

GONDWANA UNIVERSITY GADCHIROLI
SEMESTER SYSTEM SYLLABUS
FOR
B.Sc. Part III
Subject- Zoology
Semester – VI
Paper - I: General Mammalian Physiology –II

Unit –I : Nerve and Muscle Physiology

1. Types of neurons, E.M. structure of neuron
2. Conduction of nerve impulse
3. Ultrastructure of striated muscle, Sliding filament theory of muscle contraction
4. Properties of muscles (Twitch, Tetanus, Tonus, Summation, All or None Principle, Muscle fatigue)

Unit-II : Excretion

1. Structure of uriniferous tubule
2. Mechanism of urine formation
3. Counter – current mechanism
4. Normal and abnormal constituents of urine; Elementary idea of dialysis

Unit-III : Endocrinology

1. Structure and functions of pituitary gland
2. Structure and functions of thyroid and parathyroid gland
3. Structure and functions of adrenal gland
4. Structure and functions of pineal gland

Unit-IV : Reproduction

1. Oestrous and menstrual cycle
2. Male and female sex hormones
3. Causes of infertility in male and female
4. Contraceptives– Mechanical and hormonal ;*In-vitro* fertilization

Semester - VI
Paper - II :Applied Zoology –II
(Biotechniques, Microtechnique, Immunology, Bioinformatics and Biostatistics)

Unit –I :Biotechniques

1. **Concepts of sterilization:** Filtration, autoclaving, dry heat sterilization, wet sterilization and radiation
2. **Separation of biomolecules:** Centrifugation (Sedimentation, density gradient); Chromatography (Elementary idea of thin layer, gel filtration and ion exchange-Principles and applications)
3. **Electrophoresis:** Agarose gel electrophoresis, SDS-PAGE
4. Principles of colorimeter and spectrophotometers

Unit-II :Microtechnique

1. Fixation, dehydration, clearing, embedding & section cutting
2. Difficulties encountered during section cutting (causes and remedies)
3. Double staining with Haematoxylin and Eosin
4. Histochemical staining techniques for carbohydrates (Periodic acid schiff), proteins (Mercury-bromophenol blue) and lipids (Sudan black-B)

Unit – III: Immunology

1. **Concepts of immunity** – Innate and acquired immunity, organs of the immune system
2. **Antigen and Antibody** -Structure, types and functions , Antigen-antibody interaction – Precipitation and agglutination
3. **Types of immune response:** B cell response (antibody mediated), T cell response (cell mediated)
4. **Autoimmunity and immunodeficiencies-** Autoimmune diseases and their treatment, AIDS and other immunodeficiencies

Unit-IV : Bioinformatics and Biostatistics

1. Bioinformatics: Definition, Basic concepts in bioinformatics, importance and role of bioinformatics in life sciences
2. Bioinformatics databases- introduction, types of databases
3. Nucleotide sequence databases, Elementary idea of protein databases
4. Biostatistics – Tabulation of data, presentation of data, sampling errors, mean, mode, median, probability, standard error and standard deviation

Semester – VI
PRACTICAL –VI (Based on Paper XI and XII)
(Section A: General Mammalian Physiology – II and Section B: Applied Zoology – II
,Biotechniques, Microtechnique, Immunology, Bioinformatics and Biostatistics)

Section A : General Mammalian Physiology – II

1. Detection of urea, albumin, sugar and creatin in urine
2. Sperm count from any domestic animal (Source of semen: Government artificial insemination centre).
3. **Anatomical Observations** - Anatomical observations, demonstration and detailed explanation of the following with the help of ICT tools/ models/ charts/ photographs etc.
Endocrine glands of Culturable fishes
4. **Study of histological slides of Mammal**– T.S.Kidney, Pituitary, Thyroid, Adrenal, testis, ovary, uterus, placenta, medulated and non medulated nerve fibre, smooth and striated muscle

Section B : Applied Zoology – II

(Biotechniques, Microtechnique, Immunology, Bioinformatics and Biostatistics)

1. Separation of amino acids by paper chromatography
2. Separation of proteins by electrophoresis technique
3. Block preparation and section cutting
4. Double staining method (H-E)
(Source of tissue: Animal wastes from local recognized slaughter houses/ poultry farms/ fish markets etc.)
5. Demonstration of carbohydrates, proteins and lipids by histochemical methods
(Source of tissue: Animal wastes from local recognized slaughter houses/ poultry farms/ fish markets etc.)
6. Determination of mean, mode, median from a given biostatistical data and/or graphical representation of the data using computers
7. Use of internet for survey of literature using protein and nucleotide databases(NCBI)
8. Use of softwares like Microsoft offices
9. Immunological diagnosis of pregnancy
10. Antigen –Antibody Reaction

Distribution of Marks**Total Marks 30**

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| I. Physiology experiment..... | 05 |
| II. Identification and comments on spots (Mammalian histology 3 spots) | 03 |
| III. Microtechnique - Section cutting, spreading and H-E staining of given slide | 03 |
| IV. Anatomical observation | 05 |
| V. Analysis of given biostatistical data | 02 |
| VI. Retrieval of specific literature from given information..... | 02 |
| VII. Submission of slides and study tour report..... | 02 |
| VIII. Submission of certified practical record..... | 03 |
| IX. Viva voce..... | 05 |

List of Recommended Books: (For Semester V and VI)**Physiology**

1. Human Physiology – Chatterjee A. G. vol. I & II
2. Medical Physiology – Gyton
3. T. B. of Animal Physiology – Berry
4. Introduction to Animal Physiology and Related Biotechnology – H. R. Singh
5. Animal Physiology – Arora M.P.
6. General and Comparative Physiology – Hoar W. S.
7. T. B. of Animal Physiology – Hurkat and Mathur
8. Animal Physiology – Nahbhushan and kodarkar
9. T. B. of Animal Physiology & General Biology – Thakur &Puranik
10. General Endocrinology – Turner Bagnaro
11. Reproduction and Human welfare – Greep and koblinsky
12. Animal Physiology – Shastri & Goel
13. Animal Physiology – Verma&Tyagi
14. Human Physiology - Vander and sheman
15. Applied Physiology – Keels, Neils and Joels
16. Animal Physiology – Rastogi S. C.
17. Animal Physiology – Veerbala Rastogi
18. Comparative Vertebrate Endocrinology – Beutley
19. T.Y B. Sc Zoology Sem-V- Dhamani,Bakare,Harney & Bhute

20. T.Y B. Sc Zoology Sem-VI- Dhamani,Bakare,Harney & Bhute

Aquaculture

1. Wealth of India, Raw Material, Vol. IV – ICAR
2. Fishes of India vol I & II- Day
3. Fish & Fisheries of India – Jhingran
4. Hatchery Manual for Common Indian & Chinese carps – Jhivgan&Pallin
5. Fish Pathology – Roberts
6. Introduction of Fishes – Khanna
7. Fishery Science & Indian Fishes – Khanna
8. Fishery Science & Indian Fisheries – Shrivastava
9. A Manual of F. W. Aquaculture – Santhanam
10. An Aid to Identification of Commercial Fishes of India & Pakistan- Mishra
11. Standard Methods for Examination of Water & Waste Water - APHA
12. Hand Book of Breeding of Major Carps by Pituitary Hormones – S. L. Chonder

Entomology

1. T. B. of Applied Entomology – K. P. Shrivastava
2. T. B. of Agricultural Entomology - II S Pruthi
3. Modern Entomology – D. B. Tembhare (2nd Edition)
4. A Hand Book of Practical Sericulture – Ullar S. R. & Narsimhanna M.N.
5. Destructive and Useful Insects – Metcalf C.L. & Flint W.P.
6. General Text Book of Entomology – Richards O. W. & Davis R. G.
7. Agricultural Pests of India & South East Asia – Atawal A.S.
8. Hand Book of Economic Entomology for South Asia – Ayyar & Ram Krishna.
9. Medical Entomology – Hati A. K.
10. Bee-Keeping in India – Singh S
11. Indian Odonatological Bibliography ANDREW, R. J. & MITRA, T. R.
12. A handbook of Common Odonates of Central India, ANDREW, R. J., SUBRAMANIAN, K. A. & TIPPLE A.D.

Biotechnique and Microtechnique

1. Animal Tissue Technique – Humason
2. Histological Technique – Devaenport
3. Microtechnique – Jiwaji & Patki
4. Microtechnique – Wankhede
5. Biophysical Chemistry – Upadhyay, Upadhyay and Nath
6. Techniques in Life Sciences – D. B. Tembhare

Immunology

1. Immunology – R. C. Kubly et al.
2. Immunology - Tizzard
3. Immunology - Roitt, Brostoff and D. Male
4. Immunology – Abbas

Bioinformatics and Biostatistics

1. Mount W. 2004. Bioinformatics and Sequence Genome Analysis 2nd Edition CBS Pub. New Delhi.
2. Bergman, N. H. Comparative Genomics. Humana Press Inc. Part of Springer Science+BusinessMedia, 2007.
3. Baxevanis, A. D. Ouellette, B. F. F. 2009. Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins. John-Wiley and Sons Publications, New York.
4. Campbell A. M. and Heyer, L. J. 2007. Discovering Genomics, Proteomics and Bioinformatics, 2nd Edition. Benjamin Cummings.
5. Des Higgins and Willie Taylor 2000. Bioinformatics: Sequence, Structure and Databanks. Oxford University Press.
6. Rashidi H. H. and Buehler 2002. Bioinformatics Basics: Applications in Biological Science and Medicine, CRC Press, London.
7. Gibas Cynthia and Jambeck P. 2001. Developing Bioinformatics Computer Skills: Shroff Publishers and Distributors Pvt. Ltd. (O'Reilly), Mumbai