SYLLABUS FOR
M.Sc. COURSE IN ZOOLOGY
(With effect from the academic year 2021-22 Under CBCS system)

DEPARTMENT OF ZOOLOGY
KAKATIYA UNIVERSITY
HANMAKONDA 506 009
TELANGANA STATE

KAKATIYA UNIVERSITY, DEPARTMENT OF ZOOLOGY
(With effect from the academic year 2021-22 Under CBCS system)

S.No	Paper Code	Title of the Paper	Instruction Hrs/Week	No. of Credits	Marks		Total Marks
					External	Internal	
SEMESTER-I							
1	101	Biosystematics, Structure & Function Of Invertebrates	4	4	80	20	100
2	102	Tools and Techniques in Biology	4	4	80	20	100
3	103	Animal Physiology and Ethology	4	4	80	20	100
4	104	Genetics and Evolution	4	4	80	20	100
5	105	Practical-I	4	4	100	--	100
6	106	Practical-II	4	4	100	--	100
7	107	Seminar	--	1	--	25	25
		Total		25	520	105	625
SEMESTER-II							
1	201	Structure and Function of Vertebrates	4	4	80	20	100
2	202	Environmental Biology	4	4	80	20	100
3	203	Biochemistry	4	4	80	20	100
4	204	Biostatistics and Computer Applications	4	4	80	20	100
5	205	Practical-I	4	4	100	--	100
6	206	Practical-II	4	4	100	--	100
7	207	Seminar	--	1	--	25	25
		Total		25	520	105	625

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S.No	Paper Code	Title of the Paper	Instruction Hrs/Week	No. of Credits	Marks		Total Marks
					External	Internal	
SEMESTER-III							
1	301	Molecular Biology	4	4	80	20	100
2	302	Immunology	4	4	80	20	100
3	303	Subject Elective – I Parasitology (OR) Subject Elective – II Clinical Science	4	4	80	20	100
4	304	Subject Elective – III Endocrinology & Reproductive Physiolgy (OR) Subject Elective – IV Bioinformatics	4	4	80	20	100
5	305	Practical – I	4	4	100	--	100
6	306	Practical – II	4	4	100	--	100
7	307	Seminar	--	1	--	25	25
		Total		25	520	105	625
SEMESTER-IV							
1	401	Cell Biology	4	4	80	20	100
2	402	Developmental Biology	4	4	80	20	100
3	403	Subject Elective – I Fisheries And Aquaculture (OR) Subject Elective – II Neurophysiology	4	4	80	20	100
4	404	Subject Elective – III Animal Biotechnology (OR) Subject Elective – IV Entomology	4	4	80	20	100
5	305	Practical – I	4	4	100	--	100
6	406	Practical – II	4	4	100	--	100
7	407	Seminar	--	1	--	25	25
		Total		25	520	105	625
GRAND TOTAL (Sem I+II+III+IV)				**100**	**2080**	**420**	**2500**

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PRACTICALS :

1. Observations of nervous system development from lower to higher invertebrates and write the indentified modifications in the record. Dissection of the following
   a) Nervous system of Leech
   b) Nervous system of Cockroach & Reproductive system
   c) Nervous system of *Aplsia*
   d) Nervous system of *Unio mytilus*
   e) Nervous system of Cabs
   f) Nervous system of Sepia
2. Modifications of Mouth parts in insects. Separate the mouth parts from the insects, mount and observe the modifications and write the adaptations – Chewing, Piercing and Sucking etc..
3. Collect 10 invertebrates and prepare permanent slides and submit in the examinations (Parasites – 5 and Non-parasites – 5).
4. Museum specimens (from each phylum not less than 10 specimens).
5. Slides and preserved animals (from each phylum not less than 5 slides).
6. Karyotype studies for Numerical Taxonomy.
7. Hemoglobin Variation in different phyla for Evolutionary Studies.
8. Species variation – Drosophila Variants.
9. Collection of Termites to observe variants.
10. Collection of Fresh Water Molluscs.
11. Collection of Endo- parasites for species variations Trypansomes from Rats

REFERENCE BOOKS

1. Invertebrate Zoology ------- EL Jordan; P.S. Verma
2. A Text Book of Zoology Vol.I ------ P.S. Dhami; Jk.Dhami.
3. A Text Book of Invertbrate zoology ----- R.L.Kotpal.
4. Biology of Animals --- Cleveland P. Hickman JR Larryds. Roberts.

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PRACTICALS :

1. Separation of call organelles by Differential centrifugation.
2. Separation of protein by electrophori (Native & SDS page).
3. Separation of amino acids by paper and thin layer Chromatography Demonstration of column Chromatography.
4. Validation of Beer-lamberts law of a coloured compound ($CuSO_4$).
5. Measurement of pH meter Preparation of buffer.
6. Light microscope and its parts Observation of unstained and stained cells.
7. Demonstration of a fixation, dehydration, sectored and stand of any animal tissue.
8. Demonstration of Carbohydrates, Proteins Lipids and nuclear acids in tissue sections.
9. Preparation of chick fibroblast culture and viability testing.

REFERENCE BOOKS :

1. Principles and Techniques in biochemistry and molecular biology - Wilson & Walkes
2. Culture of animal cells - Freshuay
3. Sharma V.K. (1991), Techniques in microscopy and cell Viology, Tata-Mc Craw Hil.
4. Robert Braun Introduction to instrumental analysis - Mc.Crew.Hil
5. Bisen & Mathw. Tools and Techniques in Life Sciences,- CBS Publishers & distributors.
6. Principles of Animal Cell Culture - Basant Kumar & Rinesh Kumar, Int.Bork 2008,XXII edn.

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PRACTICALS:

1. Action of pepsin in digestion of proteins.
2. Estimation of salivary amylase activity.
3. Estimation of lipase activity.
4. Oxygen consumption d estimation in an aquatic or terrestrial animal.
5. Demonstration of fermentation.
6. Action of insulin on blood sugar level.
7. Experiments on urine analysis in human urine sample:

a) Test for urea, blood cells, bile salts, albumin, ketone bodies and sugar in human urine sample.

8. Determination of cell fragility by osmotic hemolysis experiment.
9. Identification of relation between temperature and heart beat in freshwater mussel.
10. Water and ionic regulation of freshwater animal in different osmotic media.
11. The Study of changes in the earthworm's responsiveness to the stimulus of touch.
12. Observation of an earthworm's responses in the cases of repeated stimulation and dual stimulation.
13. Observation of the response of invertebrates to different lighting conditions.

REFERENCE BOOKS :

1. Animal Physiology ----- Samson & Writy
2. Animal Physiology ----- Nelsion & Nelsion
3. Animal Physiology ----- Medical Physiology-Guiton
4. Text book of Animal Physiology ----- Nagbhushenen
5. Text book of Animal Physiology ----- Guize
6. Text book of Animal Physiology ----- A.K. Berry.

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PRACTICALS:

1. Problems based on multiple alleles – Blood groups
2. Problems based on Mendel's Laws – monohybrid and dihybrid ratios
3. Problems based on gene frequency – Hardy Weinberg Law
4. Karyotype studies
5. Haemoglobin variations
6. Insulin variations
7. Collection of termites to observe variants

REFERENCE BOOKS:

1. Genetics by Monroe W Strickberger
2. Evolution by Monroe W Strickberger
3. Genetics by Peter J Russell
4. Evolution by Dobzhansky, Ayala, Stebbins, Valentine
5. Genetics by P.K.Gupta
6. Human molecular Genetics by Tom Strachan and Andrew Rea

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PRACTICALS :

1. Cranial Nerves of Labeo (5th and 7th and 9th and 10th weberian oscicles)
2. Dissection demonstration of Brain and Heart of Fish, Calotes, Chick and Rat
3. Demonstration of flight muscles and Air Sacs in Birds.
4. Demonstration Vascular and urinogenetal system of Rat.
5. Collect 10 vertebrates and submit in the examinations
6. Museum specimens (from each Class not less than 15 specimens).
7. Slides related to vertebrate parts.
8. Mounting of Amphioxus, Doliolum and Scales of fishes.
9. Sketelation System (Vertebra , limbs, Girdles)

REFERENCE BOOKS :

1 Vertebrate Zoology ------- EL Jordan; P.S. Verma

2 A Text Book of Zoology Vol.II ------ P.S. Dhami; Jk.Dhami.

3 A Text Book of Vertbrate zoology ----- R.L.Kotpal.

4` Biology of Animals --- Cleveland P. Hickman JR Larryds. Roberts.

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PRACTICALS:

1. Collection and identification of animal Biodiversity of selected ecosystem.
2. Physico-chemical analysis of soil pH, soil moisture soil , temperature, humidity estimation soil, soil organic matter.
3. Air Monitoring – Particulate Matter.
4. Water Monitoring - five important parameters from drinking water. 1) Dissolved Oxygen 2) Biological Oxygen demand (B O D) 3) Chemical Oxygen demand 4) Chlorides 5) salinity.
5. Bio remediation of waste water using soil micro organisms.
6. Bioconversion of municipal waste by vermi-composting.
7. Collection, preservation and estimation of Zooplankton.
8. Mapping of national parks and wild life sanctuaries in India with a note of important wild life fauna.
9. Estimation of LC50 or LD50 of an organo phosphorous pesticide.
10. Determination of pesticide residues in soil or water.

REFERENCE BOOKS:

1. Fundamental of Ecology. E.p.odum, G W Barrett.

2. Environmental Science . Willam .P.Cunninsham Barbora woodworth saigo.

3. The use of Earthworms in waste disposal by . Edward, C.A.

4. Introduction to Environmental Engineering & Science Gilbert M. Masters.

5. Essential of Ecology by colin R. Townsend Michael Begon John.L.Harper.

6. Environmental Biology -- A.G.Agarwal.

7. Environmental Science by G.Tyler Miller.

8. Toxicology -- Y.K.Lahir.

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PRACTICALS:

1. Estimation of muscle and liver glycogen
2. Estimation of protein by Biuret and Lowry methods
3. Estimation of amino acid by Ninhydrin method
4. Estimation of serum total cholesterol
5. Estimation of vitamin – C by 2,6- dichlorophenol indophenols method
6. Estimation of Ammonia (nesslerisation method) and uric acid
7. The effect of Ph and temperature (α-amylase) activity
8. The effect of concentration of enzyme (trypsin) activity

REFERENCE BOOKS:

1. Principles of biochemistry, by Lehninger
2. Biochemistry , by Donald Voet and Judith Voet.
3. Biochemistry , by Harper.
4. Biochemistry . Jeremy M.Berg, JohnL.Tymovzko, Lubert Stryer

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PRACTICALS:

(a) Statistics

1. Problems on Mean and Median.
2. Problems on Standard Deviation.
3. Problems related to X2 test, Student T Test . And Probuality
4. Problems on Correlation.

(b) Computers

1. Literature collection using INTERNET, search engines, websites, browsing and downloading for scientific investigation.
2. Creating an e-mail account, sending and receiving mails.
3. Application of excel sheet for data processing.
4. Preparation of power point presentation with software.
5. Representation of statistical data by Histograms and Pie diagrams.

(c) Bioinformatics

1. Study of Internet resources in Bioinformatics. E.g. NCBI and EMBL.
2. Searches on MEDLINE and PubMed bibliographic databases.
3. Multiple Sequence Alignment.
4. Construction of Phylogenetic Trees for DNA and Proteins.
5. Sequence Retrieval from Databases.
6. Building of Molecules.
7. BLAST, FASTA programs for sequence database search.

REFERENCE BOOKS:

1. Statistical methods, Snedecor, G.W. and W.G. Cochran, Iowa State Univ. Press Biometry by W. H. Freeman and Francisco
2. Fundamentals of Biometry by L.N. Balaram (1980)
3. Biostatistics by N. Gurumani
4. Biostatistics-Arora and Malhan
5. Biostatistics- Jasraj and Gurudeep Raj
6. Biostatistics- P. Ramkrishan
7. Methods in Biostatistics-Mahajan
8. Mount W. 2004. Bioinformatics and sequence genome analysis 2nd Editon CBS Pub. New Delhi.
9. Bergman, N. H. Comparative Genomics. Humana Press Inc. Part of Springer Science+BusinessMedia, 2007.
10. Baxevanis, A. D. Ouellate, B. F. F. 2009. Bioinformatics: A Practical Guide to the analysis of genes and proteins. John-Wiley and Sons Publications, New York.
11. Campbell A. M. and Heyer, L. J. 2007. Discovering Genomics, Proteomics and Bioinformatics, 2nd Edition. Benjamin Cummings.

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SECOND YEAR – ZOOLOGY

SEMESTER – III
AND
SEMESTER - IV

PRACTICALS :

1. Isolation of DNA from goat spleen
2. Estimation of DNA (diphenyl method)
3. Estimation of RNA (Orcinol method)
4. UV absorption spectra of native and denatured DNA
5. Agarose gel Electrophoresis of DNA
6. DNA amplification by PCR
7. Gel Documentation

REFERENCE BOOKS:

1. Molecular Cell Biology by Lodish et al
2. Molecular Cell Biology by Alberts et al
3. Principles of Biochemistry by Lehninger
4. The Cell by Geoffrey Cooper
5. Genetics , A molecular approach by Peter J Russell
6. Biochemistry by Voet and Voet
7. Principles of Genetics by Tamarin
8. GENES VIII by Lewin
9. Biochemistry by U.Satyanarayana and U Chakrapani
10. Benjamin Lewin. GENES IX 2008. Ninth edition

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PRACTICALS:

1. Agglutination Reaction:
   a) Tube Agglutination Reaction
   b) Slide Agglutination Reaction
   c) Indirect Agglutination Inhibition Reaction
2. Precipitation Reaction
   a) Double Diffusion Reaction
   b) Single Diffusion Reaction
3. Erythrocyte Rosette-forming Cell Test.
4. Separation of Lymphocytes
5. Enzyme-Linked Immunosorbent Assay
6. Measurement of Phagocytosis by Phagocytes
7. Demonstration of Immunoectrophoresis
8. Neutralization and complement fixation
9. Collection of macrophages and their characterization
10. Identification of histological slides of lymphoid tissue - Spleen, thymus, lymphnode and bone marrow

REFERENCE BOOKS:

1. Abul K. Abbas – Call And Molecular Immunulogy
2. Kuby. Immunology, W.H Freeman,USA
3. W.Pual,Fundamentals of immunology.
4. I.M. Roitt , Essential immunology, ELBS Edition.

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PRACTICALS:

1. Study of prepared slides and museum specimens of selected parasites of representative groups of protozoans, helminths and arthropods
2. Smear preparation for protozoa
3. Study of life cycle, role as vector & control measures of:
    a) Ticks (*Argas, Boophilus*)
    b) Mosquito - anyone from- *Anopheles/ Aedes/ Culex*
    c) Any two flies: *Tabanus/ Phlebotomus/ Sarcophaga*. *Cyclops*
4. Ectoparasites & Endoparasites of wild rat, cattle, dog, chick & human including stages in excreta.
5. Culturing insect parasitic nematode, and chasing the lifecycle of the nematode on the insect host.
6. Preparation of whole mounts for helminthes
7. Collection of Parasites from digestive tract of Cockroach/gut / parasites of hen and their identification and preservation.
8. Spotters based on theory.

REFERENCE BOOKS:

1. Comparative protozoology, Ecology, Physiology, Life history, Anderson, O.R. , Springer verlag, Berlin.
2. General Parasitology, Cheng T. C., Academic Press.
3. Modem Parasitology, Cox F.E.G.,Eds.Parasitology in focus, facts & trends, Melhorn h., Eds., Spriger Verlag, Beriin.
4. Medical Parasitology, Piakarsky G. L., Springer Verlag, Berlin.
5. Modern Parasitology, Cellular immunological & immunological aspects, Wyler D. J., Eds., W. H. Freeman, NY
6. Helminths, Arthropods and Protozoa of domesticated animals. ELBS and Bailliere Tindall. London. Soulsby, E. J. L. (1982).
7. A Text book of Parasitology, Bombay popular prakashan – by S.S. Kelkar and Rohini S. Kelkar.
8. Parasitology – by Chandler and Chands
9. Parasitology, Medical Pulisher Calcutta, 1987. K.D. Chaterjee.
10. Parasitology – By Ramnik sood, C.B.S. Publisher, New Delhi – 1993.

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PRACTICALS:

1. Histological slides pertaining to endocrine glands.
2. Alloxan diabetes induction and insulinization study by blood glucose and liver glycogen estimation.
3. Effect of thyroids and anti-thyroidal agents on O_2 Consumption in the rat./ crab
4. Effect of oxytocin on uterine contractility.
5. Estrogen bioassay using immature female rats / mice.
6. Study of male and female reproductive systems in some reproductive animals.
7. Histology of ovary and testes.
8. Study of estrus cycle (Rat).
9. Diagnosis of pregnancy by the presence of HCG in urine (Acheim Zondek test)
10. Sperm morphology, motility, count and effect of some antifertility agents.
11. Models pertaining to ART(Assisted reproductive techniques), Transgenic techniques. STDs contraception, teratogenesis.
12. Visit to Veterinary Institutes to learn breeding techniques.

REFERENCE BOOKS :

1. E.J.W. Barington , General and comparative Endocrinology.
2. P.J.Bentley , Comparative Vertebrate Endocrinology.
3. R.H. Williams, Text book of Endocrinology.
4. A.Gorbman *et.al*., Comparative Endocrinology.
5. Austen,C.R. and Short R.V. Reproduction
6. R.G.Edwards, Human Reproduction
7. E. Knobil and J.D Neill,The physiology of Reproduction volume I & II
8. E.S.E .Hafeez, Reproduction and breeding techniques for laboratory animals
9. Vander and Sherman, Human Physiology.
10. Kamini A.Rao, The infertility manual
11. A.V.Nalbondov, Reproduction Physiology.
12. K.Murray and K. Granner, Harper Biochemistry
13. J.Farris and John Griffith, The rat in laboratory investigation.
14. R.Mathur and S.Shukla ,Reproductive Biology.
15. B.P.Setchell, The mammalian testis.
16. S.F.Gilbert, Developmental Biology.
17. Vinod K. Sharma., Sexually Transmitted Diseases and ADIS
18. Gayathri Prakash, Reproductive Biology.

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PRACTICALS

1. Introduction of National Center for Biotechnology Information (NCBI).
2. Introduction of biological search engine- Entrez.
3. Analysis of 3D structure of protein using RasMol through command line.
4. Pair-wise sequence alignment by using ClustalW.
5. Multiple sequence alignment by using ClustalW
6. Similarity search using the Blast and interpretation of the results.
7. Downloading and analysis of the pdb file of the biomolecules.
8. Molecular Docking of protein and ligand by Autodock.
9. Protein Structure Prediction (Homology Modeling) using SPDBV.
10. Molecular dynamics (MD) simulation using Gromacs.

Reference Books:

1. Mount W. 2004. Bioinformatics and sequence genome analysis 2nd Editon CBS Pub.
2. New Delhi.
3. Bergman, N. H. Comparative Genomics. Humana Press Inc. Part of Springer
4. Science+BusinessMedia, 2007.
5. Baxevanis, A. D. Ouellate, B. F. F. 2009. Bioinformatics: A Practical Guide to the
6. analysis of genes and proteins. John-Wiley and Sons Publications, New York.
7. Campbell A. M. and Heyer, L. J. 2007. Discovering Genomics, Proteomics and
8. Bioinformatics, 2nd Edition. Benjamin Cummings.
9. Des Higgins and Willie Taylor 2000. Bioinformatics: Sequence, structure and
10. databanks. Oxford University Press.
11. Rashidi H. H. and Buehler 2002. Bioinformatics Basics: Applications in Biological
12. Science and Medicine, CRC Press, London.
13. Gibas Cynthia and Jambeck P. 2001. Developing Bioinformatics Computer Skills:
14. Shroff Publishersand Distributors Pvt. Ltd. (O'Reilly), Mumbai

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PRACTICALS:

1. Observation of a Eukaryotic cell under higher microscope.
2. Preparation of mitotic chromosomes from roots tips.
3. Preparation of mitotic Chromosomes from testis of grasshopper.
4. Membrane fragility as a measure of osmotic tolerenance
5. Lysosome isolation in isotonic sucroses.
6. Isolation & determination of number of micrchondrice
7. Extraction of nuclear Chromate
8. Extraction of membrane lipids and observation of lipid bilayer formation

REFERENCE BOOKS:

1. Molecular all biology : Lodish, etal.
2. Molecular all biology : Bruce Alberts, etsl.
3. Cell Biology : DeRoberts.
4. Cell and molecular biology, :Gerad karp
5. Molecular cell biology : David Baltimoe.
6. Cell Biology :Sc Rostogi.

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PRACTICALS:

1. Observation of living Chick embryo.
2. Dissection and Morphology observation of the 4-14 somite chick embryo (24-34 hours).
3. Dissection and Morphology observation of the 24-38 somite chick embryo (48-85 hours).
4. Culture of Early chick embryo *in vitro*.
5. Mounting of 72 and 96 hours chick embryo.
6. Chorio-Allantoic Membrane Grafting.
7. Various patterns of Cleavage and development in freshwater Snail.
8. Larval Developmental stages of Drosophila.
9. Chromosome squash preparation from Drosophila larval salivary glands.
10. Patterns of regeneration in the Planarian/Regeneration in the Tail of Frog Tadpoles.

REFERENCE BOOKS:

1. Gilbert, S.F. Developmental Biology. 10th Edition, Sinauer Associated Inc., Massachusetts
2. Balinsky, B.I. Introduction to Embryology. Saunders, Philedelphia
3. Berril, N.J. and Karp, G. Development Biology. McGraw Hill, New York
4. Hamburger V and Hamilton HL. Handbook of chick developmental stages. Saunders Publications. 1965.
5. Berril, N.J. and Karp, G. Development Biology. McGraw Hill, New York
6. Embryology-An Introduction to Developmental Biology—Stanley Shostak
7. Muthukaruppan and Pitchappan. Animal development – a laboratory guide.CoSIP-ULP Publicatiions, India. First Edition, 1979.

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PRACTICALS:

1. Visit to local Fresh water bodies to study their Ecology.
2. Collection, Identification and Screening of fish for Ecto and Endo parasites
3. Morphometric and Meristic data of Fishes (At least 3 types).
4. Estimation of Productivity of local Fresh water bodies.
5. Collection and preservation of Water and Soil from water bodies.
6. Collection, Preservation and Identification of plankton.
7. Estimation of PH, Temperature, Chlorides, Dissolved Oxygen from water samples.
8. Estimation of Organic matter of bottom soil.
9. Visit to local fish seed production centre.
10. Visit to local fish farms.

REFERENCE BOOKS:

1. Business Management in Fisheries and Aquaculture, Fishing News, Chaston, I (Books) Ltd., 1984.
2. Aquaculture Management, Meade, J.W. Van Nostrand, New York, 1989.
3. Aquaculture principles and practices, Pillay, T.V. R. Fishes News (Books) Ltd., London, 1990.
4. Water Quality Management for Pond Fish culture, Boyd, C.E. Elsevier Scientific publishing company, 1982.
5. Principles of Fresh Water Aquaculture, Stickney, R.R. John, Wiley & Sons, New York, 1979
6. Aquaculture – The Farming and Husbandry of fresh water and marine organisms, Bardach, et al., John Wiley & Sons, New York, 1979.
7. A manual of Freshwater Aquaculture, Santhanan, R. et al., Oxford & IBH Publishing Co. Pvt. Ltd., 1987.
8. Advances in Aquaculture, Pillay, T.V.R. & M.A., DIII. Fish News (Books) Ltd., England, 1979.
9. Limnology, Welch, P.S, Mc. Grew Hill, New York, 1952.
10. Text book of Limnology, Cole, C.A., The C.V. Mosby Co., 1983.
11. Fundamentals of Limnology, Ruttner, F, Translated by D.G. Frey and F.E. Fry, University of Toronto Press, 1968.
12. The Fresh Water Fishes of India, Pakistan, Bangladesh, Burma and Sri Lanka, Hand Book , Jayaram , K.C., (1981), Z oological survey of India, Calcutta.
13. Fishes, An Introduction of Ichthyology, Moyle Peterb, Prentice Hall, (1979).
14. Principles of Systematic Zoology, Mayer and Ashok..
15. Fish and Fisheries of India, Jhingran, V.G. Hindustan Publishing Co., Calcutta, (1975).
16. Fish and Fisheries, Yadav, B.N. Daya Publishing House,
17. The Biology of Animal Parasites, Chang. T.C. Saunders, Philadelphia, (1964).
18. Text book of Fish Diseases. Conroy. D.A. and R.C. Heanean, (1968).
19. Fish Diseases Vol. I & II, Schauperclaus,
20. Methods for assessment of Fish Production in Fresh Water, Ricker, W.K. (1984), Blackwell Publications.

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PRACTICALS

1 Tail flick test for measurement of pain.
2 Spinal reflexes in decerebrated animal.
3 Preparation of neuromuscular system for electrophysiological recording.
4 Biochemical differentiation of fast and slow muscles – SDH, LDH activities, glycogen and lactatate content in altered neurobiological conditions.
5 Effect of ankle sprain on muscle metabolism.
6 Determination of contractile properties of muscle in pathological condition.
7 Determination of conduction velocity in nerve.
8 Induction of stress and estimation of on glycogen, lactate, AChE and Na-K ATPase activities.
9 Experimental studies on atrophy, hypertrophy of muscles and nerve degeneration as well as regeneration.
10 Moto rod test for motor coordination.

Suggested Books

1 Physiology and biophysics – Ruch and Patten
2 A text book of muscle physiology – D. A. Jones and J. M. Round
3 Neurobiology – Gorden M Sheperd
4 Principles of neural science – E. Kandel and others
5 Essentials of neural science and behaviour – E. Kandel and others
6 Behavioral neuroscience – Cottman
7 From Neuron to Brain – Nichollas, J. G. others
8 Neuroscience – A. Longstaff
9 Elements of molecular Neurobiology – C U M Smith
10 Physiology of excitable cells – D. J. Aidley
11 Text book of medical physiology – Guyton

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PRACTICALS:

1. Laboratory demonstration on safe handling of microorganisms.
2. Isolation of plasmid DNA from E-Coli .
3. Isolation of yeast DNA and Transformation of E-Coli.
4. Qualitative assay of B.Galactosidese in yeast Colonies/cell extracts.
5. Propagation & maintenance of tissue culture.
6. Isolation of Bone marrow and culture of mesenc hymel stem cells from isoleted murine/sleep/rat bone marrow.
7. Try pan blue exclusion method for cell viability estimation.
8. Mycoplasma detection method using PCR.
9. Production of penicillin and testing of antimicrobial activity.
10. Production of monoclonal of tissue culture.

REFERENCE BOOKS:

1. Culture of Animal cells – manual of basic Technique by R. Iam Freshney published by
2. Molecular Biotechnology by john Wiley & Sons Primrose Published by parima publishing corporation.
3. Principles and practice of Animal tissue culture by Sudha Gangal Published by University Pren
4. Laboratory procedures in Biotechnology--- Alam Doyle ,J.Bryan Griffiths.wiley publisher
5. Animal Biotechnology- A Laboratory course, --- Jeddrey M.Beeker. Elsevien IInd edition,2007.
6. Tools & Techniques in Biotechnology – Mousami Debnath, pointer publishers,2002
7. Principles & techniques of Biotechnology & Muecular Biology-- 6th edition, keith Wilson& John Walker
8. Gene cloning & manipulation, Christopher howe, Combridge Publications.
9. A manual of Laboratory Practices. Good

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PRACTICALS

1. Insect Collection and Preservation methods.
2. Collection of medically important Insects and identification up to genus level.
3. Maintenance and study the stages life cycle of Cockroach / house fly / mosquito.
4. Preparation of permanent mounts of mosquito respiratory siphon and trumpet.
5. Preparation of permanent mounts of Insect leg and antennae.
6. Preparation of permanent mounts of wings of Cockroach / house fly / mosquito.
7. Dissection, mounting and preparation of permanent slides of Insect mouth parts.
8. Dissection of salivary glands of Cockroach / house fly / mosquito.
9. Dissection of Digestive system, nervous system and reproductive system of Cockroach / House fly / mosquito.
10. Dissecting and mounting of male and female genitalia of Cockroach / house fly / mosquito.
11. Collection of venomous Arthropods and identification.
12. Maintenance of Insect / venomous arthropod collection box. (**Submission of Insect / venomous arthropod collection box is must during the practical examination)

REFERENCES:

1. Biology of Disease Vectors, 2nd Ed., William C. Marquardt, 2004, Elsevier Academic Press.
2. Medical and Veterinary Entomology, 2nd Ed., Gary Mullen & Lance Durden.
3. Medical Entomology: A Textbook on Public Health and Veterinary Problems Caused by Arthropods, Revised Edition. by Bruce Eldridge & John Edman.
4. Medical Toxicology by Richard C. Dart. Pub: Lippincott Williams & Wilkin.
5. Manual of Medical Entomology by Deane P. Furman & Paul Catts.
6. Infectious Diseases of Arthropods by Goddard.
7. Medical Entomology for Students 5th edition by Mike Service.
8. General and Applied Entomology by David and Ananthakrishnan.
9. Destructive and Useful Insects by R. L. Metcalf.
10. Ecology of Insects by Martin R. Speight Pub: Wiley-Blackwell.
11. Insect ecology by Timothy D. Schowalter 3rd Edition. Pub: Elsevier, 2011.

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