

ZOOLOGY: PRACTICAL**Duration : 5 hours****M.M. 50**

<u>S.No.</u>	<u>Exercise</u>	<u>Regular</u>	<u>Ex-Students</u>
1	Major dissection	10	15
2	Cell Biology/ Developmental Biology exercise	06	06
3	Mounting/ Slide preparation	04	04
4	Spots(10)	20	20
5	Viva-voce	05	05
6	Record	05	--
Total :-		50	50

Major Dissection marks will be given only if virtual dissection is available otherwise marks may be given according to availability of dissection alternate.

1. General survey of invertebrates (museum specimens):

The student is required to know classification, habit and habitat, economic importance etc.

- A Protozoa : *Entamoeba, Polystomella, Euglena, Noctiluca, Trypanosoma, Nyctotherus, Paramecium,*
- B Porifera : *Scypha, Hyalonema, Euplectella, Spongilla, Euspongia.*
- C. Coelenterata : *Physalia, Aurelia, Alcyonium, Corallium, Pennatula, Metridium*
- D Platyhelminthes : *Dugesia, Fasciola, Taenia, Schistosoma, Ascaris (male and female), Wucheraria, Enterobius*
and
Aschelminthes
- E Annelida and : *Nereis Heteronereis, Aphrodite, Arenicola, Chaetopterus Hirudinaria.*
- F Onychophora : *Peripatus.*
- G Arthropoda : *Limulus, Palamnaeus, Lepas, Balanus, Apus,*

Sacculina, Eupagurus, Carcinus, Lepisma, Pediculus, Bombyx, Apis, Julus, Scolopendra, Ixodes.

- H Mollusca : *Mytilus, Chiton, Teredo, Turbinella, Limax, Doris, Aplysia, Dentalium, Nautilus, Sepia, Octopus, Loligo, Pecten, Pinctada.*
- I Echinodermata : *Asterias, Pentaceros, Antedon, Ophiothrix, Holothuria.*
- J Hemichordata : *Balanoglossus.*

II. Study of the permanent slides, sections passing through different regions of animals and developmental stages.

- 1 Protozoa : Blood smears showing malarial parasite. *Paramecium*: Binary fission, conjugation.
- 2 Porifera : T.S. and L.S. of *Sycon*., spicules, spongin fibres and gemmules
- 3 Coelenterata : *Obelia* (colony and medusa), planula, scyphistoma and ephyra larvae of *Aurelia*, T.S. of mesentery of *Metridium*
- 4 Platyhelminthes : Miracidium, sporocyst, redia and cercaria larvae of *Fasciola*, scolex of *Taenia*, W.M. of mature and gravid proglottids of *Taenia*, hexacanth and cysticercus larvae of *Taenia*.
- 5 Aschelminthes : T.S. of *Ascaris*. (male and female)
- 6 Annelida : T.S. of *Nereis* through different regions, parapodia of *Nereis* and *Heteronereis*. Trochophore larva.
- 7 Arthropoda : V.S. of compound eye, nauplius, zoea, megalopa larvae and *Mysis*
- 8 Mollusca : T.S. of gill lamella and T.S. of shell of *Lamellidens*, glochidium larva.
- 9 Echinodermata : T.S. of arm, tube feet and pedicellaria, bipinnaria larva of starfish, echinopluteus larva.
- 10 Hemichordata : *Torneria* larva.

III Dissections: Various systems of preserved animals/Virtual dissection

Virtual dissection of Digestive, Blood Vascular, Excretory, Reproductive system of Frog Rat/Rabbit (if facility of virtual is made available by University)

1. *Pheretima* : General anatomy, digestive, nervous, excretory and reproductive systems.
2. *Palaemon* : Appendages, general anatomy, digestive system and nervous system.
3. *Cockroach* : Mouth parts, Alimentary canal and Reproductive system (only after permission from institutional animal ethical committee otherwise virtual)

IV Mountings: Permanent preparation of the following:

1. Protozoa : *Euglena, Paramecium*, ciliates, *Polystomella*.
2. Porifera : Sponge spicules, spongin fibres and gemmules.
3. Coelenterata : *Obelia* (colony and medusa)
4. Platyhelminthes : Proglottid of *Taenia*.
5. Annelida : Parapodia of *Nereis* and *Heteronereis*, ovary, septal nephridia and setae (*in situ*) of earthworm.
6. Arthropoda : Statocyst and hastate plate of prawn, salivary glands and tracheae of cockroach, W.M. of *Cyclops, Daphnia*, mouth parts of any 4 insects *Culex, Anopheles* male and female, housefly, cockroach and honey bee.
7. Mollusca : Gill lamella, glochidium larva, osphradium and radula of *Pila*.

Cell Biology

1. Prepared slides of mitochondria, Golgi bodies, centrosome, different stages of mitosis.
2. Buccal smear preparation for localization of mitochondria and Golgi complex using vital stains.
3. Preparation of Mitosis.
4. Squash preparation of polytene chromosomes.

Developmental Biology: Slides and specimen

- 1 W.M of eggs, early cleavage stage, T.S. of blastula and gastrula of frog.
 - 2 Study of chick embryo: 18 hours, 24 hours, 36 hours, 48 hours and 72 hours.
 - 3 T.S. of ovary and testis.
 - 4 Sperm smear to study the structure of sperm.
 - 5 Foetus with placenta.
- The teacher concerned will provide e-materials to practical in the form of video or demonstrations or written materials including dissections.

REFERENCE BOOKS (LATEST EDITIONS):

LIFE AND DIVERSITY OF ANIMALS (INVERTEBRATES)

- 1 Hickman C.P.Jr.,F.M. Hickman and L.S. Roberts, Integrated Principles of Zoology, Mosby College Publication. St. Louis.
- 2 Ayyar, E.K. and T.N.Ananthakrishnan, Manual of Zoology, Vol.1 (Invertebrata), Parts I and II. S, Viswanathan (Printers and Publishers) Pct. Ltd., Madras.
- 3 Jordan, E.L. and P.S.Verma, Invertebrate Zoology, S.Chand & Co. Ltd., Ram Nagar, New Delhi. (English and Hindi Editions).
- 4 Parker and Haswell, Text Book of Zoology, Vol.1, (Invertebrata), A.Z.T.B.S. Publishers and Distributors, New Delhi- 110051
- 5 Ismail, S.A., Vermicology: The Biology of Earthworms, Orient Longman, India.
- 6 Kotpal, RL. Agarwal and Khetrapal: Modern Text Book of Zoology: Invertebrates, Rastogi Publications, Meerut. (English and Hindi Editions)
- 7 Storer, T.I. and Usinger, K.L.: General Zoology, Tata McGraw- Hill Publishing Co., New Delhi.
- 8 Simpson, GG: Principles of Taxonomy, Oxford and IBH Publisher Co. New Delhi.

CELL AND DEVELOPMENTAL BIOLOGY :

- 9 Alberts, Bray, Lewis, Raff, Roberts and Watson, Molecular Biology of the Cell (Garland).
- 10 Balinsky, An Introduction to Embryology (CBS College Publishers)
- 11 Grant: Biology of Developing systems (Holt, Reihart and Winston).
- 12 Gilbert: Developmental Biology (Sinauer)
- 13 Alberts, B., et al., Molecular Biology of the Cell (Garland)
- 14 Lodish, H., et al., Molecular Cell Biology (Freeman).

PRACTICAL :

- 15 Verma, PS, A manual of practical Zoology S.Chand and Co. Ltd., Ram Nagar, New Delhi (English and Hindi Editions).
- 16 Lal, SS: Practical Zoology , Invertebrates, Rastogi Publication, Meerut (English and Hindi Editions).