

FUNCTIONAL ANATOMY OF NON-CHORDATES

Unit No. 1 Systematic position, Habits, Habitat and External characters of Grasshopper.

Q. 1. Multiple choice questions (2 Marks each)

- 1) Grasshopper is a _____
a) Pest, b) Predator, c) Pathogen, d) None of above.
- 2) The class of Grasshopper is _____
a) Crustacea, b) Insecta, c) Gastropoda, d) Ciliata.
- 3) The mouthparts of Grasshopper are of _____ type.
a) Mandibulate, b) Siphoning c) Piercing and sucking, d) Spongi
- 4) Grasshopper prefers to live in _____ .
a) Fresh water, b) Marine water, c) Grassland, d) Ice land.
- 5) The abdomen of Grasshopper is _____ segmented.
a) Six, b) Ten, c) Thirteen, d) Fifteen.

Q. 1/ Q. 3(b)/ Q. 5 (b) Define/Explain / Comment / Sketch and label (2 marks each)

- 1) Hypognathus, 2) Mandibulate type of mouthparts, 3) Insect,
- 4) Wings, 5) Antenna 6) Legs,
- 7) Uniramous, 8) Biramous 9) Ocelli,
- 10) Tympanum, 11) Bilateral Symmetry 12) Maxilla,
- 13) Systematic Position of grasshopper.

Q. 3. (a) Question for 3 marks.

- 1) Sketch and label- Head of grasshopper

Unit No. 2. Digestive system of Grasshopper.

Q. 1. Multiple choice questions (2 marks each)

- 1) _____ is the part of alimentary canal of grasshopper.
a) Heart, b) Crop, c) Kidney, d) Ovary.
- 2) The number of hepatic caecae in grasshopper are _____ pairs.
a) Two, b) Four, c) Six, d) Eight.
- 3) Hindgut of grasshopper includes _____ .
a) Pharynx, b) Oesophagus, c) Crop, d) Rectum.
- 4) The gizzard is also called as _____

- a) Salivary duct, b) Proventriculus, c) Malpighian tubules,
d) None of above.

5) Grasshopper feeds on _____

- a) Solid food, b) Liquid food, c) Vegetable food, d) None of above

Q. 1/ Q. 3(b)/ Q.5(b) Define / Explain / Comment / Sketch and label (2 marks each)

- 1) Gastric caecae 2) Gizzard, 3) Malpighian tubules 4) Faecal pellets

Q. 2. and Q. 4 : Short notes / sketch and label (4 marks each)

- 1) Sketch and label- digestive system of grasshopper.
2) Mouth-Parts of grasshopper.
3) Describe food feeding and digestion in grasshopper.

Q. 3 (a) Question for 3 marks.

- 1) Describe food and feeding of grasshopper.

Q. 5 (a) Question for 6 marks.

- 1) Describe digestive system of grasshopper.

Unit. No. 3 Circulatory system of grasshopper.

Q. 1. Multiple choice questions (2 marks each)

- 1) The blood of grasshopper contains _____
a) Haemocytes, b) Lymphocytes, c) Monocytes, d) Thrombocytes.
2) The heart of grasshopper is _____ chambered structure.
a) Four, b) Seven, c) Ten, d) Twelve.
3) The lacunar type of circulatory system is also called as _____
a) Closed type, b) Open type, c) Open and closed type
d) None of above.
4) The blood of grasshopper enters into the chambers of heart through _____
a) Ostia, b) Alary muscles, c) anterior aorta d) None of above.

Q. 1/ Q.3 (b)/ Q. 5(b) Define / Explain / Comment / Sketch and label (2 marks each)

- 1) Haemolymph, 2) Haemocoel, 3) Anterior aorta.
4) Diagrammatic course of circulation of grasshopper.

Q. 3 (a) Question for 3 marks each.

- 1) Describe heart and alary muscles of grasshopper.

Q. 2 and Q. 4 Short notes / sketch and label (4 mark each)

- 1) Describe heart and aorta of grasshopper.

- 2) Sketch and label - circulatory system of grasshopper.
- 3) Mechanism of circulation in grasshopper.
- 4) Write a note on Haemolymph.

Q. 5 (a) Question for 6 marks.

- 1) Circulatory system of grasshopper.

Unit. No. 4 :- Respiratory system of grasshopper.

Q. 1 Multiple choice Questions (2 marks each)

- 1) _____ Pairs of spiracles are present in grasshopper.
a) Five, b) Ten, c) Fifteen, d) Twenty.
- 2) The respiratory organs of grasshopper are called as _____.
a) Lungs, b) Gills, c) Nostrils, d) Spiracles.
- 3) A fine, elastic, ectodermal respiratory tubes are called as _____.
a) Tracheae, b) Spiracles, c) Nasal chambers, d) None of above.
- 4) Intake of oxygen and given off carbon dioxide is called as _____.
a) Digestion, b) Respiration, c) Circulation, d) Excretion.

Q.1/ Q.3 (b)/ Q. 5 (b) Define / Explain / Comment / Sketch and label (2 marks each)

- 1) Respiration, 2) Trachea, 3) Ctenidia, 4) Sketch and label- an air sac
- 5) Diffusion, 6) Spiracles.

Q. 3 (a) Question for 3 marks.

- 1) Sketch and label- respiratory system of grasshopper.
- 2) Gaseous exchange.

Unit. No. 5 :- Excretory system of grasshopper.

- 1) The excretory organs of grasshopper are called as _____.
a) Uriniferous tubules, b) Malpighian tubules.
c) Green glands d) Rectal glands.
- 2) The malpighian tubules of grasshopper are located in between _____.
a) Pharynx and oesophagus, b) oesophagus and stomach,
c) Stomach and Intestine, d) None of above.

Q. 1/ Q. 3 (b)/ Q. 5 (b) Define / Explain / comment / Sketch and label (2 marks each)

- 1) Excretion, 2) Malpighian tubules, 3) Sketch and label- malpighian tubules.

Unit. No. 6 :- Nervous system and sense organs, of Grasshopper.

Q. 1. Multiple choice question (2 marks each)

- 1) The brain of grasshopper is also called as _____.
a) Sub-oesophageal ganglion, b) Supra-oesophageal ganglion,
c) Thoracic ganglion, d) Abdominal ganglion.
- 2) The supra-oesophageal ganglion and sub-oesophageal ganglion contains ___ cells.
a) Epithelial cells, b) Goblet cells, c) Neurosecretory cells,
d) None of above.
- 3) The chief function of _____ system is control and co-ordination.
a) Digestive system, b) Respiratory system c) Excretory system,
d) Nervous system.
- 4) The middle part of brain of grasshopper is called as _____ .
a) Protocerebrum, b) Tritocerebrum, c) Duetocerebrum,
d) Non of above
- 5) _____ ganglia are present in the abdomen of grasshopper.
a) Two, b) Five, c) Nine, d) Ten.
- 6) The function of Eye is _____ .
a) Smell, b) Touch, c) Hearing, d) None of above.
- 7) The Tympanum is called as _____ .
a) Tactile organ, b) olfactory organ, c) Visual organ,
d) Auditory organ.

Q. 1/ Q. 3 (b) / Q. 5 (b) Define / Explain / Comment / Sketch and label (2 marks each).

- 1) Thoracic ganglia, 2) Sub-oesophageal ganglion, 3) Tactile organs,
- 4) Olfactory organs, 5) Gustatory organs, 6) Peripheral nerves,
- 7) Sympathetic nerves, 8) Sketch and label - Tympanum of grasshopper,
- 9) Abdominal ganglia.

Q. 3 (a) Question for 3 marks.

- 1) Sketch, label and describe brain of grasshopper.
- 2) Sketch, label and describe ocellus of grasshopper.

Q. 2. and Q. 4 : Short notes / Sketch and label (4 marks each)

- 1) Describe supra-oesophageal ganglion.
- 2) Describe organs of sight or vision.

3) Auditory organs.

Q. 5 (a) Question for 6 marks.

- 1) Describe central nervous system of grasshopper.
- 2) Sense organs of grasshopper.

Unit No. 7 :- Reproductive system of grasshopper.

Q. 1. Multiple choice questions. (2 marks each)

- 1) The male reproductive organs are called as _____.
a) Testes, b) Ovaries, c) Oviducts, d) None of above.
- 2) The eggs of Grasshopper are also called as _____.
a) Sperms, b) Ova, c) Ovipositor d) None of above.
- 3) During copulation the sperms are received and stored in the _____.
a) Seminal receptacle, b) Ootheca, c) Ovary, d) None of above.
- 4) The egg laying apparatus of female grasshopper is called as _____.
a) Ovipositor, b) Ootheca, c) Accessory glands, d) None of above.

Q. 1/ Q. 3(b) / Q. 5 (b) Define / Explain / Comment (2 marks each)

- 1) Seminal receptacle, 2) Ovariole, 3) Testes, 4) Oviducts,
- 5) Vasa deferentia 6) Accessory glands, 7) Ejaculatory duct.

Q. 3 (a) Question for 3 marks.

- 1) Sketch, label and describe ovipositor of grasshopper.

Q. 2. and Q . 4 : Short notes / Sketch and label (4 marks each)

- 1) Sketch and label- male reproductive system of grasshopper.
- 2) Sketch and label- female reproductive system of grasshopper.
- 3) Write a note on ovaries of grasshopper.

Q. 5 (a) Question for 6 marks.

- 1) Describe male reproductive system of grasshopper.
- 2) Describe female reproductive system of grasshopper.

Unit No. 8 :- Life cycle of Grasshopper.

Q. 1 Multiple choice question (2 marks each)

- 1) A sperm coming from the seminal receptacle enters the egg through the small pore in the chorion is called as _____.
a) Appopyle, b) Prosopyle, c) Micropyle, d) None of above.

- 2) A female grasshopper uses her _____ to dig a short tunnel into the ground.
a) Legs, b) Mouth, c) Ovipositor, d) None of above
- 3) A single female grasshopper may lay about _____ eggs.
a) 100. b) 200, c) 400, d) 600.
- 4) The young grasshopper hatching from the egg is called as _____ .
a) Larva, b) Nymph, c) Adult, d) None of above.
- 5) A grasshopper is called as _____ pest.
a) Crop pest, b) Stored grain pest, c) Public health pest, d) Veterinary pest.

Q.1 / Q. 3 (b) / Q. 5 (b) Define / Explain / Comment / sketch and label (2 marks each).

- 1) Fertilization, 2) Moulting, 3) Metamorphosis, 4) Pest,
- 5) Egg pod, 6) Nymph, 7) Locust, 8) Swarm, 9) Bait,

Q. 3 (a) Question for 3 marks.

- 1) Describe copulation of grasshopper.

Q. 2 and Q. 4 : Short notes / Sketch and label (4 marks each).

- 1) Write short note on oviposition in grasshopper.
- 2) Write short note on development of grasshopper.
- 3) Sketch and label - oviposition and structure of egg pod.
- 4) Sketch and label - adult winged grasshopper.

Q. 5 (a) Question for 6 marks.

- 1) Describe in brief life cycle of grasshopper.
- 2) Sketch, label and describe oviposition of grasshopper.

Unit. No. 9 :- General topics.

Q. 1 Multiple choice questions (2 marks each)

- 1) A central cavity of *Leucosolenia* sponge is known as _____
a) Haemocoel, b) Spongocoel, c) Metacoel, d) Rhinocoel.
- 2) A peculiar characteristic of sponges is presence of _____ on the body.
a) Pores, b) Hairs, C) Cillia d) None of above.
- 3) The Nauplius larva belongs to class _____.
a) Gastropoda, b) Crustacea, c) Cephalopoda, d) Arachnida.
- 4) The foot in dentalium is modified as _____ .
a) Axial organ, b) Digging organ, c) Sensory organ,
d) Gliding organ.

- 5) The presence of shell on the body is a characteristic of phylum _____.
a) Arthropoda, b) Nematoda, c) Echinodermata, d) Mollusca.
- 6) A peculiar characteristic of phylum _____ is a presence of water vascular system.
a) Coelenterata, b) Annelida, c) Mollusca, d) Echinodermata.
- 7) In Asterias the water vascular system is useful for _____.
a) Circulation, b) Locomotion, c) Excretion, d) None of above.

Q. 1/ Q. 3 (b) / Q. 5 (b) Define / Explain / Comment / Sketch and label (2 marks each)

- 1) Choanocytes, 2) Spongocoel, 3) Ostia, 4) Osculum,
5) Diploblastic, 6) Euryphylous, 7) Aphodal,
8) Diploidal, 9) Appopyles, 10) Prosopyles, 11) Hypophare,
12) Metamerism, 13) Creeping, 14) Sketch and label - *Nauplius* larva,
15) Sketch and label- *Zoaea* larva, 16) Sketch and label - *Neopilina*
17) Madreporite, 18) Stone canal, 19) Tube feet,
20) Podium, 21) Cephalic arms, 22) Polian vesicle,
23) Tiedemann's body, 24) Pedal glands 25) Siphonal apparatus,
26) Propodium, 27) Ring canal, 28) Radial canal.

Q. No. 3 (a) Question for 3 marks.

- 1) Sketch and label - Sycon type of canal system.
2) Sketch and label - Rhagon type of canal system.
3) Mysis larva.
4) Burrowing gastropods.
5) Sketch and label- water vascular system of ophiuroid.
6) Cyclometamerism theory.
7) Sketch label and describe phyllosoma larva.
8) Give significance of larval stages of Crustacea.
9) Write a note on swimming gastropods.

Q. 2 and Q. 4 : Write short note / Sketch and label / Describe in brief. (4 marks each)

- 1) Ascon type of canal system.
2) Sycon type of canal system.
3) Rhagon type of canal system.
4) Metamerism in annelids.
5) Write a note on Nauplius larva.

- 6) Write short note on Metanauplius larva.
- 7) Sketch and label - Protozoa larva.
- 8) Write short note on Zoea larva.
- 9) Write a note on Alima larva.
- 10) Sketch and label- Megalopa larva.
- 11) Foot in Amphineura.
- 12) Foot in Scaphopoda.
- 13) Sketch and label- water vascular system in Asteroidea.
- 14) Sketch and label- water vascular system in Ophiuroidea.

Q. No. 5 Question for 6 marks.

- 1) Describe importance of canal systems in sponges.
 - 2) Sketch label and describe Ascon type of canal system.
 - 3) Sketch, label and describe Sycon type of canal system.
 - 4) Describe Leucon type of canal system.
 - 5) Sketch label and describe Rhagon type of canal system.
 - 6) Describe in detail Metamerism in annelids.
 - 7) Describe foot in swimming gastropod.
 - 8) Sketch label and Describe Byssus apparatus of pelecypoda.
 - 9) Describe water vascular system of Starfish.
 - 10) Describe water vascular system in Ophiuroidea.
 - 11) Describe water vascular system in Echinoidea.
 - 12) Describe water vascular system in Crinoidea
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