

## FIRST YEAR T. D.C. SCIENCE, 2018-19

### ZOOLOGY

The first year TDC examination shall consist of three theory papers, each of three hours duration and a practical examination of five hours duration.

	<u>Marks</u>
<b>Paper-I: Life and Diversity of Animals-I (Invertebrates)</b>	<b>50</b>
<b>Paper-II : Cell Biology</b>	<b>50</b>
<b>Paper-III : Developmental Biology</b>	<b>50</b>
<b>Practical :</b>	<b>75</b>

#### **Pattern of question paper in the annual examination and distribution of marks:**

Each theory paper in the annual examination shall have three sections i.e. A,B, and C. In section A, total 10 questions will be set in the paper, selecting at least two from each unit. These questions are to be answered in a word or so. All questions are compulsory. Each question carries 0.5 mark, total 05 marks.

In section B, there shall be total 10 questions, selecting two questions from each unit, five questions to be answered by the student selecting at least one from each unit. Answer should be given in approximately 250 words. Each question carries 05 marks, total 25 marks.

In section C, 04 descriptive type questions will be set in the examination paper from five units of the syllabus of the paper, selecting not more than one question from a unit. Each question may have two sub divisions. Students are required to answer any two questions approximately in 500 words. Each question is of 10 marks, total 20 marks.

**FIRST YEAR T. D.C.SCIENCE, 2018-19**

**ZOOLOGY**

**PAPER-I: LIFE AND DIVERSITY OF ANIMALS-I (INVERTEBRATES)**

**Duration : 3 hours**

**M.M. 50**

**UNIT- I**

- 1 General characters and classification of Protozoa and Porifera (up to classes) with examples.
- 2 Type study: Paramecium. Parasitic protozoans and their Pathogenesis
- 3 Type study-Sycon.
- 4 Canal system in sponges.

**UNIT-II**

- 5 General characters and classification of Coelenterata and Ctenophora
- 6 Type study-Obelia.
- 7 Corals and coral reefs - their formation, kinds and importance. Polymorphism in Coelenterates, Metagenesis.
- 8 Affinities of Ctenophora

**UNIT-III**

- 9 General characters and classification of Platyhelminthes (upto classes) and Aschelminthes (upto phyla)
- 10 Type study –Fasciola , Taenia
- 11 Concept of pseudocoelom
- 12 General characters and classification of Nematoda (upto classes)
- 13 Type study: Ascaris
- 14 Endoparasites in relation to human diseases, parasitic adaptations of trematodes, cestodes, and nematodes.

**UNIT-IV**

- 15 General characters and classification of Annelida and Arthropoda (up to classes) with examples.
- 16 Concept of metamerism, segmentation and coelom
- 17 Type study-Pheretima, Periplaneta.

18 Economic importance of arthropods

#### **UNIT-V**

19 General characters and classification of Mollusca and Echinodermata (up to classes) with examples.

20 Type Study –*Pila* and *Asterias*

21 Concept of Torsion and its importance

22 Echinoderm larvae.

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**ZOOLOGY**

**PAPER II : CELL BIOLOGY**

**Duration : 3 hours**

**M.M. 50**

**UNIT -I**

- 1 Cell theory and its modern interpretation
- 2 Structure, function and general characteristics various types of cells
- 3 Prokaryotic and eukaryotic cells.

**UNIT -II**

- 4 Various models and hypothesis in understanding the structure of plasma membrane (Overton, Danielli and Davison, Robertsons and Fluid mosaic model)
- 5 Functions of plasma membrane and membrane transport
- 6 Cell cytoskeleton-Microtubule, Microfilament and Intermediate Filament.
- 7 Structure and function Cilia, flagella, Centriole and basal bodies.
- 8 Brief idea of cell cycle (General description of mitosis and meiosis).

**UNIT -III**

- 9 Structure and function of nucleus and nucleolus.
- 10 Nucleic acids: Watson and Crick model of DNA, chemical nature of DNA and replication of DNA.
- 11 Chemical nature and structure of various types of RNAs and basic concept of transcription

**UNIT -IV**

- 12 Structure and function of Ribosome
- 13 Structure and function of Endoplasmic Reticulum (Rough and Smooth)
- 14 Basic concept of Protein Synthesis.

## UNIT -V

- 15 Structure and function of Golgi. Concept of GERL system.
- 16 Structure and function of Mitochondria and Peroxisomes.
- 17 Structure, function and polymorphism of Lysosomes.

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**ZOOLOGY**

**PAPER- III : DEVELOPMENTAL BIOLOGY**

**Duration : 3 hours**

**M.M. 50**

**UNIT -I**

- 1 Aims and scope of developmental biology. Brief historical review and concepts of Embryology.
- 2 Neuroendocrine regulation of reproductive organs in brief.
- 3 Gametogenesis: Spermatogenesis and structure of sperm, oogenesis and structure of ovum, types of ova.

**UNIT -II**

- 4 Fertilization: Main events of fertilization, acrosome reaction, polyspermy preventing mechanisms.
- 5 Errors in fertilization and significance of fertilization. Parthenogenesis (In brief)
- 6 *In vitro* fertilization and test tube baby.
- 7 Embryo transplant.

**UNIT -III**

- 8 Cleavage: planes, patterns & types of cleavage.
- 9 Blastulation: Types of blastulae.
- 10 Gastrulation: fate maps, morphogenetic movements and their significance in gastrulation. Mechanism and main characteristic of gastrulation.

**UNIT -IV**

- 11 Elementary knowledge of fate of three germ layers.
- 12 Primary organizer and embryonic induction, concept of competence.
- 13 Determination, differentiation; Main characteristics of growth and regeneration.
- 14 Regeneration.

**UNIT -V**

- 15 Extra embryonic membranes: Development and functions.
- 16 Placentation: Definition, types, classification on the basis of morphology and histology. Functions of placenta.

**FIRST YEAR T.D.C. SCIENCE – 2018-19**

## ZOOLOGY: PRACTICAL

Duration : 5 hours

M.M. 75

<u>S.No.</u>	<u>Exercise</u>	<u>Regular</u>	<u>Ex-Students</u>
1	Major dissection	18	25
2	Cell Biology/ Developmental Biology exercise	09	12
3	Mounting/ Slide preparation	08	08
4	Spots(10)	20	20
5	Viva-voce	10	10
6	Record	10	--
<b>Total :-</b>		<b>75</b>	<b>75</b>

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

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

H Mollusca : *Mytilus, Chiton, Teredo, Turbinella, Laviculus, Limax, Doris, Aplysia, Dentalium, Nautilus, Sepia, Octopus, Loligo, Pecten, Solen, Pinctada.*

I Echinodermata : *Asterias, Pentaceros, Antedon, Ophiothrix, Holothuria.*

J Hemichordata : *Balanoglossus, Saccoglossus.*

**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*, rectal 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, R.L. 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, G.G.: 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, Reinhart 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, P.S., A manual of practical Zoology S.Chand and Co. Ltd., Ram Nagar, New Delhi (English and Hindi Editions).
- 16 Lal, S.S.: Practical Zoology , Invertebrates, Rastogi Publication, Meerut (English and Hindi Editions).