

Solution

Class 12 - Biology

Biology Class XII - 2020-21 paper 1

Section A

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|--|--|
| 1. Albuminous seeds | Exalbuminous seeds |
| Endosperm is present in mature seed | No residual endosperm is found in the mature seed |
| Endosperm is not consumed entirely by the growing embryo | Endosperm is consumed entirely by the growing embryo |
| Cotyledons are thin | Cotyledons are thick |
| Examples include wheat, maize, barley, sunflower etc | Examples include pea, groundnut, gram etc. |
2. Protandry is the condition in which an organism begins life as a male and then changes into a female. The condition of flowers whose male parts mature before the female ones.
3. Male gametophyte - It develops in microsporangium inside the pollen grains.
Female gametophyte - It develops in the ovule.
4. Chasmogamous flowers have exposed anthers and stigma. Cross pollination cannot occur in cleistogamous flowers, as such flowers do not open at all.
5. True; The immature sperms or the spermatozoa embed their head into the wall of the sertoli cells. Sertoli cells nourish the young sperm cells with nutrients and blood products.
6. **Name of cells:** Sertoli cells
Location: Line up on the inner surface of seminiferous tubules.
7. Yes.
Because this technique is being misused for female foeticide.
8. **Vasectomy:** Cutting and ligating vas-deferens as a means of contraception in males.
Tubectomy: Cutting and ligating fallopian tubes as a means of contraception in females. Both the techniques of surgery to avoid pregnancy, have no significant side effects.
9. The epididymis is a long, coiled tube that stores sperm and transports it from the testes.
- OR
- One larger cell is vegetative cell and two small cells are male gametes.
10. Yes, the introduction of sex education in schools can play a great role to provide the right information to the young ones. It will help especially people in the adolescent age group to lead a healthy reproductive life.
11. **(a)** Assertion and reason both are correct
Explanation: The first milk after the birth of a baby is called colostrum. It is rich in proteins, calories, and antibiotics necessary for the proper health of the baby.
12. **(a)** Both assertion and reason are correct
Explanation: After implantation, embryo differentiates into the outer layer called ectoderm, middle layer mesoderm, and inner layer endoderm. These three layers form all tissues or organs of human beings.
13. **(a)** Both assertion and reason are correct
Explanation: The statutory ban on amniocentesis for sex determination is due to increasing female foeticide after knowing the sex of the baby using the chromosomal pattern of amniotic fluid surrounding the foetus.
14. **(a)** Both assertion and reason are correct
Explanation: Breastfeeding during the initial few days of lactation is recommended by doctors because it contains immunoglobulin containing colostrum that provides antibodies to fight infection.
15. i. (a) two theca
ii. (b) tapetum
iii. (c) sporogenous tissue
iv. (b) microsporogenesis

- v. (b) Both Assertion and Reason are true but Reason is not the correct explanation of the Assertion
16. i. (d) LH
 ii. (d) all of these
 iii. (c) Both i. and ii.
 iv. (b) causes strong uterine contractions during parturition
 v. (a) placenta villi

Section B

17. The phenomenon of formation of more than one embryo during seed formation is called polyembryony. In citrus, beside the presence of a normal embryo produced as a result of sexual reproduction, additional extra embryos are produced either due to fertilization of more than one egg in ovule or due to formation of embryo from nucellus and integuments by a process called apomixis. The additional embryos are called apomictic embryos.
18. (I) Primary spermatocyte will also have 30 chromosomes because it is formed by mitotic division from spermatogonial cell.
 (ii) The spermatid is produced by meiotic division (reductional division) from primary spermatocyte and will have only half (15) chromosomes.
 The primary spermatocyte first undergoes meiosis I to produce two haploid secondary spermatocytes. The secondary spermatocytes undergo meiosis II to produce four haploid spermatids.
19. Yes, it is also a modified sexual reproduction and introduces genetic variation that may be advantageous and improve the race. The better human race can be produced by getting sperms or ova from selected superior males and females.
20. The advent of the birth control pill makes it unnecessary to use other means of contraception, particularly the condom. Thus STDs are more readily transmitted during sexual activity.
21. The unfertilised mature embryo-sac is 7-celled, 8-nucleate because central cell has two polar nuclei. The haploid cells of embryo-sac are
 i. 3-celled egg apparatus (2 synergids and an egg or oosphere) present at micropylar end.
 ii. one central cell (binucleate) with 2 polar nuclei
 iii. 3-antipodal cells present at chalazal end.
22. **Name of hormones:** LH (Luteinising hormone), FSH (Follicle stimulating hormone) and progesterone.
Sources: LH and FSH are secreted by the anterior lobe of the pituitary gland on stimulation by GnRH secreted by the hypothalamus.
 Progesterone is an ovarian hormone produced by follicular cells (corpus luteum) on stimulation by LH. Rising levels of progesterone inhibit the release of GnRH which in turn inhibits the production of FSH, LH, and progesterone.
- OR
- The process of covering the emasculated flowers or the female flowers, after dusting with the desired pollen, with bags of butter paper.
 This technique ensures the use of only desired pollen grains for pollination and protection of stigma from contamination (from unwanted pollen).
23. If the fruit is derived from the ovary alongwith other accessory floral parts, it is called false fruit. It is true in case of apple where thalamus also contributes in the formation of fruit alongwith the ovary. Thalamus of the flower is involved in fruit formation like in apple and cashew, while true fruits develop only from the ovary.
- OR
- i. A-FSH and oestrogen, B-LH and C- Progesterone.
 ii. a. Corpus luteum - It secretes progesterone required for the maintenance of endometrium.
 b. Endometrium - It is the innermost layer of the uterus. It provides nutrition for the development of the foetus. Implantation of blastocyst occurs in the endometrium.
24. Sertoli cells are large, pyramid shaped found inside the seminiferous tubules.
Functions. its main function is to nourish the developing sperm cells through the stages of spermatogenesis, the Sertoli cell has also been called the "mother" or "nurse" cell. Sertoli cells also act as phagocytes, consuming the residual cytoplasm during spermatogenesis.
25. In this method the menstrual cycle and ovulation do not occur during intense lactation following parturition. So the chances of pregnancy are low during this period.

Section C

26. Emasculation is the process of removal of anthers before maturation from the flower buds of female parent so that chances of self pollination are eliminated.

Plant breeders employ this technique for artificial hybridization for crop improvement programme.

27. Morula

(i) It is a solid sphere of 8-16 blastomeres.

(ii) Zona-pellucida remains intact

Blastocyst

(i) It contains about 64 cells and hollow inside due to the development of blastocoel cavity.

(ii) As the blastocyst enlarges, zona-pellucida disintegrates.

Blastocyst gets implanted after 7 days of fertilization.

OR

The use of IUD is the most effective and popular. Different types of IUDs are presently available such as the non-medicated IUDs (e.g., Lippes loop), copper-releasing IUDs (CuT, Cu 7, Multifload 375) and the hormone-releasing ones (Progestasert, LNG-20).

Functions: IUDs increase phagocytosis of sperms within the uterus and the Cu ions released by some suppress sperm motility and the fertilising capacity of sperms. The hormone-releasing IUDs, in addition, make the uterus unsuitable for implantation and the cervix hostile to the sperms.

Advantages: IUDs are ideal contraceptives for females who want to delay pregnancy and/or space children. It is one of the most widely accepted methods of contraception in India.

28. Some methods that assist infertile couples to have children are:

i. IVF - (In-vitro fertilization) in case of blocked fallopian tubes.

ii. ET - Embryo transfer technique-(test-tube babies), surrogate mothers can also be used.

iii. GIFT - Gamete intrafallopian transfer.

iv. ICSI - Intracytoplasmic sperm injection.

v. IUI - Intrauterine insemination.

29. Double fertilization is the joining of a female gametophyte with two male gametes. One sperm fertilizes the egg cell and the other sperm combines with the two polar nuclei of the large central cell of the embryo sac. This helps in providing enough nutrition to the embryo during seed germination.

30. The placenta is a temporary organ formed in the placenta mammals. Tissues of placenta are derived from both foetus and the mother. A large number of chorionic villi of developing embryo and uterine tissue become interdigitated with each other to form placenta.

Placenta is structural and functional unit between developing embryo (foetus) and mother body. The placenta is connected to the foetus through an umbilical cord, which helps in the transport of substances to and from the embryo. Placenta also acts as an endocrine gland. It secretes different hormones like human chorionic gonadotrophin (hCG), human placental lactogen (hPL), estrogens, progestogens. In late pregnancy, the hormone Relaxin is also released.

Functions of placenta are:

1. Hormones hCG, hPL, estrogen & progesteron support foetal growth, metabolic changes in the mother and maintenance of pregnancy.

2. Relaxin help in parturition.

3. Placenta provide oxygen and food to foetus.

4. It collects waste materials from foetus.

Section D

31. **Polyembryony** - It is the occurrence of more than one embryo in a seed. It was discovered by Leeuwenhoek in 1719 in orange.

Polyembryony can be three types:

1. **Cleavage polyembryony:** When a single fertilized egg produces more than one embryos, it is the case of cleavage polyembryony.

2. **Simple polyembryony:** When the production of more than one embryos in single seed is the result of fertilization of multiple archegonia, then it is known as simple polyembryony.

3. **Rosette polyembryony:** In some of the gymnosperms, the rosette cells produce additional embryos and this is known as rosette polyembryony.

Polyembryony can also be classified as true and false polyembryony:

1. **True polyembryony:** It is the production of embryos from cleavage of the zygote or from synergids and antipodal cells.
2. **False polyembryony:** It is the production of multiple embryos from the formation of multiple embryo sac in an ovule.

OR

ART (Assisted Reproductive Technologies) enable the infertile couple to have children.

The ART techniques are ZIFT, GIFT, and IUT. Differences are as follow

ZIFT	GIFT	IUT
Stands for Zygote Intra Fallopian Transfer.	Stands for Gamete Intra Fallopian Transfer.	Stands for Intra Fallopian Transfer
The gamete from a male and female parent is collected and fertilized outside body in simulated conditions and zygote is transferred in fallopian tube at less than 8 blastomere stage.	The technique in which ovum collected from a donor female is transferred into the fallopian tube of another female known as a surrogate mother. Then ova is fertilized inside the body(in the fallopian tube) of a surrogate mother.	It is the technique in which egg is fertilized outside the body and transferred in the uterus at more than 8 blastomere stage.

32. i. The parts identified in the given TS of the ovary are as follows:
- A-Graafian follicle
 - B-Antrum
 - C-Secondary oocyte
 - D-Corpus Luteum
 - F-Primary follicle and Primary oocyte
- ii. In human females, primary oocytes are formed during the embryonic developmental stages in the foetal ovaries.
- a. Primary oocytes start dividing and enter prophase -I of meiosis to remain suspended at this stage.
 - b. Each primary oocyte is surrounded by a layer of granulosa cells and becomes the primary follicle.
 - c. The primary follicle when surrounded by more layers of granulosa cells, is called a secondary follicle.
 - d. Secondary follicle transforms into a tertiary follicle, with the development of a fluid-filled cavity (antrum) around the primary oocyte.
 - e. Granulosa cells become organised into an outer theca externa and an inner theca interna.
 - f. Now, primary oocyte completes meiosis-I and forms a larger haploid secondary oocyte and a tiny first polar body.

OR

Mass of parenchymatous cells named as nucellus differentiates into primary archesporial cells. This archesporial cell divide by periclinal division to form Parietal cell (it is outer) and inner sporogenous cell. Sporogenous cell directly acts as Megaspore Mother Cell (MMC) with denser cytoplasm and a prominent nucleus which undergo meiosis (Megasporogenesis) to form four haploid megaspores know as megaspore tetrad. Out of these three micropylar megaspores degenerate while chalazal megaspores further grow to form female gametophyte i.e. Embryosac. such growth is known as monosporic development. Functional megaspore divides by three free mitotic divisions to form 8-nucleate, or 7-celled embryo-sac (known as female gametophyte). The development of haploid megaspore from megaspore mother cell is called megasporogenesis.

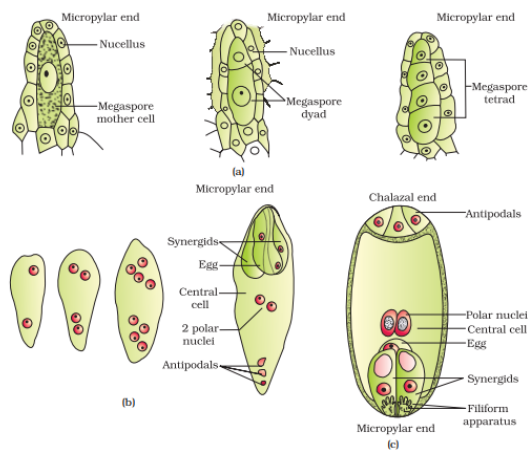


Figure: Different stages in the development of embryo-sac from a megaspore

33. The rapid increase in population over a relatively short period is called population explosion. Population of India which was approximately 350 million at the time of our independence, crossed 1 billion in May 2000.

Reasons:

1. A rapid decline in death rate, maternal mortality rate and infant mortality rate.
2. An increase in number of people in reproductive age.
3. Better public health care and greater medical attention.
4. Control of diseases
5. Protection from natural calamities
6. Development of agriculture, improvement in food storage conditions and better means of transport.

OR

The accessory glands are associated with the reproductive system, they do not form gametes but help primary sex organs in their gamete formation, transportation and nourishment. The accessory glands secretions are in the form of a liquid called seminal plasma, which along with the sperm from semen or seminal fluid. The functions of different accessory glands are as follows:

- i. **Seminal vesicles:** It consist of slightly alkaline viscous seminal fluid that contains fructose and prostaglandins. Fructose provides energy to the sperms for swimming of sperm towards ova for fertilization, while prostaglandins stimulate vaginal contractions in the female genital tract to help in the fusion of gametes. Its secretions constitute 60-70 % of total semen.
- ii. **Prostate gland:** It secretes thin, milky, alkaline fluid, which is discharged into the urethra. It activates the sperms to swim. It also neutralises the acidity of urine. Prostate secretion makes 20-30% of total semen.
- iii. **Cowper's glands (bulbourethral glands):** They secrete a mucus-like substance that lubricates the vagina for frictionless movements of the penis during copulation. Its secretions are alkaline in nature thus help in neutralizing the acidity of urine in the urinogenital tract.
- iv. **Other glands:** Prepuce contains preputial glands which produce a sebaceous substance which is whitish pasty, foul-smelling accumulation called smegma' beneath the base of the Glans Penis. The urethra also has mucus-secreting cells in its lining.