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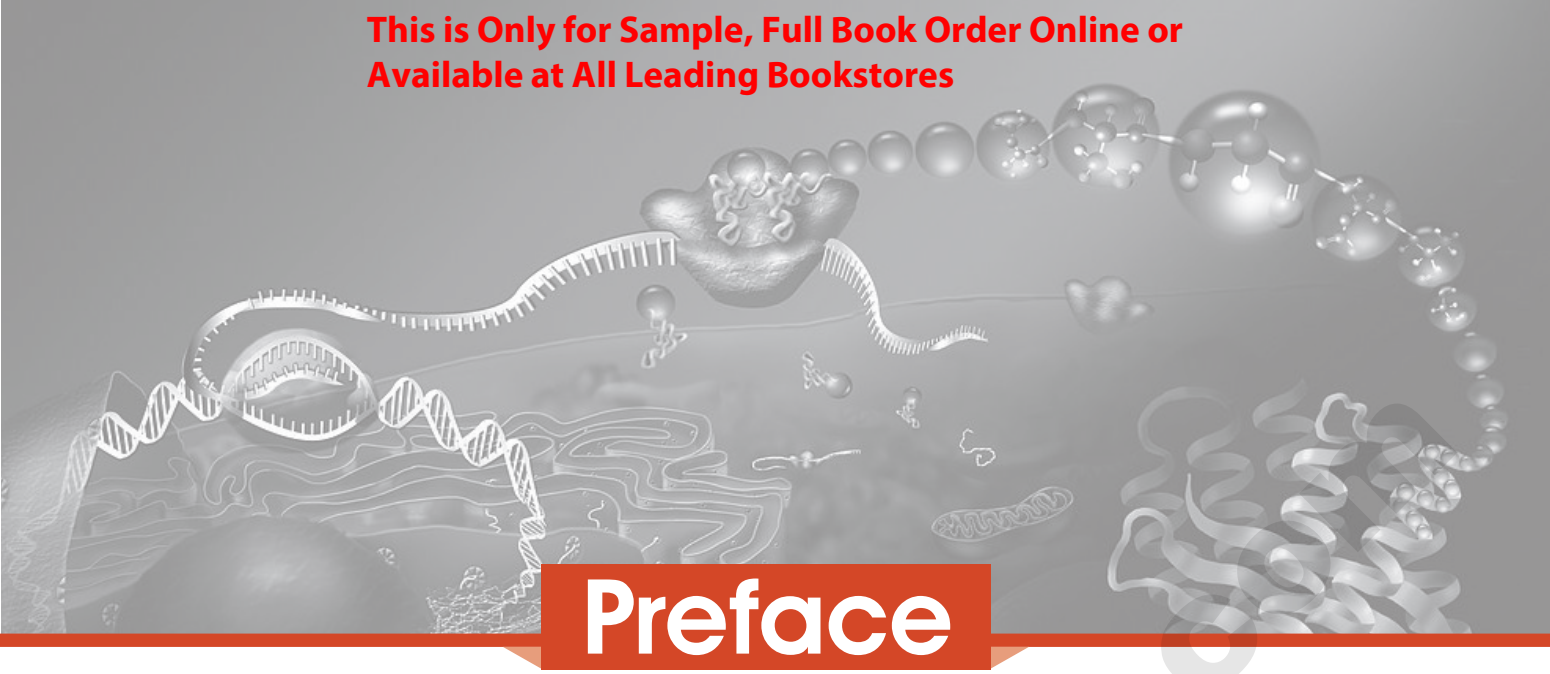

Preface

'Each has his own tree of ancestors,
but at the top of all sits Probably Arboreal.'

- Robert Louis

Respected Principals, Correspondents, Head Masters / Head Mistresses, Teachers,

From the bottom of our heart, we at SURA Publications sincerely thank you for the support and patronage that you have extended to us for more than a decade.

It is in our sincerest effort we take the pride of releasing **SURA'S Bio-Zoology & Zoology** for +2 Standard. This guide has been authored and edited by qualified teachers having teaching experience for over a decade in their respective subject fields. This Guide has been reviewed by reputed Professors who are currently serving as Head of the Department in esteemed Universities and Colleges.

With due respect to Teachers, I would like to mention that this guide will serve as a teaching companion to qualified teachers. Also, this guide will be an excellent learning companion to students with exhaustive exercises and in-text questions in addition to precise answers for textual questions.

In complete cognizance of the dedicated role of Teachers, I completely believe that our students will learn the subject effectively with this guide and prove their excellence in Board Examinations.

I once again sincerely thank the Teachers, Parents and Students for supporting and valuing our efforts.

God Bless all.

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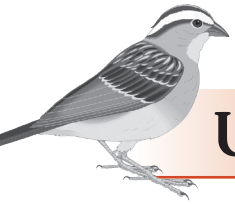

UNIT I

Chapter 1

REPRODUCTION IN ORGANISMS

CHAPTER SNAPSHOT

1.1 Modes of reproduction
1.2. Asexual reproduction
1.3. Sexual reproduction

MUST KNOW DEFINITIONS

Asexual reproduction	:	Reproduction by single parent involving amitotic or mitotic divisions only.
Sexual reproduction	:	Participation of two individuals and involves formation of male and female gamete.
Fission	:	Division of parent body into two or more identical Daughter individuals.
Binary fission	:	Parent organism divides into two daughter cells.
Multiple fission	:	Parent body divides into many similar daughter cells.
Strobilation	:	A special type of transverse fission giving rise to number of individuals.
Budding	:	Parent body produces one or more buds which separate from the parent and lead an independent life
Gemmule	:	Internal buds formed is sponge which can tolerate adverse conditions and are a means of asexual reproduction.
Apolysis	:	Separation of gravid proglottids from the body of a tape worm.
Regeneration	:	Regrowth in the injured region.
External fertilization	:	Fusion of male & female gametes takes place outside the body of the female organism.
Internal fertilization	:	Fusion of male and female gametes takes place within the body of the female organism.
Fertilization	:	Fusion of male & female gametes.
Conjugation	:	Type of sexual reproduction between two individuals, where certain amount of nuclear material exchange takes place after which they separate.
Parthenogenesis	:	Development of an egg into a complete individual without fertilization.
Oviparous condition	:	Young ones hatch from eggs laid outside the mother's body.
Viviparous condition	:	Animals give birth to young ones.
Ovoviviparous conditions	:	Embryo develops inside the eggs and remains in the mother's body until they are ready to hatch.

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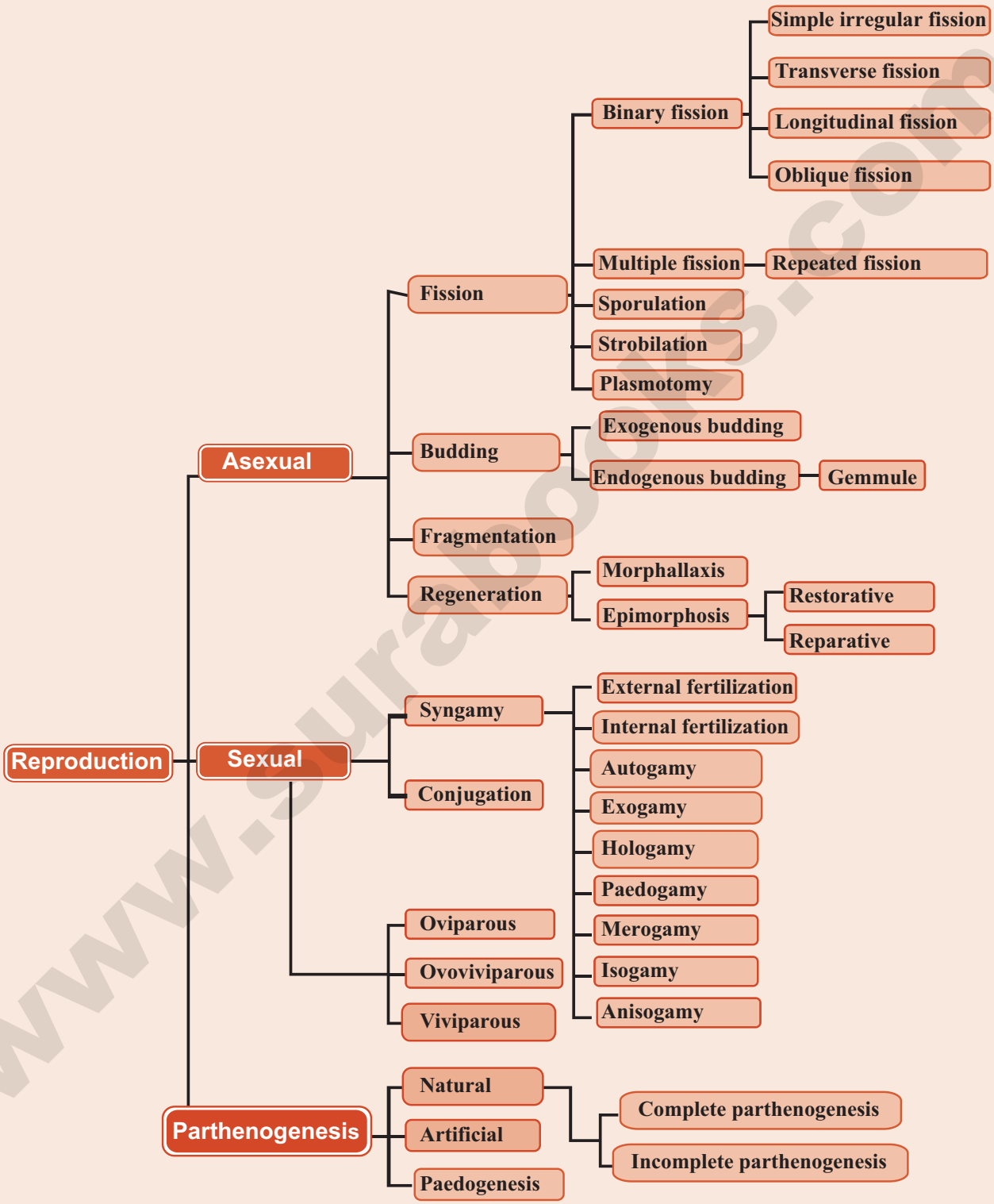

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Evaluation

1. In which type of parthenogenesis are only males produced? *[QY-2019; FRT & July-'22]*

(a) Arrhenotoky (b) Thelytoky
(c) Amphitoky (d) Both a and b

[Ans. (a) Arrhenotoky]

2. The mode of sexual reproduction in bacteria is by *[Aug-2021]*

(a) Formation of gametes
(b) Endospore formation
(c) Conjugation
(d) Zoospore formation **[Ans. (c) Conjugation]**

3. In which mode of reproduction variations are seen *[FRT & May-'22]*

(a) Asexual (b) Parthenogenesis
(c) Sexual (d) Both a and b

[Ans. (c) Sexual]

4. Assertion and reasoning questions:

In each of the following questions there are two statements. One is assertion (A) and other is reasoning (R). Mark the correct answer as

A. If both A and R are true and R is correct explanation for A.
B. If both A and R are true but R is not the correct explanation for A.
C. If A is true but R is false.
D. If both A and R are false.

I. **Assertion:** In bee society, all the members are diploid except drones.

Reason: Drones are produced by parthenogenesis.

A B C D

[Ans. (A) If both A and R are true and R is correct explanation for A]

II. **Assertion:** Offsprings produced by asexual reproduction are genetically identical to the parent.

Reason: Asexual reproduction involves only mitosis and no meiosis.

A B C D

[Ans. (A) If both A and R are true and R is correct explanation for A]

5. Name an organism where cell division is itself a mode of reproduction.

Ans. Bacteria, *Amoeba.*

6. Name the phenomenon where the female gamete directly develops into a new organism with an avian example.

Ans. Phenomenon – Parthenogenesis

Eg: Turkey.

7. What is Parthenogenesis? Give two examples from animals. *[QY-2019; Aug-2021; FRT & May-'22]*

Ans. (i) Development of an egg into a complete individual without fertilization is known as parthenogenesis.

(ii) Parthenogenesis is of two main types namely, **Natural Parthenogenesis** and **Artificial Parthenogenesis**.

(iii) **Natural Parthenogenesis** - **Ex:** Honey bees, Gall fly

(iv) **Artificial Parthenogenesis** - **Ex:** Annelid, Seaurchin

8. Which type of reproduction is effective -Asexual or sexual and why? (OR) Why sexual method of reproduction is better than asexual reproduction? *[PTA-5]*

Ans. (i) In asexual reproduction, single parent give rise to an individual. The chances of inducing variation in progeny and its environmental adaptability is low as the genetic material is its exact copy.

(ii) In sexual reproduction, fusion of male and female gametes takes place. Thus, the offspring shows greater variation and can withstand in any environment due to the variation occurs during Meiosis cell division & crossing over.

Hence, sexual mode of reproduction is more effective.

9. The unicellular organisms which reproduce by binary fission are considered immortal. Justify.

Ans. (i) In **binary fission** (asexual reproduction), the single parental organism divides into two halves and each half forms a daughter individual. This is seen in unicellular organism like bacteria, *Amoeba* etc.

(ii) The parent cell does not die but it becomes a part of the daughter cells formed.

(iii) This means that the same organism keeps spliting into new young ones. So there is no way we could say that the organism has died.

(iv) Thus the unicellular organisms which reproduce by binary fission are considered immortal.

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10. Why is the offspring formed by asexual reproduction referred as a clone?

Ans. **(i)** Asexual reproduction involves a single parent.

(ii) Offsprings produced by asexual reproduction are morphologically and genetically similar to their parents exact copies of their parents and are called clones.

11. Give reasons for the following: *[Sep-2020]*

(a) Some organisms like honey bees are called parthenogenetic animals.

(b) A male honey bee has 16 chromosomes where as its female has 32 chromosomes.

Ans. **(a)** Development of an egg into a complete individual without fertilization is known as parthenogenesis. It is of two types.

(i) In certain animals, parthenogenesis occurs regularly, constantly and naturally in their life cycle and is known as natural parthenogenesis.

(ii) Artificially it can be induced in animals by physical or chemical stimuli which is called artificial parthenogenesis.

(b) In honey bees, both sexual reproduction and parthenogenesis occurs, and it is described as incomplete parthenogenesis.

During sexual reproduction, the fertilized eggs (zygotes) develop into queen bee and workers (females). The unfertilized eggs develop into drones (males). Thus honey bees are called parthenogenetic animals.

In honey bees, the normal chromosomal number in a cell is $2n = 32$. Gametes (sperms & egg) will have only $n = 16$ chromosomes since they are haploid.

The female bees are formed by fertilization of gametes.

$$\text{sperm } (n) + \text{egg } (n) = 2n$$

Therefore they have 32 chromosomes. Since the drones (males) are formed from unfertilized eggs(n) they have only 16 chromosomes.

12. Differentiate between the following:

(a) External and Internal fertilization

(b) Regeneration in lizard and *Planaria*

Ans.

(a)

External fertilization	Internal fertilization
The fusion of male and female gametes takes place outside the body of female organisms in the water medium. **Eg:** sponges, fishes and amphibians.	The fusion of male and female gametes takes place within the body of female organisms. **Eg:** reptiles, aves and mammals.

(b) Regeneration is regrowth in the injured region

Regeneration in *Planaria*	Regeneration in lizard
It shows the morphallaxis type of regeneration in which the whole body grows from a small fragment	Lizard shows the epimorphosis type of regeneration in which replacement of lost body parts occur.
The whole body can be got by regeneration	It shows the restorative type of regeneration in which several body parts can only develop but the whole body cannot develop.

13. How is Juvenile phase different from reproductive phase? *[FRT-'22]*

Ans.

Juvenile phase	Reproductive phase
Juvenile phase/ vegetative phase is the period of growth between the birth of the individual upto reproductive maturity.	During reproductive phase/ maturity phase the organisms reproduce and their offsprings reach maturity period.

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14. Explain the different kinds of syngamy in living organisms. *[FRT-'22]*

Ans. Different kinds of syngamy (fertilization) are prevalent among living organisms.

(a) **Autogamy** - The male and female gametes are produced by the same cell or same organism and both the gametes fuse together to form a zygote. **e.g.** *Actinosphaerium* and *Paramecium*.

(b) **Exogamy** - The male and female gametes are produced by different parents and they fuse to form a zygote. So it is biparental. **e.g.** Human beings – dioecious or unisexual animal.

(c) **Hologamy** - Lower organisms, sometimes the entire mature organisms do not form gametes but they themselves behave as gametes and the fusion of such mature individuals is known as hologamy **e.g.** *Trichonympha.*

(d) **Paedogamy** - It is the sexual union of young individuals produced immediately after the division of the adult parent cell by mitosis. **e.g.** *Actinophrys.*

(e) **Merogamy** - The fusion of small sized and morphologically different gametes (merogametes) takes place. **e.g.** *Protozoa.*

(f) **Isogamy** - The fusion of morphological and physiological identical gametes (isogametes) is called isogamy. **e.g.** *Monocystis.*

(g) **Anisogamy** - The fusion of dissimilar gametes is called anisogamy (Gr. An-without; iso-equal; *gam*-marriage). Anisogamy occurs in higher animals but it is customary to use the term fertilization instead of anisogamy or syngamy. **e.g.** higher invertebrates and all vertebrates.

PTA Question & Answers

Choose the Correct Answer — 1 Mark

1. *Plasmotomy* means *[PTA-2]*

(a) Mononucleated parent divides into two mononucleated individuals.

(b) Multinucleated parent divides into two mononucleated invividuals.

(c) Multinucleated parent divides into many mononucleated individuals.

(d) Multinucleated parent divides into many multinucleated daughter individuals.

[Ans. (d) Multinucleated parent divides into many multinucleated daughter individuals]

2. Human beings are unisexual animals, the type of syngamy in human beings is *[PTA-3]*

(a) autogamy (b) exogamy

(c) hologamy (d) paedogamy

[Ans. (b) exogamy]

3. In hydra, the buds develop from *[PTA-4]*

(a) ectoderm layer only

(b) ectoderm and endoderm layers

(c) ectoderm, mesoderm and endoderm layers

(d) ectoderm and mesoderm layers

[Ans. (b) ectoderm and endoderm layers]

4. The primary and secondary hosts of Tape worm are respectively. *[PTA-5]*

(a) Mosquito and man

(b) Man and housefly

(c) Cattle and man

(d) Man and pig

[Ans. (d) Man and pig]

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Very Short Answers — 2 Marks

1. Zygote is not formed during the conjugation of *Paramecia*, but we call it as sexual reproduction why? *[PTA-2]*

Ans. **(i)** *Paramecium* reproduces both sexually and asexually.

(ii) In *Paramecium*, conjugation is a form of sexual reproduction. It is a temporary union of two individuals of same species for mutual exchanges of genetic materials.

(iii) It can also multiply during nuclear organizations.

Various process of *Paramecium* reproduction listed below:

(i) Transverse binary fission - Asexual reproduction.

(ii) Conjugation - Sexual reproduction by cross fertilization.

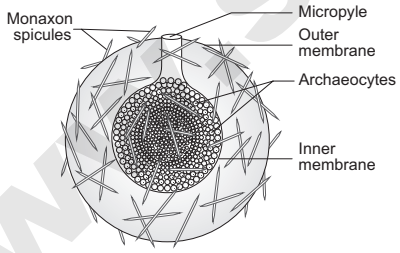
2. Why do we call parthenogenesis as a special type of sexual reproduction in animals? *[PTA-4]*

Ans. **(i)** Development of an egg into a complete individual without fertilization is known as parthenogenesis.

(ii) Parthenogenesis is the special type of sexual reproduction seen in animals. It is of two main types namely natural parthenogenesis and artificial parthenogenesis.

3. Draw the diagram of a gemmule and label the parts. *[PTA-3]*

Ans.



Gemmule in sponges

Short Answers — 3 Marks

1. Meiosis cell division does not take place during the gametes formation of drone bees. Give reason. *[PTA-2]*

Ans. **(i)** Drones are produced by parthenogenesis, unfertilized eggs develop into drone bees (males).

(ii) Males have the half the number of chromosomes (haploid). Thus meiosis cell division does not take place during the gametes formation of drone bees.

2. Write the differences between multiple fission and sporulation in *Amoeba*. *[PTA-6]*

Ans.

	Multiple fission	Sporulation
1.	The parent body divides into many similar daughter cells simultaneously.	During unfavourable conditions *Amoeba* multiplies by sporulation without encystment.
2.	Nucleus divides repeatedly without the division of the cytoplasm, later the cytoplasm divides into many parts as that of nuclei.	Nucleus breaks into several small fragments or chromatin blocks.
3.	Each cytoplasmic part encircles one daughter nucleus.	Each fragment develops a nuclear membrane, becomes surrounded by cytoplasm and develops a spore-case around it .
4.	This results in the formation of many smaller individuals from a single parent organism.	When conditions become favourable, the parent body disintegrates and the spores are liberated, each hatching into a young amoeba.

GOVERNMENT EXAM QUESTIONS

Bio-Zoology (Short version)

Choose the Correct Answer — 1 Mark

1. Which among the following animals exhibit ovoviviparity? *[Govt.MQP-2019]*

(a) frog (b) shark
(c) sheep (d) hen

[Ans. (b) shark]

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HOTS

1. The organisms exhibiting sexual reproduction shows variations. Give reasons.

Ans. ***(i)*** Sexual reproduction involves formation of gametes by meioses brings in exchange of chromosomal segments between paternal and maternal chromosomes.

(ii) Fertilization is a chance of probability because the ovum can be fertilized by any of the sperms. Hence variations will occur and degree of variations cannot be predicted in sexual reproduction.

★★★

Unit Test

[Time : 1 hr] **[Marks: 25]**

I. CHOOSE THE CORRECT ANSWER. 10 × 1 = 10

1. Technique used for cultivation of sponges is based on _____
(a) Multiple fission (b) Parthenogenesis
(c) Regeneration (d) Autogamy

2. Conjugation is a type of _____
(a) Asexual reproduction (b) Autogamy
(c) External fertilization
(d) Sexual reproduction

3. Choose the correct pair
i. Shark - Placenta
ii. *Taenia solium* - Regeneration
iii. Frog - Continuous breeder
iv. Plasmotomy - *Pelomyxa*
(a) i and iii (b) ii and iii
(c) i and iv (d) i, ii and iv

4. (i) Lizard is a continuous breeder.
(ii) Asexual reproduction is also known as somatogenic reproduction
(iii) In repeated fission, young ones do not separate till fission process is completed.
(iv) Strobilation is a kind of longitudinal fission.
(a) i and iii (b) i, ii and iv
(c) ii and iii (d) ii and iv

5. Starfish shown ____ type of regeneration.
(a) epimorphosis - reparative
(b) epimorphosis (restorative)
(c) morphallaxis (d) paedogenesis

6. Assertion : Ovoviviparity is seen is shark
Reason : Placenta is formed to transfer nutrients to the embryo
(a) If both A and R are true and R is correct explanation for A
(b) If both A and R are true but R is not the correct explanation for A
(c) If A is true but R is false
(d) If both A and R are false.

7. Which statement is incorrect regarding the type of binary fission stated?
(a) Transverse binary fission is seen in *Planaria*.
(b) Longitudinal binary fission is seen in *Euglena*.
(c) Oblique binary fission is seen in *Flagellates*.
(d) Simple iregular binary fission is seen in *Amoeba*.

8. Division of cytoplasm is called _____
(a) karyokinesis (b) cytokinesis
(c) *Trichonympha* (d) Paedogamy

9. The mode of asexual reproduction in bacteria is by
(a) Formation of gametes
(b) Endospore formation (c) Conjugation
(d) Zoospore formation

10. In which mode of reproduction variations are seen
(a) Asexual (b) Parthenogenesis
(c) Sexual (d) Both a and b

II. VERY SHORT ANSWER 2 × 2 = 4

11. What is repeated fission? Give an example.

12. Explain Apolysis.

III. SHORT ANSWER 2 × 3 = 6

13. What is (a) Merogamy (b) Hologamy

14. Draw a gemmula and label any two parts.

IV. LONG ANSWER 1 × 5 = 5

15. Write a note on parthenogenesis.

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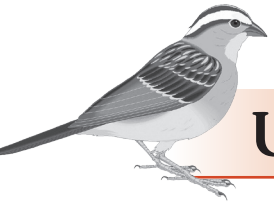


UNIT I

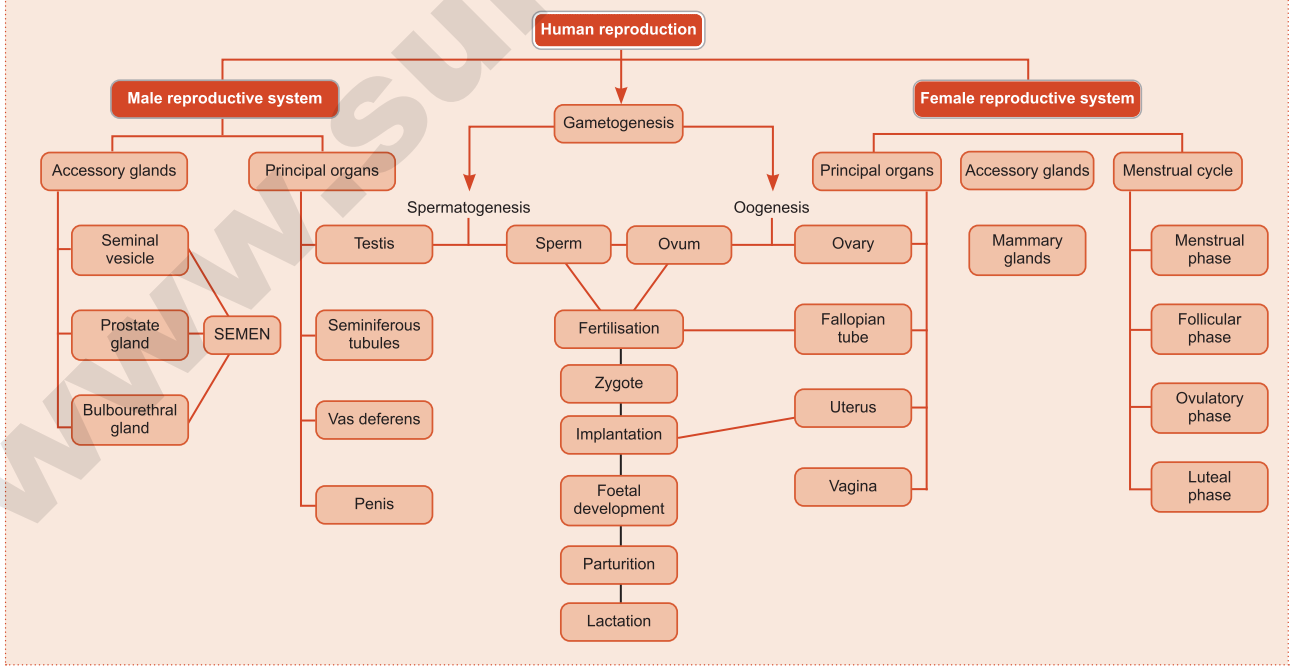
Chapter 2

HUMAN REPRODUCTION

CHAPTER SNAPSHOT

2.1 Human reproductive system
2.2 Gametogenesis
2.3 Menstrual cycle
2.4 Fertilization and implantation
2.5 Maintenance of pregnancy and embryonic development
2.6 Parturition and lactation

Concept Map



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MUST KNOW DEFINITIONS

Gametogenesis	:	Formation of gametes by spermatogenesis and oogenesis.
Insemination	:	Transfer of sperms by the male into the female genital tract.
Fertilization	:	Fusion of male and female gametes to form zygote is called fertilization.
Cleavage	:	Rapid mitotic divisions of the zygote which convert the single celled zygote into a multicellular structure called blastocyst.
Implantation	:	Attachment of blastocyst to the uterine wall.
Placentation	:	Formation of placenta which is the intimate connection between foetus and uterine wall of the mother for exchange of nutrients.
Gastrulation	:	Process by which blastocyst is changed into a gastrula with three primary germ layers
Organogenesis	:	Formation of specific tissues, organs and organ systems from three germ layers.
Parturition	:	Expulsion of the foetus from the mother's womb.
Sertoli cells	:	Elongated and pyramidal cells which provide nourishment to sperms till maturation.
Semen	:	Milky white fluid which contains sperms & seminal plasma
Fallopian tube	:	Oviduct or uterine tube which receives the egg after ovulation
Uterus	:	Hollow, thick – walled, inverted pear shaped structure in female reproductive system in which implantation of embryo occurs.
Mammary glands	:	Modified sweat glands involved in lactation in females and rudimentary in males.
Spermatogenesis	:	Process of formation of sperms in seminiferous tubules of testis
Oogenesis	:	Process of development of ovum in the ovaries
Spermiogenesis	:	The spermatids are transformed into mature sperms by the process of spermiogenesis.
FSH	:	Follicle stimulating hormone produced by the pituitary gland
LH	:	Lutenizing Hormone produced by the pituitary gland
ABP	:	Androgen Binding protein
Acrosome	:	Pointed structure at the tip of the sperm head.
Hyaluronidase	:	Proteolytic enzyme produced by acrosome of sperm,
Menstrual cycle	:	Ovarian cycle occurring once in every 28/29 days during reproductive life of female from menarche to menopause except during pregrancy.
Graafian follicle	:	Mature ovarian follicle which releases the egg.
Corpus luteum	:	Temporary endocrine gland formed from ruptured graffian follicle during pregnancy.
Placenta	:	Disc shaped temporary endocrine organ formed during pregnancy which connects foetus and uterine wall.
Gastrulation	:	The transformation of the blastocyst into a gastrula with the primary germ layers by the movement of the blastomeres is called gastrulation.
Gestation	:	Period for which the foetus is in the mother's womb.
hCS	:	Human Chorionic Somatomammotropin
hCG	:	Human Chorionic Gonadotropin
hPL	:	Human Placental Lactogen
Polyspermy	:	Entry of more than one sperm into the ovum.

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Evaluation

1. The mature sperms are stored in the *[Aug-2021; FRT & May-'22]*

(a) Seminiferous tubules (b) Vas deferens
(c) Epididymis (d) Seminal vesicle

[Ans. (c) Epididymis]

2. The male sex hormone testosterone is secreted from *[FRT-'22]*

(a) Sertoli cells (b) Leydig cell
(c) Epididymis (d) Prostate gland

[Ans. (b) Leydig cell]

3. The glandular accessory organ which produces the largest proportion of semen is

(a) Seminal vesicle
(b) Bulbourethral gland (c) Prostate gland
(d) Mucous gland **[Ans. (a) Seminal vesicle]**

4. The male homologue of the female clitoris is

(a) Scrotum (b) Penis
(c) Urethra (d) Testis

[Ans. (b) Penis]

5. The site of embryo implantation is the *[July-'22]*

(a) Uterus (b) Peritoneal cavity
(c) Vagina (d) Fallopian tube

[Ans. (a) Uterus]

6. The foetal membrane that forms the basis of the umbilical cord is *[FRT-'22]*

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

[Ans. (a) Allantois]

7. The most important hormone in intiating and maintaining lactation after birth is

(a) Oestrogen (b) FSH
(c) Prolactin (d) Oxytocin

[Ans. (c) Prolactin]

8. Mammalian egg is

(a) Mesolecithal and non-cleidoic
(b) Microlecithal and non-cleidoic
(c) Alecithal and non-cleidoic
(d) Alecithal and cleidoic

[Ans. (c) Alecithal and non-cleidoic]

9. The process which the sperm undergoes before penetrating the ovum is *[Aug-2021]*

(a) Spermiation (b) Cortical reaction
(c) Spermiogenesis (d) Capacitation

[Ans. (d) Capacitation]

10. The milk secreted by the mammary glands soon after child birth is called

(a) Mucous (b) Colostrum
(c) Lactose (d) Sucrose

[Ans. (b) Colostrum]

11. Colostrum is rich in

(a) Ig E (b) Ig A
(c) Ig D (d) Ig M

[Ans. (b) Ig A]

12. The Androgen Binding Protein (ABP) is produced by *[July-'22]*

(a) Leydig cells (b) Hypothalamus
(c) Sertoli cells (d) Pituitary gland

[Ans. (c) Sertoli cells]

13. Find the wrongly matched pair *[Sep-2020]*

(a) Bleeding phase - fall in oestrogen and progesterone
(b) Follicular phase - rise in oestrogen
(c) Luteal phase - rise in FSH level
(d) Ovulatory phase - LH surge

[Ans. (c) Luteal phase - rise in FSH level]

Answer the following type of questions Assertion (A) and Reason (R)

a. A and R are true, R is the correct explanation of A
b. A and R are true, R is not the correct explanation of A
c. A is true, R is false
d. Both A and R are false

14. A – In human male, testes are extra abdominal and lie in scrotal sacs.
R – Scrotum acts as thermoregulator and keeps temperature lower by 2°C for normal sperm production .

[Ans. (a) A and R are true, R is the correct explanation of A]

15. A – Ovulation is the release of ovum from the Graafian follicle.
R – It occurs during the follicular phase of the menstrual cycle.

[Ans. (c) A is true, R is false]

16. A – Head of the sperm consists of acrosome and mitochondria.
R – Acrosome contains spiral rows of mitochondria.

[Ans. (d) Both A and R are false]

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17. Mention the differences between spermiogenesis and spermatogenesis. *[July-'22]*

Ans.

Spermiogenesis	Spermatogenesis
It is the process of maturation of spermatids into spermatozoa.	It is the process of formation of sperm cells or male gametes.
Follicle Stimulating Hormone (FSH) stimulate testicular growth and enhances the production of Androgen Binding Protein (ABP) by the sertoli cells and helps in the process of spermiogenesis.	Lutenizing Hormone (LH) acts on the Leydig cells and stimulates the synthesis of testosterone which in turn stimulates the process of spermatogenesis.

18. At what stage of development are the gametes formed in new born male and female?

Ans.

(i) In a new born male, spematogenesis (formation of sperms) starts at the age of puberty. It is initiated due to the increase in the release of Gonadotropin Releasing Hormone (GnRH) by the hypothalamus .

(ii) Oogenesis is the process of development of the female gamete or egg in the ovaries. During foetal development, certain cells in the germinal epithelium of foetal ovary divide by mitosis and produce millions of oogonia or egg mother cells.

(iii) No more oogonia are added after birth. The oogonial cells enter into prophase I of meiosis to form primary oocytes which are temporarily arrested at this stage.

(iv) The primary oocytes then become primary follicles. From birth to puberty, a large number of follicles degenerate. At puberty the primary follicle undergoes further development and finally releases the ovum.

19. Expand the acronyms

a. FSH b. LH c. hCG d. hPL

Ans.

(a) FSH – Follicular Stimulating Hormone
(b) LH – Lutenizing Hormone
(c) hCG – Human Chorionic Gonadotropin
(d) hPL – Human Placental Lactogen.

20. How is polyspermy avoided in humans?

Ans. Once fertilization is accomplished, cortical granules from the cytoplasm of the ovum form a barrier called the fertilization membrane around the ovum. This prevents further penetration of other sperms. Thus polyspermy (entry of more than one sperm into an egg) is prevented.

21. What is colostrum? Write its significance. *[Mar-2020]*

Ans. The mammary glands of a female secrete a yellowish fluid called **colostrum** during the initial days after parturition.

Significance :

(i) It has less lactose than milk and almost no fat, but it contains more proteins, vitamin A and minerals.

(ii) It is rich in IgA antibodies. It helps to protect the infants digestive tract against bacterial infections.

(iii) It is the ideal food for infants since it contains all constituents in suitable concentration and is easily digestable.

(iv) It is loaded with immune, growth and tissue repair factors.

(v) It acts as a natural antimicrobial agent to actively stimulate the maturation of the infant's immune system.

(vi) It is fully sufficient till 6 months of age for all infants.

22. Placenta is an endocrine tissue. Justify. *[Mar-2020]*

Ans.

(i) Placenta is a temporary endocrine organ formed during pregnancy.

(ii) During pregnancy, the placenta acts as a temporary endocrine gland and produces large quantities of human Chorionic Gonadotropin (hCG), human Chorionic Somatomammotropin (hCS) or human Placental Lactogen (hPL), oestrogens and progesterone which are essential for a normal pregnancy.

(iii) A hormone called relaxin is also secreted during the later phase of pregnancy which helps in relaxation of the pelvic ligaments at the time of parturition.

(iv) hCG, hPL and relaxin are produced only during pregnancy. Thus placenta is a endocrine tissue.

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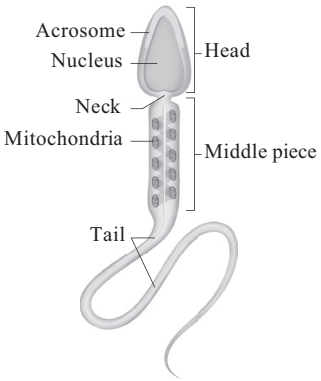
23. Draw a labeled sketch of a spermatozoan. *[Sep-2020; Aug-2021; FRT & July-'22]*

Ans.



24. What is Inhibin? State its functions. *[Aug-2021; FRT-'22]*

Ans. **Inhibin** is a hormone secreted by the sertoli cells in the stratified epithelium of the seminiferous tubule in the testis.

Function: It is involved in the negative feedback control of sperm production.

25. Mention the importance of the position of the testis in humans. *[FRT-'22]*

Ans.

(i) Testis are the primary male sex organs.

(ii) They are a pair of ovoid bodies lying in the scrotum.

(iii) The scrotum is a sac of skin that hangs outside the abdominal cavity.

(iv) Testis are important for the production and storage of sperm. Since viable sperms cannot be produced at normal body temperature, the scrotum is placed outside the abdominal cavity to provide a temperature 2-3°C lower than the normal internal body temperature. Thus, the scrotum acts as a thermoregulator for spermatogenesis.

26. What is the composition of semen? *[FRT & May-'22]*

Ans.

(i) Semen is a milky white fluid which contains sperms and the seminal plasma.

(ii) The seminal plasma contains fructose sugar, ascorbic acid, prostaglandins and a coagulating enzyme called **vesiculase** which enhance sperm mobility.

(iii) It also contains citrate, several enzymes and prostate specific antigens.

(iv) It also provides nutrients and contains chemicals that protect and activate the sperms.

27. Explain the process of fertilization and implantation of the fertilization ovum.

(or) *[PTA-6; Sep-2020; Aug-2021; FRT-'22]*

Briefly explain the mechanism of fertilization and implantation in human beings.

Ans.

(i) Fertilization occurs when a haploid sperm fuses with a haploid ovum to form a fertilized egg or diploid zygote.

(ii) The sperms deposited in the female reproductive tract undergo capacitation, which is a biochemical event that enables the sperm to penetrate and fertilise the egg.

(iii) Fertilization occurs only if the ovum and sperms are transported simultaneously to the ampullary isthmic junction of the fallopian tube.

(iv) Before a sperm can enter the egg, it must penetrate the multiple layers of granulosa (follicular) cells which are around the ovum forming the **corona radiata**. The follicular cells are held together by an adhesive cementing substance called hyaluronic acid.

(v) The acrosomal membrane disintegrates releasing the proteolytic enzyme, **hyaluronidase** during sperm entry through the corona radiata and zona pellucida. This is called **acrosomal reaction.**

(vi) Once fertilization is accomplished, cortical granules from the cytoplasm of the ovum form a barrier called the fertilization membrane around the ovum preventing further penetration of other sperms. Thus **polyspermy** is prevented.

(vii) The first cleavage produces two identical cells called **blastomeres**. These produce 4 cells, then 8 and so on. After 72 hours of fertilization, a loose collection of cells forms a berry shaped cluster of 16 or more cells called the **morula**.

(viii) By progesterone, smooth muscles of the fallopian tube relax and the dividing embryo takes 4-5 days to move through the fallopian tube into the uterine cavity and finally gets implanted in the uterine wall.

(ix) The inner cell mass of the blastocyst develops into the **embryo** and becomes embedded in the endometrium of the uterus.

(x) This process is called implantation and it results in pregnancy.

(xi) If the fertilised ovum is implanted outside the uterus it results in ectopic pregnancy.

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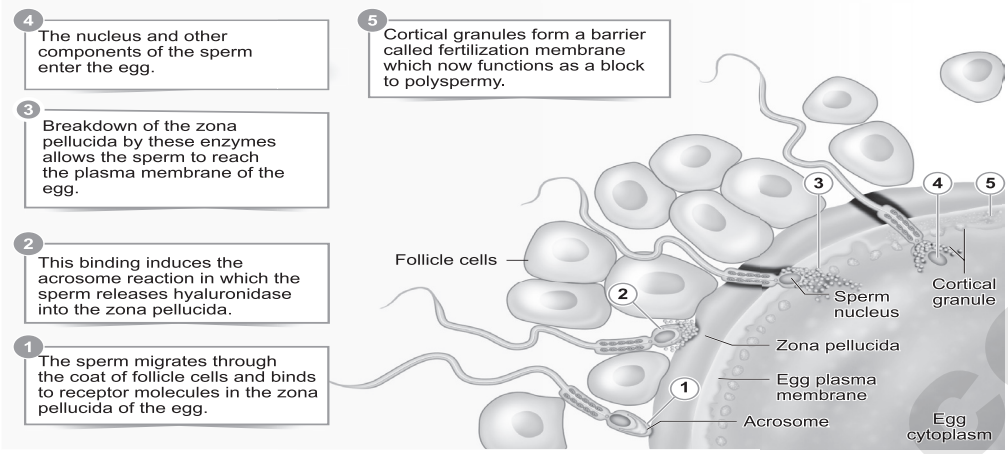


Events of Fertilization

28. Define Gametogenesis. *[FRT & July-'22]*

Ans. Gametogenesis is the process of formation of gametes i.e., sperms and ovary from the primary sex organs in all sexually reproducing organisms. Meiosis plays the most significant role in the process of gametogenesis.

29. Describe the structure of the human ovum with a neat labelled diagram.

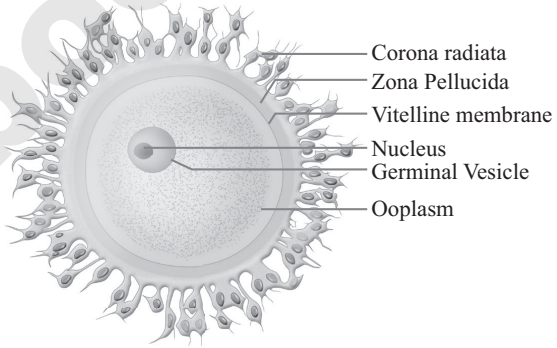
[Sep-2020; Aug-2021; FRT, May & July-'22]

Ans. ***(i)*** Human ovum is non-cleidoic, alecithal and microscopic in nature.

(ii) Its cytoplasm is called Ooplasm contains a large nucleus called the germinal vesicle.

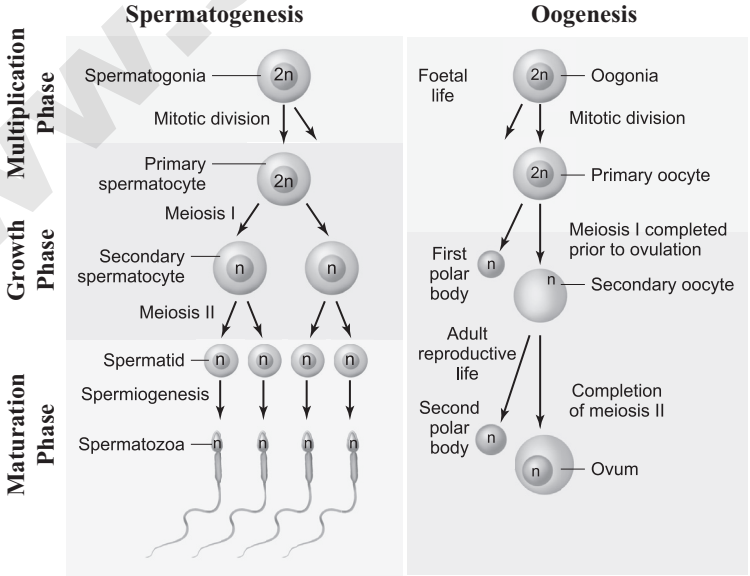
(iii) The ovum is surrounded by three coverings namely an inner thin transparent vitelline membrane, middle thick zona pellucida and outer thick coat of follicular cells called corona radiata.

(iv) Between the vitelline membrane and zona pellucida is a narrow perivitelline space.



30. Give a schematic representation of Spermatogenesis and Oogenesis in humans. *[PTA-1; QY-2019]*

Ans.



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31. Explain the various phases of the menstrual cycle.

Ans. Menstrual cycle consists of the following phases

1. Menstrual phase
2. Follicular or proliferative phase
3. Ovulatory phase
4. Luteal or secretory phase

1. Menstrual phase:

(i) The cycle starts with the menstrual phase when menstrual flow occurs and lasts for 3-5 days.

(ii) Menstrual flow is due to the breakdown of endometrial lining of the uterus and its blood vessels due to decline in the level of progesterone and oestrogen.

(iii) Menstruation occurs only if the released ovum is not fertilized.

2. Follicular or proliferative phase:

(i) The follicular phase extends from the 5th day of the cycle until the time of ovulation.

(ii) During this phase, the primary follicle in the ovary grows to become a fully mature Graafian follicle and simultaneously, the endometrium regenerates through proliferation.

(iii) These changes are induced by the secretion of gonadotropins like FSH and LH, which increase gradually during the follicular phase.

(iv) It stimulates follicular development and secretion of oestrogen by the follicle cells.

3. Ovulatory phase:

(i) Both LH and FSH attain peak level in the middle of the cycle (about the 14th day).

(ii) Maximum secretion of LH during the mid cycle called LH surge induces the rupture of the Graafian follicle and the release of the ovum (secondary oocyte) from the ovary wall into the peritoneal cavity. This process is called as ovulation.

4. Luteal or secretory phase:

(i) During luteal phase, the remaining part of the Graafian follicle is transformed into a transitory endocrine gland called **corpus luteum**.

(ii) The corpus luteum secretes large amount of progesterone which is essential for the maintenance of the endometrium.

(iii) It paves way for the implantation of the fertilized ovum.

(iv) The uterine wall secretes nutritious fluid in the uterus for the foetus. So, this phase is also called as secretory phase.

(v) During pregnancy, all events of menstrual cycle stop and there is no menstruation.

(vi) In the absence of Fertilization, the corpus luteum degenerates completely and leaves a scar tissue called corpus albicans.

(vii) It also initiates the disintegration of the endometrium leading to menstruation, marking the next cycle.

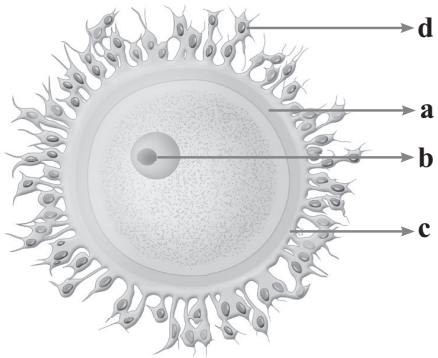
32. Explain the role of Oxytocin and Relaxin in parturition and lactation. *[Mar-2020]*

Ans. **Relaxin –** It is a hormone secreted by the placenta and also found in corpus luteum. It helps in relaxation of the pelvic ligaments at the time of parturition.

(i) **Oxytocin –** As pregnancy progresses, increase in oxytocin concentration promotes **uterine contractions** which facilitate moulding of foetus and downward movement of the foetus. These powerful concentration of the uterine muscles leads to the expulsion of the baby through birth canal resulting in child birth or parturition.

(ii) It causes the **"Let-Down" reflex** - the actual ejection of milk from the alveoli of the mammary glands. During lactation, oxytocin also stimulates the recently emptied uterus to contract, helping it to return to pre-pregnancy size.

33. Identify the given image and label its parts marked as a, b, c and d



Ans. Human Ovum

a – Vitelline membrane b – Nucleus
c – Zona Pellucida d – Corona radiata

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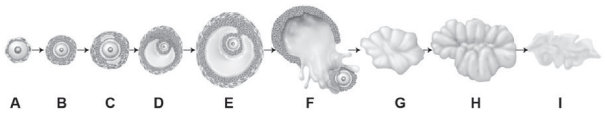
34. The following is the illustration of the sequence of ovarian events (a-i) in a human female.



a) **Identify the figure that illustrates ovulation and mention the stage of Oogenesis it represents.**

b) **Name the ovarian hormone and the pituitary hormone that have caused the above-mentioned events.**

c) **Explain the changes that occurs in the uterus simultaneously in anticipation.**

d) **Write the difference between C and H.**

Ans. (a) The figure 'F' illustrates ovulation. It represents the maturation stage of Oogenesis.

(b) The pituitary hormone leutinising hormone and the ovarian hormone oestrogen are responsible for the above mentioned events.

(c) ***(i)*** The endometrium of the uterus becomes thicker to receive the fertilized ovum in anticipation. (Implantation)

(ii) The uterine wall secretes nutritious fluid in the uterus for the foctus.

Difference between C and H:

C-Secondart follicle, H-Corpus luteum

(d)

C - Secondary Follicle	H - Corpus Luteum
Found in follicular phase or proliferative phase.	Found in luteal phase or secretary phase
It secretes Oestrogen	It secretes progesterone.
Secondary follicle grows and become a fully mature graafian follicle.	Corpus Luteum degenerates and leaves a scar called corpus albicans.

Zoology Long Version Questions (for pure science Group)

Q.No. 1 to 16 Refer Evaluation.

17. Painful menstruation is termed as

(a) Dysmenorrhoea
(b) Menorrhagia
(c) Amenorrhoea
(d) Oligomenorrhoea

[*Ans.* (a) Dysmenorrhoea]

18. Which one of the following menstrual irregularities is correctly matched? *[Mar-2020]*

(a) Menorrhagia - excessive menstruation
(b) Amenorrhoea - absence of menstruation
(c) Dysmenorrhoea - irregularity of menstruation
(d) Oligomenorrhoea - painful menstruation

[*Ans.* (b) Amenorrhoea - absence of menstruation]

19. Refer Evaluation Q.No.17

20. Refer Evaluation Q.No.18

21. Refer Evaluation Q.No.19

22. Refer Evaluation Q.No.20

23. Refer Evaluation Q.No.21

24. Refer Evaluation Q.No.22

25. Refer Evaluation Q.No.23

26. Refer Evaluation Q.No.24

27. Refer Evaluation Q.No.25

28. Refer Evaluation Q.No.26

29. Refer Evaluation Q.No.27

30. Refer Evaluation Q.No.28

31. Refer Evaluation Q.No.29

32. Refer Evaluation Q.No.30

33. Refer Evaluation Q.No.31

34. Refer Evaluation Q.No.32

35. Refer Evaluation Q.No.33

36. Refer Evaluation Q.No.34

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37. List the various menstrual disorders.

Ans. (i) **Amenorrhoea:** Absence of menstruation is called amenorrhoea.

Primary amenorrhoea: Menarche does not appear till the age of 18.

Secondary amenorrhoea: Absence of menstruation for three consecutive months.

(ii) **Polymenorrhoea :**

1. Menstrual cycle happens shorter than 21 days.
2. It may be due to hyperactivity of the anterior pituitary gland, psychological disturbances and malnutrition.
3. Chronic pelvic inflammation by certain sexually transmitted diseases (STD) such as chlamydiasis or gonorrhoea can cause inflammation in the uterus causing polymenorrhoea.

(iii) **Dysmenorrhoea :** Pain associated with menstruation is called dysmenorrhoea.

There are two types

1. **Primary dysmenorrhoea:** Pain or cramps during menstrual period.
2. **Secondary dysmenorrhoea:** Disorder in the Reproductive system like endometriosis or uterine fibroids.

(iv) **Menorrhagia :**

1. Heavy and prolonged menstrual period that disrupts a woman's normal activities is referred to as menorrhagia.
2. It may be due to hormonal imbalance, ovarian dysfunction, uterine fibroids and may also be due to cancer of the ovary, uterus or cervix.

(v) **Oligomenorrhoea :** Oligomenorrhoea is a condition with infrequent menstrual periods. It occurs in women of childbearing age.

PTA Question & Answers

Choose the Correct Answer — 1 Mark

1. The right order of reproductive events in human being is _____. *[PTA-3]*

(a) Gametogenesis → fertilization → blastocyst → gastrulation → organogenesis → parturition

(b) Gametogenesis → Cleavage → gastrulation → blastocyst → organogenesis → parturition

(c) Gametogenesis → fertilization → blastocyst → Cleavage → gastrulation → parturition → organogenesis

(d) Gametogenesis → fertilization → Cleavage → organogenesis → blastocyst → gastrulation → parturition

[*Ans.* (d) Gametogenesis → fertilization → Cleavage → organogenesis → blastocyst → gastrulation → parturition]

2. Which one of the following is an incorrect statement regarding uterus? *[PTA-4]*

(a) It is an inverted pear shaped structure

(b) It lies between urinary bladder and rectum

(c) The uterus opens into the vagina through fundus

(d) The wall of uterus has three layers.

[*Ans.* (c) The uterus opens into the vagina through fundus]

Very Short Answers — 2 Marks

1. Scrotum acts as a thermo regulator for spermatogenesis. Why? *[PTA-1]*

Ans. (i) Since viable sperms cannot be produced at normal body temperature, the scrotum is placed outside the abdominal cavity to provide a temperature 2-3°C lower than the normal internal body temperature.

(ii) Thus, the scrotum acts as a thermoregulator for spermatogenesis.

Short Answers — 3 Marks

1. Explain the penetration mechanism of a sperm into an egg. *[PTA-3]*

Ans. (i) The sperms deposited in the female reproductive tract undergo capacitation, which is a biochemical event that enables the sperm to penetrate and fertilise the egg.

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(ii) Fertilization occurs only if the ovum and sperms are transported simultaneously to the ampullary isthmic junction of the fallopian tube.

(iii) Before a sperm can enter the egg, it must penetrate the multiple layers of granulosa (follicular) cells which are around the ovum forming the corona radiata.

(iv) The acrosomal membrane disintegrates releasing the proteolytic enzyme, hyaluronidase during sperm entry through the corona radiata and zona pellucida. This is called acrosomal reaction.

(v) Once fertilization is accomplished, cortical granules from the cytoplasm of the ovum form a barrier called the fertilization membrane around the ovum preventing further penetration of other sperms. Thus **polyspermy** is prevented.

Long Answers — 5 Marks

1. Explain the role of hormones in the maintenance of human male fertility. *[PTA-2]*

Ans. (i) Spermatogenesis starts at the age of puberty and is initiated due to the increase in the release of Gonadotropin Releasing Hormone (GnRH) by the hypothalamus.

(ii) GnRH acts on the anterior pituitary gland and stimulates the secretion of two gonadotropins namely Follicle Stimulating Hormone (FSH) and Lutenizing Hormone (LH).

(iii) FSH stimulates testicular growth and enhances the production of Androgen Binding Protein (ABP) by the sertoli cells and helps in the process of spermiogenesis.

(iv) LH acts on the Leydig cells and stimulates the synthesis of testosterone which in turn stimulates the process of spermatogenesis.

2. Explain the role of placenta during pregnancy. *[PTA-4]*

Ans. (i) During pregnancy, the placenta acts as a temporary endocrine gland and produces large quantities of human Chorionic Gonadotropin (hCG), human Chorionic Somatomammotropin (hCS) or human Placental Lactogen (hPL), oestrogens and progesterone which are essential for a normal pregnancy.

(ii) A hormone called relaxin is also secreted during the later phase of pregnancy which helps in relaxation of the pelvic ligaments at the time of parturition.

(iii) It should be noted that hCG, hPL, hCS and relaxin are produced only during pregnancy.

(iv) In addition, during pregnancy the level of other hormones like oestrogen and progesterone, cortisol, prolactin, thyroxine, etc., is increased several folds in the maternal blood.

(v) These hormones are essential for supporting foetal growth.

3. Explain the anatomy of testes with the help of a diagram. *[PTA-5]*

Ans. (i) Testes are the primary male sex organs. They are a pair of ovoid bodies lying in the scrotum.

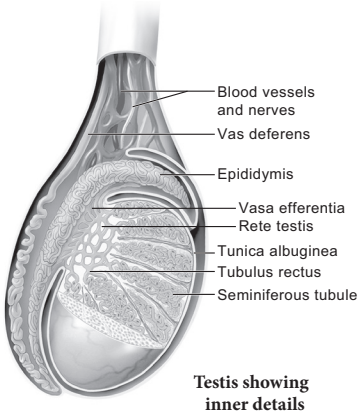
(ii) The scrotum is a sac of skin that hangs outside the abdominal cavity.

(iii) Since viable sperms cannot be produced at normal body temperature, the scrotum is placed outside the abdominal cavity to provide a temperature 2-3°C lower than the normal internal body temperature.

(iv) Thus, the scrotum acts as a thermoregulator for spermatogenesis.

(v) Each testes is covered by an outermost fibrous tunica albuginea and is divided by septa into about 200 - 250 lobules each containing 2-4 highly coiled testicular tubules or seminiferous tubules.

(vi) These highly convoluted tubules which form 80 percent of the testicular substance are the sites for sperm production.



Testis showing inner details

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GOVERNMENT EXAM QUESTIONS

Bio-Zoology (Short version)

Choose the Correct Answer — 1 Mark

1. Which of the following is not belonging to the accessory glands of the male reproductive system? *[QY-2019]*

(a) Prostate gland (b) Corpus albicans
(c) Cowper's gland
(d) Bulbourethral glands

[Ans. (c) Cowper's gland]

2. Why is colostrum recommended to new born baby? *[HY-2019]*

(a) It contains higher amount of carbohydrates.
(b) It contains higher amount of fats.
(c) It contains Ig A antibodies.
(d) It contains Ig E antibodies.

[Ans. (c) It contains Ig A antibodies]

3. World Breast feeding week is observed during: *[HY-2019]*

(a) March 1st week
(b) December 1st week
(c) August 1st week
(d) July 1st week **[Ans. (c) August Ist week]**

4. Which one of the following is true to gastrulation? *[Mar-2020]*

(a) Formation of multicellular structure from Zygote.
(b) Formation of specific organs from germ layers.
(c) Formation of three germ layer embryo from single layer embryo.
(d) Attachment of blastocyst to the uterine wall.

[Ans. (c) Formation of three germ layer embryo from single layer embryo]

5. The Skene's glands of female are homologous to : *[Sep-2020]*

(a) Bulbourethral glands of the male
(b) Cowper's gland of male
(c) Prostate gland of male
(d) Glans penis of male

[Ans. (c) Prostate gland of male]

6. The function of androgen binding protein is : *[Sep-2020]*

(a) Ejaculation of sperms
(b) Process of a spermiogenesis
(c) Stimulates the synthesis of inhibin
(d) Inhibiting the release of FSH

[Ans. (b) Process of a spermiogenesis]

Very Short Answers — 2 Marks

1. Describe the structure of the head of a human sperm. *[Govt.MQP-2019]*

Ans. *(i)* The head comprises of two parts namely acrosome and nucleus.
(ii) Acrosome is a small cap like pointed structure present at the tip of the nucleus and is formed mainly from the golgi body of the spermatid.
(iii) It contains hyaluronidase, a proteolytic enzyme, popularly known as sperm lysin which helps to penetrate the ovum during fertilization.
(iv) The nucleus is flat and oval.

2. What is known as capacitation of sperm cells? *[HY-2019]*

Ans. *(i)* Sperm capacitation is a biochemical event that enables the sperm to penetrate and fertilise the egg.
(ii) The sperms deposited in the female reproductive tract undergo capacitation.

3. What is "Let – Down" reflex? *[Mar-2020]*

Ans. The hormone oxytocin brings causes "Let - down" reflex which is the actual ejection of milk from the alveoli of the mammary glands.

4. What is ovulation? *[Mar-2020]*

Ans. *(i)* The release of ovum by the rupture of the Graafian follicle is called **ovulation**.
(ii) It occurs during ovulatory phase of menstrual cycle.

Short Answers — 3 Marks

1. Name the temporary endocrine organ formed during pregnancy. Write its uses. *[HY-2019]*

Ans. *(i)* Placenta is a temporary endocrine organ formed during pregnancy
(ii) It connects the foetus to the uterine wall through the umbilical cord.
(iii) It is the organ by which the nutritive, respiratory and excretory functions are fulfilled.

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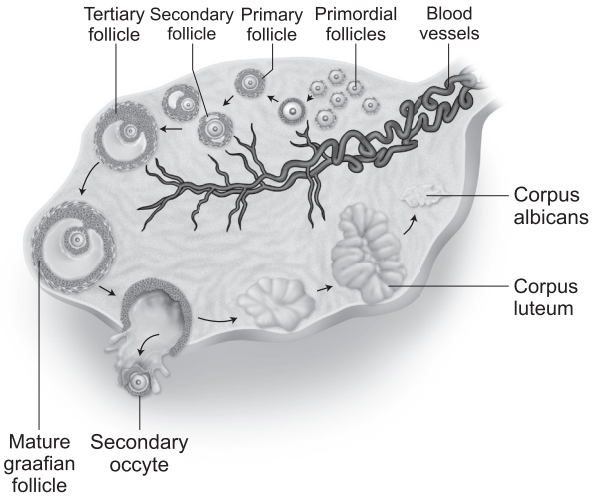
Long Answers — 5 Marks

1. Describe the structure of human ovary. *[FRT-'22]*

Ans. (i) Ovaries are the primary female sex organs that produce the female gamete, ovum. The ovaries are located one on each side of the lower abdomen.



(ii) The ovary is an elliptical structure about 2-4 cm long. Each ovary is covered by a thin cuboidal epithelium called the germinal epithelium which encloses the ovarian stroma. The stroma is differentiated as the outer cortex and inner medulla. Below the germinal epithelium is a dense connective tissue, the tunica albuginea.

(ii) The cortex appears dense and granular due to the presence of ovarian follicles in various stages of development. The medulla is a loose connective tissue with abundant blood vessels, lymphatic vessels and nerve fibres. The ovary remains attached to the pelvic wall and the uterus by an ovarian ligament called mesovarium.

Zoology (Long version)

Choose the Correct Answer — 1 Mark

1. Which is the correct order of action? *[May-'22]*

(a) FSH → LH → Inhibin → Spermatogenesis
(b) LH → Leydig cells → Testosterone → Spermatogenesis
(c) TSH → FSH → Sertoli cells → Spermatogenesis
(d) LTH → Sertoli cells → Androgen → Spermatogenesis

[*Ans.* (b) LH → Leydig cells → Testosterone → Spermatogenesis]

2. _____ is the process of formation of sperms and ovumn. *[FRT-'22]*

(a) Embryo (b) Graaffian follicle
(c) Gametogenesis (d) Menstrual cycle

[*Ans.* (c) Gametogenesis]

3. The spermatids are transformed into mature sperms by a process called _____. *[FRT-'22]*

(a) spermiation (b) spermiogenesis
(c) gametogenesis (d) oogenesis

[*Ans.* (b) spermiogenesis]

4. Sperm lysin as an Proteolytic enzyme is called _____. *[FRT-'22]*

(a) Binding protein (b) Hyaluronidase
(c) Anti-lysin (d) Lipase

[*Ans.* (b) Hyaluronidase]

5. In human, gestation period is _____ days. *[FRT-'22]*

(a) 240 days (b) 200 days
(c) 180 days (d) 280 days

[*Ans.* (d) 280 days]

Very Short Answers — 2 Marks

1. Hypothalamus is the controlling centre of spermatogenesis. How? *[Sep-2020]*

Ans. Spermatogenesis starts at puberty due to increase of Gonadotropin Releasing Hormone (GnRH) by the **hypothalamus.**

GnRH acts on the anterior pituitary gland and stimulates secretion of two gonadotropins.

(i) Follicle Stimulating Hormone - Helps in testicular growth and spermiogenesis.

(ii) Lutenizing Hormone - Stimulates the synthesis of Testosterone, which in turn stimulates spermatogenesis.

2. What is Ectopic pregnancy? *[Sep-2020]*

Ans. (i) If the fertilised ovum is implanted outside the uterus it results in ectopic pregnancy.

(ii) The growth of the embryo may cause internal bleeding, infection and in some cases even death due to rupture of the fallopian tube.

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3. Name the hormones produced from the placenta during pregnancey. *[FRT-'22]*

Ans. Hormones produced by the placenta during pregnancy are:

(i) human Chorionic Gonadotropin (hCG)
(ii) human Chorionic Somatomammotropin (hCS)
(iii) human Placental Lactogen (hPL)
(iv) Oestrogens
(v) Progesterone
(iv) Relaxin

4. What are the four main functions of reproductive system? *[FRT-'22]*

Ans. The reproductive system has four main functions namely,

(i) to produce the gametes namely sperms and ova
(ii) to transport and sustain these gametes
(iii) to nurture the developing offspring
(iv) to produce hormones

Long Answers — 5 Marks

1. Explain about extra embryonic membranes. *[FRT-'22]*

Ans. The extra embryonic membranes namely the amnion, yolk sac, allantois and chorion protect the embryo from dessication, mechanical shock and help in the absorption of nutrients and exchange of gases.

Amnion

The amnion is a double layered translucent membrane filled with the amniotic fluid. It provides a buoyant environment to protect the developing embryo from injury, regulates the temperature of the foetus and provides a medium in which the foetus can move.

Yolk sac:

The yolk sac forms a part of the gut and is the source of the earliest blood cells and blood vessels.

Allantois:

The allantois forms a small out pocketing of embryonic tissue at the caudal end of the yolk sac. It is the structural base for the umbilical cord that links the embryo to the placenta and ultimately it becomes part of the urinary bladder.

Chorion:

The chorion is the outermost membrane which encloses the embryo and all other membranes and also helps in the formation of the placenta.

Chorionic Villi:

The trophoblast cells in the blastocyst send out several finger like projections called chorionic villi carrying foetal blood and are surrounded by sinuses that contain maternal blood. The chorionic villi and the uterine tissues form the disc-shaped placenta.

Placenta:

Placenta is a temporary endocrine organ formed during pregnancy and it connects the foetus to the uterine wall through the umbilical cord. It is the organ by which the nutritive, respiratory and excretory functions are fulfilled.

2. List out the major reproductive events in human beings. *[FRT-'22]*

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

(i) **Gametogenesis:** Formation of gametes by spermatogenesis and oogenesis.
(ii) **Insemination:** Transfer of sperms by the male into the female genital tract.
(iii) **Fertilization:** Fusion of male and female gametes to form zygote, called Fertilization.
(iv) **Cleavage:** Rapid mitotic divisions of the zygote which convert the single celled zygote into a multicellular structure called blastocyst.
(v) **Implantation:** Attachment of blastocyst to the uterine wall.
(vi) **Placentation:** Formation of placenta which is the intimate connection betweenfoetus and uterine wall of the mother for exchange of nutrients.
(vii) **Gastrulation:** Process by which blastocyst is changed into a gastrula with three primary germ layers
(viii) **Organogenesis:** Formation of specific tissues, organs and organ systems from three germ layers.
(ix) **Parturition:** Expulsion of the foetus from the mother's womb.

3. Describe the structure of the human uterus with a neat labelled diagram. *[May-'22]*

Ans. *(i)* The uterus or womb is a hollow, thick-walled, muscular, highly vascular and inverted pear shaped structure lying in the pelvic cavity between the urinary bladder and rectum.

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Unit Test

[Time : 1 hr] [Marks: 25]

I. Choose the Correct Answer 10×1 = 10

1. **The foetal membrane that forms the basis of the umbilical cord is _____ .**
(a) Allantois (b) Amnion
(c) Chorion (d) Yolk sac

2. **The Androgen Binding Protein (ABP) is produced by _____ .**
(a) Leydig cells (b) Hypothalamus
(c) Sertoli cells (d) Pituitary gland

3. **_____ is popularly known as sperm lysin.**
(a) Inhibitin (b) Hyaluronidase
(c) Androgen (d) Acrosome

4. **Identify the correct pair from the below.**
(i) Mammary gland – Areola
(ii) Sperms – Relaxin
(iii) Polarbody – 46 chromosmes
(iv) Middle piece – ATP
(a) i and iv (b) ii and iv
(c) i, ii and iv (d) ii and iii

5. **Identify the wrong statement from the below.**
(i) Testis acts as a thermoregulator.
(ii) Seminal vesicles secrete an acidic fluid
(iii) Vesiculase is a enzyme in seminal fluid
(iv) Hymen can get stretched due to physical exercises.
(a) All the above (b) i and ii
(c) iii and ii (d) i, iv and ii

6. **Which one of the following menstrual irregularities are correctly matched?**
(a) Menorrhagia - Excessive menstruation
(b) Amenorrhoea - Absence of menstruation
(c) Dysmenorrhoea - Irregularity of menstruation
(d) Oligomenorrhoea - Painful menstruation

7. **_____ is a berry shaped cluster of cells.**
(a) Blastula (b) Gastrula
(c) Morula (d) Zygote

8. **Assertion :** By 36th week, the baby is positioned into pelvis for parturition.
Reason : The Braxter – Hick's contractions will begin for parturition.
(a) A and R are true, R is the correct explanation of A
(b) A and R are true, R is not the correct explanation of A
(c) A is true, R is false
(d) Both A and R are false

9. **Choose the odd man out**
(a) Skene's glands (b) Endometrium
(c) Mammary glands (d) Fallopian tube

10. **The _____ glands in human female are homologous to the prostate glands in male**
(a) Bartholins glands (b) skene's glands
(c) mammary glands (d) cowper's glands

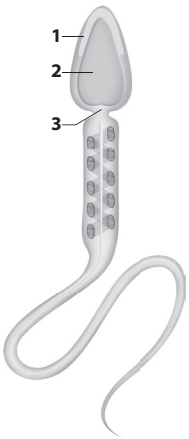
II. Very Short Answer 2×2 = 4

11. What is Placenta?

12. Mention the significance of location of testis.

III. Short Answer 2×3 = 6

13. In the diagram given below.



(a) Identify the diagram
(b) Label the parts indicated.

14. What is the function of yolk sac?

IV. Long Answer 1×5 = 5

15. List the differences between Spermatogenesis and Oogenesis.

(OR)

Write a note on Menstrual cycle.

★★★

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UNIT I

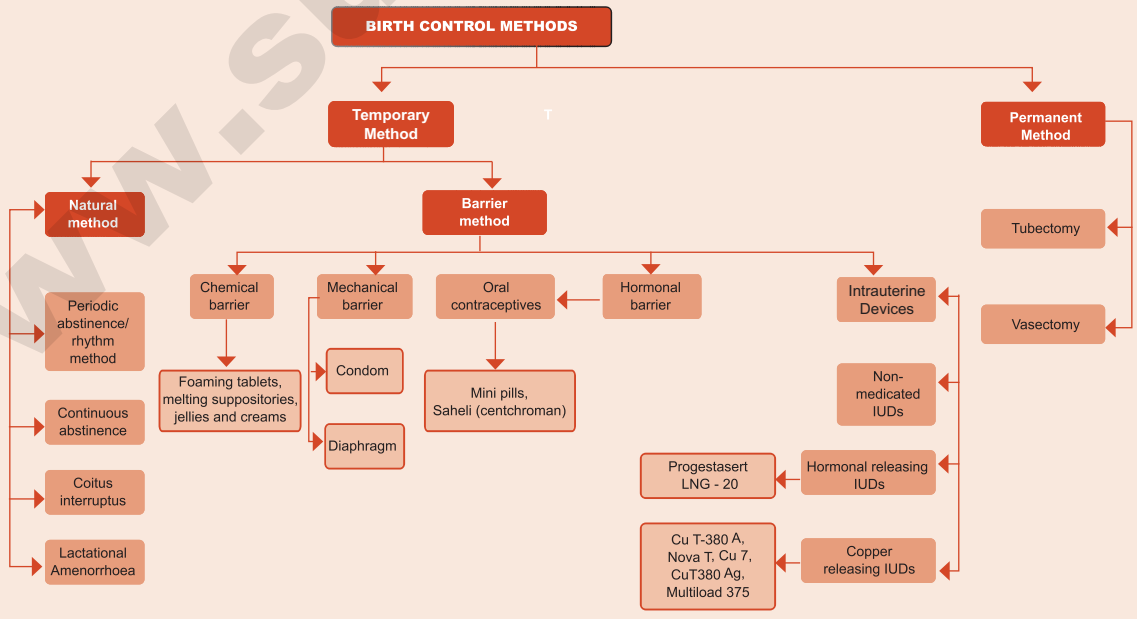
Chapter 3

REPRODUCTIVE HEALTH

CHAPTER SNAPSHOT

3.1. Need for reproductive health problems and strategies
3.2. Amniocentesis and its statutory ban
3.3. Social impact of sex ratio, female foeticide and infanticide
3.4. Population explosion and birth control
3.5. Medical termination of pregnancy (MTP)
3.6. Sexually transmitted diseases (STD)
3.7. Infertility
3.8. Assisted reproductive technology (ART)
3.9. Detection of foetal disorders during early pregnancy

Concept Map



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MUST KNOW DEFINITIONS

Female foeticide	:	Aborting the female in the mother's womb.
Female infanticide	:	Female infanticide is 'killing the female child after her birth.
PCPNDT Act	:	Preconception and prenatal diagnostic technique act.
POCSO Act	:	Prevention of children from sexual offences.
Birth control	:	Voluntary use of Contraceptive procedures to prevent fertilization.
Lactational amenorrhea	:	Delay in ovarian cycles due to lactation.
Barrier method of contraception	:	Ovum and sperm are prevented from meeting to prevent fertilization
Tubectomy	:	Surgical Sterilisation in women
Vasectomy	:	Surgical Sterilisation in men
Azoospermia	:	Absence of spermatozoa in the ejaculate semen.
Infertility		Inability to conceive or produce children even after the unprotected sexual cohabitation
Ultrasonography	:	Scanning technique which helps to detect fluid disorders during early pregnancy.
Amniocentesis	:	Taking a small sample of amniotic fluid to diagnose for chromosomal abnormalities.
Foetoscope	:	An instrument used to monitor the foetal heart rate.

ACRONYMS

IUD	:	Intra Uterine Devices Devices inserted by medical experts in the uterus as a Contraceptive measure.
MTP	:	Medical termination of pregnancy (voluntary or intentional termination of pregnancy in a Non-surgical way)
STD	:	Sexually transmitted diseases.
AIDS	:	Acquired immunodeficiency syndrome.
HIV	:	Human immunodeficiency virus.
HPV	:	Human papilloma virus
HBV	:	Hepatitis B Virus
IUI	:	Intra Uterine Insemination
IVF	:	*In Vitro* Fertilization
ZIFT	:	Zygote intra-fallopian transfer
GIFT	:	Gamete Intra-fallopian Transfer
ICSI	:	Intra-cytoplasmic sperm injection
CVS	:	Chorionic Villus Sampling

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Evaluation

1. Which of the following is correct regarding HIV, hepatitis B, gonorrhoea and trichomoniasis?

(a) Gonorrhoea is a STD whereas others are not.
(b) Trichomoniasis is a viral disease whereas others are bacterial.
(c) HIV is a pathogen whereas others are diseases.
(d) Hepatitis B is eradicated completely whereas others are not.

[*Ans.* (c) HIV is a pathogen whereas others are diseases]

2. Which one of the following groups includes sexually transmitted diseases caused by bacteria only?

(a) Syphilis, gonorrhoea and candidiasis
(b) Syphilis, chlamydiasis and gonorrhoea
(c) Syphilis, gonorrhoea and trichomoniasis
(d) Syphilis, trichomoniasis and pediculosis

[*Ans.* (b) Syphilis, chlamydiasis and gonorrhoea]

3. Identify the correct statements from the following

(a) Chlamydiasis is a viral disease.
(b) Gonorrhoea is caused by a spirochaete bacterium, *Treponema pallidum*.
(c) The incubation period for syphilis is 2 to 14 days in males and 7 to 21 days in females.
(d) Both syphilis and gonorrhoea are easily cured with antibiotics.

[*Ans.* (d) Both syphilis and gonorrhoea are easily cured with antibiotics]

4. A contraceptive pill prevents ovulation by *[FRT & May-'22]*

(a) blocking fallopian tube
(b) inhibiting release of FSH and LH
(c) stimulating release of FSH and LH
(d) causing immediate degeneration of released ovum.

[*Ans.* (b) inhibiting release of FSH and LH]

5. The approach which does not give the defined action of contraceptive is

(a)	Hormonal contraceptive	Prevents entry of sperms, prevent ovulation and fertilization
(b)	Vasectomy	Prevents spermatogenesis
(c)	Barrier method	Prevents fertilization
(d)	Intra uterine device	Increases phagocytosis of sperms, suppresses sperm motility and fertilizing capacity of sperms

[*Ans.* (b) Vasectomy - Prevents spermatogenesis]

6. Read the given statements and select the correct option.

Statement 1: Diaphragms, cervical caps and vaults are made of rubber and are inserted into the female reproductive tract to cover the cervix before coitus.

Statement 2: They are chemical barriers of conception and are reusable.

(a) Both statements 1 and 2 are correct and statement 2 is the correct explanation of statement 1.
(b) Both statements 1 and 2 are correct but statement 2 is not the correct explanation of statement 1.
(c) Statement 1 is correct but statement 2 is incorrect.
(d) Both statements 1 and 2 are incorrect.

[*Ans.* (c) Statement 1 is correct but statement 2 is incorrect]

7. Match column I with column II and select the correct option from the codes given below. *[Mar-2020]*

	Column I		Column II
A.	Copper releasing IUD	(i)	LNG-20
B.	Hormone releasing	(ii)	Lippes loop IUD
C.	Non-medicated IUD	(iii)	Saheli
D.	Mini pills	(iv)	Multiload-375

(a) A-(iv), B-(ii), C-(i), D-(iii)
(b) A-(iv), B-(i), C-(iii), D-(ii)
(c) A-(i), B-(iv), C-(ii), D-(iii)
(d) A-(iv), B-(i), C-(ii), D-(iii)

[*Ans.* (d) A-(iv), B-(i), C-(ii), D-(iii)]

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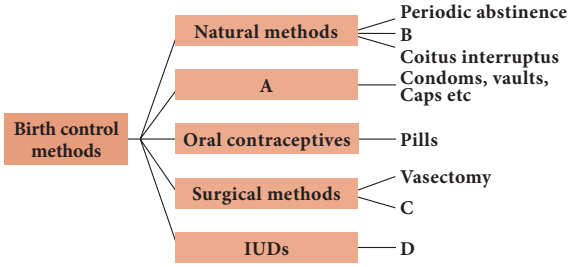
8. **Select the incorrect action of hormonal contraceptive pills from the following** *[Sep-2020]*

(a) Inhibition of spermatogenesis.
(b) Inhibition of ovulation.
(c) Changes in cervical mucus impairing its ability to allow passage and transport of sperms.
(d) Alteration in uterine endometrium to make it unsuitable for implantation.

[*Ans.* (a) Inhibition of spermatogenesis.]

9. **Select the correct term from the bracket and complete the given branching tree**



(Barriers, Lactational amenorrhoea, CuT, Tubectomy)

Ans. A – Barrier methods
B – Lactational amenorrhoea
C – Tubectomy
D – CuT

10. **Correct the following statements**

a) Transfer of an ovum collected from donor into the fallopian tube is called ZIFT.
b) Transfering of an embryo with more than 8 blastomeres into uterus is called GIFT.
c) Multiload 375 is a hormone releasing IUD.

Ans. **(a)** Transfer of an ovum collected from donor into the fallopian tube is called **GIFT (Gamete Intra – fallopian transfer)**

(b) Transferring of an embryo with more than 8 blastomeres into uterus is called **IUT (Intra uterine transfer)**

(c) Multi load 375 is a **copper** releasing IUD.

11. **Which method do you suggest the couple to have a baby, if the male partner fails to inseminate the female or due to very low sperm count in the ejaculate?**

Ans. Intra Uterine Insemination (IUI)

Procedure:

(i) Semen is collected from the husband or a healthy donor.
(ii) Processed sperm sample is infused into the uterus bye passing the vagina.
(iii) Ovaries are stimulated to produce more ova.
(iv) Sperm fertilize with egg and results normal pregnancy.

12. **Expand the following (a) ZIFT (b) ICSI**

Ans. **(a)** ZIFT – Zygote intra-fallopian transfer

(b) ICSI – Intra-cytoplasmic sperm injection

13. **What are the strategies to be implemented in India to attain total reproductive health?**

(OR) *[FRT & May-'22]*

Write any three major tasks carried out under Reproductive and Child Health Care. *[FRT -'22]*

Ans. These programmes are popularly named as 'Reproductive and Child Health Care (RCH). Major tasks carried out under these programmes are:

(i) Creating awareness and providing medical assistance to build a healthy society.
(ii) Introducing sex education in schools about adolescence and adolescence related changes.
(iii) Educating couples about the birth control methods and family planning norms.
(iv) Creating awareness about care for pregnant women, post-natal care of mother and child and the importance of breast feeding.
(v) Encouraging and supporting governmental and non-governmental agencies to identify new methods and/or to improve upon the existing methods of birth control.

Health care programmes such as massive child immunization, supply of nutritional food to the pregnant women, Janani Suraksha Yojana, Janani Shishu Suraksha Karyakaram, RMNCH+A approach etc., are taken up at the national level by the Government of India.

14. **Differentiate foeticide and infanticide.** *[QY-2019; FRT , May & July-'22]*

Ans.

Foeticide	Infanticide
It refers to 'aborting the foetus in the mother's womb' intentionally.	It is 'killing the child after the birth'.

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(vi) Egg retrieval is done by minor surgery under general anesthesia, using ultrasound guide after 34 to 37 hours of hCG (human chorionic gonadotropin) injection.

(vii) The eggs are prepared and stripped from the surrounding cells.

(viii) At the same time, sperm preparation is done using a special media.

(ix) After preparing the sperms, the eggs are brought together. 10,000-1,00,000 motile sperms are needed for each egg.

(x) Then the zygote is allowed to divide to form 8 celled blastomere and then transferred into the uterus for a successful pregnancy.

(xi) The transfer of an embryo with more than 8 blastomeres stage into uterus is called Embryo transfer technique.

3. Explain about permanent birth control methods. *[FRT-'22]*

Ans. **Permanent birth control methods** are adopted by the individuals who do not want to have any more children.

(i) **Surgical sterilisation methods** are the permanent contraception methods advised for male and female partners to prevent any more pregnancies. It blocks the transport of the gametes and prevents conception.

(ii) Tubectomy is the surgical sterilisation in women.

(iii) In this procedure, a small portion of both fallopian tubes are cut and tied up through a small incision in the abdomen or through vagina. This prevents fertilization as well as the entry of the egg into the uterus.

(iv) Vasectomy is the surgical procedure for male sterilisation.

(v) In this procedure, both vas deferens are cut and tied through a small incision on the scrotum to prevent the entry of sperm into the urethra. Vasectomy prevents sperm from heading off to penis as the discharge has no sperms in it.

4. Write short notes on : *[FRT-'22]*

(i) Ultrasound scanning

(ii) Foetoscope

Ans. ***(i)*** **Ultrasound scanning :** Ultrasound has no known risks other than mild discomfort due to pressure from the transducer on the abdomen or vagina. No radiation is used during this procedure. Ultrasonography is usually performed in the first trimester for dating, determination of the number of foetuses, and for assessment of early pregnancy complications.

(ii) **Foetoscope :** Foetoscope is used to monitor the foetal heart rate and other functions during late pregnancy and labour. The average foetal heart rate is between 120 and 160 beats per minute. An abnormal foetal heart rate or pattern may mean that the foetus is not getting enough oxygen and it indicates other problems.

Additional Questions

Choose the Correct Answer — 1 Mark

I. Choose the Correct options for the below Questions

1. In the year_____ India is expected to become the largest country in population size.
(a) 2021 (b) 2025 (c) 2022 (d) 2030
[*Ans.* (c) 2022]

2. Sperm remains active for _____ hours in the female reproductive tract.
(a) 60 (b) 70 (c) 72 (d) 78
[*Ans.* (c) 72]

3. Saheli is an example for _____ method
(a) Mechanical barrier (b) Chemical barrier
(c) Hormonal barrier
(d) Intra uterine devices
[*Ans.* (c) Hormonal barrier]

4. Formation of chronic ulcer is a symptom of __
(a) Genital herpes (b) Syphilis
(c) Gonorrhoea (d) AIDS
[*Ans.* (b) Syphilis]

5. Fatigue, Jaundice, stomach pain are the symptoms of_____
(a) Genital warts (b) AIDS
(c) Chlamydiasis (d) Hepatitis–B
[*Ans.* (d) Hepatitis–B]

6. The incubation period for _____ varies between 1–8 months.
(a) HPV (b) HIV
(c) HBV (d) *candida*
[*Ans.* (a) HPV]

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7. **The incubation period for _____ can be more than 10 years.**
(a) HPV (b) HBV
(c) Treponema (d) HIV
[Ans. (d) HIV]

8. **PAP smear can help to detect _____ .**
(a) Jaundice (b) Cancer
(c) AIDS (d) Hepatitis B
[Ans. (b) Cancer]

9. **_____ vaccination of girls between 9–13 years can prevent cervical cancer.**
(a) HIV (b) HPV
(c) MMR (d) HBV
[Ans. (b) HPV]

10. **Mayer – Rokitansky syndrome is a condition in which**
(a) Ova are not produced
(b) Ovaries are not formed
(c) Uterus is not functioning
(d) Fallopian tube is ruptured
[Ans. (c) Uterus is not functioning]

11. **Test tube baby is got by _____ technique**
(a) IUI (b) CVS (c) ICSI (d) IVF
[Ans. (d) IVF]

12. **Cryopreservation of embryos are done when _____**
(a) eggs are not available
(b) sperm count is less
(c) more embryos are available than the required
(d) there is abnormality in the embryo
[Ans. (c) more embryos are available than the required]

13. **One sperm is directly injected into cytoplasm of the egg in _____technique.**
(a) ICSI (b) GIFT (c) IUT (d) TCSE
[Ans. (a) ICSI]

14. **_____ involves taking a sample of placental tissues to test for chromosomal abnormalities.**
(a) CVS (b) ICSI (c) TESE (d) IVF
[Ans. (a) CVS]

15. **_____ is needed for normal functioning of reproductive structures.**
(a) Vitamin A (b) Vitamin E
(c) Vitamin B (d) Vitamin C
[Ans. (b)Vitamin E

16. **International diseases refer to _____**
(a) Syphilis and AIDS
(b) AIDS and Gonorrhoea
(c) AIDS and Hepatitis B
(d) Syphilis and Gonorrhoea
[Ans. (d) Syphilis and Gonorrhoea]

17. **Most of the intrauterine transfer of embryo is done at_____ stage.**
(a) 8 celled (b) 16 celled
(c) 32 celled (d) 4 celled
[Ans. (a) 8 celled]

18. **_____ is an epidemic disease.**
(a) HPV (b) HIV
(c) Cervical cancer (d) Jaundice
[Ans. (b) HIV]

19. **One of the following prevents sperm from heading off to penis as the discharge has no sperms in it.**
(a) Tubectomy (b) LNG – 20
(c) Vasectomy (d) Cu T 380 Ag
[Ans. (c) Vasectomy]

20. **This is not the Major task of RCH.**
(a) Vaccinating the mother and child for infectious diseases
(b) Introducing six education in Schools
(c) Educating couples about the available birth control
(d) Creating awareness about care for pregnant Women
[Ans. (a) Vaccinating the mother and child for infectious diseases]

21. **All the following aims at creating a safe and secure environment for both females and males. Except.**
(a) Sexual Harassment at work place Act.
(b) POCSO Act
(c) Recommendation of Justice Verma Committee, 2013.
(d) PCPNDT **[Ans. (d) PCPNDT]**

22. **This is an ideal contraceptive for females who want to delay pregnancy.**
(a) Oral contraceptives (b) IUDs
(c) Diaphragms, cervical caps
(d) Vaults **[Ans. (b) IUDs]**

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23. At which stage, the embryo is transferred into the uterus.
(a) 4 celled stage (b) 8 celled stage
(c) 12 celled stage (d) 16 celled stage
[*Ans.* (b) 8 celled stage]

24. _____ is observed as world population day
(a) 11th June (b) 11th April
(c) 11th July (d) 11th May
[*Ans.* (c) 11th July]

25. Identify the bacterial STI
(a) Gonorrhoea (b) Syphilis
(c) Chlamydiasis (d) All the above
[*Ans.* (d) All the above]

26. An abnormal foetal heart beat rate or pattern indicates the foetus is not getting enough ____.
(a) Nutrients (b) Oxygen
(c) Blood. (d) Signals.
[*Ans.* (b) Oxygen]

27. Fatigue, jaundice, fever, rashes, stomach pain, liver Cirrhosis and liver failure are the symptoms of _____ .
(a) Chalmydiasis
(b) Lynphogvanuloma Veneveum.
(c) Hepatitis
(d) Syphilis [*Ans.* (c) Hepatitis]

II. Choose the Correct Options for the Below Fill in the Blanks

1. Prevention of children from sexual offences is covered under_____ act.
(a) PCPNDT (b) patent act
(c) ART (d) POCSO
[*Ans.* (d) POCSO]

2. _____ can be diagnosed by PAP smear test.
(a) Cervical cancer (b) Bone cancer
(c) Blood cancer (d) Intestinal cancer
[*Ans.* (a) Cervical cancer]

3. Oral contraceptive pills contain synthetic _____ and _____ hormones.
(a) androgen and testosterone
(b) Androgen and Oxytocin
(c) relaxin and inhibin
(d) Progesterone and estrogen
[*Ans.* (d) Progesterone and estrogen]

4. _____ is an example of a contraceptive pill.
(a) Alesse (b) Ortho Tri-cyclen
(c) Saheli (d) Eryosterol
[*Ans.* (c) Saheli]

5. IUD's increase _____ of the sperm within the uterus.
(a) Endocytosis (b) Pinocytosis
(c) Phagocytosis (d) Exocytosis
[*Ans.* (c) Phagocytosis]

6. The problem of overpopulation can be overcome by _____ .
(a) awareness program (b) free education
(c) Birth control (d) meals scheme
[*Ans.* (c) Birth control]

7. Foaming tablets and jellies are _____ barriers for birth control.
(a) mechanical (b) chemical
(c) hormonal (d) natural
[*Ans.* (b) chemical]

8. Usage of ____ greatly reduces the risk of STI.
(a) IUDS. (b) Latex Condoms.
(c) Saheli (d) Lippes loop
[*Ans.* (b) Latex Condoms]

9. The _____ method of contraception has a success rate of 95 – 99% in India.
(a) IUDs (Intra-uterine devices)
(b) hormonal (c) chemical
(d) mechanical
[*Ans.* (a) IUDs Intrauterine devices]

10. Diseases like _____ are transmitted sexually and by sharing of needless.
(a) gonorrhoea (b) genital herpes
(c) AIDS/Hepatitis – B (d) candidiasis
[*Ans.* (c) AIDS/Hepatitis - B]

11. _____ is a sexually transmitted diseases caused by protozoan.
(a) Trichomoniasis (b) Genital warts
(c) Syphilis (d) Candidiasis
[*Ans.* (a) Trichomoniasis]

12. _____ is a sexually transmitted disease caused by a fungus.
(a) Chlamydiasis (b) Candidiasis
(c) Genital herps (d) Syphilis
[*Ans.* (b) Candidiasis]

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13. _____ is a cause of infertility in women.
(a) Varicocoele
(b) Endometriosis/Uterine fibroids
(c) Well developed ovaries
(d) Hormonal balance
[*Ans.* (b) Endometriosis / Uterine fibroids]

14. _____ is a procedure to treat infertile man with low sperm count.
(a) Intra-uterine insemination
(b) *In vitro* fertilization
(c) Intra-uterine transfer
(d) Zygote intra-fallopian transfer
[*Ans.* (a) Intra-uterine insemination]

15. Coitus can be avoided on the 14th day of the menstrual cycle to prevent fertilization, because _____ takes place on that day.
(a) Lactation. (b) Ovulation.
(c) Sperms are more active.
(d) Uterus is ready for implantation.
[*Ans.* (b) Ovulation]

16. _____ is a method used to detect foetal diseases during early pregnancy
(a) CT scanning (b) MRI scanning
(c) Ultrasound scanning
(d) PET scanning
[*Ans.* (c) Ultrasound scanning]

III. Identify the correct Statements

1.
(i) HPV causes tumours.
(ii) Syphilis is transmitted sexually by sharing of needles.
(iii) The statutory marriageable age for males is 18 years.
(iv) Surgical sterilization methods block the transfer of gametes.
(a) i, iii and iv (b) i and iv
(c) iii and iv (d) ii only [*Ans.*(b) i and iv]

2.
(i) Saheli contains synthetic testosterone and estrogen.
(ii) Non-medicated IUDs are made of copper.
(iii) Lactational amenorrhoea cause infertility.
(iv) Embryo transfer techniques helps to treat many causes of infertility.
(a) i and iii (b) ii and iii
(c) iv only (d) i, iii, and iv
[*Ans.*(c) iv only]

IV. Identify the Wrong Pair

1.
(i) Chemotherapy – Cervical cancer
(ii) IVF – Egg retrival
(iii) Contraceptive – Infertility
(iv) Cryopreservation – Avoid ovarian stimulation
(a) iii only (b) ii, and iv
(c) iv (d) i and iv only
[*Ans.*(a) iii only]

2.
(i) Doppler device – Foetal heart
(ii) NACO – Family planning
(iii) 4 – D ultrasound – Early pregnancy
(iv) Herpes simplex – Enlarged lymph nodes
(a) i and iv (b) ii and iv
(c) i and iii (d) iii and iv
[*Ans.*(b) ii and iv]

3.
(i) Non-medicated IUD – Lippes loop
(ii) Saheli – Plastic loop
(iii) Hormone releasing IUD – Progestasert
(iv) Copper releasing IUD – Multi load 375
(a) i and iv (b) ii
(c) i and iii (d) iii and iv
[*Ans.*(b) ii]

V. Match the following

1.

1.	GIFT	(a)	Fallopian tube
2.	ICSI	(b)	placental tissue
3.	CVS	(c)	uterus
4.	ZIFT	(d)	injection of sperm

(A) 1 – b 2 – a 3 – c 4 – d
(B) 1 – a 2 – b 3 – d 4 – c
(C) 1 – a 2 – d 3 – b 4 – c
(D) 1 – c 2 – b 3 – c 4 – d
[*Ans.* (C) 1-a 2-d 3-b 4-c]

2.

1.	Syphilis	(a)	Trachoma
2.	Gonorrhoea	(b)	Greenish yellow discharge
3.	Chlamydiasis	(c)	Ulcer
4.	Trichomoniasis	(d)	Pain and pus

(A) 1 – d 2 – a 3 – c 4 – b
(B) 1 – c 2 – a 3 – d 4 – b
(C) 1 – b 2 – a 3 – d 4 – c
(D) 1 – c 2 – d 3 – a 4 – b
[*Ans.* (D) 1-c 2-d 3-a 4-b]

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3.

1.	**IUD**	**A.**	**LNG – 20**
2.	**Natural method**	**B.**	**Meeting of gametes**
3.	**IUS**	**C.**	**Phagocytosis**
4.	**Diaphragm**	**D.**	**Rhythm**

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

[*Ans.* (B) 1-c 2-d 3-a 4-b]

VI. Identify the correct assertion and reason

In each of the following questions there are two statements. One is assertion (A) and other is reasoning (R). Mark the correct answer as

(a) A and R correct, R is the correct explanation of A.
(b) A and R right but R is not the correct explanation of A.
(c) A is correct R is false.
(d) Both A & R are false.

1. **Assertion :** STD can be prevented by Monogamy.
Reason : TNHSP, a unit of Health and family welfare development of Government of Tamil Nadu does free screening for cervical and breast cancer.

[*Ans.* (b) A and R right but, R is not the correct explanation of A]

2. **Assertion :** MTP during the second trimester is risky for the parent & foetus.
Reason : It must be performed by trained medical personnel.

[*Ans.* (a) A and R correct, R is the correct explanation of A]

3. **Assertion :** Oral contraceptives are not recommended for birth control.
Reason : Surgical sterilisation is the best birth control method for all age groups.

[*Ans.* (d) Both A & R are false]

4. **Assertion :** Vitamin E helps in the normal functioning of reproductive structures in man.
Reason : Vitamin E is known as anti sterility vitamin.

[*Ans.* (a) A and R correct, R is the correct explanation of A]

5. **Assertion :** Condomes safeguards the user from AIDS and STDs.
Reason : Condoms are made of polyunthane, latex and lambskin.

[*Ans.* (a) A and R correct, R is the correct explanation of A]

VII. Choose the odd man out

1. (a) Saheli (b) CuT – 380
(c) LNG – 20 (d) GnRH

[*Ans.* (d) GnRH]

Reason: It is a hormone, whereas the others are example of contraceptives.

2. (a) IUD (b) ICSI
(c) Vasectomy (d) IUS

[*Ans.* (b) ICSI]

Reason: It is a technique to achieve pregnancy whereas the others are birth control methods.

3. (a) Amniocentesis (b) CVS
(c) Ultrasound scanning (d) Foetoscope

[*Ans.* (d) Foetoscope]

Reason: It is an instrument to monitor the foetal heart beat whereas the others are techniques to detect abnormalities in the foetus

4. (a) Syphilis (b) Candidiasis
(c) Chlamydiasis (d) Gonorrhoea

[*Ans.* (b) Candidiasis]

Reason: It is an sexually transmitted infection caused by fungus whereas the others are sexually transmitted infections caused by bacteria.

5. (a) Candidiasis (b) Hepatitis B
(c) Genital herpes (d) Genital warts

[*Ans.* (a) Candidiasis]

Reason: It is an sexually transmitted infection caused by fungus whereas the others are sexually transmitted infections caused by virus.

6. (a) Cervical cancer (b) Trichomoniasis
(c) Genital wants (d) Cervical dysplasia

[*Ans.* (b) Trichomoniasis]

Reason: It is an sexually transmitted infection caused by protozoans whereas the others are sexually transmitted infections caused by virus.

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Answer in one word*

1. Government of India legalized MTP in _____.
[*Ans.* 1971]
2. Saheli was developed by Central drug research institute located at _____ [*Ans.* Lucknow]
3. Cervical cancer can be prevented with _____
[*Ans.* Vaccination]
4. Natural AIDS control organization was established in_____ [*Ans.* 1992]
5. 1st December is observed as _____
[*Ans.* World AIDS day]
6. Surgical sterilisation in women is called _____ [*Ans.* Tubectomy]
7. Cervical cancer is caused by _____
[*Ans.* Human papilloma virus (HPV)]
8. In Mayer Rokitansky syndrome, female _____
[*Ans.* Do not have functional uterus]
9. _____ is a hormone releasing IUD
[*Ans.* Progestasert/LNG – 20]
10. _____ is a copper releasing IUD.
[*Ans.* NovaT, Multi load 375

* Only for quick revision not in pattern

Give Reasons

1. **Surgical sterilisation method can prevent pregnancy permanently.**

Ans. Surgical sterilisation methods are the permanent contraception methods advised for male and female partners to prevent any more pregnancies. It blocks the transport of the gametes and prevents conception.

2. **Hormone – releasing IUDs are called IVS (Intrauterine systems).**

Ans. They increase the viscosity of the cervical mucus and thereby prevent sperms from entering the cervix.

3. **Modification in life style can prevent cervical cancer.**

Ans. Modification in lifestyle can also help in preventing cervical cancer. Healthy diet, avoiding tobacco usage, preventing early marriages, practicing monogamy and regular exercise minimize the risk of cervical cancer.

Very Short Answers — 2 Marks

1. **What is PCPNDT Act?**

Ans. Government of India has taken various steps like PCPNDT Act (Preconception and Prenatal diagnostic technique act-1994) enacted to ban the identification of sex and to prevent the use of prenatal diagnostic techniques for selective abortion.

2. **Define Birth control.**

Ans. The voluntary use of contraceptive procedures to prevent fertilization or prevent implantation of a fertilized egg in the uterus is termed as birth control.

3. **What is the purpose of barrier method of contraception?**

Ans. In these methods, the ovum and sperm are prevented from meeting so that fertilization does not occur.

4. **What is Saheli?**

Ans. Saheli, is a contraceptive pill devised by Central Drug Research Institute (CDRI) in Lucknow, India. It contains a non-steroidal preparation called centchroman.

5. **What is the role of IUDs?**

Ans. IUD - Intra-Uterine Device. They increase phagocytosis of sperm within the uterus and prevent meeting of gametes there by acting as birth control measure.

6. **What does MTP stand for?**

Ans. *(i)* MTP stands for medical termination of pregnancy.
(ii) Medical method of abortion is a voluntary or intentional termination of pregnancy in a non-surgical or non-invasive way.

7. **Name two sexually transmitted infections and their causative agent.**

Ans.

Disease	Causative agent
Hepatitis-B	Hepatitis B virus (HBV)
AIDS	HIV(Human Immunodeficiency Virus)

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8. Mention two sexually transmitted diseases caused by bacteria.

Ans. *(i)* Syphilis *(ii)* Gonorrhoea

9. Mention two sexually transmitted diseases caused by virus.

Ans. *(i)* AIDS *(ii)* Genital Herpes.

10. What is Cervical dysplasia?

Ans. Cervical cancer is caused by a sexually transmitted virus called Human Papilloma virus (HPV). HPV may cause abnormal growth of cervical cells or cervical dysplasia.

11. What is IUT?

Ans. IUT - Intra Uterine Transfer.

(i) Embryo with more than 8 blastomeres is inserted into uterus to complete its further development.

(ii) It is a method to achieve pregnancy by Assisted Reproductive technology.

12. Define Infertility.

Ans. Inability to conceive or produce children even after unprotected sexual cohabitation is called **infertility.**

13. Why is Ultrasonography performed during pregnancy?

Ans. Ultrasonography is usually performed in the first trimester for dating, determination of the number of foetuses, and for assessment of early pregnancy complications.

14. What is a Foetoscope?

Ans. *(i)* Foetoscope is used to monitor the foetal heart rate and other functions during late pregnancy and labour. The average foetal heart rate is between 120 and 160 beats per minute.

(ii) An abnormal foetal heart rate or pattern may mean that the foetus is not getting enough oxygen and it indicates other problems.

15. What is Mayer-Rokitansky syndrome?

Ans. All women are born with ovaries, but some do not have functional uterus. This condition is called Mayer-Rokitansky syndrome.

Short Answers — 3 Marks

1. What is Lactational amenorrhoea?

Ans. *(i)* Menstrual cycles resume as early as 6 to 8 weeks from parturition. However, the reappearance of normal ovarian cycles may be delayed for six months during breastfeeding. This delay in ovarian cycles is called **lactational amenorrhoea**.

(ii) It serves as a natural but an unreliable form of birth control.

2. Mention the type of IUDs with example.

Ans. *(i)* Copper releasing IUD - Multiload 375 CuT 380.

(ii) Hormone – releasing IUD - LNG-20.

(iii) Non-medicated IUD - Lippes loop.

3. Mention any 3 causes for infertility.

Ans. *(i)* Low body fat or anorexia in women. i.e. a psychiatric eating disorder characterised by the fear of gaining weight.

(ii) Under developed ovaries or testes.

(iii) Female may develop antibodies against her partner's sperm.

4. What is embryo transfer technique?

Ans. The transfer of an embryo with more than 8 blastomeres stage into uterus is called embryo transfer technique.

5. What is ZIFT?

Ans. *(i)* ZIFT - Zygote Intra-Fallopian Transfer.

(ii) The zygote upto 8 blastomere stage is transferred to the fallopian tube by laparoscopy. The zygote continues its natural divisions and migrates towards the uterus where it gets implanted.

6. What is Cryopreservation?

Ans. *(i)* Cryopreservation (or freezing) of embryos is often used when there are more embryos than needed for a single IVF transfer.

(ii) Embryo cryopreservation can provide an additional opportunity for pregnancy, through a Frozen embryo transfer (FET), without undergoing another ovarian stimulation and retrieval.

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7. What is GIFT?

Ans. GIFT - Gamete Intra-Fallopian Transfer

(i) Transfer of an ovum collected from a donor into the fallopian tube. In this, the eggs are collected from the ovaries and placed with the sperms in one of the fallopian tubes.

(ii) The zygote travels toward the uterus and gets implanted in the inner lining of the uterus.

8. What is micro-testicular sperm extraction (TESE)?

Ans. Microsurgical sperm retrieval from the testicle involves a small midline incision in the scrotum, through which one or both testicles can be seen. Under the microscope, the seminiferous tubules are dilated and small amount of testicular tissue in areas of active sperm production are removed and improved for sperm yield compared to traditional biopsy techniques.

9. How will you detect the foetal disorders, during the early stages of pregnancy?

Ans. The techniques used to detect the foetal disorders during the early stages of pregnancy are:

(i) Ultrasound scanning

(ii) Amniocentesis

(iii) Chorionic villus sampling (CVS)

(iv) Foetoscope

Long Answers — 5 Marks

1. Explain about Breast Self Examination and Early diagnosis of Cancer.

Ans. Breast self examination and early diagnosis of cancer

(i) Breast is divided into 4 quadrants and the center (Nipple) which is the 5th quadrant.

(ii) Each quadrant of the breast is felt for lumps using the palm of the opposite hand.

(iii) The examination is done in both lying down and standing positions, monthly once after the 1st week of menstrual cycle.

This way if there are lumps or any deviation of the nipple to one side or any blood discharge from the nipple we can identify cancer at an early stage. Mammograms are done for women above the age of 40 years and for young girls and women below 40 years. Ultrasound of the breast aids in early diagnosis.

2. Write a note on Cervial Cancer.

Ans. *(i)* Cervical cancer is caused by a sexually transmitted virus called Human Papilloma virus (HPV).

(ii) HPV may cause abnormal growth of cervical cells or cervical dysplasia.

Symptoms and signs: Pelvic pain, increased vaginal discharge and abnormal vaginal bleeding.

Risk factors for cervical cancer:

(i) Having multiple sexual partners

(ii) Prolonged use of contraceptive pills

Diagnosis:

(i) Papanicolaou smear (PAP smear) combined with an HPV test.

(ii) X-Ray, CT scan, MRI and a PET scan may also be used to determine the stage of cancer.

Treatment: Radiation therapy, surgery and chemotherapy.

Prevention:

(i) Modern screening techniques can detect precancerous changes in the cervix. Therefore screening is recommended for women above 30 years once in a year.

(ii) Cervical cancer can be prevented with vaccination. Primary prevention begins with HPV vaccination of girls aged 9 – 13 years, before they become sexually active. Modification in lifestyle can also help in preventing cervical cancer.

(iii) Healthy diet, avoiding tobacco usage, preventing early marriages, practicing monogamy and regular exercise minimize the risk of cervical cancer.

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Unit Test

[Time : 1 hr] [Marks: 25]

I. Choose the Correct Answer. 10 × 1 = 10

1. **Which one of the following groups includes sexually transmitted diseases caused by bacteria only?**
(a) Syphilis, gonorrhoea and candidiasis
(b) Syphilis, chlamydiasis and gonorrhoea
(c) Syphilis, gonorrhoea and trichomoniasis
(d) Syphilis, trichomoniasis and pediculosis

2. **International diseases refer to _____**
(a) Syphilis and AIDS
(b) AIDS and Gonorrhoea
(c) AIDS and Hepatitis B
(d) Syphilis and Gonorrhoea

3. **Most of the intrauterine transfer of embryo is done at_____ stage**
(a) 8 celled (b) 16 celled
(c) 32 celled (d) 4 celled

4. **Sperm remains active for _____ hours in the female reproductive tract**
(a) 60 (b) 70 (c) 72 (d) 78

5. **Usage of _____ greatly reduces the risk of STI.**
(a) IUDS. (b) Latex Condoms.
(c) Saheli (d) Lippes loop

6. **One sperm is directly injected into cytoplasm of the egg in _____technique**
(a) ICSI (b) GIFT
(c) IUT (d) TCSE

7. **Read the given statements and select the correct option.**
Statement 1: Diaphragms, cervical caps and vaults are made of rubber and are inserted into the female reproductive tract to cover the cervix before coitus.
Statement 2: They are chemical barriers of conception and are reusable.
(a) Both statements 1 and 2 are correct and statement 2 is the correct explanation of statement 1.
(b) Both statements 1 and 2 are correct but statement 2 is not the correct explanation of statement 1.
(c) Statement 1 is correct but statement 2 is incorrect.
(d) Both statements 1 and 2 are incorrect.

8. **Identify the Wrong Statements:**

(i)	**Chemotherapy**	**– cervical cancer**
(ii)	**IVF**	**– Egg retrival**
(iii)	**Contraceptive**	**– Infertility**
(iv)	**Cryopreservation**	**– Avoid ovarian stimulation**

(a) iii only (b) ii, and iv
(c) iv (d) i and iv only
[*Ans.*(a) iii only]

9. **The _____ method of contraception has a success rate of 95 – 99% in India.**
(a) IUDs Intrauterine devices
(b) Hormonal
(c) Chemical
(d) mechanical

10. **A contraceptive pill prevents ovulation by _____ .**
(a) blocking fallopian tube
(b) inhibiting release of FSH and LH
(c) stimulating release of FSH and LH
(d) causing immediate degeneration of released ovum.

II. Very Short Answer 2 × 2 = 4

11. What is CVS?
12. What is the role of IUDs?

III. Short Answer 2 × 3 = 6

13. How are STDs transmitted?
14. What is GIFT?

IV. Long Answer 1 × 5 = 5

15. What are the strategies to be implemented in India to attain total reproductive health?

★★★

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NEET

NEET BASED QUESTIONS

1. **Deiters' cells are supporting cells in :**
   (A) Organ of corti (B) Neuroglia cells (C) Both (A) and (B) (D) None of these
2. **Which layer of the uterine endometrium is shed during menstruation?**
   (A) Decidua basalis (B) Decidua capsularis
   (C) Decidua menstrualis (D) Decidua parietalis
3. **The statistical and quantitative study of human population is called :**
   (A) Demography (B) Kalology (C) Mastology (D) Nephilogy
4. **Break bone fever is also known as :**
   (A) Dengu (B) Sleeping sickness (C) Ague (D) Leishmaniasis
5. **Colles' fracture is associated with :**
   (A) Humerus (B) Radius (C) Ulna (D) Femur
6. **Gull's disease is associate with :**
   (A) Myxoedema (B) Bright's disease (C) Acromegaly (D) None of these
7. **Ecotone is characterised by :**
   (A) Terrestrial ecosystem
   (B) Transitional zone between two diverse communities
   (C) Zone of transition between water and land (D) Forest ecosystem
8. **Long chain molecules of fatty acids are formed by :**
   (A) Polymerisation of two carbon compunds (B) Decomposition of fats
   (C) Polymerisation of glycogen (D) None of these
9. **Process of urea formation in humans is also known as :**
   (A) Hans Kreb cycle (B) Nitrogen cycle (C) Transamination (D) All the above
10. **In some animals, allantois is also related with:**
    (A) Storage of nitrogenous wastes (B) Blood formation
    (C) Digestion (D) All the above
11. **Bedbug can survive long time starvation because :**
    (A) It stores glycogen (B) It converts uric acid to amino acid
    (C) Its life span is very long (D) It can minimise its requirements
12. **Oxygen toxicity is related with :**
    (A) Failure of ventilation of lungs (B) Collapse of alveolar walls
    (C) Its life span is very long (D) It can minimise its requirements
13. **During respiration, failure of ventilation leads to :**
    (A) Decreased oxygen tension (B) Decreased carbon dioxide tension
    (C) Carbonate tension (D) Dicarbonate tension
14. **Latissimus dorsi muscles in humans :**
    (A) Draws legs forward (B) Draws arms downward and backwards
    (C) Moves head (D) Moves ankles
15. **The association of Sea Anemone and Hermit crab is an example of :**
    (A) Mutualism (B) Commensalism (C) Parasitism (D) None of these
16. **Heparin is produced by :**
    (A) Nervous cells (B) Liver cells (C) Kidney cells (D) Spleen
17. **If the human blood pH changes below 7.0 or rises above 7.8, which of the following will not function properly?**
    (A) Heart (B) Nerves (C) Liver (D) All of these

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12th STD

INSTANT SUPPLEMENTARY EXAM - JULY 2022
PART III
BIOLOGY

Reg. No.

TIME ALLOWED : 3.00 HOURS] **(with Answers)** [MAXIMUM MARKS : 70

Instructions: (1) Check the question paper for fairness of printing. If there is any lack of fairness, inform the Hall Supervisor immediately.

(2) Use **Blue** or **Black** ink to write and underline and pencil to draw diagrams.

Note: Candidate should answer **Part-I** (Bio-Botany) & **Part-II** (Bio-Zoology) in separate answer-books.

PART - II (BIO - ZOOLOGY)
(Marks : 35)

SECTION - 1

Note : (i) Answer **all** the questions: **(8 × 1 = 8)**

(ii) Choose the most appropriate answer from the given **four** alternatives and write the option code and the corresponding answer.

1. The term 'Biodiversity' was introduced by _____.
   (a) Edward Wilson (b) Walter Rosen
   (c) Norman Myers (d) Alice Norman

2. Choose the correctly matched pair:
   (a) Heroin - Psychotropic
   (b) Benzodiazepine - Pain Killer
   (c) LSD - Narcotic
   (d) Amphetamines - Stimulant

3. ELISA is a molecular tool used for _____
   (a) Detection of mutations
   (b) Detection of Pathogens
   (c) Selection of animals having desired traits
   (d) Selection of plants having desired traits

4. The Androgen Binding Protein (ABP) is produced by:
   (a) Leydig cells (b) Hypothalamus
   (c) Sertoli cells (d) Pituitary gland

5. Which of the following is the correct sequence of event with reference to the Central Dogma of Protein Synthesis?
   (a) Transcription, Translation, Replication
   (b) Transcription, Replication, Translation
   (c) Duplication, Translation, Transcription
   (d) Replication, Transcription, Translation

6. The book "Origin of species by natural selection" was published by _____.
   (a) Charles Darwin
   (b) Lamark
   (c) Weismann
   (d) Hugo de Vries

7. What can be the blood group of offspring when both parents have AB blood group?
   (a) A, B and AB
   (b) AB only
   (c) A, B, AB and O
   (d) A and B only

8. The agricultural scientist, environmental activist, celebrated for his work on spreading organic farming is _____.
   (a) G. Nammalvar
   (b) Dr. Sultan Ahmed Ismail
   (c) Dr. M.S. Swaminathan
   (d) N. Krishnamurthy

SECTION - 2

Note: Answer **any four** of the following questions. **(4 × 2 = 8)**

9. Define gametogenesis.
10. Differentiate foeticide and infanticide.
11. What is a genetic code.
12. Define the term 'Super bug'.
13. Differentiate between Somatic cell gene therapy and Germline gene therapy.
14. Differentiate Natality and Mortality.

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SECTION - 3

Note : Answer **any three** of the following questions. Q.No. **19** is **compulsory.** **(3 × 3 = 9)**

15. Draw a neat labelled diagram of Human Sperm.

16. What is Bioremediation? Name any one micro organism involved in Bioremediation.

17. What is Pedogenesis? Mention any two of its functions.

18. State the theory of spontaneous generation.

19. Classify the pollutants.

SECTION - 4

Note: Answer the following questions **(2 × 5 = 10)**

20. (a) What is Karyotyping? Write the applications of Karyotyping.

(OR)

(b) What are called Medical wastes? Write a note on its management and the methods of disposal.

21. (a) Write the goals of Human Genome Project. (HGP).

(OR)

(b) What is a Vaccine? Explain its types.

♣♣♣

ANSWERS

PART - II (BIO - ZOOLOGY)

SECTION - 1

1. (b) Walter Rosen
2. (d) Amphetamines - Stimulant
3. (b) Detection of Pathogens
4. (c) Sertoli cells
5. (d) Replication, Transcription, Translation
6. (a) Charles Darwin
7. (a) A, B and AB
8. (a) G. Nammalvar

SECTION - 2

9. Gametogenesis is the process of formation of gametes i.e., sperms and ovary from the primary sex organs in all sexually reproducing organisms. Meiosis plays the most significant role in the process of gametogenesis.

10.

Foeticide	Infanticide
It refers to 'aborting the foetus in the mother's womb' intentionally.	It is 'killing the child after the birth'.

11. The genetic code is universal. All known living systems use nucleic acids and the same three base codons (triplet codon) direct the synthesis of protein from amino acids.

12. "Superbug" is a term used to describe strains of bacteria that are resistant to the majority of antibiotics commonly used today.

13.

S. No.	Somatic Cell Gene Therapy	Germ Line Gene Therapy
i.	Therapeutic genes transferred into the somatic cells.	Therapeutic genes transferred into the germ cells.
ii.	Introduction of genes into bone marrow cells, blood cells, skin cells etc.,	Genes introduced into eggs and sperms.
iii.	Will not be inherited in later generations.	Heritable and passed on to later generations.

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12th STD

INSTANT SUPPLEMENTARY EXAM - JULY 2022
ZOOLOGY

Reg. No.

TIME ALLOWED : 3.00 HOURS] **(with Answers)** [MAXIMUM MARKS : 70

Instructions: (1) Check the question paper for fairness of printing. If there is any lack of fairness, inform the Hall Supervisor immediately.

(2) Use **Blue** or **Black** ink to write and underline and **pencil** to draw diagrams.

PART - I

Note : (i) Answer **all** the questions: **(15 × 1 = 15)**

(ii) Choose the most appropriate answer from the given **four** alternatives and write the option code and the corresponding answer**.**

1. In which type of parthenogenesis are only males produced?
   (a) Arrhenotoky (b) Thelytoky
   (c) Amphitoky (d) Both (a) and (b)

2. Three children of a family have blood groups A, AB and B. What could be the genotypes of their parents?
   (a) $I^A I^B$ and $1^O I^O$ (b) $I^A I^O$ and $1^B I^O$
   (c) $I^B I^B$ and $1^A I^A$ (d) $I^A I^A$ and $1^O I^O$

3. Which is a macrophage?
   (a) Monocyte (b) Thrombocyte
   (c) Erythrocyte (d) Lymphocyte

4. The relationship between sucker fish and shark is _____.
   (a) Competition (b) Commensalism
   (c) Predation (d) Parasitism

5. The site of embryo implantation is the:
   (a) Uterus (b) Peritoneal cavity
   (c) Vagina (d) Fallopian tube

6. The phenomenon of "Industrial Melanism" demonstrates:
   (a) Natural selection
   (b) Induced mutation
   (c) Reproductive isolation
   (d) Geographical isolation

7. Cirrhosis of Liver is caused by chronic intake of _____.
   (a) Opium (b) Alcohol
   (c) Tobacco (d) Cocaine

8. LNG-20 is an IUD which makes the uterus unsuitable and cervix hostile to the sperms as they are:
   (a) Hormone releasing IUDs
   (b) Copper releasing IUDs
   (c) Plastic made devices
   (d) Copper made devices

9. ELISA is mainly used for :
   (a) Detection of mutations
   (b) Detection of pathogens
   (c) Selecting animals having desired traits
   (d) Selecting plants having desired traits

10. Who introduced the term "Biodiversity"?
    (a) Edward Wilson (b) Walter Rosen
    (c) Norman Myers (d) Alice Norman

11. In the E-waste generated by personal computer, which among the following metal is most abundant?
    (a) Copper (b) Lead
    (c) Palladium (d) Tin

12. Hershey and Chase experiment with bacteriophage showed that:
    (a) Protein gets into the bacterial cells
    (b) DNA is the genetic material
    (c) DNA contains radioactive sulphur
    (d) Viruses undergo transformation

13. The most common substrate used in distilleries for the production of ethanol is :
    (a) Soya meal (b) Ground gram
    (c) Molasses (d) Corn meal

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14. Which period was called 'Age of fishes'?
    (a) Permian (b) Triassic
    (c) Devonian (d) Ordovician
15. What is the sex index of Drosophila, having 3A+XXY chromosomes?
    (a) 1.5 (b) 1.0
    (c) 0.67 (d) 0.5

Part - II

Note: Answer **any six** of the following. Question No **24** is **compulsory**. **(6 × 2 = 12)**

16. What is bioremediation?
17. Mention the differences between spermatogenesis and spermiogenesis.
18. What are the three levels of Biodiversity?
19. Name the acts which aim at creating a safe and secure environment for both females and males. Add a note on its importance.
20. Tabulate the types of malaria with their causative agent.
21. What are the characteristics of an ideal contraceptive?
22. What is criss-cross inheritance?
23. Why do you think it is not possible to produce vaccine against 'common cold'?
24. Draw any four symbols commonly used in pedigree charts.

Part - III

Note: Answer **any six** of the following. Question Number **33** is **compulsory.** **(6 × 3 = 18)**

25. Differentiate relative dating and absolute dating?
26. Write short notes on Ideonella Sakaiensis.
27. Draw a labelled sketch of human ovum.
28. State any three goals of the human genome project.
29. Explain how 'Roise' is different from a normal cow.
30. Write the basic features of reproduction.
31. What are the applications of Karyotyping?
32. Explain hibernation and aestivation with examples.
33. How does lactational amenorrhoea serve as a natural birth control method?.

Part - IV

Note: Answer **all** the questions. **(5 × 5 = 25)**

34. (a) Explain the process of spermatogenesis with neat schematic sketch.

    (OR)

    (b) List any five salient features of genetic code.
35. (a) Describe the origin of life with the experiment by Urey and Miller.

    (OR)

    (b) List out the various causes for biodiversity losses.
36. (a) Explain the life cycle of plasmodium in man.

    (OR)

    (b) (i) Discuss briefly about Ecosan toilets.
    (ii) What are the remedies for plastic wastes?
37. (a) Explain the formation of nucleosome.

    (OR)

    (b) Write the properties of soil in detail.
38. (a) Explain the structure of immunoglobulin with suitable diagram.

    (OR)

    (b) What are the applications of PCR?

♣♣♣

Answers

Part - I

1. (a) Arrhenotoky
2. (b) $I^A I^O$ and $I^B I^O$
3. (a) Monocyte
4. (b) Commensalism
5. (a) Uterus
6. (a) Natural selection
7. (b) Alcohol
8. (a) Hormone releasing IUDs
9. (b) Detection of pathogens
10. (b) Walter Rosen
11. (b) Lead
12. (b) DNA is the genetic material
13. (c) Molasses
14. (c) Devonian
15. (c) 0.67

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