SECOND YEAR T. D.C.SCIENCE, 2018-19

ZOOLOGY

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

	Marks
Paper-I:Life and Diversity of Animals-II (Vertebrates)	**50**
Paper-II : Genetics and Biotechnology	**50**
Paper-III :Applied Zoology and Microbiology	**50**
Practical :	**75**

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 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.

SECOND YEAR TDC SCIENCE, 2018-19

ZOOLOGY

PAPER-I : LIFE AND DIVERSITY OF ANIMALS-II (VERTEBRATES)

Duration : 3 hours **M.M. : 50**

UNIT-I

1 Characteristics and classification of Protochordates and Agnatha upto orders with examples emphasizing their biodiversity, economic importance and conservation.

2 Type study- *Herdmania.*

3 Affinities of *Amphioxus* and importance of Ammocoete larva.

UNIT-II

4 Characteristics and classification of Pisces (after Berg) and Amphibia upto orders with examples emphasizing their biodiversity, economic importance and conservation.

5 Type study- *Scoliodon,* Fish Migration, Parental care in Amphibian.

UNIT-III

6 Characteristics and classification of Reptiles upto orders with examples emphasizing their biodiversity, economic importance and conservation.

7 Type study- *Calotes.* Identification of poisonous and non-poisonous snakes, venom, antivenom, medicinal significance of venom.

8 *Sphenodon*: Characteristics and affinities.

UNIT-IV

9 Characteristics and classification of Aves upto orders with examples emphasizing their biodiversity economic importance and conservation.

10 Type study - *Columba,* flight adaptations, perching mechanism, types of feathers.

11 Bird migration.

UNIT-V

12 Characteristics and classification of Mammalia upto orders with examples emphasizing their biodiversity, economic importance and conservation.

13 Type study – *Rattus*, (Digestive, respiratory and urinogenital systems only).

14 Dentition, hair and thermoregulation; integumentary derivatives.

SECOND YEAR TDC SCIENCE, 2018-19

ZOOLOGY

PAPER-II : GENETICS AND BIOTECHNOLOGY

Duration : 3 hours **M.M.: 50**

UNIT-I

1 Light and electron microscope structure of chromosome (from nucleosome to organization of chromatids. Morphological classification of chromosome).

2 Extra-chromosomal inheritance.

3 Chromosomal theory of sex determination, hormonal theory of sex determination, X and Y chromosomes, gynandromorphs.

UNIT-II

4 Brief history of genetics, mendelian laws and their significance.

5 Linkage and crossing over : kinds of linkage – complete and incomplete linkage, linkage groups, significance of linkage.

6 Genetic interaction: Complimentary gene, duplicate genes,supplementary gene and epistasis.

7 Multiple-gene inheritance, ABO blood group, Rh factor.

UNIT-III

8 Concept of gene, mucon, recon,cistron, gene expression -lac-operon and trip-operon.

9 Genetic engineering: Restriction enzymes, Palindrome sequences, cloning vehicle, C-DNA.

10 Applications of genetic engineering. Hybridoma technology.

UNIT-IV

11 Mutations: Definition, gene mutation, chromosomal mutation, chromosomal aberrations, somatic and germ mutations, numerical alterations of chromosomes, molecular basis of mutation, mutagenic agents

12 Polytene and lamp-brush chromosomes.

13 Eugenics and genetic counselling.

UNIT-V

14 Medicines and biotechnology: Microbes in medicine, antibiotics, vaccines, enzymes and antigens.

15 Food and dairy microbiology: Fermented food production, dairy products, food preservation, microbial spoilage, alcoholic beverages, and vinegar.

16 Role of Biotechnology in health care.

SECOND YEAR TDC SCIENCE, 2018-19

ZOOLOGY

PAPER-III : APPLIED ZOOLOGY AND MICROBIOLOGY

Duration: 3 hours **M.M.: 50**

UNIT - I

1 History, general account and scope of sericulture. Distribution of mulberry and non- mulberry silkworm.

2 Life history of *Bombyx mori*.

3 Rearing techniques of silkworm

(a) Brief account of environmental conditions of rearing and programming of mulberry cultivation.

(b) Rearing of silk worm.

4 Reeling of silk yarn.

5 Brief idea of diseases of silk worm.

UNIT-II

6 History, scope and general practices of pearl culture.

7 Rearing of pearl oyster:

(a) Indigenous methods of pearl culture.

(b) Modern methods of pearl culture.

8 Economic Importance of pearl and pearl culture.

9 Brief idea of diseases and enemies of pearl culture.

UNIT-III

10 Fin-fish culture and fisheries:

(a) Culturable fresh water fishes of India.

(b) Inland, marine and estuarine fisheries.

(c) Preservation of fishes.

(d) Economic importance of fishing industry.

UNIT-IV

11 Concepts of basic microbiology and its significance, theory of spontaneous generation, gram theory of fermentation and disease, work of Louis Pasteur.

12 General account of classification, structural organization, physiology and multiplication of bacteria.

13 General account of classification, structural organization, physiology and multiplication of bacteria.

14 Brief idea of Industrial, Medical and Environmental microbiology.

UNIT-V

15 DNA and RNA viruses

16 **AIDS:** Causative agents, Transmission, Pathogenicity, Prevention and Laboratory diagnosis of infections and treatment

SECOND YEAR TDC SCIENCE, 2018-19

ZOOLOGY - PRACTICAL

Duration : 5 Hrs. **M.M. :75**

S.No.	Exercise	Regular	Ex-Students
1	Major dissection	18	25
2	Minor dissection/	09	12
3	Mounting/Applied Zoology exercise	08	08
4	Spots	20	20
5	Viva-voce	10	10
6	Record	10	--
	Total :-	**75**	**75**

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

General survey of Vertebrates (Museum specimens)

A Urochordata : *Ciona, Pyrosoma, Doliolum, Salpa,*

B Cephalochordata : *Amphioxus*

C Agnatha : *Petromyzon*, Ammocoete larva

D Pisces : *Echeneis, Sphyrna, Torpedo, Pristis, Labeo, Clarias, Anabas, Hippocampus* (male and female), *Chimaera, Anguilla, Protopterus.*

E Amphibia : *Ichthyophis, Axolotl* larva, *Salamander, Bufo, Rana, Hyla, Pipa, Amphiuma, Alytes.*

F Reptilia : *Testudo, Trionyx, Hemidactylus, Draco, Calotes, Chamaeleon, Varanus, Phrynosoma, Heloderma, Naja, Vipera, Typhlops, Bungarus, Hydrophis, Eryx,* models of Dinosaurs.

G	Aves	:	*Columba, Psittacula, Passer, Bubo,* model of *Archaeopteryx*
H	Mammalia	:	*Pteropus, Rhinopoma, Felis, Erinaceous, Hystrix Crocedura, Manis.*

PREPARED SLIDES :

1	Cephalochordata	:	*Amphioxus*: T.S. through buccal region, T.S. through pharynx showing gonads, T.S. through caudal region.
2	Pisces	:	Placoid, cycloid and Ctenoid scales, V.S. of skin.
3	Amphibia	:	V.S. of skin, T.S. of testis, T.S. of kidney and T.S. of liver.
4	Reptilia	:	V.S. of skin and T.S. of stomach.
5	Aves	:	T.S. of intestine, T.S. of liver, T.S. of ovary, filoplume W.M.
6	Mammalia	:	T.S. of pancreas, T.S. of thyroid gland, L.S. of pituitary gland, T.S. of stomach, T.S. of intestine, L.S. of kidney, T.S. of testis and ovary and V.S. of skin, T.S. of lung.

PERMANENT PREPARATIONS: Unstained placoid scales, spicules of *Herdmania.*

DISSECTION (Virtual): Virtual dissection will be done (if facility of virtual is made available by University

Herdmania	:	Neural complex.
Scoliodon	:	Alimentary canal, scroll valve *in situ*, afferent and efferent branchial arteries, eye muscles, internal ear.
Digital animals	:	Arterial, venous and urino-genital systems.

OSTEOLOGY :

Identification of disarticulated skeleton of *Rana*, *Varanus, Gallus* and *Oryctolagus*. Palates of birds.

GENETICS:

Drosophila : Life cycle and its culture. Identification of wild and mutant *Drosophila.*

APPLIED ZOOLOGY:

1 Identification of different stages (from egg to adult) of silkworm.

2 Tools used in silk worm rearing.

3 Mounting of mouth parts and sting apparatus of honey bee.

4 Identification of cultivable varieties of shell fish and fin fish.

5 Gram staining of microbes.

- 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 (VERTEBRATES)

1 Ayyar, E.K. and T.N. Ananthakrishnan, Manual of Zoology, Vol.II (Chordata), S.Viswanathan (Printers and Publishers) Pvt. Ltd. , Madras.

2 Jordan, E.L. and P.S.Verma, Chordate Zoology and Elements of Animal Physiology, S. Chand & Co. Ltd., Ram Nagar, New Delhi (English and Hindi Editions).

3 Parker and Haswell, Text Book of Zoology, Vol.II (Chordata), A.Z.T.B.S. Publishers and Distributors, New Delhi- 110051.

4 Waterman, Allyn J. et.al., Chordate Structure and Function, Mac Millan and Co., New York.

5 Kotpal, RL, Modern Text Book of Zoology- Vertebrates, Rastogi Publications, Meerut (English and Hindi Editions).

6 Ganguly, BB, Sinha, AK and Adhikari, S : Biology of Animals, Vol.II, New Central Book Agency (P) Ltd. Kolkatta.

7 Alexander, R.M.: The Chordates (Cambridge University Press).

8 Monielth, A.R: The Chordates (Cambridge University Press).

9 Young, J.Z : Life of Vertebrates (Oxford University PressL)

10 Waterman, A.J: Chrodata - Structure and Function (Macmillan Co.).

GENETICS AND BIOTECHNOLOGY:

11 Verma, P.S. and V.K.Agarwal, Genetics, S.Chand & Co.

12 Lewis, C.D. and Lewin, R., Biology of Gene, McGraw Hill, Toppan Co. Ltd.

13 Gunther S. Stent, Molecular Genetics, macmillan Publishing Co. Inc.

14 Goodenough, V., Genetics, New York Holt, Rinchart and Winston.

15 Gardner, Principles of Genetics, Wiley Eastern Pvt., Ltd.

16 Winchester, Genetics, Oxford IBH Publications

17 Stickberger, Genetics, MacMillan Publications.

18 Pai, A.C., Foundations of Genetics, McGraw Hill Publications.

19 R.A.Meyers (Endocrinology.): Molecular Biology and Biotechnology, VCH Publishers.

20 Glick : Molecular Biotechnology.

21 R.W.Old and S.B. Primrose: Principles of Gene Manipulation and Introduction to Genetic Engineering.

22 Gupta PK : Elements of Biotechnology, Rastogi Publications, Meerut.

APPLIED ZOOLOGY AND MICROBIOLOGY :

23 Jhingran, VG, Fish and Fisheries of India. Hindustan Publishing Corporation, New Delhi.

24 Kovaleve, PA, Silkworm Breeding Stocks, Central Silk Board, Merine Drive, Bombay.

25 Roger, A. Morse, The ABC and XYZ of Bee Culture, A.I. Root and Co., Medina, Ohio 44256.

26 Metcalf CL and WP Flint, Destructive and Useful Insects, Tata McGraw Hill publishing Co. Ltd., New Delhi- 110051

27 Sharma PD, Microbiology, Rastogi Publications Meerut.

28 Shukla and Upadhyaya : Economic Zoology (Rastogi Publishers)

29 Venkitaraman : Economic Zoology (Sudarshana Publishers)

PRACTICAL:

30 Verma, PS, A manual of practical Zoology Vertebrates S.Chand and Co. Ltd., Ram Nagar, New Delhi (English and Hindi Editions).

31 Lal, SS : Practical Zoology Vertebrates, Rastogi Publication, Meerut (English and Hindi Editions).