LH surge stimulates completion of reduction division of oocyte. Following ovulation, the Graafian follicle changes to corpus luteum.

43 Which set is similar?

[CBSE AIPMT 2001]

- (a) Corpus luteum – Graafian follicle
- (b) Sebum – Sweat
- (c) Bundle of His – Pacemaker
- (d) Vit-B₇ – Niacin

Ans. (a)

Corpus luteum is temporary endocrine tissue developing from ruptured Graafian follicle.

Sebum is an oily lipid containing secretion of mammalian sebaceous glands.

Sweat is an aqueous secretion of mammalian sweat glands.

Bundle of His is a part of conducting system of heart and pace-maker is responsible for initiation of heart beat in right auricle SA node.

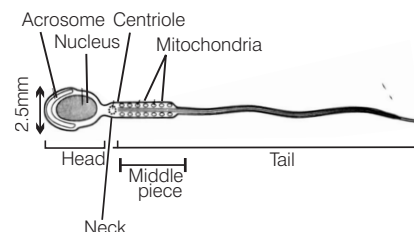
Vitamin-B₃ is also known as niacin.

44 Middle piece of mammalian sperm possesses [CBSE AIPMT 1999, 91]

- (a) mitochondria and centriole
- (b) mitochondria only
- (c) centriole only
- (d) nucleus and mitochondria

Ans. (b)

The middle piece of human sperm contains mitochondria which are coiled around an axial filament called mitochondrial spiral. These provide energy for the movement of sperm.



45 After ovulation, Graafian follicle regresses into [CBSE AIPMT 1999]

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

Ans. (a)

Just after ovulation, LH (secreted by anterior lobe of pituitary gland) stimulates remaining ovarian follicles to develop into corpus luteum.

The corpus luteum plays an important role in the preparation of the endometrium for the implantation of the fertilised egg by secreting oestrogens and progesterone.

46 In 28 days human ovarian cycle, ovulation occurs on

[CBSE AIPMT 1997, 94]

- (a) 1 day
- (b) 5 day
- (c) 14 day
- (d) 28 day

Ans. (c)

The first phase (proliferative phase) of menstrual cycle ends on 14th day, the ovarian follicles rupture and ovulation occurs.

47 Fertilisins are emitted by [CBSE AIPMT 1997, 91]

- (a) immature eggs
- (b) mature eggs
- (c) sperms
- (d) polar bodies

Ans. (b)

Eggs secrete the chemical fertilisin, which is made up of glycoprotein. It interacts with the antifertilisin (protein on sperm surface) of a sperm of same species.

48 Human eggs are
[CBSE AIPMT 1997, 89]

- (a) alecithal
- (b) microlecithal
- (c) mesolecithal
- (d) macrolecithal

Ans. (a)

The eggs almost free of yolk are called alecithal, e.g. human eggs (ova). In such eggs the cleavage pattern is holoblastic (Gr. *holo*-whole; *blastos*-germ) that is the cleavage extends completely through the egg.

49 Ovulation occurs under the influence of [CBSE AIPMT 1994]

- (a) LH
- (b) FSH
- (c) oestrogen
- (d) progesterone

Ans. (a)

The Luteinising Hormone (LH) of anterior pituitary regulates the ovulation from the Graafian follicle. This LH surge causes ovulation to occur.

50 In telolecithal egg the yolk is found [CBSE AIPMT 1993]

- (a) all over the egg
- (b) on one side
- (c) both the sides
- (d) at centre

Ans. (b)

Yolk is concentrated towards vegetal pole. The nucleus and major part of cytoplasm is displaced to animal pole as in mesolecithal and macrolecithal eggs of vertebrates.

51 Freshly released human egg has [CBSE AIPMT 1991]

- (a) one Y-chromosome
- (b) one X-chromosome
- (c) two X-chromosomes
- (d) Both (a) and (b)

Ans. (c)

Human female is homozygous, i.e. produces same kind of gametes that carry X-chromosome while human male is heterozygous, i.e. produces unlike gametes that carries either X-chromosome or Y-chromosome.

52 Egg is liberated from ovary in [CBSE AIPMT 1989]

- (a) secondary oocyte stage
- (b) primary oocyte stage
- (c) oogonial stage
- (d) mature ovum stage

Ans. (a)

In most of the organisms including human female the ovulation, i.e., release of ovum from ovary occurs at secondary oocyte stage in which meiosis-I has been completed and first polar body has been released.

53 There is no DNA in [CBSE AIPMT 2009]

- (a) an enucleated ovum
- (b) mature RBCs
- (c) a mature spermatozoan
- (d) hair root

Ans. (a)

The chromatin material inside the nucleus is composed of DNA, some proteins and RNA. Infact it is basically DNA-protein complex. Thus, in an enucleated ovum, DNA will be absent. The mature RBCs, mature spermatozoan and root hair are nucleated which contain DNA.

TOPIC 3 Fertilisation and Implantation

54 Receptors for sperm binding in mammals are present on [NEET 2021]

- (a) corona radiata
- (b) vitelline membrane
- (c) perivitelline space
- (d) zona pellucida

55 Capacitation occurs in [NEET 2017]

- (a) rete testis
- (b) epididymis
- (c) vas deferens
- (d) female reproductive tract

Ans. (d)

Capacitation is a process, where the spermatozoa acquire the capacity to fertilise the eggs. It occurs in female reproductive tract.

Concept Enhancer

Capacitation involves following changes

- (i) Dilution of inhibitory factors of semen.
- (ii) Removal of cholesterol vesicles covering sperm head and acrosome.
- (iii) Increase in the permeability of acrosome.

Ans. (d)

Receptors for sperm binding are present on zona pellucida layer of ovum in mammals.

A sperm comes in contact with zona pellucida layer of ovum and induces changes that blocks further entry of other sperms.

It ensures entry of only one sperm inside the ovum for fertilisation.

56 Fertilisation in humans is practically feasible only if [NEET 2016, Phase I]

- (a) the ovum and sperms are transported simultaneously to ampullary - isthmic junction of the Fallopian tube
- (b) the ovum and sperms are transported simultaneously to ampullary-isthmic junction of the cervix
- (c) the sperms are transported into cervix within 48 hrs of release of ovum in uterus
- (d) the sperms are transported into vagina just after the release of ovum in Fallopian tube

Ans. (a)

Fertilisation in humans, is practically feasible only if the sperms and ovum are transported simultaneously at ampullary-isthmic junction of Fallopian tube.

57 Ectopic pregnancies are referred to as [CBSE AIPMT 2015]

- (a) pregnancies with genetic abnormality
- (b) implantation of embryo at site other than uterus
- (c) implantation of defective embryo in the uterus
- (d) pregnancies terminated due to the hormonal imbalance

Ans. (b)

Ectopic pregnancy develops when an embryo implants somewhere other than the uterus, such as in one of Fallopian tube. It is also known as eccysis or tubal pregnancy.

58 In human females, meiosis-II is not completed until [CBSE AIPMT 2015]

- (a) puberty
- (b) fertilisation
- (c) uterine implantation
- (d) birth

Ans. (b)

In human females, meiosis II is not completed until fertilisation. Secondary oocyte is arrested in metaphase II stage until sperm cell contacts plasma membrane of the oocyte and completes meiosis II resulting in release of ovum.

59 Select the correct option describing gonadotropin activity in a normal pregnant female

[CBSE AIPMT 2014, 12]

- (a) High level of FSH and LH stimulates the thickening of endometrium
- (b) High level of FSH and LH facilitate implantation of the embryo
- (c) High level of hCG stimulates the synthesis of estrogen and progesterone
- (d) High level of hCG stimulates the thickening of endometrium

Ans. (c)

hCG (human Chorionic Gonadotrophin) secretion occurs about 48-72 hours after implantation. Its level increases and excess of hCG leaks into urine which is the indication of pregnancy.

This hormone like LH stimulates the corpus luteum to secrete high levels of progesterone and some estrogen to maintain pregnancy. There steroids are required to maintain the development of placenta, initiate the development of mammary glands and inhibit ovulation.

60 Which one of the following statements about morula in humans is correct?

[CBSE AIPMT 2010]

- (a) It has almost equal quantity of cytoplasm as an uncleaved zygote but much more DNA
- (b) It has far less cytoplasm as well as less DNA than in an uncleaved zygote
- (c) It has more or less equal quantity of cytoplasm and DNA
- (d) It has more cytoplasm and more DNA than an uncleaved zygote

Ans. (a)

Cleavage divisions are mitotic division, in which the single-celled zygote is converted into a multicellular morula. But during cleavage divisions, there is no growth of resultant daughter cells /blastomeres. So, the DNA content will increase, but there is no increase or insignificant increase in amount of protoplasm.

61 A change in the amount of yolk and its distribution in the egg will affect. [CBSE AIPMT 2009, 95, 93]

- (a) formation of zygote
- (b) pattern of cleavage
- (c) number of blastomeres produced
- (d) fertilisation

Ans. (b)

Patterns of cleavage are based on amount of yolk and its distribution in the eggs. Any change in amount and distribution of yolk directly affects the pattern of cleavage.

As holoblastic cleavage is found in microlecithal, mesolecithal or telolecithal types of eggs. Meroblastic cleavage is found in macrolecithal and highly telolecithal eggs of reptiles, birds and monotreme mammals.

62 Gray crescent is the area

[CBSE AIPMT 2005]

- (a) at the point of entry of sperm into ovum
- (b) just opposite to the site of entry of sperm into ovum
- (c) at the animal pole
- (d) at the vegetal pole

Ans. (b)

The gray crescent area is the area just opposite to the entry of sperm into ovum.

63 What is true for cleavage?

[CBSE AIPMT 2002]

- (a) Size of embryo increases
- (b) Size of cells decreases
- (c) Size of cells increases
- (d) Size of embryo decreases

Ans. (b)

Cleavage is a succession of rapid cell division during which the cells undergo the S phase (DNA synthesis) and M-phase (mitosis) of the cell cycle but often virtually skip the G_1 and G_2 -phases. Cleavage simply divides the cytoplasm of larger cells into smaller cells, called blastomeres.

64 Cleavage in mammalian egg is

[CBSE AIPMT 2000]

- (a) equal holoblastic
- (b) unequal holoblastic
- (c) superficial meroblastic
- (d) discoidal meroblastic

Ans. (b)

The progressive division of cells during embryonic growth is called **cleavage**. It is not accompanied by increase in the overall size of embryo.

The first cleavage occurs in human zygote about 30 hours after fertilisation. It is holoblastic (complete) and gives rise to the blastomeres—one of which is slightly larger than the other.

65 Blastopore is

[CBSE AIPMT 2000, 1992]

- (a) opening of neural tube
- (b) opening of gastrocoel
- (c) future anterior end of embryo
- (d) found in blastula

Ans. (b)

Blastopore is the opening of gastrocoel. Gastrulation is a process of migration and rearrangement of cells which are already present in blastula, a new cavity is formed named archenteron or gastrocoel which open outside through blastopore.

66 What is true about cleavage in fertilised egg of human?

[CBSE AIPMT 1994]

- (a) Meroblastic
- (b) Starts when egg reaches uterus
- (c) Starts in Fallopian tube
- (d) It is identical to normal mitosis

Ans. (c)

In human, cleavage occurs in the Fallopian tube (oviduct) during the movement of zygote towards uterus.

67 Acrosome reaction in sperm is triggered by

[CBSE AIPMT 1993]

- (a) capacitation
- (b) release of lysin
- (c) influx of Na^+
- (d) release of fertilisin

Ans. (d)

Ovum secretes a chemical substance, called **fertilisin** which has number of spermophilic sites on its surface where the sperm of species specific type can be bound by their antifertilisin site. This fertilisin-antifertilisin reaction triggers acrosome reaction. The main aim of this reaction is to thin out the number of sperms to reduce the chances of polyspermy.

68 Extrusion of second polar body from egg nucleus occurs

[CBSE AIPMT 1993]

- (a) after entry of sperm but before completion of fertilisation
- (b) after completion of fertilisation
- (c) before entry of sperm
- (d) without any relation of sperm entry

Ans. (a)

The sperm entry stimulates the secondary oocyte to undergo Meiotic II division, which produces the ovum and second polar body.

69 Termination of gastrulation is indicated by [CBSE AIPMT 1993]

- (a) obliteration of blastocoel
- (b) obliteration of archenteron
- (c) closure of blastopore
- (d) closure of neural tube

Ans. (a)

Termination of gastrulation is indicated by obliteration of blastocoel.

70 Meroblastic cleavage is a type of division [CBSE AIPMT 1992]

- (a) horizontal
- (b) partial/parietal
- (c) total
- (d) spiral

Ans. (b)

In meroblastic cleavage zygote divides partially. This type of cleavage is found in mesolecithal and centrolecithal eggs like eggs of reptiles, birds, insects and egg-laying mammals.

71 During cleavage, what is true about cells? [CBSE AIPMT 1991]

- (a) Nucleocytoplasmic ratio remains unchanged
- (b) Size does not increase
- (c) There is less consumption of oxygen
- (d) The division is like meiosis

Ans. (b)

Cleavage is the rapid mitotic cell division of the zygote upto the completion of blastula stage. Cleavage differs from the ordinary mitosis in following respects:

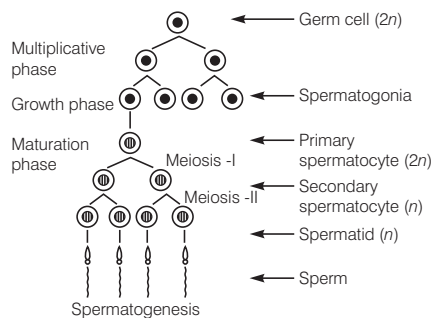
- (a) Interphase are short and do not involve growth.
- (b) Divisions are very rapid, nuclear cytoplasmic ratio increases with each division.
- (c) There is a decrease in the size of blastomeres (cells resulting from cleavage), but size and shape of the embryo do not change.

72 How many sperms are formed from a secondary spermatocyte? [CBSE AIPMT 1990]

- (a) 4
- (b) 8
- (c) 2
- (d) 1

Ans. (c)

As it is clear from the figure that each secondary spermatocyte, after second meiosis give rise to two spermatids, each of which develops into sperm.



TOPIC 4 Embryogenesis, Parturition and Lactation

73 Which of the following secretes the hormone, relaxin, during the later phase of pregnancy? [NEET 2021]

- (a) Graafian follicle
- (b) Corpus luteum
- (c) Foetus
- (d) Uterus

Ans. (b)

Corpus luteum is formed in ovary after the ovulation and degenerates if pregnancy does not occur.

In later phase of pregnancy the corpus luteum secretes relaxin hormone. Relaxin dilates the cervix and helps in parturition. Graafian follicle, uterus and foetus has no role in relaxin secretion.

74 Which of these is not an important component of initiation of parturition in humans? [NEET 2021]

- (a) Increase in oestrogen and progesterone ratio
- (b) Synthesis of prostaglandins
- (c) Release of oxytocin
- (d) Release of prolactin

Ans. (d)

Prolactin hormone is not important for initiation of parturition because it is released after the parturition in order to secrete the milk from the mammary gland. Parturition is usually initiated by the release of oxytocin hormone from the maternal pituitary.

This hormone increases the concentration of uterine muscles. Prostaglandins are synthesised and released in response to the oxytocin hormone which induces stronger contraction resulting in expulsion of baby. During parturition there is an increase in oestrogen and progesterone ratio in the female body.

75 In human beings, at the end of 12 weeks (first trimester) of pregnancy, the following is observed. [NEET (Oct.) 2020]

- (a) Eyelids and eyelashes are formed
- (b) Most of the major organ systems are formed
- (c) The head is covered with fine hair
- (d) Movement of the foetus

Ans. (b)

In human beings, at the end of 12 weeks (first trimester), most of the major organ systems are formed, e.g. the limbs and external genital organs gets well-developed.

76 Select the correct sequence of events [NEET (Odisha) 2019]

- (a) Gametogenesis → Gamete transfer → Syngamy → Zygote → Cell division (Cleavage) → Cell differentiation → Organogenesis
- (b) Gametogenesis → Gamete transfer → Syngamy → Zygote → Cell division (Cleavage) → Organogenesis → Cell differentiation
- (c) Gametogenesis → Syngamy → Gamete transfer → Zygote → Cell division (Cleavage) → Cell differentiation → Organogenesis
- (d) Gametogenesis → Gamete transfer → Syngamy → Zygote → Cell differentiation → Cell division (Cleavage) → Organogenesis

Ans. (a)

The correct sequence of events are Gametogenesis (i.e. production of gametes) → Gamete transfer (i.e. movement of gamete at the site of fertilisation) → Syngamy (i.e. the fusion of gametes) → Zygote (i.e. a eukaryotic cell formed by fertilisation of gametes) → Cell division (cleavage) → Cell differentiation (i.e. the process where a cell changes from one cell type to another) → Organogenesis (i.e. the process of formation of three germ layers).

77 Which of the following hormones is responsible for both the milk ejection reflex and the foetal ejection reflex? [NEET (Odisha) 2019]

- (a) Oestrogen
- (b) Prolactin
- (c) Oxytocin
- (d) Relaxin

Ans. (c)

Oxytocin hormone is responsible for both, the milk ejection reflex and foetal ejection reflex. It is a peptide hormone normally produced in the hypothalamus and released by the posterior pituitary gland.

78 Colostrum, the yellowish fluid, secreted by mother during the initial days of lactation is very essential to impart immunity to the new born infants because it contains **[NEET (National) 2019]**

- (a) monocytes
- (b) macrophages
- (c) immunoglobulin A
- (d) natural killer cells

Ans. (c)

Colostrum, the yellowish fluid, secreted by mother during the initial days of lactation is very essential to impart immunity to the newborn infants because it contains immunoglobulin A. The type of immunity provided by colostrum is natural passive immunity. As IgA is secreted in mother's milk, it is also called secretory immunoglobulin. Monocytes are a type of white blood cell having simple oval nucleus. Macrophages are cells of the immune system. These cells can engulf bacteria, fungi, viruses and parasites. Natural killer cells are lymphocytes and are a component of innate immune system.

79 The amnion of mammalian embryo is derived from **[NEET 2018]**

- (a) mesoderm and trophoblast
- (b) endoderm and mesoderm
- (c) ectoderm and mesoderm
- (d) ectoderm and endoderm

Ans. (c)

Amnion of mammalian embryo is derived from ectoderm and mesoderm. It is one of the extraembryonic membrane which is formed by the amniogenic cells of ectodermal origin on inner side and somatopleuric extraembryonic mesoderm on outer side. This membrane acts as a shock absorber for the foetus, regulates foetal body temperature and prevents desiccation. The origin of other extraembryonic membranes is as follows

Chorion Trophoectoderm and mesoderm.

Allantois and Yolk sac Outer mesoderm and inner endoderm.

80 Hormones secreted by the placenta to maintain pregnancy are

[NEET 2018]

- (a) hCG, hPL, progestogens, estrogens
- (b) hCG, hPL, estrogens, relaxin, oxytocin
- (c) hCG, hPL, progestogens, prolactin
- (d) hCG, progestogens, estrogens, glucocorticoids

Ans. (a)

The hormones secreted by the placenta to maintain pregnancy are hCG, hPL, progestogens and estrogens. Placenta is the intimate connection between the foetus and uterine wall of the mother to exchange the materials. It has endocrine function and secretes the following hormones

- (i) **Human Chorionic Gonadotropins (hCG)** It stimulates and maintains the corpus luteum to secrete progesterone until the end of pregnancy.
- (ii) **Human Placental Lactogen (hPL)** It is also known Human Chorionic Somatomam- motropin (HCS), it stimulates the growth of mammary glands during pregnancy.
- (iii) **Progesterone and estrogen** support foetal growth, maintain pregnancy, inhibit uterine contractions, etc.

On the other hand, the sources of other hormones are as follows

Oxytocin Secreted by posterior lobe of pituitary gland during foetal ejection reflex. **Glucocorticoid** Secreted by adrenal gland of foetus to induce foetal ejection reflex.

Relaxin Secreted by corpus luteum to increase flexibility of pubis symphysis.

Prolactin Secreted by anterior lobe of pituitary, helps in the secretion of milk.

81 Match column I with column II and select the correct option using the codes given below.

[NEET 2016, Phase II]

Column I	Column II
A. Mons pubis	1. Embryo formation
B. Antrum	2. Sperm
C. Trophoectoderm	3. Female external genitalia
D. Nebenkern	4. Graafian follicle

Codes

- (a) A B C D
- (b) 3 4 1 2
- (c) 3 1 4 2
- (d) 1 4 3 2

Ans. (b)

The correct match are

- (a) Mons pubis–Female external genitalia
- (b) Antrum–Graafian follicle
- (c) Trophoectoderm–Embryo development
- (d) Nebenkern–Sperm

Concept Enhancer Nebenkern is a mitochondrial structure present in the sperm of certain insects.

82 Several hormones like hCG, hPL, oestrogen, progesterone are produced by **[NEET 2016, Phase II]**

- (a) ovary
- (b) placenta
- (c) Fallopian tube
- (d) pituitary

Ans. (b)

Several hormones like–hCG, hPL, oestrogen, progesterone are produced by placenta. It is a structural and functional connectivity between the developing embryo (foetus) and the maternal body. It is connected to embryo through an umbilical cord which helps in transport of substances to and from the embryo. Placenta also acts as an endocrine tissue by producing the above mentioned hormones.

83 Which one of the following is not the function of placenta? It **[NEET 2013]**

- (a) facilitates supply of oxygen and nutrients to embryo
- (b) secretes oestrogen
- (c) facilitates removal of carbon dioxide and waste material from embryo
- (d) secretes oxytocin during parturition

Ans. (d)

Pituitary secretes oxytocin during parturition. The functions of placenta are supply of oxygen and nutrients to embryo. It also secretes estrogen, facilitates removal of carbon dioxide and waste materials from embryo.

84 Signals for parturition originate from **[CBSE AIPMT 2012, 10]**

- (a) both placenta as well as fully developed foetus
- (b) oxytocin released from maternal pituitary
- (c) placenta only
- (d) fully developed foetus only

Ans. (a)

The process of delivery of the foetus (childbirth) is called parturition which is induced by a complex neuroendocrine mechanism.

The signals for parturition originate from the fully developed foetus and the placenta which induce mild uterine contractions called foetal ejection reflex.

This triggers release of oxytocin from maternal pituitary. Oxytocin causes stronger uterine contractions which in turn stimulate further secretion of oxytocin. The stimulatory reflex between the uterine contraction and oxytocin secretion continues resulting in stronger and stronger contractions. This leads to expulsion of the baby out of the uterus through the birth canal, i.e. parturition.

- 85** The first movements of the foetus and appearance of hair on its head are usually observed during which month of pregnancy?

[CBSE AIPMT 2010]

- (a) Fourth month (b) Fifth month
(c) Sixth month (d) Third month

Ans. (b)

During development of foetus in human by week 20, hair begin to grow including eyebrows and eyelashes, fingerprints develop. Fingernails and toe nails grow. Firm hand grip. Between 16 and 20 weeks the first movements of the foetus are observed.

- 86** Which extra-embryonic membrane in humans prevents desiccation of the embryo inside the uterus?

[CBSE AIPMT 2008]

- (a) Chorion (b) Allantois
(c) Yolk sac (d) Amnion

Ans. (d)

Amnion is an extra embryonic membrane that surrounds embryo in reptiles, birds and mammals. It provides a kind of private aquarium to the embryo and protects it from mechanical shock and desiccation.

Chorion (serosa) is the outermost extra embryonic membrane in reptiles, birds and mammals. It surrounds the whole embryonic system of embryo.

Yolk sac contains yolk in reptiles and birds. In mammals yolk sac is also known as umbilical vesicle. It is connected to enteron of embryo by a slender yolk stalk.

- 87** During embryonic development, the establishment of polarity along anterior/ posterior, dorsal/ventral or medial/lateral axis is called

[CBSE AIPMT 2003]

- (a) anamorphosis
(b) pattern formation
(c) organiser phenomena
(d) axis formation

Ans. (d)

Embryonic axis are formed very early in development and sometimes by the polarity of the egg.

- 88** Extra-embryonic membranes of the mammalian embryo are derived from

[CBSE AIPMT 1994]

- (a) inner cell mass
(b) trophoblast
(c) formative cells
(d) follicle cells

Ans. (b)

Extra-embryonic membranes are formed outside the embryo from the trophoblast in amniotes (reptiles, birds and mammals) and perform specific function. These are yolk sac, amnion, allantois and chorion.

- 89** Gonads develop from embryonic

[CBSE AIPMT 1990]

- (a) ectoderm (b) endoderm
(c) mesoderm (d) Both (b) and (c)

Ans. (c)

Gonads develop from mesoderm. Beside gonads mesoderm also forms muscles, connective tissue, dermis of skin, bones and cartilages, peritoneal layers, coelom, circulatory system (heart, blood vessels, blood, lymphatic system), kidneys, ureters and adrenal cortex.

- 90** Cells become variable in morphology and function in different regions of the embryo.

The process is [CBSE AIPMT 1989]

- (a) differentiation
(b) metamorphosis
(c) organisation
(d) rearrangement

Ans. (a)

After formation of three primary germ layers (i.e., ectoderm, mesoderm and endoderm), cells of these three layers become variable in morphology, shape, size and more specified to form organs so as to meet out the future functional needs of the foetus, this process is called differentiation.