

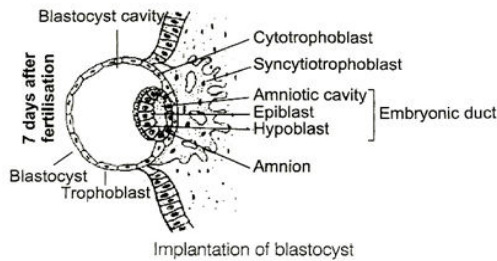
Topic :- Human Reproduction

- 1 (b)
The part of fallopian tube closer to the ovary is funnel-shaped infundibulum, which help in collection of the ovum after ovulation.
- 2 (b)
A-200, B-300, C-60%, D-40%
- 3 (b)
Acrosome present in head of sperm, is derived from Golgi complex. It secretes a lytic enzyme hyaluronidase, which helps in the penetration of ovum.
- 4 (c)
In previous Diagram *F* and *A* represents spermatogonium and spermatozoa
- 5 (a)
Second meiotic division give rise to haploid ovum ($1n$) and second polar body.
Oogenesis is the process of formation of mature ovum. *It has three phases*
(a) **Multiplication Phase** Oogenesis takes place in embryo stage. A couple of million of gamete mother cells (oogonia) are formed within each foetal ovary. No more oogonia are formed after birth. These cells (oogonia) get into prophase-I of meiotic division. They get temporarily arrested as this stage called primary oocyte
(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 60000 and 80000 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
(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 fertilization 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)
- 6 (a)
Implantation It is the attachment of the blastocyst to the uterine wall. It occurs after 7 days of fertilization. About 8 days after fertilization, the trophoblast develops into two layers in

the region of contact between the blastocyst and endometrium.

These layers are (a) **syncytiotrophoblast** that contains non-distinct cell boundaries and (b) **cytotrophoblast** between the inner cell mass and syncytiotrophoblast that is composed of distinct cells. The portion of the blastocyst where the inner cell mass is located lies against the endometrium of the uterus. The blastocyst sinks into a pit formed in the endometrium and gets completely buried in the endometrium. The embedded blastocyst forms villi to get nourishment.

The cells of the inner cell mass differentiate into two layers (a) a layer of small, cuboidal cells known as the **hypoblast layer**, and (b) a layer of high columnar cells, the **epiblast layer**. Both the hypoblast and epiblast form a flat disc called the embryonic disc



7

(c)

Secondary spermatocytes are haploid as these are formed after meiosis-I (reductional division).

8

(c)

In parturition there is strong uterine contraction leads to the expulsion of baby called child birth

9

(a)

Near the nipple mammary duct expand to form mammary ampullae (lactiferous sinuses) where some milk may be stored before going to **lactiferous duct**

10

(c)

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

11

(d)

Transfer of sperms by male in genital tract

Gametes. *The major reproductive events in human beings are as follows*

(i) **Gametogenesis** It is the formation of gametes. It includes **spermatogenesis** (formation of sperms) and **oogenesis** (formation of ova/eggs)

(ii) **Insemination** It is the transfer of sperms by the male into the genital tract of the female

(iii) **Fertilization** Fusion of male and female gametes to form zygote is called fertilization

(iv) **Cleavage** It is rapid mitotic divisions of the zygote which convert the single celled zygote into a multicellular structure called blastocyst (blastula)

(v) **Implantation** It is the attachment of blastocyst to the uterine wall

(vi) **Placentation** It involves the formation of placenta which is the intimate connection between the foetus and uterine wall of the mother to exchange the materials

(vii) **Gastrulation** It is the process by which blastocyst is changed into gastrula with three primary germ layers

(viii) **Organogenesis** It is the formation of specific tissue, organs and organ systems from three primary germ layers

(ix) **Parturition** (child birth) it involves expelling of the baby from the mother's womb (uterus)

12 **(d)**

Sertoli's cells or nurse cells are found in the germinal epithelium of the seminiferous tubules, which nourish the developing sperms.

13 **(d)**

In growth curve, exponential phase or log phase is characterized rapid growth in population, which continues till enough food is available.

14 **(b)**

1st month.

Summary of important development changes in the human embryo

Time from Fertilisation	Organ Formed
Week 1	Fertilisation cleavage starts about 24 hours after fertilisation cleavage to form a blastocyst 4-5 days after fertilisation. More than 100 cells implantation 6-9 days after fertilisation
Week 2	The three primary germ layers (ectoderm, endoderm and mesoderm) develop
Week 3	Woman will not have a period. This may be the first sign that she is pregnant. Beginning of the backbone. Neural tube develops, the beginning of the brain and spinal cord (first organs)
Week 4	Heart, blood vessels, blood and gut start forming. Umbilical cord developing
Week 5	Brain developing, 'Limb buds', small swelling which are the beginning of the arms and legs. Heart is a large tube and

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	starts to beat, pumping blood. This can be seen on an ultrasound scan
Week 6	Eyes and ears start to form
Week 7	All major internal organs developing. Face forming. Eyes have some colour. Mouth and tongue develop. Beginning of hand and feet
Week 12	Foetus fully formed, with all organs, muscles, bones, toes and fingers. Sex organs well developed. Foetus is moving
Week 20	Hair beginning to grow including eyebrows and eyelashes. Fingerprints developed. Fingernails and toenails growing. Firm hand grip. Between 16 and 20 weeks baby usually felt moving for first time
Week 24	Eyelids open. Legal limit of abortion in most circumstances
By Week 26	Has a good chance of survival if born prematurely
By Week 28	Baby moving vigorously. Responds to touch and loud noises. Swallowing amniotic fluid and urinating
By Week 30	Usually lying head down ready for birth
40 Weeks	Birth

16

(a)

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Organogenesis is a formation of an organ, tissue, organ system.

Placentation is a connection between foetus and uterine wall.

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(a)

Extraembryonic or Foetal Membranes

The growing embryo/foetus develops four membranes called the extraembryonic or foetal membranes. These include chorion, amnion, allantois and yolk sac

(i) **Chorion** It is made up of trophoblast outside and somatopleuric extraembryonic mesoderm inside. It completely surrounds the embryo and protects it. It also takes part in the formation of placenta

(ii) **Amnion** It is composed of trophoblast inside and somatopleuric extraembryonic mesoderm outside. The space between the embryo and the amnion is called the amniotic cavity, which is filled with a clear, watery fluid secreted by both the embryo and the membrane. The amniotic fluid prevents desiccation of the embryo and acts as a protective cushion that absorbs shocks

(iii) **Allantois** The allantois is composed of endoderm inside and splanchnopleuric extraembryonic mesoderm outside. It is a sac like structure, which arises from the gut of the embryo near the yolk sac. In human the allantois is small and non-functional except for furnishing blood vessels to the placenta

(iv) **Yolk Sac** The primary yolk sac consists of endoderm inside and splanchnopleuric extraembryonic mesoderm outside. The yolk sac is non-functional in human beings except that it functions as the site of early blood cell formation

18

(b)

In *in vitro* fertilization, the zygote or early embryos upto 8 blastomeres are transferred into the fallopian tube. If the embryo is more than 8 blastomeres then it is transferred into uterus called as IUD.

19

(a)

Proliferation of endometrium.

In the ovulatory phase, both LH and FSH attain a peak level in middle of cycle (about 14 day). Rapid secretion of LH induces rupturing of Graafian follicle and thereby releasing the ovum in human beings (secondary oocyte is released). This is called ovulation. Infact increase level of LH causes ovulation

20

(a)

Adrenal glands are paired structures located on the top of the kidneys. Each adrenal gland has two parts external adrenal **cortex** and internal adrenal **medulla**. The adrenal cortex is derived from the **mesoderm** of the embryo. The adrenal medulla develops from the **neuroectoderm** of the embryo.

ANSWER-KEY										
Q.	1	2	3	4	5	6	7	8	9	10
A.	B	B	B	C	A	A	C	C	A	C
Q.	11	12	13	14	15	16	17	18	19	20
A.	D	D	D	B	A	A	A	B	A	A

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