

Previous IPE  
**SOLVED PAPERS**

**MARCH-2024 (TS)**

**PREVIOUS PAPERS****IPE: MARCH-2024(TS)****Time: 3 hours****JR.ZOOLOGY****Max.Marks: 60****SECTION-A****I. Answer ALL the following VSAQ:****10 × 2 = 20**

1. What is meant by tautonymy? Give two examples.
2. What is cephalization? How is it useful to its possessors?
3. Mention any two substances secreted by mast cells and their functions.
4. Define osteon.
5. What is Aristotle's lantern? Give one example of an animal possessing it?
6. Distinguish between altricial and precocial hatchlings.
7. What is a kinety?
8. Distinguish between proter and opisthe.
9. The eggs of *Ascaris* are called 'mammillated eggs'. Justify.
10. What are circadian rhythms?

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

11. What are the reasons for greater biodiversity in the tropics?
12. Write a short note on lymph.
13. Mention the general characters of Arcahnida.
14. Describe the structure of the heart of frog.
15. Give an account of pseudopodia.
16. What are the adverse effects of tobacco?
17. Draw a neat labelled diagram of the mouthparts of cockroach?
18. Describe Green House Effect.

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

19. Describe the respiratory system of cockroach with the help of neat and labelled diagrams.
20. Describe different types of food chains that exist in an ecosystem.
21. Describe the life cycle of *Plasmodium vivax* in mosquito.

# IPE TS MARCH-2024

## ANSWERS

### SECTION-A

1. What is meant by tautonymy? Give two examples.

[AP M-16,17,24][TS M-17,20,22,23,24]

**A:** 1) The practice of naming the animals in which the generic name and specific name are the same is called tautonymy.

2) **Ex-1:** Naja naja- The Indian cobra      **Ex-2:** Axis axis- Spotted deer

2. What is cephalization? How is it useful to its possessors? [TS M-20,24][AP May-17]

**A:** 1) **Cephalization** is the formation of nerve and sensory cells at the anterior part of the body.

2) Animals with cephalization can sense the new environment and move efficient that the other animals in seeking food, locating mates and in avoiding or escaping from predators.

3. Mention any two substances secreted by mast cells and their functions. [AP M-16]

**A:** 1) Heparin, histamine, bradykinin and serotonin are secreted by Mast cells.

2) **Heparin** is an **anticoagulant**. [TS M-16,24]

3) **Histamine** and **Bradykinin** are **Vasodilators**.

4) **Serotonin** is **Vasconstrictior**

4. Define osteon. [TS M-20,24][AP M-15,23,24]

**A:** **Osteon:** In a dense bone, a Haversian canal and the surrounding lamellae and lacunae are collectively called Osteon or Haversian system. It works as transport system.

5. What is Aristotle's lantern? Give one example of an animal possessing it?

**A:** 1) **Aristotles lantern** is a complex **5 jawed masticatory apparatus**. [AP -17,22,24][TS -17,20,24] present in **buccal cavity** of **sea urchins**.

2) **Ex:** Echinus (Sea urchin)

**6. Distinguish between altricial and precocial hatchlings.****[TS M-24]**

- A:** 1) **Altricial** is the condition in which the hatchlings (young birds) depend upon parents for food and protection, until they acquire feathers and wings. It is present in birds of flight.
- 2) **Precocial** is the condition in which the young birds do not depend on parents for food. They can collect their food. It is present in flight less birds.
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**7. What is a kinety?****[AP M16] [AP May-19,22][TS 16,19,23,24][TS May-17]**

- A:** 1) **kinety**: It is of longitudinal row of kinetosomes and their inter connecting kinetodesmata
- 2) **Kinety** is a part of **infra ciliary system of ciliates**.
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**8. Distinguish between proter and opisthe. [TS 15,17,24, May-19] [AP 15,17,18,23,24]**

- A:** 1) The **Proter** is the **anterior individual**.

It receives anterior contractile vacuole, cytopharynx and cytostome of parent.

- 2) The **Opisthe** is the **posterior individual**.

It receives posterior contractile vacuoles and develops other organelle.

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**9. The eggs of Ascaris are called 'mamillated eggs'. Justify. [AP Mar-19] [TS M-18,19,24]**

- A:** The eggs of Ascaris have a protein outer coat which has papillae hence looks rippled. So it is called mamillated egg.
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**10. What are circadian rhythms?****[TS M-15,22,24]**

- A:** 1) The **biological rhythms** that occur in a time period of 24 hours are called Circadian rhythms.
- 2) Biological rhythms are behavior activities that are repeated at regular intervals.

**SECTION-B**

**11. What are the reasons for greater biodiversity in the tropics?**

[AP -19][TS M-18,22]

- A:**
- 1) Tropics are the regions on either side of equator.
  - 2) Tropical latitudes remained undisturbed for millions of years.
  - 3) Tropics had long undisturbed evolutionary time.
  - 4) This long duration helped speciation and species diversity.
  - 5) Tropical climate are more constant which promoted niche speciation and greater biodiversity.
  - 6) Solar energy and water are abundant in nature. Hence food production also leads to greater biodiversity.

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**12. Write short notes on lymph.**

[TS M-22,24]

- A:**
- 1) Lymph is a colourless fluid.
  - 2) The interstitial fluid that passes through lymphatic system is called lymph.
  - 3) Lymph contains plasma and lymphocytes.
  - 4) It contains less amount of nutrients and oxygen but has more  $\text{CO}_2$  and other metabolites.
  - 5) Lymph is formed in interstitial space. When blood passes through capillaries then nutrients, oxygen and other materials diffuse into interstitial space, due to hydrostatic pressure.
  - 6) Most of the fluid in interstitial space enters blood. But a small portion reach the lymph vessels and becomes lymph.
  - 7) Finally, lymph reaches the blood through subclavian veins, near heart.
  - 8) Lymphatic system provides an 'accessory route' by which interstitial fluid flows back to blood.

**13. Mention the general characters of Arachnida.**

[AP M-24] [AP May-19]

**A: General characters of Arachnida:**

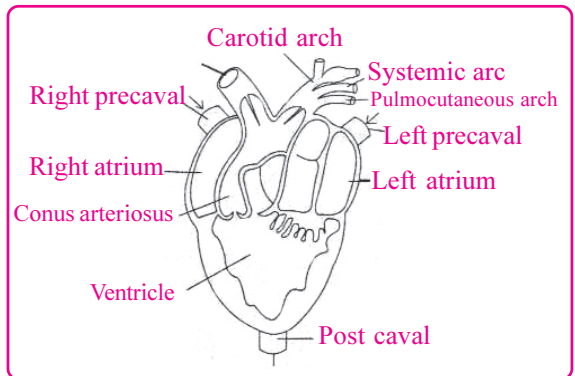
- 1) Arachnida are **terrestrial chelicerate arthropods**.
- 2) Their body can be divided into prosoma and opisthosoma.
- 3) Prosoma has six pairs of appendages.
  - a) a pair of chelicerate
  - b) a pair of pedipalps
  - c) 4 pairs of walking legs.
- 4) Spinnerets of spider secrete spider silk. Spinnerets are modified abdominal appendages.
- 5) Respiratory organs are book lungs(scorpion) and tracheae(some spiders).
- 6) Respiratory pigment is haemocyanin contains copper.
- 7) Excretory organs are malpighian tubules and coxal glands.
- 8) Development is direct. **No larval stage**.
- 9) Scorpions are **Viviparous**. Ex: Palamnaeus (scorpion), Aranea (spider), Sarcoptes (itch mite)

**14. Describe the structure of the heart of frog.**

[APM-24][TS M-19]

**A: Structure of heart of frog:**

- 1) Frogs heart is a **muscular pump** located in upper part of the body cavity.
- 2) Frogs heart is **three chambered**.
- 3) There are **two auricles and one ventricle**.
- 4) **Double layered pericardium** surrounds the heart and protects it from mechanical shocks.
- 5) **Sinus venosus** is a triangular chamber opening into right atrium (auricle) on the dorsal side of the heart.
- 6) The **ventricle opens** into conus arteriosus on the ventral side of heart.
- 7) **Conus arteriosus** bifurcates and each branch give rise to three aortic arches namely carotid, systemic and pulmocutaneous.
- 8) Blood from the heart goes to various parts **through aortic arches**.
- 9) Three major veins collect blood and joins sinus venosus.
- 10) Circulation of frog is described as incomplete **double circulation**.

**FROG HEART**

**15. Give an account of pseudopodia. [TS M-24][TS May-19] [AP M-19,20,22,24]**

**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:**

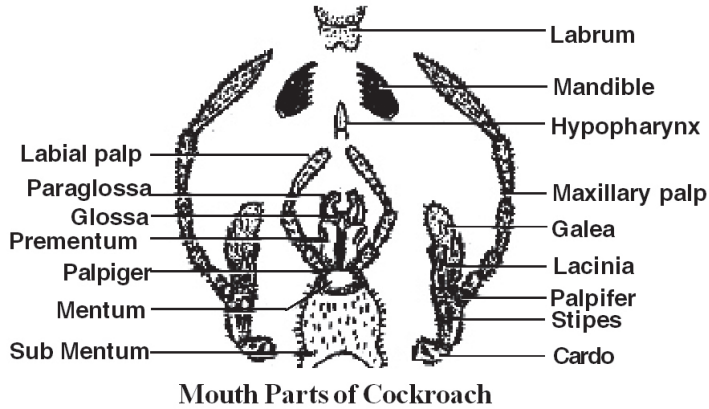
- 1) Pseudopodium is formed by conversion of gel cytoplasm to sol cytoplasm and vice versa (Sol to gel)
- 2) Sol-gel theory is the most accepted theory.
- 3) Allen's theory 'Front contraction' or 'fountain zone' theory is more appropriate.
- 4) Actin and myosin molecules also have a role.
- 5) Pseudopodial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

**16. What are the adverse effects of tobacco? [TS M-17,19,22, 23,24] [IPE-14]**

**A: Adverse effects of Tobacco: [AP Mar -16,19, May-19]**

- 1) Tobacco is smoked, chewed as gutkha or snuffed.
- 2) Smoking increases carbon monoxide level in blood and reduces oxygen level.
- 3) Tobacco contains Nicotine, an alkaloid.
- 4) Nicotine stimulates adrenal gland.
- 5) The hormones adrenaline and non-adrenaline increase blood pressure and heart rate.
- 6) It causes bronchitis, emphysema, coronary heart disease and gastric ulcers.
- 7) It increases the incidence of cancer of throat, lungs and urinary bladder.

17. Draw a neat labelled diagram of the mouthparts of cockroach?



18. Describe Green House Effect. [AP Mar, May-17][IPE-14][TS 23,24]

**A: 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  $\text{CO}_2$  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.

This phenomenon is called Green house effect.



**SECTION-C**

19. Describe the respiratory system of cockroach with the help of neat and labelled diagrams?

[AP M-16,18] [TS M-15,19]

**A: 1) Respiratory system of cockroach:**

It is explained in two parts I) Tracheal System II) Mechanism

I) Tracheal system consists of (1) Stigmata (2) Tracheae (3) Tracheoles.

**1) Stigmata (spiracles):**

- i) The external openings of tracheal system are called stigmata (or) spiracles.
- ii) There are ten pairs of spiracles.
- iii) The first two pairs are in thorax. Remaining eight pairs are present in the abdominal segments.
- iv) Spiracles are located on the pleura.
- v) The respiratory system of cockroach is described as polypneustic (having more than 3 pairs of spiracles) and Holopneustic (all the spiracles are functional).
- vi) All spiracles are valvular. Each spiracle is supported by a chitinous ring peritreme.
- vii) The spiracle has hair like trichomes to filter dust from air.

**2) Tracheae:**

- i) All the stigmata open internally into small chambers called atria.
- ii) In thoracic region, horizontal tracheae arise from atria.  
They join to form dorso cephalic and ventrocephalic trunks.
- iii) Branches from these trunks enter various parts of head.  
Lateral longitudinal trunks are also present.
- iv) Three tracheal tubes arise from each abdominal atrium.
- v) They open into 3 longitudinal trunks, namely dorsal, lateral and ventral longitudinal trunks.
- vi) These trunks of both side are connected by commissural tracheae.
- vii) Branches are given out from all these trunks to various parts of the body.
- viii) The tracheal wall has three layers. They are  
(a) Outer basement membrane (b) Middle epithelium (c) Inner cuticle called intima.
- ix) Intima is produced into a spiral thickening called Taenidia.
- x) Taenidia prevents the collapse of tracheae, when air is not present in it.

**3) Tracheoles:**

- i) Trachea ends in tracheoblast cell. It has several intra cellular tubules called tracheoles.
- ii) Intima and taenidia are absent in tracheoles. Their inner surface is lined by a protein called trachein.
- iii) Tracheoles are filled with tracheolar fluid.

**II) Mechanism:** Respiration involves two events namely inspiration and expiration.

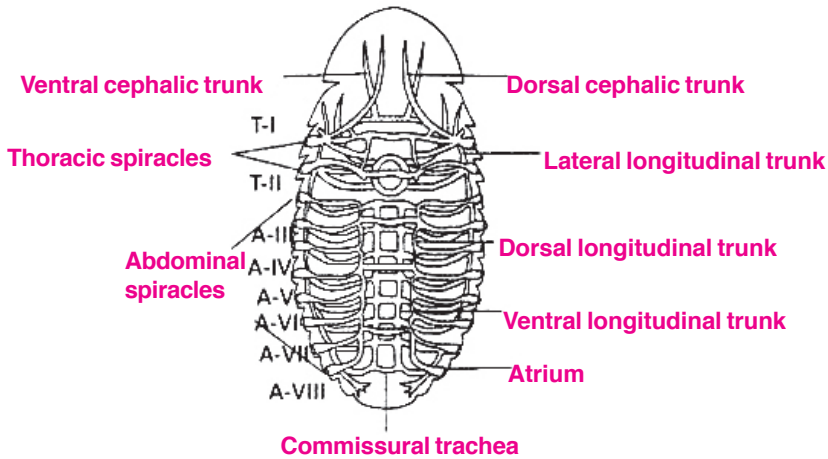
The muscles that help in this process are dorsoventral and ventral longitudinal muscles.

**1) Inspiration:**

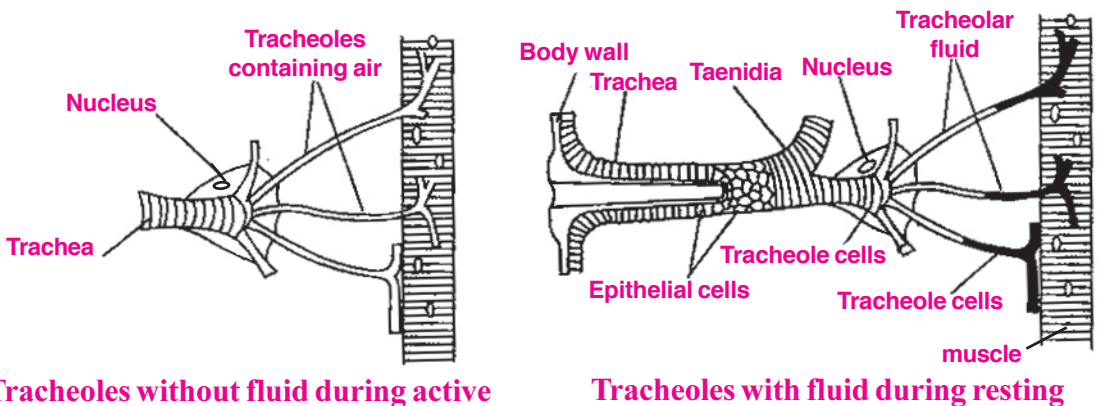
- i) Taking in of air is inspiration. The volume of body is increased by relaxation of dorsoventral and ventral longitudinal muscles. Air is drawn into tracheal tubes and reaches tissues.
- ii) During inspiration, thoracic spiracles are kept open and abdominal spiracles are closed.
- iii) Inspiration is a passive process (does not use energy)

**2) Expiration:** Sending out air is Expiration.

- i) During expiration, thoracic spiracles are closed. The thoracic spiracles are closed and abdominal spiracles are kept open.
- ii) Expiration is an active process as it uses energy.
- iii) Opening and closing of spiracles is influenced by  $\text{CO}_2$  tension in haemolymph and  $\text{O}_2$  tension in trachea.



**RESPIRATORY SYSTEM OF COCKROACH**



## 20. Describe different types of food chains that exist in an ecosystem.

[TS May-22][AP, TS Mar-19][AP May-17] [AP, TS M-16][IPE-14]

### A: I) Food Chain:

- 1) Sun is the main source of energy to ecosystem.
- 2) The biological systems of environment have several food levels called trophic levels.
- 3) A trophic level is composed of organisms which have same source of energy and same number of transferring steps. There are generally 3 to 5 trophic levels.
- 4) Sometimes, a given species may occupy more than one trophic level. **Ex:** Sparrow
- 5) The food energy always passes from lower trophic level to higher trophic levels.
- 6) When the food path is linear, the components resemble the links of a chain. Hence, it is called food chain.
- 7) The food chain generally ends in decomposers.

### II) Types of Food Chains:

- 1) Grazing food chain
- 2) Parasite food chain
- 3) Detritus food chain.

**1) Grazing food chain:** It is also called predator food chain. The first trophic level is occupied by green plants (producers). Second trophic level is occupied by Herbivores. The third, fourth and fifth trophic levels are occupied by primary, secondary and tertiary carnivores respectively.

- Ex:**
- i) Rose bush → aphids → spiders → small birds → hawks.
  - ii) Grass → Grass hopper → Frog → Snake → Hawk
  - iii) Grass → Goat → Man
  - iv) Plants → Caterpillar → Lizard → Snake
  - v) Grass → Deer → Tiger.

**2) Parasitic Food chain:** In this, the food energy passes from large organisms to small organisms. The first trophic level is occupied by large trees. They provide shelter and food to a variety of birds, reptiles and mammals. These animals form the second trophic level. Each of these animals host many ecto and endo parasites.

**Ex:** Tree → Birds, lizards, mammals → parasites.

**3) Detritus Food chain:** This food chain begins with detritus. Detritus is dead organic matter of leaves, dead bodies and **faeces** of animals. Detritus has decomposers which secrete enzymes, that break down detritus into simple absorbable substance. Detritus feeders are earthworms, flies and maggots which form the second trophic level.

**Ex:** Detritus → Earthworms → Frogs → Snakes → Hawks.

• **Food web:** The food chains are not isolated chains. They are interconnected. They form a web called food web. The feeding relationships are not simple. There are omnivores which complicate the chains. **Ex:** Man, Bear, Crow.

## 21. 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 Ookinetic & 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.**

