



MARCH-2020 (AP)

PREVIOUS PAPERS**IPE: MARCH-2020(AP)****Time : 3 Hours****JR.ZOOLOGY****Max.Marks : 60****SECTION-A****I. Answer ALL the following VSAQ:****10 × 2 = 20**

1. Write the full form of IUCN. In which book threatened species are enlisted.
2. Mention the animals that exhibited a 'tube -within-a-tube' organisation for the first time? Name their body cavity.
3. What is the strongest cartilage? In which regions of the human body, do you find it?
4. "Cardiac muscle is highly resistant to fatigue". Justify.
5. What are the two chief morphological 'body forms' of cnidarians?
What are their chief functions?
6. Name the four extra embryonic membranes.
7. List any two differences between a flagellum and cilium.
8. Why do we refer to the offspring, formed by asexual method of reproduction, a clone?
9. What do you mean by parasitic castration? Give one example.
10. What is biological magnification?

SECTION-B**II. Answer any SIX of the following SAQs:****6 × 4 = 24**

11. Define species. Explain the various aspects of 'species'.
12. Describe the three types of cartilage.
13. What are the salient features exhibited by polychaetes?
14. Name the four 'hallmarks' of chordates and explain the principal function of each of them.
15. Give an account of pseudopodia.
16. Distinguish between hypertrophy and hyperplasia with an example for each.
17. Draw a neat labelled diagram of the salivary apparatus of cockroach.
18. What is summer stratification? Explain.

SECTION-C**III. Answer any TWO of the following LAQs:****2 × 8 = 16**

19. Describe the life cycle of *Plasmodium vivax* in mosquito.
20. Describe the digestive system of cockroach with the help of a neat labelled diagram.
21. (a) What are the deleterious effects of depletion of ozone in the stratosphere?
(b) Describe Green House Effect.

IPe AP MARCH-2020

ANSWERS

SECTION-A

1. Write the full form of IUCN. In which book threatened species are enlisted.

[APM-20][TS M-19]

- A: 1) IUCN stands for International Union for Conservation of Nature and natural resources.
2) Threatened species are enlisted in 'Red Data Book' of IUCN.

2. Mention the animals that exhibited a 'tube -within-a-tube' organisation for the first time? Name their body cavity.

[AP M-15,18,20]

- A: 1) 'Tube-within-a-tube' organisation is first formed in **Nematoda**.
2) The body cavity in Nematodes is **Pseudocoelom**.

3. What is the strongest cartilage? In which regions of the human body, do you find it?

[TS May-19][AP M-16,20][TS M-15]

- A: 1) 'Fibrous cartilage' is the strongest cartilage.
2) It is present in intervertebral discs and pubic symphysis of pelvis.

4. "Cardiac muscle is highly resistant to fatigue". Justify. [AP M-20][TS May-17]

- A: Cardiac muscle is highly resistant to fatigue because it has numerous sarcomeres, many molecules of myoglobin and rich supply of blood for continuous aerobic respiration.

5. What are the two chief morphological 'body forms' of cnidarians? What are their chief functions? [AP M-19]

- A: 1) The chief morphological body forms of cnidarians are (i) Medusa form (ii) Polyp form
2) Chief function of medusoid form is reproduction and polypoid form is nutrition.

6. Name the four extra embryonic membranes. [AP M-20][TS M-17,20]

- A: The four extra embryonic membranes are (a) Amnion (b) Allantois (c) Chorion (d) Yolk sac

7. List any two differences between a flagellum and cilium. [APM-17,19,20] [TS M-16,18,20]

A:	Flagellum	Cilium
	1) Flagellum is long whip like locomotor organelle .	1) Cilium is small hair like structure.
	2) Flagellum performs undular movement.	2) Cilium performs pendular movement.
	3) Flagellum helps in locomotion	3) Cilium helps in locomotion, food collection, movement of materials and also sensory.

8. Why do we refer to the offspring, formed by asexual method of reproduction, a clone?

[APM-19,20][TS Mar-17]

- A: 1) The term clone is used to describe morphologically and genetically similar individuals which are exact copies of their parent.
- 2) Lower organism produce offspring by asexual reproduction.
- 3) The offspring show 'uniparental inheritance' without any genetic variation, hence they are called a clone.

9. What do you mean by parasitic castration? Give one example.[APM-20][TS M-20]

- A: 1) Degeneration of gonads (testis) of the host due to presence of a parasite is called parasitic castration.

[TS May-19]

- 2) **Ex:** Sacculina (a crustacean parasite) causes degeneration of ovaries in the crabs.

10. What is biological magnification?

[AP M-20]

- A: 1) Gradual increase in the concentration of pollutants at successive trophic levels in an aquatic food chain is called Bio-magnification.
- 2) **Ex:** DDT concentration in a sample water is 0.003 ppb through biomagnification it reaches to 5 ppm in fish eating birds.

SECTION-B

11. Define species. Explain the various aspects of 'species'. [TS M-16,17][IPE-14]

A: I) Species:

[AP M-20,22]

- 1) It is the **basic unit** of classification of living organisms.
- 2) John Ray described species on the basis of common descent(ancestors)
- 3) **Buffon' s def:** Species is an interbreeding groups of similar individuals, sharing a common gene pool and producing fertile offspring.

II) Various aspects of Species:

- 1) Species is a breeding unit, as it isolates reproductivity of individuals .
- 2) Species is an ecological unit, as its shares the same ecological niche
- 3) Species is a genetic unit, as it shows similarity in the karyotype.
- 4) Species is an evolutionary unit, as it exhibits similar structural and functional characters.
- 5) Species is dynamic, as it reflects continuous tendency for change.

12. Describe the three types of cartilage.

[AP M-18,20][TS 18,20]

A: I) Cartilage:

- 1) It is a solid flexible connective tissue.
- 2) It has collagen fibres, elastic fibres, chondroblasts enclosed in lacunae and surrounded by perichondrium.
- 3) Cartilage has no blood supply.
- 4) Growth and regeneration of cartilage takes place by the activity of perichondrial cells.
- 5) Perichondrium has blood capillaries.

II) Types of Cartilage: There are three types of cartilage.

1) Hyaline cartilage:

- i) Bluish white, translucent cartilage.
- ii) It has delicate collagen fibres.
- iii) It is the weakest and most common cartilage.
- iv) **Ex:** Walls of nose, costal cartilage, trachea, bronchus and larynx.

2) Elastic cartilage:

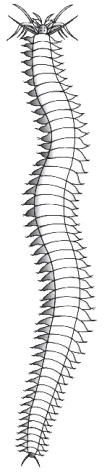
- i) It is yellow.
- ii) It has elastic fibres in addition to collagen fibres.
- iii) It provides strength and elasticity.
- iv) **Ex:** Pinna, Eustachian tube and epiglottis.

3) Fibrous cartilage:

- i) Matrix has bundles of collagen.
- ii) It is strongest cartilage.
- iii) Perichondrium is absent.
- iv) **Ex:** Intervertebral discs and pubic symphysis.

13. What are the salient features exhibited by polychaetes? [TS M-16, 19][AP-18,20]**A: Salient features of Polychaetes:**

- 1) Polychaetes are **marine annelids**.
- 2) They are **commonly bristle worms or clam worms**.
- 3) Many are **free moving forms**. Others **live in tubes**.
- 4) Distinct head with **sense organs like eyes, tentacles and palps are present**.
- 5) Parapodia are locomotor organs.
- 6) Parapodia **serve respiration in addition to gills**.
- 7) **Clitellum and Gonoducts are absent**.
- 8) They are **bisexual**.
- 9) Sex cells are released into coelom and pass out through nephridiopores.
- 10) Fertilisation is external.
- 11) **Larva is Trochophore**.
- 12) **Ex:** Nereis (sandworm), Aphrodite (sea mouse), Arenicola (lugworm)

**Nereis****14. Name the four 'hallmarks' of chordates and explain the principal function of each of them. [TS M-16] [AP M-18,20,22]****A: 'Hallmark' characters of chordates:**

- 1) Notochord:** It is present in all chordates at some stage of life. It is rod like structure located above the alimentary canal and below the nerve cord. It is supportive in function. It is **mesodermal** in origin.
- 2) Nerve cord:** There is a dorsal tubular fluid, filled nerve cord present above the notochord. In vertebrates the anterior end becomes the brain and the rest of the cord becomes spinal cord. It coordinates various functions of the body. It is **ectodermal** in origin.
- 3) Pharyngeal gill slits:** The pharynx is perforated on either side which become gill slits. They are well developed in aquatic lower vertebrates and lower chordates. They are reduced and non functional in higher vertebrates. They help in exchange of gases (respiration). They are **ecto-endodermal** in origin.
- 4) Postanal tail:** Part of the body that projects beyond the anus is tail. Generally it has vertebral column, blood vessel and muscles. It helps in locomotion, balancing, prehensile (5th leg) and defence organ.

15. Give an account of pseudopodia.**[TS May-19][AP M-19,20,22]**

A: I) Pseudopodia: Pseudopodia means false feet. They are temporarily formed for locomotion and food collection in Rhizopods. They are extensions of cytoplasm in the direction of movement.

II) Types of Pseudopodia:

(1) Lobopodia - Blunt, finger like pseudopodia. **Ex:** Amoeba and Entamoeba

(2) Filopodia - Filamentous pseudopodia. **Ex:** Euglypha

(3) Reticulopodia - Network like pseudopodia. **Ex:** Elphidium

(4) Axopodia or Heliopodia - Ray like pseudopodia **Ex:** Actinophrys

III) Process of formation:

- 1) Pseudopodium is formed by conversion of gel cytoplasm to sol cytoplasm and vice versa (Sol to gel)
- 2) Sol-gel theory is the most accepted theory.
- 3) Allen's theory 'Front contraction' or 'fountain zone' theory is more appropriate.
- 4) Actin and myosin molecules also have a role.
- 5) Pseudopodial movement or amoeboid movement is performed by Amoeba, Entamoeba, macrophages, neutrophils etc.

16. Distinguish between hypertrophy and hyperplasia with an example for each.

A: 1) Hypertrophy: Some parasites cause abnormal increase in the size of the host cell which finally ruptures. **[AP,TS M-20]**

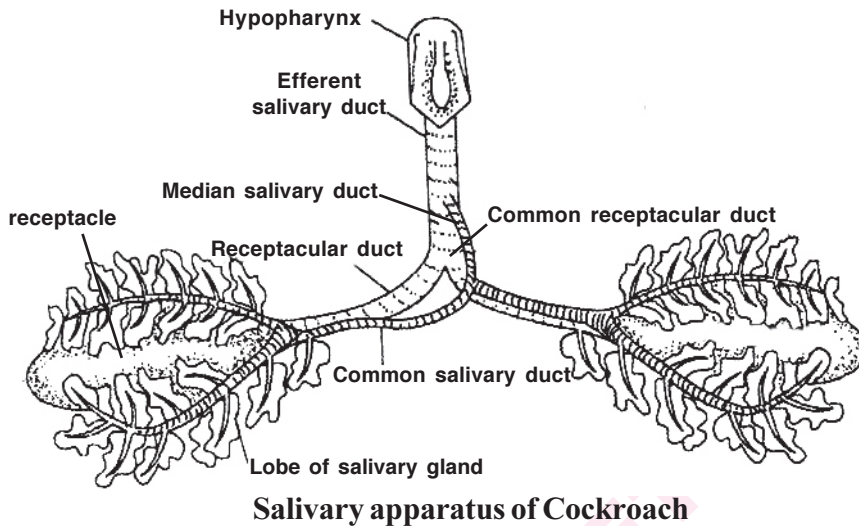
Ex: Plasmodium causes increase in the size of RBC which finally bursts.

2) Hyperplasia: Some Parasites cause increase in the size of the organ by increasing the number of cells. This causes inconvenience or death to the host.

Ex: Fasciola hepatica lives in bile ducts of sheep. It blocks the passage of bile duct by increasing the cells.

17. Draw a neat labelled diagram of the salivary apparatus of cockroach.

A:



18. What is summer stratification? Explain.

[TS M-17,20] [AP M-18,20]

A: **I) Summer Stratification:** During summer, in temperate lakes, the formation of three layers of water is called Summer stratification.

During summer the temperature of lakes rises upto 25°C . Hence, periodic circulation of water takes place. Then three types of layers are formed.

1) Epilimnion 2) Thermocline 3) Hypolimnion

1) Epilimnion: The upper, warm, oxygen rich layer of water having a temperature range of 21°C - 25°C is called epilimnion.

2) Thermocline: The below layer of epilimnion is called thermocline or metalimnion.

Here, the temperature decreases at the rate of 1°C per meter.

3) Hypolimnion: The bottom layer where the temperature is about 7°C is called Hypolimnion.

In this layer, the water is stagnant, relatively cool, nutrient rich, low oxygen content due to absence of Photosynthetic activity.

II) Autumn overturn is followed by Summer Stratification:

1) During Autumn the temperature of surface water falls to 4°C .

2) The water becomes heavy when the temperature is at 4°C . It sinks to the bottom. The bottom water comes to the surface with many nutrients. This circulation is called autumn (fall) over turn.

3) Due to autumn overturn uniform temperature and uniform distribution

SECTION-C

19. Describe the life cycle of Plasmodium vivax in mosquito. [AP, TS M-16,17,22]

A: Life cycle of Plasmodium in Mosquito(Mosquito Phase)- Ross Cycle: [AP Mar-20]

Gametocytes of Plasmodium are formed in man and their further development takes place in female Anopheles mosquito.

When a female Anopheles mosquito bites and sucks the blood of a malaria patient, the gametocytes along with the other stages of the erythrocytic cycle reach the crop of mosquito. Here all the stages are digested except the gametocytes.

Further part of the life cycle consists of four phases.

I) Gametogony II) Fertilization III) Formation of Ookinete & Oocysts IV) Sporogony

I) Gametogony: The formation of male and female gametes from the gametocytes is called gametogony. It occurs in the lumen of the crop of mosquito.

(1) Formation of male gametes:

- i) During this process, the nucleus of microgametocyte divides into eight daughter nuclei.
- ii) The eight daughter nuclei pass into eight flagella like structures and form male gametes.
- iii) Then the flagella like structures begin lashing movements and get separated from the flagellated body. This process is called **exflagellation**.

(2) Formation of female gamete:

- i) The female gametocyte undergoes a few changes and transforms into a female gamete. This process is called maturation.
- ii) The nucleus moves towards the periphery, and the cytoplasm forms a projection called **fertilization cone**.

II) Fertilization: The fusion of male and female gametes is called fertilization.

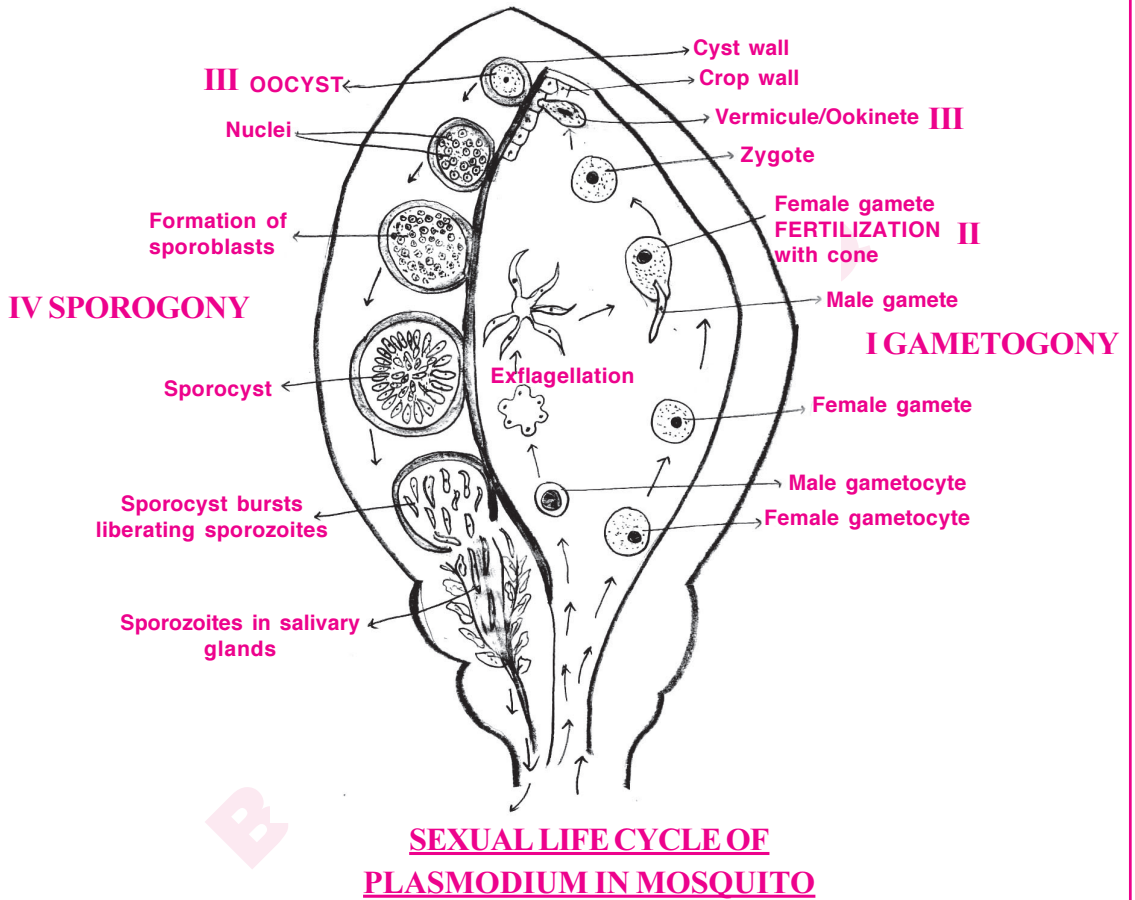
- 1) One of the active male gamete comes in contact with the 'fertilization cone' of the female gamete and enters into it.
- 2) The pronuclei and cytoplasm of these two gametes fuse with each other. As a result the zygote is formed.
- 3) These gametes are dissimilar in size and hence the process is called anisogamy.

III) Formation of Ookinete & Oocysts:

- 1) The **zygote elongates and becomes motile** and is called ookinete within **18 to 24 hours**.
- 2) It pierces the wall of the crop and settles beneath the basement membrane.
- 3) It becomes round and secretes a cyst around its body.
- 4) This encysted ookinete is now called oocyst

IV) Sporogony: The oocyst enlarges in size and begins sporogony.

- 1) According to Bano, the nucleus of the oocyst first undergoes reduction division.
- 2) Then the nucleus divides repeatedly by mitosis and produces a number of nuclei.
- 3) Each bit of nucleus is surrounded by a little bit of the cytoplasm and it transforms into a sickle shaped sporozoite. Oocyst with such sporozoites (about 10,000) is called sporocyst.
- 4) Sporocysts are formed into spindle shaped sporozites.
- 5) From there, they travel into the salivary glands and become ready for infection of a healthy person.
- 6) The life cycle of plasmodium in mosquito is completed in about **10 to 24 days**.



20. Describe the digestive system of cockroach with the help of a neat labelled diagram.**A: Digestive system of Cockroach:****[AP M-20][TS May-19][TS Mar-19]**

The digestive system of cockroach consists of I. Alimentary canal II. Digestive glands.

I) Alimentary canal: The alimentary canal extends from mouth to anus.

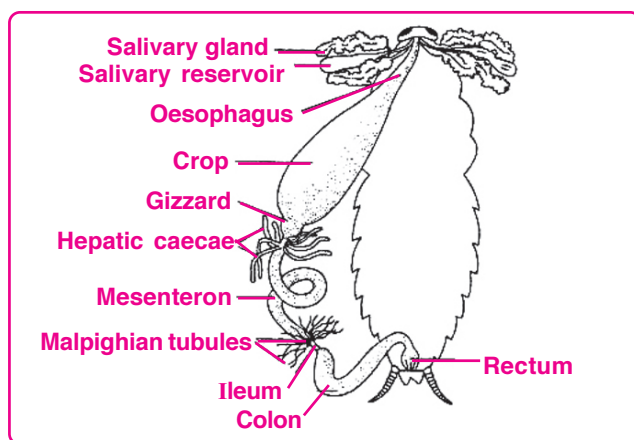
It is divided into 3 regions. They are (I) Foregut (II) Midgut (III) Hindgut

1) Foregut (Stomodaeum):

- i) Foregut has pharynx, oesophagus, crop and gizzard.
- ii) Pharynx is a very short tube. It leads into a narrow tubular oesophagus.
- iii) Oesophagus opens into a sac like crop. It stores food for digestion.
- iv) Its outer surface is covered by tracheal tubes.
- v) Behind the crop there is a thick walled muscular gizzard.
- vi) The chitinous inner lining of the gizzard has six powerful teeth.
- vii) These teeth form an efficient grinding apparatus.
- viii) Thus Gizzard acts as a grinding mill and sieve.
- ix) The membranous funnel projected into mesenteron from gizzard is called stomodeal valve.
- x) This valve prevents backward movement of food from mesenteron into gizzard.

II) Midgut(Mesenteron):

- i) It is a short narrow tube.
- ii) Anterior part of midgut contains 6 to 8 finger shaped diverticula called hepatic caecae.
- iii) These are helpful in digestion and absorption of digested food material.
- iv) The anterior part of midgut is secretory and posterior part is absorptive.
- v) Secretory part secretes enzymes.
- vi) The food bolus is surrounded by chitinous and porous peritrophic membrane which is secreted by the funnel like stomodeal valve of the gizzard.
- vii) It protects midgut wall from hard food particles.



II) Hindgut (Proctodaeum):

- i) It is a long coiled tube.
- ii) The hindgut is divided into ileum, colon and rectum.
- iii) There is a sphincter between mesenteron and hindgut.
- iv) The sphincter prevents back movement of undigested food and uric acid from the hindgut to midgut.
- v) Ileum collects uric acid from Malpighian tubules which are present at the anterior end of ileum.
- vi) Colon is a long, coiled tube. It opens into short and wide rectum which opens out through anus.
- vii) Rectum has 6 longitudinal folds called rectal papillae. They absorb water from undigested food.
- viii) Entire hindgut is internally lined by cuticle.

II) Digestive glands: The digestive glands of cockroach includes

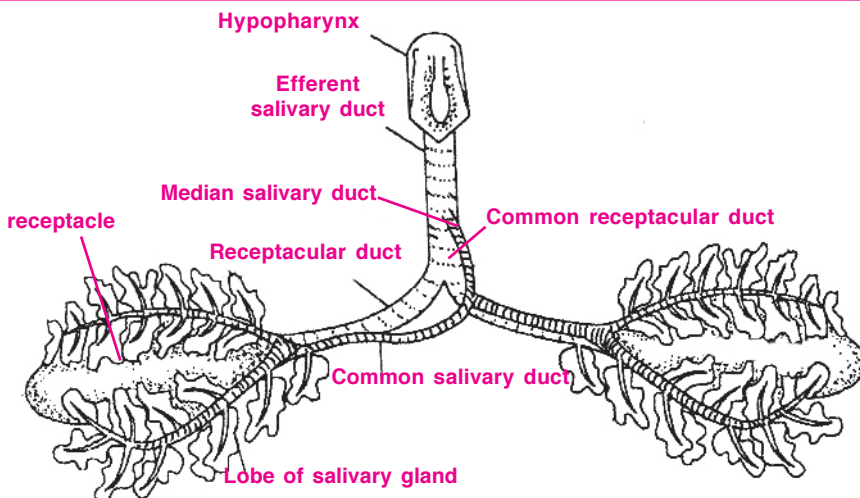
(1) Salivary glands (2) Hepatic caecae (3) Glandular cells of mesenteron.

1) Salivary glands:

- i) A pair of salivary glands are present on either sides of the crop.
- ii) Each salivary gland has two lobes
- iii) Each lobe has many lobules called acini.
- iv) Each acinus is made up of secretory cells called zymogen cells.
- v) All the zymogen cells are connected by ductules.
- vi) The ductules open into a common salivary duct. The two common salivary ducts are joined to form the median salivary duct.
- vii) There is a pair of salivary receptacles to store saliva.
- viii) The receptacular ducts unite to form common receptacular duct.
- ix) The median salivary duct is connected to common receptacular duct to form an efferent salivary duct.
- x) The efferent salivary duct opens at the base of hypopharynx in mouth cavity.
- xi) Saliva is secreted by zymogen cells which contains starch digesting enzyme amylase.

2) Hepatic caecae: There are six to eight finger like diverticula called hepatic caecae which contain secretory and absorptive cells

3) Glandular cells of Mesenteron: Glandular cells of mesenteron secrete maltase, invertase, proteases and lipase.



SALIVARY APPARATUS OF COCKROACH

21. (a) What are the deleterious effects of depletion of ozone in the stratosphere?

(b) Describe Green House Effect.

A: (a) Deleterious effects of depletion of ozone in the stratosphere:

- When ozone layer is depleted markedly in stratosphere, it leads to ozone hole. [AP M-19,20]
- Then ozone layer becomes very thin and it can't prevent the UV radiation completely.
- Then the UV radiations with shorter wavelengths (UV-B) enter the earth surface.

Deleterious(Harmful) effects of depletion of ozone:

- 1) UV rays damage DNA and may induce mutations.
- 2) They cause aging of skin, damage to skin cells and cause skin cancer.
- 3) High concentrations of UV-B radiation results in inflammation of cornea.
- 4) This leads to snow blindness and cataract. Some times it permanently damages cornea.

(b) Green house effect: 'Green house effect' is a naturally occurring phenomenon, that is responsible for heating of the Earth's surface and atmosphere.

- 1) When sunlight reaches the outer most layer of the atmosphere, it absorbs some radiation.
- 2) About one fourth of solar radiation is reflected back by clouds and gases and only half of the incoming solar radiation reaches the earth surface and earth gets heated.
- 3) Then a small portion of heat is reflected back into the atmosphere. Due to the presence of green house gases CO_2 and methane a major part of the radiation again reflects back to the earth surface.
- 4) Due to this, earth surface heats up once again (Global warming). This phenomenon is called Green house effect.

Kyoto protocol: To save earth from the dangers of global warming. 191 countries have signed the protocol in Kyoto of Japan to reduce the emission of green house gases to the level of 1990.