DIRECTORATE OF SCHOOL EDUCATION

CHENNAI DISTRICT

LEARNING MATERIAL

2022 – 2023

HIGHER SECONDARY – SECOND YEAR

BIO-ZOOLOGY / ZOOLOGY

PREFACE

We take pleasure in presenting this simplified learning material of Bio Zoology and Zoology for students of Std XII.

Specific lessons have been selected and the answers are framed in a precise manner to make learning easier. The objective of this learning material is to enable students to understand the concepts with ease and to ultimately perform better in the board examination. We express our heartfelt thanks to the Respected Chief Educational Officer, Chennai for his initiative and valuable guidance.

“There is no substitute for Hard Work”

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LEARNING MATERIAL
BIO – ZOOLOGY & ZOOLOGY

CHAPTER – 1
REPRODUCTION IN ORGANISMS

Two Mark Questions

1. Why is reproduction significant in organisms?
    - Results in continuation of species
    - Introduces variations in organisms

2. Mention the different modes of asexual reproduction in animals
    - Fission
    - Budding
    - Fragmentation
    - Regeneration

3. What is fission?
    - Fission is the division of the parent body into two or more identical daughter individuals.

4. Name the types of fission.
    - Binary fission
    - Multiple fission
    - Sporulation
    - Strobilation
    - Plasmotomy

5. What is binary fission?
    - The parent organisms divides into two halves and each forms a daughter individuals Karyokinesis and cytokinesis take place
    - Eg: amoeba

6. Mention the types of binary fission.
    - Simple irregular
    - Transverse
    - Longitudinal
    - Oblique

7. What is oblique binary fission?
    - Place of division is oblique
    - Seen in dinoflagellates Eg: ceratium

8. What is strobilation?
    - Transverse fissions occur simultaneously
    - Individuals do not separate immediately from each other Eg. Aurelia.

9. What is Plasmotomy?
    - It is the division of multinucleated parent into many multinucleate daughter individuals
    - Nuclear division occurs later to maintain normal number of nuclei. Eg: Opalina.

10. Define budding.
    - The parent body produces one or more buds
    - Each bud seperates from the parent and grows into a new individual E.g. sponges

11. Differentiate Exogenous and Endogenous budding.

Exogenous budding	**Endogenous budding**
• Exogenous Buds are formed on the outer surface of the parent body • E.g. Hydra	• Endogenous buds are formed inside the cyloptasm and many remain within the parent body • E.g. Noctiluca

12. What is fragmentation?
    - A type of asexual reproduction
    - The parent body breaks into fragments
    - Each fragment can develop into a new individual E.g. Sea anemone

13. What is Regeneration? State it's types
    - Regrowth in the injured region
    - The two types are morphallaxis and epimorphosis

14. What is Epimorphosis? Mention it's types
    - Replacement of lost body parts
    - Reparative and Restorative

15. Differentiate Reparative and Restorative regeneration.

Reparative Regeneration	**Restorative Regeneration**
Only certain damaged tissues can be regenerated E.g. Man	Severed body parts can develop E.g. Starfish

16. What is syngamy?
    - Fusion of two haploid gametes (ovum and sperm) to produce a diploid zygote.

17. Define parthenogenesis
    - Development of an egg into a complete invidual without fertilization.

18. Differentiate seasonal breeders and continuous breeders

Seasonal breeders	Continuous breeders
The animals reproduce at a particular period of the year E.g. Frogs, lizards	They continue to breed throughout their sexual maturity E.g. Honey bees, rabbit

19. What is encystment?
    - During Unfavourable conditions, Amoeba withdraws its pseudopodia.
    - Secretes a protective, chitinous cyst wall around it and becomes inactive

20. What are pseudopodiospores / amoebulae?
    - When conditions become favourable, the encysted amoeba divides by multiple fission.
    - Produce many minute amoebae

Three Mark Questions

21. Differentiate Asexual and Sexual reproduction.

Asexual Reproduction	Sexual Reproduction
• Reproduction by a single parent • Takes place without the involvement of gametes • Offsprings are genetically identical	• Reproduction involving two parents • Takes place with the involvement of gametes • Leads to genetic variation

22. Differentiate between transverse and longitudinal binary fission.

Transverse Binary Fission	Longitudinal Binary Fission
• Plane of division runs along the transverse axis • In Paramecium, macronucleus divides by amitosis and micronucleus by mitosis • E.g. Paramecium, Planaria	• Plane of division runs along the longitudinal axis • In flagellates, the flagellum is retained by one daughter cell. The new basal granule forms a flagellum in the other daughter cell • E.g. Euglena, Vorticella

23. Differentiate External and Internal Fertilization.

External Fertilization	Internal Fertilization
• The fusion of male and female gametes takes place outside the body, in water • E.g. Sponges, fishes, amphibians	• The fusion of male and female gametes takes place within the body of the female organism • E.g. Reptiles, aves, mammals

24. Write a short note conjugation
    - The temporary union of two individuals of the same species
    - The Conjugants exchange certain amount of nuclear material and then get separated
    - Common among ciliates E.g. Paramecium

25. What are the three phases of life cycle?
    - Juvenile phase : Period of growth between birth and reproductive maturity
    - Reproductive Phase : Organisms reproduce and their offsprings reach maturity
    - Senescent phase : Degeneration in structure and function of the body

26. How does apolysis take place in Tapeworm?
    - In tapeworm older and gravid proglottids are at the posterior end of the strobila.
    - The gravid proglottids are cut off singly or in groups
    - Helps in transferring the developed embryos from man to pig

27. Write a brief note on how asexual reproduction takes place by gemmules.
    - Occurs in freshwater and marine sponges
    - Gemmule is a hard ball with an internal mass of food laden archaeocytes
    - The gemmule can withstand adverse conditions.
    - When conditions are favourable, gemmules begin to hatch.

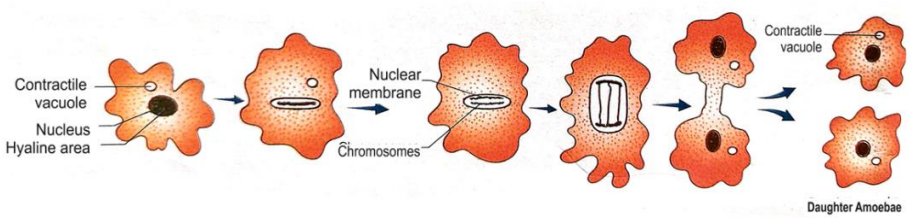
28. Give a brief account on multiple fission
    - The parent body divides into many similar daughter cells
    - First nucleus divides repeatedly and then the cytoplasm
    - Cytoplasm encircles nucleus
    - Many smaller individuals from a single parent. E.g. Vorticella

29. Define Arrhenotoky. Thelytoky, Amphitoky.
    - Arrhenotoky – only males are produced by parthenogenesis E.g. Honey bees
    - Thelytoky – only females are produced by parthenogenesis E.g. Solenobia
    - Amphitoky – Males or females are produced by parthenogenesis E.g. Aphis

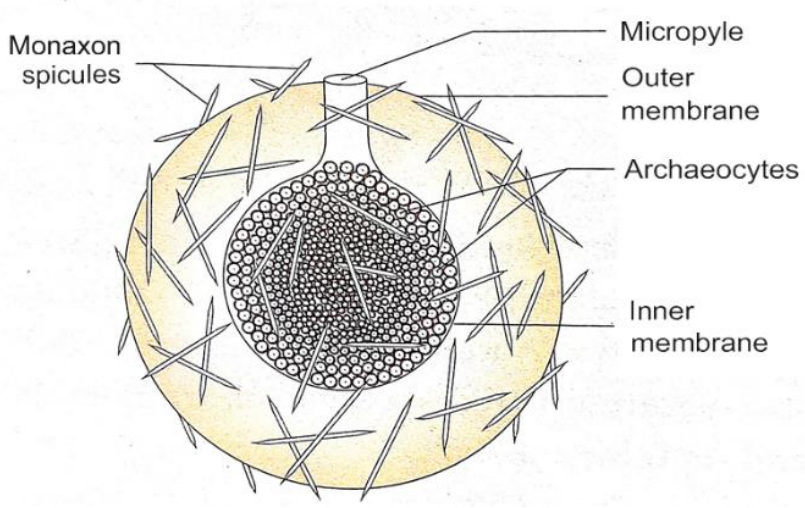
30. Give reasons :
    some organisum like honey bees are called parthenogenetic animals.
    - Honey bees show incomplete parthenogenesis
    - Unfertilized eggs develop into drones.
    - Fertilized eggs develop into queen and workers

    A male honey bee has 16 chromosomes whereas its female has 32 chromosomes
    - Male honey bees develop from unfertilized eggs. So they have only haploid number (16) of chromosomes
    - Females develop from fertilized egg. They have diploid number (32) of chromosomes

31. Draw and label the parts
    Binary fission in Amoeba



32. Draw and label the parts
Gemmule in sponges



Five Make Questions

33. Describe the different modes of Asexual reproduction.
    - The different modes of asexual reproduction are fission, budding, fragmentation and regeneration

Fission
- Division of parent body into two or more identical daughter individuals E.g Amoeba

Budding
- The parent body produces buds that grow into young ones
- the buds seperate from parent to lead a normal life E.g Sponges

Fragmentation
- The parent body breaks into fragments and each fragment develops into an individual E.g Sea Anemone.

Regeneration
- Regeneration is regrowth in the injured region E.g Hydra
- Reparative and Restorative

34. Define parthenogenesis Write a note on its types
    - Parthenogenesis is development of an egg into a complete individual
    - The two main types are Natural parthenogenesis and Artificial Parthenogenesis
    - Natural parthenogenesis: In certain animals, Parthenogenesis occurs constantly and naturally in their life cycle
    - Natural parthenogenesis may be complete or incomplete
    - Paedogenetic parthenogenesis: The larvae produce a new generation of larvae E.g Liver fluke
    - Artificial parthenogenesis: The unfertilized egg is induced to develop into a complete individual by physical or chemical stimuli e.g Sea Urchin

35. Describe the different kinds of Syngamy
    - **Autogamy** : Male and female gametes are produced by the same organism E.g Paramecium

- **Exogamy** : male and female gametes are produced by different parents e.g human
- **Hologamy** : The Entire mature organisms behave as gametes E.g Trichonympha
- **Paedogamy** : Sexual union of young individuals
- **Merogamy** : Fusion of small sized and morphologically different gametes.
- **Isogamy** : Fusion of morphological and physiological identical gametes Eg Monocystis
- **Anisogamy** : Fusion of dissimilar gametes E.g Vertebrates

CHAPTER – 2

HUMAN REPRODUCTION

Two Mark Questions

1. Why are scrotal sacs present outside the body in males or How does scrotum act as a thermoregulator?
    - Viable sperms cannot be produced at normal body temperature
    - The scrotum is placed outside the abdominal cavity to provide a temperature $2^{o}c$ -$3^{o}c$ lower than the normal body temperature.

2. What are Bartholin's glands or greater vestibular glands? Mention their role.
    - Bartholin's glands are located posterior to the left and right of the opening of the vagina.
    - They secrete mucus to lubricate vagina.

3. What is mitochondrial spiral or nebenkern? Mention its significance
    - Spirally twisted mitochondria in the middle piece of sperm
    - It produces energy in the form of ATP for the movement of sperms

4. Write the composition of semen ?
    - Semen contains sperms and the seminal plasma
    - Seminal Plasma contains fructose Sugar, ascorbic acid, prostaglandins and vesiculase.

5. What is corpus luteum? Write its function.
    - During luteal phase, the remaining part of the Graafian follicle is transformed into a transitory endocrine gland.
    - It secretes large amount of progesterone which is essential for the maintenance of endometrium .

6. How is polyspermy avoided in humans?
    - After fertilisation , cortical granules from the cytoplasm of the ovum form a barrier called the fertilization membrane around the ovum.
    - It prevents penetration of other sperms.

7. What are Leydig cells? Mention their significance.
    - Leydig cells are embedded in the soft connective tissue surrounding the seminiferous tubules.
    - They cells secrete testosterone which initiates spermatogenesis.

8. What is cryptorchidism? How is it rectified?
    - The failure of one or both testes to descend down into the scrotal sacs.
    - A Surgical correction at a young age can rectify the defect.

9. What is inhibin? Write its function
    - A hormone secreted by sertoli cells.
    - Involved in the negative feedback control of sperm production.

10. Mention the functions of seminal fluid
    - acts as a transport medium
    - provides nutrients
    - protect and activate sperms

11. What do you know about Braxter Hick's contraction?
    - Throughout pregnancy the uterus undergoes periodic episodes of weak and strong contractions.
    - These contractions lead to false labour.

12. What is Ferguson reflex or neurohumoral reflex
    - The downward movement of the foetus causes dilation of cervix of the uterus and vaginal canal.
    - It results in a neurohumoral reflex.

13. Differentiate Spermatogenesis and Spermiogenesis

Spermatogenesis	**Spermiogenesis**
Sequences of events in the seminiferous tubules of testes that produce sperms	The spermatids are transformed into mature sperms.

Three Mark Questions

14. Mention the role of oxytocin
    - Oxytocin causes "Let Down" reflex, the actual ejection of milk from the alveoli of mammary glands.
    - brings about the powerful contraction of the uterine muscles and leads to the expulsion of the baby through the birth canal.
    - during lactation, it helps the uterus to contract.

15. What is colostrum? Write its significance
    - A yellowish fluid secreted by mammary glands during the initial few days of parturition
    - it contains more proteins, vitamin A and minerals.
    - It is rich in IgA antibodies.

16. Write a note on 'Acrosomal reaction'
    - The acrosomal membrane of the sperm disintegrates releasing proteolytic enzyme, hyaluronidase
    - Sperm enters the ovum through corona radiata and zona pellucida

17. Mention the main functions of reproductive system
    - To produce the gametes namely sperms and ova
    - To nurture the developing offspring
    - To produce hormones.

18. Placenta is an endocrine tissue. Justify.
    Placenta produces
    - hCG – human Chorionic Gonadotropin
    - hPL – human Placental Lactogen
    - oesterogen
    - progesterone
    - these hormones are essential for normal pregnancy
    - Relaxin – helps in relaxation of pelvic ligaments at the time of parturition
      – Promotes Parturition

Define the following terms

a) **Menarche** **:** Starting of first menstrual period. It is also called as puberty.

b) **Menopause** **:** i) Phase in a woman's life when ovulation and menstruation stop.

ii) permanent cessation of the primary functions of ovaries.

c) **Hymen** **:** The external opening of the vagina is partially closed by a thin ring of tissue called hymen.
it is often torn during the first coitus.

d) **Gestation Period** **:** Human pregnancy lasts for about 280 days or 40 weeks.

e) **Epididymis** **:** i) It is single highly coiled tube that temporarily stores sperms

ii) they undergo maturation and acquire increased motility and fertilizing capacity.

f) **Ectopic pregnancy** **:** The fertilized ovum is implanted outside the uterus.
about 95% of ectopic pregnancies occur in the fallopian tube.

g) **Capacitation** **:** it is a biochemical event that enables the sperm to penetrate and fertilise the egg.

h) **Trophoblast** **:** Single layer of large flattened cells in the blastocyst of the embryo.

Five Mark Questions

19. What are the major reproductive events in human beings?

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.

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.

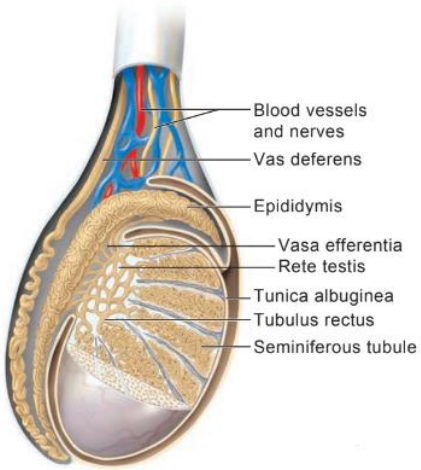
Placentation : Formation of placenta which is the intimate connection between foetus and uterine wall of the mother for exchange of nutrients.

Gastrulation : Process by which blastocyst is changed into a gastrula with three primary germ layers.

Organogenesis : Formation of specific tissue, organs and organ systems from three germ layers.

Parturition : Expulsion of the foetus from the mother's womb.

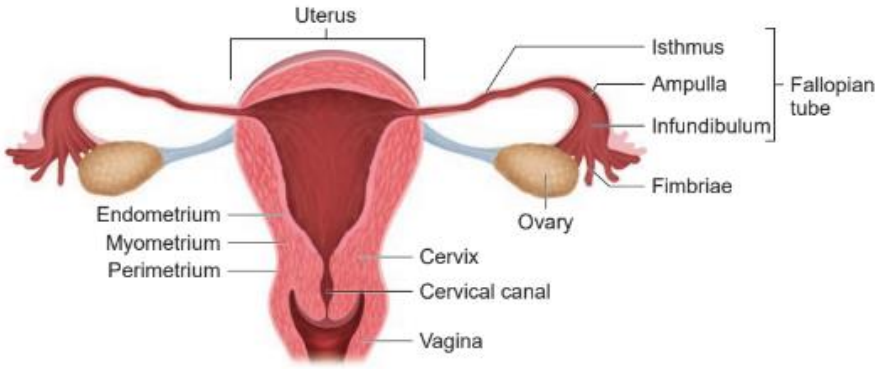
20. Describe the structure of testis with a neat labelled diagram



- Testis are the primary male sex organs.
- They are a pair of ovoid bodies lying in the scrotum
- Scrotum is a sac of skin that hangs outside the abdominal cavity
- Each testis is covered by fibrous tunica albuginea
- It is divided by septa into 200 to 250 lobules
- Each lobule has 2 to 4 coiled seminiferous tubules
- Sperms are produced in the seminiferous tubule

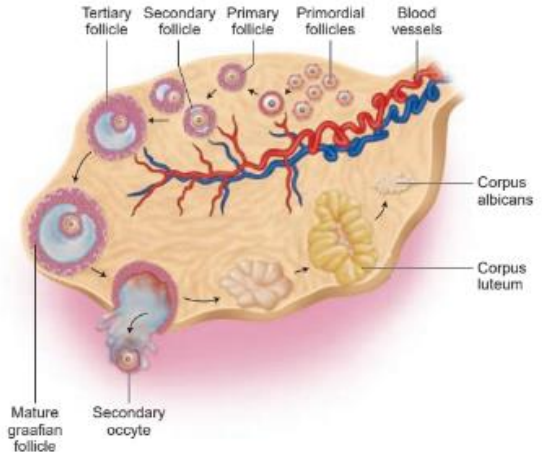
- There are two types of cells in seminiferous tubule – sertoli cells and spermatogonic cells
- Leyding cells are embedded in the tissue surrounding the seminiferous tubules.

21. Describe the structure of Uterus



- Uterus is Hollow, thick walled, muscular, highly vascular, inverted pear shaped structure
- It lies in the pelvic cavity between the urinary bladder and rectum.
- Major portion is the body.
- The uterus opens into the vagina through cervix
- The cavity of the cervix is called cervical canal
- The cervical canal along with vagina forms the birth canal
- The wall of uterus has 3 layers – Perimetrium, Myometrium and Endometrium

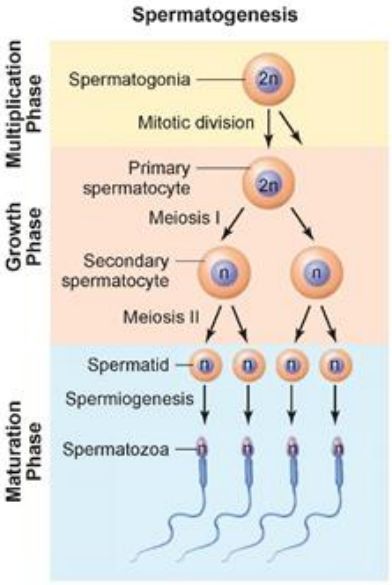
22. Describe the structure of ovary with a neat label diagram



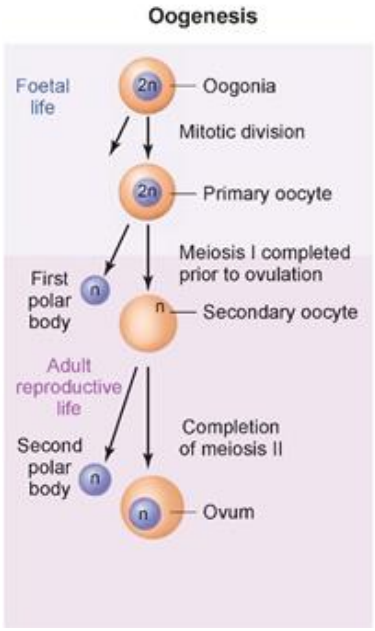
- Ovaries are the primary female sex organs that produce the ovum
- The ovaries are located on each side of the lower abdomen

- It is an elliptical structure about 2-4 cm long
- It is covered by cuboidal epithelium enclosing ovarian stroma
- Stroma is differentiated into outer cortex and inner medulla
- Cortex region has ovarian follicles
- Medulla has blood vessels, lymphatic vessels and nerve fibres.
- Ovary is attached to the pelvic wall and the uterus by mesovarium.

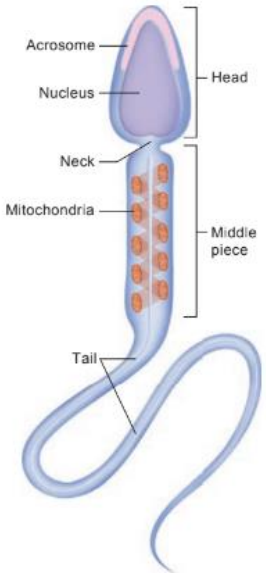
23. Give a schematic representation of spermatogenesis in Human?



24. Give a schematic representation oogenesis in humans?

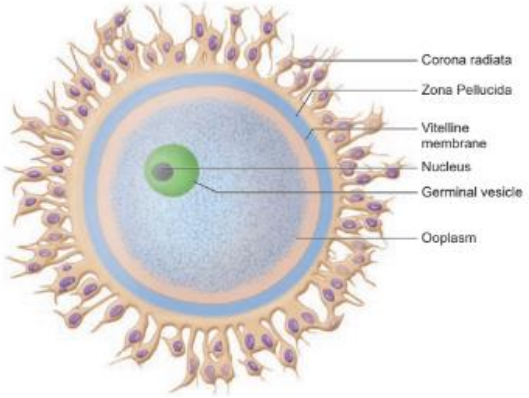


25. Describe the structure human sperm with a neat labelled diagram



1. The human sperm is microscopic, flagellated and a motile male gamete.
2. The sperm is composed of a head, neck, middle piece and a tail.
3. The head comprises of acrosome and nucleus.
4. The middle piece possesses mitochondria which produces energy in the form of ATP molecules.
5. The tail is the longest part and is slender and tapering.

26. Describe the structure human ovum with a neat labelled diagram?



1. Human ovum is microscopic, non-cleidoic and alecithal female gamete.
2. The ovum is surrounded by three coverings namely vitelline membrane, zona pellucida and corona radiata.
3. The cytoplasm of the egg is called ooplasm and contains a large nucleus called the germinal vesicle.
4. The narrow space between the vitelline membrane and zona pellucida is known as perivitelline space.

27. Explain the various phases of the menstrual cycle

- Cycle of events starting from one menstrual period till the next one is called the menstrual cycle during which cyclic changes occur in the endometrium.
- It occurs approximately once in every 28/29 days during the reproductive life of female from menarche to menopause except during pregnancy

Menstrual Phase

- Lasts 3 to 5 days
- Level of progesterone and oestrogen decrease
- This leads to the breakdown of endometrium and its blood vessels
- It occurs only if released ovum is not fertilized

Follicular / Proliferative phase

- Extends from the 5^{th} day of the cycle until ovulation.
- Primary follicles grow to form a mature Graafian follicle
- Endometrium regenerates through proliferation
- FSH & LH levels increase
- Follicle cells secrete estrogen

Ovulatory Phase

- FSH & LH attain peak level in the middle of the cycle (about the 14^{th} day)
- Maximum secretion of LH during the mid cycle is called LH surge
- It induces rupture of Graafian follicle
- Ovum is released from the ovary into peritoneal cavity.

Luteal / Secretory Phase

- The remaining part of Graafian follicle is transformed to transitory endocrine gland called corpus luteum.
- Corpus luteum secretes progesterone to maintain endometrium
- Fertilization leads to implantation of fertilized ovum
- In the absence of fertilization , the corpus luteum degenerates completely and leaves a scar tissue called corpus albicans.

28. Write an account on the extra embryonic membranes

- Amnion
- Yolk sac
- Allantois
- Chorion

Functions

- They protect the embryo from desiccation, mechanical shock
- Help in absorption of nutrients and exchange of gases.

Amnion

- Double layered translucent membrane filled with amniotic fluid
- Provides buoyant environment to protect the embryo from injury
- Regulates temperature
- Provides a medium for the foetus to move

Yolk Sac

- Forms a part of the gut

- Source of earliest blood cells and blood vessels.

Allantois

- Structural base for the umbilical cord
- Becomes part of the urinary bladder

Chorion

- Outermost membrane which encloses the embryo and all other membranes
- Helps in the formation of placenta.

29. Write and account on the accessory sex glands in males and mention their functions

Seminal vesicles

- Secrete seminal plasma containing fructase sugar, ascorbic acid, prostaglandins and vesiculase
- Vesiculase enhances sperm motility

Prostate gland

- Encircles urethra
- Secretes a slightly acidic fluid that contains citrate, enzymes and prostate specific antigens
- Semen contains sperms and seminal plasma

Bulbourethral glands / Cowper's gland

- Inferior to prostate
- Secretions helps in lubrications of penis.

30. Give an account on mammary gland
    - Modified sweat glands Located in thoracic region
    - Contains glandular tissue and fat
    - Median nipple is surrounded by a pigmented area called areola
    - Sebaceous glands are found on the surface.
    - Consists of 2-25 lobes that contain alveoli
    - Alveoli open into mammary tubles that form mammary duct
    - They join to form mammary ampulla, which is connected to lactiferous duct.
    - Lactiferous duct expands to form lactiferous sinus which serves as a reservoir of milk.

31. List the various menstrual disorders. (ZOOLOGY)
    Amenorrhoea : Absence of menstruation
    Primary Amenorrhoea : menarche does not appear till the age of 18
    Secondary Amenorrhoea : absences of menstruation for over three consecutive months.
    Polymenorrhoea : menstrual cycle is shorter than 21 days.
    Menorrhagia : Heavy and prolonged menstrual period.

CHAPTER – 3

REPRODUCTIVE HEALTH

Two Mark Questions

1. List out four health care programmes by the Govt. of India?
    - Massive Child immunization
    - Supply of nutritional food to pregnant women.
    - Janani Suraksha Yojana
    - Janani Shishu Suraksha Karyakaram

2. Differenciate female foeticide & female infanticide

Female foeticide	Female infanticide
Aborting the female foetus in the mother's womb.	Killing the female child after birth

3. What is PCPNDT Act?
    - Pre-conception and Pre-Natal Diagnostic technique
    - To prevent use of prenatal diagnostic techniques for selective abortion.

4. What is an ideal contraceptive?
    - An ideal contraceptive should be user friendly.
    - Easily available
    - With least side effects
    - Should not interfere with sexual drive.

5. What are Sexually Transmitted Infections (STI)? Give Examples
    - STD or venereal diseases (VD) or Reproductive Tract Infections (RTI) are called as Sexually Transmitted Infections (STI)
    - It is transmitted during intimate sexual contact with an infected partner. E.g Syphilis, AIDS

6. Comment on 'Saheli'
    - An oral contraceptive pill by Central Drug Research Institute Lucknow, India.
    - Contains a non-steroidal preparation called Centchroman.

7. Name same Copper releasing IUDS.
    - Cu T-380 A
    - Nova T
    - Cu 7
    - CuT-380 Ag
    - Multiload – 375

8. Name the Hormone IUDs?
    - Progestasert
    - LNG – 20.

9. What is IUT?
    - Intra Uterine Transfer
    - Embryo with more than 8 blastomeres is inserted into uterus to complete its further development.

10. Write the causative agent and symptoms of cervical cancer.
    - Cervical Cancer is caused by a sexually transmitted virus called Human Papilloma virus (HPV).
    - Symptoms are pelvic pain, increased vaginal discharge and abnormal bleeding

11. What are the Risk Factors of Cervical Cancer
    - Having multiple sexual Partners
    - Prolonged use of contraceptive pills.

12. What is called "Mayer-Rokitansky Syndrome"?
    - All women are born with ovaries.
    - Some do not have functional uterus.

13. What is meant by Surrogacy?
    - It is a method of assisted reproduction or agreement
    - Whereby a women agrees to carry pregnancy for another person.

14. Define Azoospermia.
    - Azoospermia is defined as the absence of spermatozoa in the ejaculate semen on atleast two occasions.
    - It is observed approximately in 1% of the population.

15. What is meant by Chorionic Villus Sampling (CVS)
    CVS is a prenatal test that involves taking a sample of the placental tissue to test for chromosomal abnormalities.

16. Write the uses of foetoscope.
    - It is used to monitor the foetal heart rate
    - other functions during late pregnancy and labour.

17. Which Vitamin is known as anti-sterility Vitamin? Why?
    - Vitamin E
    - It helps in the normal functioning of reproductive structures.

Three Mark Questions

18. Write a brief note on Amniocentesis
    - Amniocentesis involves taking a small sample of the amniotic fluid that surrounds the foetus to diagnose for chromosomal abnormalities
    - generally performed in a pregnant woman between the 15^{th} and 20^{th} weeks of pregnancy

- involves inserting a long thin needle through the abdomen into the amniotic sac to withdraw a small sample of amniotic fluid.
- the amniotic fluid contains cells shed from the foetus.

19. What is Lactational Amenorrhoea?
    - menstrual cycle resumes 6 to 8 weeks from parturition.
    - reappearance of normal ovarian cycles may be delayed for six months during breast feeding.
    - this delay in ovarian cycles is called Lactational Amenorrhoea.

20. How are STDs transmitted?
    - STDs are transmitted from person to person during intimate sexual contact with an infected partner.
    - Hepatitis-B and HIV are transmitted sexually by sharing of infusion needles, surgical instruments with infected people, blood transfusion, from infected mother to the baby.

21. Write the preventive measures of STDs?
    - By avoiding sex with unknown partners and multiple partners.
    - By using condoms.
    - In case of doudt, consult a doctor for diagnosis and get complete treatment.

22. Write about STIs caused by fungus
    - Candidiasis
    - Causative agent - Candida albicans
    - Symptoms - Attacks mouth, intestinal tract and Vagina. Vaginal itching or soreness, abnormal vaginal discharge, pain during urination.

23. Write about Protozoan STI
    Trichomoniasis
    Causative agent - Trichomonas vaginalis
    Symptoms - Vaginitis, greenish yellow vaginal discharge, itching and burning sensation, urethritis, epididymitis and prostatitis.

24. Write the preventive measures against Cervical Cancer
    - by Vaccination.
    - Primary prevention beings with HPV vaccination of girls aged 9-13 years.
    - Modification in lifestyle can also help in preventing cervical cancer.

25. Write a note on Cryopreservation?
    - Cryopreservation of embryos is often used when there are more embryos than needed for a single IVF transfer.
    - Embryo Cryopreservation can provide an additional opportunity for pregnancy through a Frozen embryo transfer (FET)

26. Differentiate Tubectomy & Vasectomy

Tubectomy :	**Vasectomy**
The surgical sterilization in women.	The surgical sterilization in men.
Small portion of both fallopian tubes are cut & tied.	Both vas deferens are cut and tied.
Permanent Birth control method in women.	Permanent birth control method is men.

27. Name the Acts that aim at creating a safe environment for both male and female?
    - POCSO Act – Prevention Of Children from Sexual Offence.
    - Sexual Harassment at workplace (Prevention, prohibition and redressal) Act
    - Recommendation of Justice Verma Committee, 2013.

28. Differentiate Genital herpes from Genital warts

Genital herpes	**Genital warts**
caused by Herpes simplex virus	caused by Human Papilloma virus
Sores in and around the vulva, vagina, urethra in female and penis in male.	Hard outgrowths (Tumour) on the external genitalia, cervix and perianal region
Incubation period : 2-21 days	Incubation period : 1-8 months

29. What are the strategies to be implemented in India to attain total reproductive health?
    - Introducing sex education in schools
    - Educating couples about birth control methods
    - Creating awareness about care for pregnant women, postnatal care of mother and child.

30. Write a note on the diagnosis and treatment options of Cervcial Cancer .
    Diagnosis : PAP smear with HPV test, X-ray, CT Scan, MRI, PET Scan
    Treatment : radiation therapy, chemotherapy, surgery

Five Mark Questions

31. What are the Causes of Infertitlity?
    - Undescended testes and swollen veins in scrotum.
    - Tight clothing in men
    - Under developed ovaries or testes.
    - Female may develop antibodies against her partner's sperm.
    - Males may develop an autoimmune response to their own sperm.

32. Write an Account on the Natural Methods of Birth Control
    Periodic abstinence / rhythm method
    - Ovulation occurs at about 14^{th} day of menstrual cycle.
    - Ovum survives for 2 days

- Sperm remains alive for 72 hours in the female reproductive tract.
- Coitus is to be avoided during this time

Continuous abstinence :

- Simple & most reliable method to avoid pregnancy.
- Not to have coitus for a definite period

Coitus interruptus:

- Withdrawal of penis before ejaculation
- Deposition of sperm into vagina is prevented

Lactational amenorrhoea:

- Delaying of normal ovarian cycle during breast feeding.

33. Describe the barrier Methods of Birth Control

a) Chemical barrier:

Chemical agents like foaming tablets, jellies, creams, melting substances are used to inactivate the sperms in vagina

b) Mechanical Barrier:

- A thin sheath of condoms are used to cover the penis in male and vagina, cervix in female before coitus.
- Diaphragms, cervical caps and vaults used in female reproductive tract to cover cervix before coitus.

c) Hormonal Barrier:

- Pills are used to prevent ovulation
- They inhibit the secretion of FSH & LH hormones.
- Combined pill contains synthetic progesterone and estrogen hormones.
- Saheli, Contraceptive pill has non-steriodal preparation called centchroman.

D) Intra uterine Devices (IUD)

- IUDs are inserted by medical experts in the uterus through the vagina
- E.g Cu releasing IUDs, Hormone - releasing IUDs Non-medicated IUDs.

34. What is Assisted reproductive technology (ART)? Explain the various techniques involved in it.

A collection of procedures, which includes the handling of gametes and/or embryos outside the body to achieve pregnancy is known as Assisted Reproductive Technology.

Intrauterine insemination(IUI)

- Procedure to treat infertile men with low sperm count
- the semen is collected either from the husband / healthy donor
- it is introduced into the uterus through the vagina by a catheter after stimulating the ovaries to produce more ova

In vitro fertilisation(IVF) or Test Tube baby

- Sperm and eggs are allowed to unite outside the body in the laboratory
- One or more fertilised eggs may be transferred into the woman's uterus where they implant and develop
- IVF is used to treat many causes of infertility

Zygote intra-fallopian transfer (ZIFT)

- Zygote upto 8 blastomere stage is transferred to the fallopian tube by laparoscopy
- The zygote divides and migrates towards the uterus and gets implanted

Gamete intra-fallopian transfer (GIFT)

- Transfer of an ovum Collected from a donor into the fallopian tube

- Eggs are placed with sperms in fallopian tube
- Zygote gets implanted in the uterus

Intra-cytoplasmic sperm injection(ICSI)

- Only one sperm is carefully injected into the focal point of the egg
- the zygote is allowed to divide to form an 8 celled blastomere and then transferred to the uterus

35. Explain Bacterial STI / Bacterial diseases.

Name of the Disease	**Causative agent**	**Symptom**	**Incubation**
Gonorrhoea	Neisseria gonorrhoeae	Affects the urethra, rectum and throat and in females the cervix also get affected. Pain and pus discharge in the genital tract and burning sensation during urination.	2 to 5 days
Syphilis	Treponema pallidum	**Primary stage** Formation of painless ulcer on the external genitalia. **Secondary stage** Skin lesions, rashes, swollen joints and fever and hair loss. **Tertiary stage** Appearance of chronic ulcers on nose, lower legs and palate. Loss of movement, mental disorder, visual impairment, heart problems, gummas (soft non-cancerous growths) etc.,	10 to 90 days
Chlamydiasis	Chlamydia trachomatis	Trachoma, affects the cells of the columnar epithelium in the urinogenital tract, respiratory tract and conjunctiva.	2 to 3 weeks or upto 6 weeks

Lymphogranuloma venereum	Chlamydia trachomatis	Cutaneous or mucosal genital damage, urithritis and endocervicitis. Locally harmful ulcerations and genital elephantiasis.	

36. Explain Viral STI / Viral diseases

Name of the Disease	**Causative agent**	**Symptom**	**Incubation**
Genital herpes	Herpes simplex virus	Sores in and around the vulva, vagina, urethra in female or sores on or around the penis in male. Pain during urination, bleeding between periods. Swelling in the groin nodes.	2- 21 days (average 6 days)
Genital warts	Human papilloma virus (HPV)	Hard outgrowths (Tumour) on the external genitalia, cervix and perianal region.	1-8 months
Hepatitis-B	Hepatitis B virus (HBV)	Fatigue, jaundice, fever, rashes and stomach pain. Liver cirrhosis and liver failure occur in the later stage.	30-80 days
AIDS	Human immunodeficiency virus (HIV)	Enlarged lymph nodes, prolonged fever, prolonged diarrhoea, weight reduction, night sweating.	2 to 6 weeks even more than 10 years

CHAPTER – 7 / 8

HUMAN HEALTH AND DISEASES

Two Mark Questions

1. Define health.
   It is a complete state of physical, mental and social well being and not merely absence of disease.

2. Mention the Symptoms and preventive measures of malaria
   - Headache, muscular pain., shivering chills
   - High fever followed by sweating.

   Prevention

   - Use of mosquito net
   - Spread oil on the water surface to kill mosquito larvae.

3. Write a note on ringworm
   - It is a common fungal disease
   - Dry, scaly lesions on skin and nails
   - Athlete's foot caused by Tinea pedis

4. Write a note on Viral Hepatitis
   - Caused by Hepatitis B virus
   - Symptoms
   - Liver damage
   - Yellow eyes
   - Pain in abdomen

5. Differentiate innate and acquired immunity

S.No	**Innate immunity**	**Acquired immunity**
1.	Present from birth	Acquired after birth
2	Non specific	specific

6. Immunotherapy
   - Also called biological therapy
   - Uses substances made by the body or in a laboratory to resist or improve the immune system function.

7. What are interferons? Mention their role.
    - Interferons are antiviral proteins
    - Induce antiviral state in infected cells.

8. A patient was hospitalized with fever and chills. Merozoites were observed in her blood. What is your diagnosis?
    - It is an indication of malarial parasite – Plasmodium
    - The patient is suffering from malaria.

9. How does Exercise play a role in suppressing depression?
   Exercise Stimulates the body to produce serotonin and endorphins which are neurotransmitters that suppress depression.

Three Mark Questions

10. How do you broadly classify diseases?

INFECTIOUS DISEASES/ COMMUNICABLE DISEASES	**NON- INFECTIOUS DISEASES/ NON COMMUNICABLE DISEASES.**
Transmitted from one person to another	Not transmitted from one person to another
Caused by virus , bacteria, fungi	Caused due to genetic and nutritional deficiency
Eg. AIDS, Cholera	Vitamin deficiency, heart attack.

11. Write a note on auto immune disease:
    - is due to an abnormal immune response
    - Immune system fails to distinguish between “self” and “non-self” and attacks its own body.
    - Our body produces antibodies and cytotoxic T cells that destroy our own tissues. E.g. Grave’s disease

12. What is Metastasis?
    - When a tumour continues to grow and invades healthy tissue, it is called cancer.
    - They spread to other parts of the body from the tumour and give rise to secondary tumour. This is known as metastasis.

13. Differentiate between normal cell and cancer cell

Normal cell	**Cancerous cell**
Small, uniformly shaped nucleus	Large, Variable shaped nucleus

Uniform cell size and shape	Variation in cell size and shape
Cell Growth and differentiation is controlled	Not controlled.

14. Mention the effects of drug and alcohol

Short term effects:

- Euphoria , pain
- Alteration in behaviour
- Blood pressure
- Narcosis
- Nausea, vomiting

Long Term effects:

- Liver cirrhosis
- Weakens the heart muscle
- Stoke, heart attack, Coronary Heart Disease

15. Write a note on depression

Mental disorders that causes people to experience

- Depressed mood
- Feelings of guilt
- Disturbed sleep
- Low energy
- Poor concentration.
- Poor appetite

16. List the common withdrawal symptoms of drug and alcohol abuse.

- Tremors to convulsions
- Severe agitation and fits
- Depressed mood
- Anxiety, restlessness
- Insomnia
- Dryness of throat

17. Write a note on antibody mediated immunity/ humoral immunity

- It is a characteristic feature of vertebrates only
- Pathogens are destroyed by production of antibodies.
- Brought about by B- cells with the help of antigen presenting cells and T- helper cells

18. Write a note on Helminth diseases

S.No	**Diseases**	**Causative agent**	**Mode of transmission**	**Symptoms**
1	Ascariasis	Ascaris lumbricoides	Contaminated food and water	Abdominal pain Anaemia Hepatitis

2	Filariasis	Wuchereria bancrofti	Culex mosquito	Inflammation in lymph nodes Elephantiasis of limbs.

19. Write a note on protozoan diseases (2 or 3 or 5 M)

S.NO	Diseases	Causative Agent	Site of Infection	Mode of Transmission	Symptoms
1	Amoebiasis	Entamoeba histolytica	Large intestine	Houseflies	Ulceration , bleeding, mucus in stools.
2	Kala azar	Leishmania donovani	Bone marrow, spleen	Sand fly	Anaemia, weight loss, enlargemant of spleen and liver, fever
3	Malaria	Plasmodium sp	RBC	Female Anopheles mosquito	Shivering chills, High fever, headache.

Five Mark Questions

20. **Explain the life cycle of Plasmodium in humans**.

- Man is the secondary host
- Through the bite of an infected female Anopheles masquito, sporozoites enter the man.
- Sporozoites enter the liver and form merozoites, these enter RBC.
- Inside RBC, merozoites develop as trophozoites, and enter signet ring stage.
- Schizonts divide and form mononucleated merozoites.
- RBC lyses and haemozoin toxin is released
- Merozoites differentiate into macro and micro gametocytes.
- They develop into female and male gamete respectively.

21. Write a note on types of innate immunity

Type of immunity	Mechanism
Anatomical barrier	● Skin: prevents the entry of microbes ● Mucus : entraps microorganisms
Physiological barrier	● Temperature: inhibits the growth of pathogens ● Chemical indicators like lysozyme is antibacterial
Phagocytic barriers	● Monocytes , macrophages digest microbes

Inflammatory barriers	• Release of chemotactic signals like serotonin, histamine influx the phagocytic cells into the affected area. • This phenomenon is called diapedesis.

22. Differentiate active and passive immunity

S.No	Active Immunity	Passive Immunity
1	Active immunity is produced actively by host's immune system.	Passive immunity is received passively and there is no active host participation.
2	produced due to contact with pathogen	produced due to antibodies from outside.
3	durable and effective in protection.	transient and less effective.
4	Immunological memory is present..	No memory
5	Immunity is effective only after a short period .	Immunity develops immediately.

23. Differentiate primary and secondary Immune response

S.No	Primary Immune Response	Secondary Immune Response
1	It occurs as a result of primary contact with an antigen.	It occurs as a result of second and subsequent contacts with the same antigen
2	Antibody level reaches peak in 7 to 10 days.	Antibody level reaches peak in 3 to 5 days.
3	Prolonged period required to give immunity.	It gives immunity in a short time.
4	rapid decline in antibody level.	Antibody level remains high for longer period
5	It appears in the lymph nodes and spleen.	It appears mainly in the bone marrow

24. **Write a note on lymphoid organs**

- Organs involved in the origin , maturation and proliferation of lymphocytes
- Based on the functions – there are two types
    1. Primary or central lymphoid organ
    2. Secondary or peripheral lymphoid organ

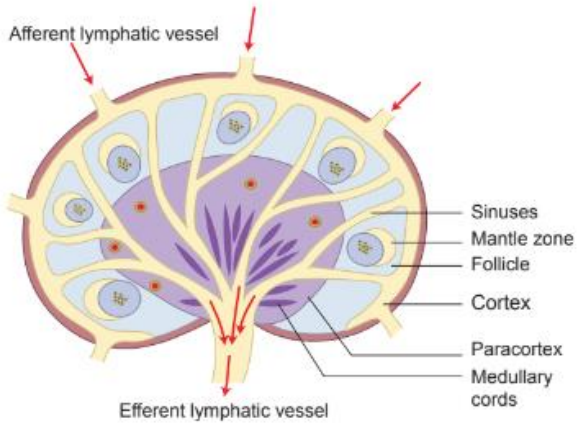
Primary or Central lymphoid organ	Secondary or peripheral lymphoid organ
Provide environment for lymphocyte maturation	Traps antigen and make them available for mature lymphocytes

Organs: Bursa of fabricius - birds Bone marrow, thymus - mammals	Organs: Lymph Nodes, appendix, tonsils, spleen MALT, GALT, BALT
Lymphocytes mature in these organs, they become immuno competent cells B cells in bone marrow T cells in thymus	In these organs, antigens are localized so that they can be effectively exposed to mature lymphocytes.

25. Explain the structure of Thymus

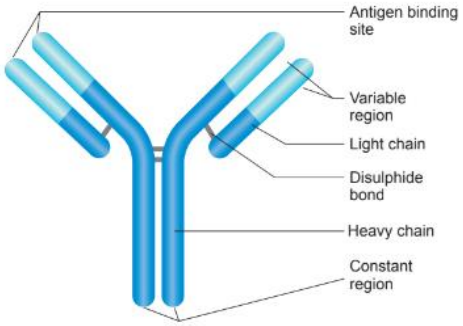
- is a primary lymphoid, bilobed organ located behind the sternum and above the heart.
- It has many lobules separated from each other by connective tissue called septa.
- Each lobule is differentiated into an outer cortex and inner medulla.
- Thymus gland is mainly involved in proliferation and maturation of T – cells and secretion of thymosin hormone.
- By early teens , it is replaced by adipose tissues.

26. Explain the structure of lymph nodes



- Lymph node is a small bean shaped structure found along the course of lymphatic duct.
- Lymph node has three zones: cortex, paracortex and medulla.
- The cortex contains B lymphocytes, macrophages and follicular dendritic cells.
- The medulla consists of sparsely populated B-lymphocytes, which secrete antibody molecules.
- The paracortex zone lies between the cortex and medulla and consists of richly populated
- T Cells and dendritic cell.

27. Explain the structure of antibody / immunoglobulin



- Immunoglobulins are protein molecule synthesized on exposure to antigens
- 5 major types Ig G, Ig M, Ig A, Ig D, Ig E

STRUCTURE:

- Structure of Ig is Y shaped.
- Has 4 polypeptide chains

  2 light chain – (L) mol.wt 25000 daltons

  2 heavy chain – (H) mol.wt 50000 daltons

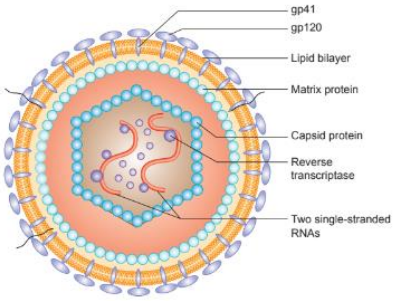
- Poly peptide chains are linked by di-sulphide (s-s) bonds.
- Each chain has 2 regions.
  1. Variable region
  2. Constant region.
- C- regions are same in all antibodies.
- V- region is the antigen binding site

28. What is vaccine? Write a note on its types
    - A vaccine is a biological preparation , provides active acquired immunity to a particular disease.

Types of vaccines

Vaccines	Nature of vaccine	example
Live attenuated	Use the aged, weak virus	MMR vaccine, chickenpox vaccine
Killed vaccine	Use killed virus	Polio vaccine
Toxoids	Use the toxins secreted by microorganism	DPT vaccine
Second generation vaccine	Surface antigen of the pathogen	Hepatitis -B- vaccine
Third generation vaccine	Contains the purest vaccine	DNA vaccine

29. Explain the Structure of HIV



- Belongs to the genus Lentivirus
- Spherical, 100-120 nm in dia.
- Has a dense core surrounded by a lipoprotein envelope.
- Envelope has Glycoproteins, gp 120, and gp 41
- Inner core has two single stranded RNA.
- Core is covered by capsid and another layer of matrix proteins

Define

Immunogen - substance capable of initiating an immune response.

Hapten: non immunogenic but can act with the products of a specific immune response.

Adjuvants : that can enhance the immune response to an antigen.

Epitope: an antigenic determinant and an active part of the antigen

Paratope: antigen binding site and is a part of the antibody

Anaphylaxis : sudden, severe hypersensitivity reaction as a result of mast cell degranulation

Bacterial diseases in human beings

Disease	**Diseases Causative agent**	**Site of infection**	**Mode of Transmission**	**Symptoms**
Cholera	Vibrio cholerae	Intestine	Contaminated food and water/ faecal oral route	Severe diarrhoea and dehydration
Tetanus (Lock jaw)	Clostridium tetani	Spasm of muscles	Through wound infection	Rigidity of jaw spasm of the muscles of the jawand face
Typhoid (Enteric fever)	Salmonella typhi	Intestine	Through contaminated food and water	Headache Abdominal discomfort, fever
Pneumonia	Streptococcus pneumoniae	Lungs	Droplet infection	Fever, cough, and brown sputum

Tuberculosis	Mycobacterium tuberculosis	Lungs	Droplet infection	Thick mucopurulent nasal discharge

Viral diseases in human beings

S.No.	Diseases	Causative agent	Site of infection	Mode of transmission	Symptoms
1	Common cold	Rhino viruses	Respiratory tract	Droplet infection	Nasal ongestion and discharge, headache
2	Mumps	Mumps virus (RNA virus), Paramyxo virus	Salivary glands	Saliva and droplet infection	Enlargement of the parotid glands
3	Measles	Rubella virus (RNA virus), Paramyxo virus	Skin and respiratory tract	Droplet infection	reddish rashes on the skin, neck and ears
4	Chicken pox	Varicella -Zoster virus (DNA Virus)	Respiratory tract, skin and nervous system	Droplet infection and direct contact	Mild fever with itchy skin, rash and blisters
5	Poliomyelitis	Polio virus (RNA virus)	Intestine, brain, spinal cord	Droplet infection	muscular stiffness and weakness, paralysis

CHAPTER - 11
BIODIVERSITY AND ITS CONSERVATION

Two Mark Questions

1. How many hotspots are there in India? Name them.
   There are four hotspots in India. They are
   - Himalaya
   - Western ghats
   - Sundalands
   - Indo Burma

2. Name the active chemical found in medicinal plant Rauwolfia vomitaria. What type of diversity it belongs to?
   The active ingredient is reserpine. The type of diversity is genetic diversity.

3. What are called endangered species? Give example.
   A species that has been categorized as very likely to become extinct. E.g. Bengal Tiger

4. What are Hotspots?
   Hotspots are areas characterized with high concentration of endemic species experiencing unusual rapid rate of habitat modification loss.

5. List the prominent wildlife Sanctuaries in Tamil Nadu.
   - Mudumalai wild life Sanctuary
   - Point Calimere wild life Sanctuary
   - Indira Gandhi Wild life Sanctuary
   - Vedanthangal Lake Birds wild life Sanctuary

6. List some National Parks in Tamil Nadu.
   - Guindy National park
   - Gulf of Mannar National Park
   - Mudumalai National Park
   - Mukurthi National Park
   - Indira Gandhi National Park

7. Define Species Richness.
   The number of species per unit area at a specific time. Eg. Western Ghats have greater Amphibian species than Eastern Ghats.

Three marks Questions

8. Name the different Biogeographical regions of India.
   (i) Trans- Himalayan Region (ii) Himalayas (iii) Indian Desert (iv) Western Ghats
   (v) Gangetic Plains (vi) Coastal region

9. What is Red Data Book? State its purpose
   - A catalogue of taxa facing risk of extinction.

   Purpose
   - To create awareness on the degree of threat to biodiversity.
   - Provide global index on declining biodiversity.
   - Identification and documentation of species at high risk of extinction.

10. Write the difference between Insitu and Exsitu conservation

Insitu Conservation	Exsitu Conservation
• Conservation of genetic resources in natural population • protecting an endangered species in its natural habitat or restoring the habitat Itself • Eg. National parks, Wild life Sanctuaries	• Placing of threatened species in special care locations for protection • Prevents extinction of organsims. • Eg. Zoological parks, Botanical gardens

11. List some Biosphere Reserves in Tamil Nadu.
    - Agasthyamalai
    - Nilgiri
    - Gulf of Mannar

12. Mention the effects of global climatic change
    - Increases land and ocean temperature
    - Resulting in melting of glaciers
    - Outbreak of diseases
    - Migration of animals.

13. How can we contribute to promote biodiversity conservation?
    - Identify and protect all threatened species
    - Air, water and soil should be conserved.
    - Wild life Protection Act should be implemented.

14. Write the reasons for richness of biodiversity in Tropics.
    - Average rainfall is more than 200 mm per year.
    - Climate seasons, temperature, humidity and photoperiods are more or less stable.
    - Rich resource and nutrient availability.

Five Mark Question

15. Alien species invasion is a threat to endemic species- Substantiate.
    - Exotic species are organisms often introduced unintentionally for commercial purpose, as biological control agents etc.
    - Tilapia fish introduced from east coast of South Africa into Kerala's inland waters became invasive. Puntius dubius and Labeo kontius face local extinction.
    - Introduction of Nile Perch in East Africa led to the extinction of 200 nature species of Cichlid fish in lake.
    - Papaya Mealy Bug from Mexico and Central America destroyed huge crops of Papaya in Assam, Tamil Nadu and West Bengal.

16. Mention the major threats to biodiversity caused by human activities.
    - Human activities- Fragmentation and degradation due to agricultural practices, extraction (mining, fishing, logging) . Fragmentation leads to isolation of endangered species.
    - Specialized diet and habitat, small population size and limited geographic distribution.
    - Large mammals require larger areas
    - Mammals have low reproductive output.

17. Jhum cultivation is major threat to biodiversity in North eastern states – Substantiate.
    - In shifting cultivation, plots of natural tree vegetation are burnt away and the cleared patches are farmed for2-3 seasons.
    - After few years fertility reduces, and crop production become less.
    - The farmer then abandons this patch and cuts down a new patch of forest trees for crop production.
    - This system is practiced in north-eastern regions of India.
    - When vast areas are burnt, it results in loss of forest cover, pollution and discharge of Co2.
    - It leads to loss of habitat and climatic change.

18. List various causes for biodiversity loss/decline.
    - Habitat loss, fragmentation and destruction
    - Pollution and pollutants
    - Climatic change
    - Introduction of Alien species
    - Natural disasters

19. What is Extinction? Write an account on its types
    - Species is considered extinct when none of its members are alive anywhere in the world.
    - These are three types of extinction.
    - **Natural Extinction:** (i) It is a slow process of replacement of existing species with Better adapted species due to changes in environmental conditions, predators and diseases.

(ii) A small population can extinct soon.

- **Mass Extinction :** (i) The earth has experienced quite a few mass extinctions due to environmental catastrophes.

  (ii) 225 million years ago during the Permian 90% of shallow water invertebrates disappeared.

- **Anthropogenic extinction :** These are due to human activities like Hunting, habitat destruction, urbanization and industralisation. Eg. Dodo bird, Steller's sea cow.

20. Write about Coextinction.
    - Coextinction of a species is the loss of species as a consequence of extinction of other.
    - Eg. Calvaria tree and Dodo bird.
    - Calvaria tree is dependent on dodo bird for completion of its life cycle- Mutual association.
    - The tough horny endocarp of seeds of Calvaria tree are made permeable by the actions of large stones in bird's gizzard and digestive juices.
    - It makes germination easier.
    - The extinction of Dodo bird led to Calvaria tree coextinction.

21. Explain three levels of biodiversity.
    - There are three levels of biodiversity are
    - Genetic diversity (ii) Species diversity (iv) Ecosystem diversity

Genetic diversity:

- It refers to differences in genetic make up between distinct species and to the genetic variation within species. Eg. Rauwolfia vomitaria, a medicinal plant in different ranges of Himalayas contains differences in concentration of reserpine.

Species diversity:

- It refers to variety in number and richness of species in any habitat.
- Eg. Western Ghats have greater Amphibian species diversity than Eastern ghats.

Ecosystem diversity:

- It is the variety of habitats, biotic communities and ecological processes in the biosphere.

Write short Notes

(i) Protected areas:

- These are biogeographical areas where biological diversity along with natural and cultural resources is protected, maintained and managed through legal measures.
- national parks, wild life sanctuaries and biosphere reserves.

(ii) Wild Life Sanctuaries(WLS)

- Sanctuaries are tracts of land where wild animals and fauna can take refuge without being hunted or poached.
- The main purpose is protecting endangered species.

(iii) Sacred Groves

Grove of trees that are of special religious importance to a particular culture.

(iv) Offsite collections

They are live collections of wild and domesticated species in Botanical Gardens, Zoological Parks, Wild life Safari Parks etc.

(v) Gene banks

A type of biorepository which preserve genetic materials gametes of threatened species can be preserved in fertile condition for long periods.

(vi) Habitat Fragmentation

Process where a large continuous area of habitat is reduced and divided into fragments.

CHAPTER – 12 / 13
ENVIRONMENTAL ISSUES

Two Mark Questions

1. Expand (i) CFC (ii) AQI (iii) PAN
    - CFC- Chloroflurocarbon
    - AQI- Air Quality Index
    - PAN – Peroxyacetyl Nitrate

2. Define Eutrophication.
   When run-off from land containing nutrients reaches water bodies like lakes, it results in dense growth of plant life.

3. What is Algal bloom?
   Water Pollution can cause eutrophication due to nutrient enrichment. This causes algal bloom.

4. Define Air Quality Index.
   Number used by Government agencies to communicate to the public how polluted the air is at a given time.

5. What are the source of water pollution?
   Municipal wastes, Industrial wastes, agricultural wastes.

6. Define Biological oxygen Demand (BOD)
   Amount of oxygen that would be consumed if all the organic matter in one litre of water were oxidized by bacteria.

7. What is colony-collapse syndrome?
   In honey bees, pesticides can lead to destruction of hives and lower agricultural productivity.

8. Write the aims of Namami Gange.
   Integrated conservation Mission - for effective abatement of pollution, conservation and rejuvenation of river Ganga.

9. Define Accelerated or cultural eutrophication.
   Pollutants from anthropogenic activities like effluents from industries can radically accelerate the aging process of water bodies.

10. What is SMOG and how it is harmful to us?
    - Smog is a type of air pollution caused by tiny particles in the air.
    - Creates ground-level ozone and reduces visibility.
    - Makes breathing more difficult for asthma people.

Three Mark Questions

11. Describe about control measures of air pollution.
    - Trees are the best remedy for air pollution
    - Forests act as carbon sinks and lungs of planet.
    - Electrostatic precipitators reduce release of industrial pollutants.

12. What are the steps taken by the Central and State Government in India to reduce air pollution?
    - Increase green cover along side road
    - Reducing carbon emissions
    - Encourage use of renewable energy

13. Write the effects of Noise pollution.
    - Heart disease, high blood pressure, stress, hearing loss.
    - Peptic ulcer, headache, memory loss occur
    - Affects marine animals.

14. Suggest some measures to control noise pollution.
    - Planting trees.
    - Workers should be provided with ear plugs and ear muffs.
    - Lubrication of machinery and regular servicing.

15. Write a note on the Hazardous effects of solid wastes.
    - Landfill sites produce foul smell if wastes are not stored & treated properly.
    - Pesticides, radioactive materials and plastics when burnt, produces dioxins.
    - These gases are toxic and carcinogenic and affect human health.

16. What is Biomagnification
    - When non-degradable substances enter food chain, they do not get metabolized or broken down or expelled and instead get transferred up the trophic levels of food chain.
    - During this process, they show increase in concentration.

17. Mention the effects of water pollution on Organisms
    - Can be lethal to aquatic organisms.
    - Clogs fish gills and feathers of aquatic birds.
    - Human can be affected by hepatitis, typhoid and fluorosis.
    - Causes Eutrophication.

Five Mark Questions

18. Classify degradable pollutants based on the time taken to breakdown.

    Rapidly degradable pollutants:

    These can be broken down by natural process. E.g. Domestic waste, vegetable waste.

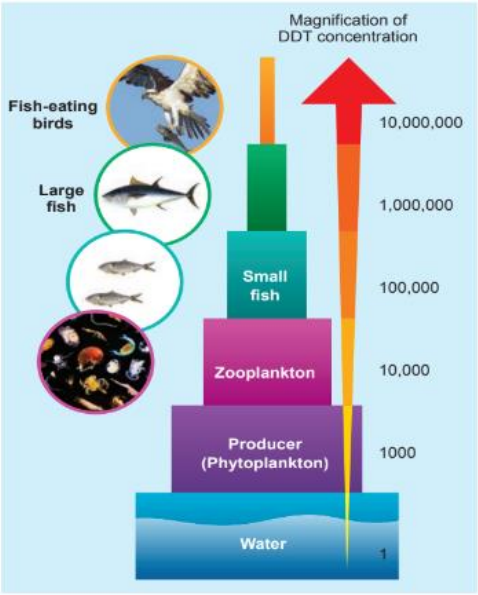
    Slowly degradable pollutants:

These pollutants remain in the environment for many years in an unchanged condition. E.g. DDT

Non degradable pollutants:

These cannot be degraded by natural processes. They are difficult to eliminate and continue to accumulate. E.g. Chromium, Nickel.

19. Explain about biomagnification of DDT



- When non degradable substances enter the food chain, they do not get metabolised or broken down or expelled.
- They get transferred up the trophic levels of the food chain.
- During this process, they show an increase in concentration which is referred to as biomagnification.
- This results in increased toxicity and can be lethal.
- In an aquatic food chain, concentration of DDT is enhanced at successive trophic levels.

20. Write the methods of disposal of radioactive waste.

Limit generation:

- Limiting the generation of waste is the first and most important consideration.

Dilute and disperse:

- For wastes having low radioactivity, dilution and dispersion are adopted.

Delay and decay:

- Much of the radioactivity in nuclear reactors and accelerators is very short lived. So it is an important strategy.
- Concentrate and confine process:
- It is used for longer lived radioactivity. The waste is contained in corrosion resistant containers and transported to disposal sites.

21. What are agrochemicals? Mention its effects?

Chemicals which are used in agriculture for growth of plants and pest control are called agrochemicals.

Effects:

- May kill beneficial bacteria and soil organisms.
- Can cause eutrophication in water bodies.
- Chemicals can cause skin rashes and irritation of eyes.
- Beneficial insects and animals can be affected.
- Many chemicals are reported to be carcinogenic.

22. Write an account on waste water management?

Waste water originates from domestic waters, industrial wastes and animal wastes.

Primary treatment:

- Floating debris removed by sequential filtration
- Soil and pebbles removed by sedimentation.

Secondary or Biological Treatment

- The primary effluent is passed into large aeration tanks.
- This allows vigorous growth of useful aerobic microbes into flocs.
- While growing, the microbes consume the major part of the organic matter in the effluent.
- The sewage water is treated till the BOD is reduced.

Tertiary treatment

- Final process
- Improves the quality of the waste water before it is used
- Removes the remaining inorganic compounds.
- UV is an ideal disinfectant for waste water since it does not alter the quality and inactivates harmful microbes.

23. Explain the effects of air pollution.

- Affects all organisms as they depend on atmosphere for respiration.
- Decreases body's capacity to fight infections in respiratory system and reduces body's defense mechanism.
- Causes irritation in throat, nose, lungs, eyes and breathing problems like asthma.
- Increases the risk of cardiovascular diseases, induce hardening of arteries, cardiac arrhythmia even heart attack.
- Gas leaks can be lethal or affect the quality of air.

24. Write about E-waste and its disposal.

Electronic waste or e- waste are discarded electrical electronic devices as well as any refuse created by discarded electronic devices and components involved in their manufacture or use.

Eg. Personal computer- lead
Switches - Mercury
Steel components - Cobalt
PCB

Disposal : Reuse, Resale, Salvage, Recycling

Short Notes:

(i) **Peroxyacetyl nitrate**

- a secondary pollutant present in photochemical smog.
- It is thermally unstable
- Causes eye irritation.

(ii) **Global warming**

- Increase in the concentrations of greenhouse gases
- causes greenhouse effect, warming of the earth, resulting in sea level

(iii) **Ozone depletion**

- Thinning of the stratospheric ozone layer
- Causes the 'ozone hole' resulting in poor screening of the harmful UV
- Increase in incidences of skin cancer.

(iv) **Acid rain**

- It is a form of precipitation that contains sulphuric acid or nitric acid.
- It damages trees, crops and harms marine animals

(v) **organic farming**

- Method of farming system which aims at cultivating the land and raising crops in such way so as to keep the soil alive and in good health by use of organic wastes.

(vi) **Medical waste**

- Any kind of waste that contains infectious material generated by hospitals, laboratories, medical research centres, veterinary clinics etc.
- Medical waste contains blood, urine, body parts, bandages, gloves, needles, swabs and tissues.

(vii) **Waste disposal:**

- Incineration, chemical disinfection, autoclaving, encapsulation, microwave irradiation. Final disposal- land fill and burying.

(viii) **Plastic Waste**

- Plastic are low molecular weight organic polymers that are non-degradable in the natural environment.
- E.g. toys, carry bags, food containers
- Remedies: **R**efuse, **R**educe, **R**euse, **R**ecycle.

(ix) **Ecosan toilets**

- Ecological sanitation is a sustainable system for handling human excreta by using dry composting toilets.
- Ecosan toilets generate natural fertilizer from recycled human excreta.

(x) catalytic converters

Catalytic converters in vehicles help to reduce polluting gases drastically.

Additional Questions

1. Holandric genes
   The genes present in the differential region of Y chromosome.

2. Applications of karyotyping
   - Helps in gender identification
   - Helps to identify the abnormalities of chromosomes
   - Genetic diseases in human beings can be detected

3. Symptoms of Down's syndrome
   - Severe mental retardation
   - Flattened nose
   - Malformed ears
   - Mouth constantly open

4. Extra chromosomal/cytoplasmic inheritance(Zoology)
   The cytoplasmic extra nuclear genes have a characteristic pattern of inheritance do not resemble the genes of nuclear chromosomes.

5. Define
   Eugenics(zoology)
   - Wellborn.
   - Application of laws of genetics for the improvement of human race.

   Euphenics(Zoology)
   - The symptomatic treatment of genetic disease of man.

   Euthenics(Zoology)
   - The science of improvement of existing human race by improving the environmental conditions.

6. Tata box
   In Eukaryotes, the promoter has Adenine – Thymine rich regions

7. Pribnow box
   In prokaryotes, the promoter has Adenine – Thymine rich regions

8. Salient features of genetic code
   - It is a triplet code
   - It is universal
   - It is commaless
   - UAA, UAG UGA are the stop codons

9. Applications of DNA fingerprinting
   - **Forensic analysis -** used in the identification of a person involved in criminal activities
   - **Pedigree analysis -** for detecting inherited diseases
   - **Conservation of wildlife -** protection of endangered species

- **Anthropological studies -** useful in determining the origin and migration of human population and genetic diversities

10. Darwin's theory of Natural selection-Postulates
    - Overproduction
    - Struggle for existence
    - Universal occurrence of variations
    - Origin of species by natural selection

11. Gene therapy
    Involves the transfer of a normal gene into a person's cells that carries one or more mutant alleles

12. Differentiate somatic cell gene therapy and germ line gene therapy

Somatic cell gene therapy	**Germ line gene therapy**
Therapeutic genes are transferred into somatic cells	Therapeutic genes are transferred into the germ cells
Introduction of genes into bone marrow cells, blood cells, skin cells etc	Genes introduced into eggs and sperms
will not be inherited in later generations.	Heritable and passed on to later generations

13. Stem cells
    - Stem cells are undifferentiated cells found in most of the multicellular animals
    - they have the ability to differentiate into all types of cells that are derived from ectoderm, endoderm and mesoderm

14. Steps involved in polymerase chain reaction (PCR)
    - Denaturation
    - Renaturation
    - Primer extension

15. Advantages of cloning
    - Helps in the production of proteins and drugs in the field of medicine
    - Aids stem cell research
    - To save endangered species

16. Disadvantages of cloning
    - Process is tedious and very expensive
    - Causes animals to suffer
    - They age faster and are less healthy than the parent

17. Paedogenesis
    Soil is formed from rocks which are the parent materials of soil by weathering and is called embryonic soil

18. Functions of soil
    - Medium for plant growth

- Means for water storage and purification
- Habitat for many organisms

19. Adaptations of aquatic animals
    - Streamlined structure helps in swift movement
    - presence of Air bladders for buoyancy
    - Respiration by gills

20. Adaptations of terrestrial animals
    - Secretion of mucus to maintain moisture e. g Earthworm
    - Birds breed before rainy season. Rarely reproduce during drought
    - Camels excrete highly concentrated urine

21. Applications of PCR
    - To study the differences in the genomes of two different organisms.
    - In the field of forensic medicine, to identify the criminals.
    - For the amplification of specific DNA segments, in gene therapy.

22. Functions of Immunoglobulin/antibodies
    - Opsonisation
    - Agglutination
    - Precipitation
    - Neutralization

23. Polycystic Ovary Syndrome (PCOS)
    Complex endocrine disorder in women.
    Partially formed follicles on the ovaries with immature eggs.
    Symptoms: irregular menstrual cycle, Obesity, hirsutism.

24. Birth Rate

$$\text{Birth rate (b)} = \frac{\text{number of birth per unit time}}{\text{average population}}$$

25. Death Rate

$$\text{Death rate (d)} = \frac{\text{number of deaths per unit time}}{\text{average population}}$$

26. Analysis of two species population interactions

S. NO.	TYPES OF INTERACTION	SPECIES 1	SPECIES 2	GENERAL NATURE OF INTERACTION	EXAMPLES
1	Amensalism	–	0	The most powerful animal or large organisms inhibits the growth of other lower organisms	Animals destroyed at the feet of elephants
2	Mutualism	+	+	Interaction favorable to both and obligatory	Between crocodile and bird
3	Commensalism	+	0	Population 1, the commensal benefits, while 2 the host is not affected	Sucker fish on shark
4	Competition	–	–	Direct inhibition of each species by the other	Birds compete with squirrels for nuts and seeds
5	Parasitism	+	–	Population 1, the parasite, generally smaller than 2, the host	*Ascaris* and tapeworm in human digestive tract
6	Predation	+	–	Population 1, the predator, generally larger than 2, the prey	Lion predatory on deer