



SOLAPUR UNIVERSITY, SOLAPUR
REVISED SYLLABUS - M.Sc. I ZOOLOGY

To be implemented from year 2011-2012

M.Sc. SEMESTER - I and II

Semester	Paper /Practical	Title of the paper/ Practical	Hours/week	Marks
SEMESTER I				
THEORY				
I	ZOO 101	Biosystematics	4	100
I	ZOO 102	Tools and techniques in Biology	4	100
I	ZOO 103	Cell and Molecular Biology	4	100
I	ZOO 104	Population genetics and evolution	4	100
PRACTICAL				
I	ZOO 105	Practical based on ZOO 101/102	6	100
I	ZOO 106	Practical based on ZOO 103&104	6	100
SEMESTER II				
THEORY				
II	ZOO 201	Computational Biology	4	100
II	ZOO 202	General and Comparative Endocrinology	4	100
II	ZOO 203	Developmental Biology	4	100
II	ZOO 204	Environmental Physiology	4	100
PRACTICAL				
II	ZOO 205	Practical based on 201 & 202	6	100
II	ZOO 206	Practical based on 203 & 204	6	100

Paper ZOO 101
Biosystematics

Maximum marks 100

Teaching periods 40

- 1.0 Definition and basic concept of Biosystematics and Taxonomy. (3)
- 1.1 Historical resume of Systematics.
 - 1.2 Importance and applications of Biosystematics in Biology.
 - 1.3 International code of Zoological nomenclature.
- 2.0 Trends in Biosystematics –concepts of different conventional and newer aspects. (4)
- 2.1 Chemotaxonomy.
 - 2.2 Cytotaxonomy.
 - 2.3 Molecular taxonomy.
- 3.0 Molecular perspectives on the conservation of diversity. (4)
- 3.1 Diversity and ecosystem process theory, achievements and future directions.
- 4.0 Dimensions of speciation and taxonomic characters. (7)
- 4.1 Mechanism of speciation in panmictic and apomictic species.
 - 4.2 Species concepts- category, different concepts, sub-species and other interspecific categories.
 - 4.3 Theories of biological classification, hierarchy of categories.
 - 4.4 Taxonomic characters- different kinds, origin of reproductive isolation- biological mechanism genetic incompatibility.
- 5.0 Procedure and keys in taxonomy. (7)
- 5.1 Taxonomic collection, preservation and curation process of identification.
 - 5.2 Taxonomic keys- different kinds taxonomic keys, their merits and demerits.
 - 5.3 Systematic publications- different kinds of publications.
 - 5.4 Process of typification of different zoological types.
- 6.0 Molecular phylogenetics. (7)
- 6.1 How to construct phylogenetic trees?
 - 6.2 Phylogenetic inference- Distance methods, parsimony methods, Maximum likelihood methods.
 - 6.3 Immunological techniques.
 - 6.4 Amino acid sequences and phylogeny.
 - 6.5 Nucleic acid phylogeny- DNA-DNA hybridizations, restriction enzyme sites, nucleotide sequence comparisons and homologies.
- 7.0 Computer Aided Taxonomy. (3)
- 8.0 Levels of structural organization: Unicellular, colonial and multicellular forms; levels of organization of tissues, organs and systems; comparative anatomy. (5)

Suggested Reading Material

1. M.Kato- The Biology of Diversity.
2. J.C. Avise – Molecular markers. Natural History and Evolution, Chapman & Hall, New York.
3. E.O. Wilson- Biodiversity, Academic Press, Washington.
4. G.G. Simpson –Principle of Animal Taxonomy, Oxford IBH Publishing Company.
5. E. Mayer- Elements of Taxonomy.
6. E.O. Wilson- The Diversity of Life. W.W. Northern and Company.
7. B.K. Tikedar- Threatened Animals of India, ZSI Publication, Calcutta.

8. E. Mayer- Principles of Systematic Zoology, M. Hill Publication.

M.Sc. SEMESTER - I

Paper ZOO 102

Tools and techniques in Biology

Maximum marks 100

Teaching periods 40

- 1.0 Principles and uses of analytical Instruments. (5)
- 1.1 Spectroscopy (Spectrophotometers, NMR, IR)
 - 1.2 Densitometric scanner.
 - 1.3 Lasers in Biology.
 - 1.4 X- rays in Biology.
 - 1.5 Electron microscope (TEM, SEM)
- 2.0 Cell culture techniques. (5)
- 2.1 Design and functioning of tissue culture laboratory.
 - 2.2 Culture media preparation.
 - 2.3 Types of culture- monolayer, suspension, macrocarrier culture, capillary culture units, feeder layers, reconstituted basement membrane rafts, cell secretions and metabolic harvesting.
 - 2.4 Cell viability testing.
 - 2.5 Cell-characterization.
 - 2.6 Cell-transformation.
- 3.0 Cell-based techniques. (5)
- a) Fusogens-somatic cell - fusion and its application.
 - b) Fusion in different cell-cycle phases and its applications.
 - c) Cell hybrids and its applications.
- 4.0 Cryotechnique. (4)
- 4.1 Cryopreservation of cells, tissues, organs and organisms.
 - 4.2 Cryotomy.
 - 4.3 Freeze - drying and freeze fracturing techniques.
- 5.0 Separation techniques. (5)
- 5.1 Chromatography, electrophoresis, column fractionation, precipitation, filtration.
 - 5.2 Ultracentrifugation and sub-cellular fractionation.
 - 5.3 Cell separation by - flowcytometry, centrifugation,
- 6.0 Radioisotopes and uses. (5)
- 6.1 Radiolabel techniques in biology.
 - 6.2 Radioactivity counter Geigometry and Scintillation.
 - 6.3 Autoradiography.
 - 6.4 Metabolic labeling.
 - 6.5 Biotelemetry.

- 7.0 Immunological techniques based on antigen antibody interactions, antibody labels, hybrid antibody, immunoassay, immunocytochemistry and its application. technology (vectors, DNA cloning, DNA library).. (4)
- 8.0 Recombinant – DNA - A. Molecular biology and recombinant DNA methods: Isolation and purification of RNA , DNA (genomic and plasmid) and proteins, different separation methods; analysis of RNA, DNA and proteins by one and two dimensional gel electrophoresis, isoelectric focusing gels; generation of genomic and cDNA libraries in plasmid, phage, cosmid, BAC and YAC vectors; in vitro mutagenesis and deletion techniques, gene knock out in bacterial and eukaryotic organisms; (5)
- 9.0 Electrophysiological methods: ECG and MRI (2)

Suggested Reading Material

1. John R.W. Masters. Animal Cell Culture. IRL Press.
 2. Robert Braun. Introduction of Instrumental Analysis. McGraw Hill International Editions.
 3. K. Wilson and K.H. Goulding. A Biologist Guide to Principles and Techniques of Practical Biochemistry. ELBS Ed.
 4. Pattabhi, V. Biophysics. Narosa Publishing House.
 5. Bisen, P.S.; Mathur. Tools and Techniques in Life Sciences. CBS Publishers and Distributors.
 6. Keith Wilson & John Walker. Practical Biochemistry. Cambridge low price.
 7. Cell Cooper , A molecular approach Second Edition
 8. Cell : Alberts, 2002
 9. Rediscovering Biology: Annenberg E Edition
 10. Cell Physiology
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M.Sc. SEMESTER - I

PAPER ZOO 103

Cell and Molecular Biology

Maximum marks 100

Teaching periods 40

- 1.0 Introduction- Experimental systems in Cell Biology. (2)
- 2.0 Biomembranes. (4)
- 2.1 Molecular composition, arrangement and functional consequences.
- 2.2 Transport across the cell membrane - Passive and active transport, pumps, uniports, symports and antiports.
- 2.3 Transport across epithelia
- 2.4 Membrane potential
- 3.0 Structural organization and function of intracellular organelles: Cell wall, nucleus, mitochondria, Golgi bodies, lysosomes, endoplasmic reticulum, peroxisomes, plastids, vacuoles, chloroplast (5)
- 4.0 Cytoskeleton. (8)

- 4.1 Microfilaments and microtubules - structure and dynamics.
- 4.2 Cilia, flagella - structure and dynamics.
- 4.3 Microtubules and mitosis.
- 4.4 Microtubular organizing centers - centriole, kinetochore, basal bodies.
- 4.5 Intermediate filaments- Structure and function.
- 4.6 Actin- binding proteins.
- 4.7 Cell movement and cytoskeleton (Signal transduction included).
- 4.8
- 5.0 CELL COMMUNICATION AND CELL SIGNALING (5)
 - Host parasite interaction: Recognition and entry processes of different pathogens like bacteria, viruses into animal and plant host cells, alteration of host cell behavior by pathogens, virus-induced cell transformation, pathogen-induced diseases in animals and plants, cell-cell fusion in both normal and abnormal cells.
- 6.0 Cell-cell adhesion, (4)
 - 6.1 Cell junctions (tight, adhesion belts, focal contacts, septate, desmosomes, Hemidesmosomes, gap, chemical synapses, plasmodesmata).
- 7.0 Cell matrix and cell matrix adhesion
 - 7.1 Integrins.
 - 7.2 Collagens.
 - 7.3 Non-collagen components (glycosaminoglycans, proteoglycans, elastin, fibronectin).
 - 7.4 Auxin and cell expansion.
 - 7.5 Cellulose fibril synthesis and orientation.
- 8.0 Cell cycle. (3)
 - 8.1 Cell - cycle - control (cyclins and cyclin dependent protein kinases (cdk), MPF-role, , re-replication block and its removal, feed back control).
- 9.0 Cell organelles and cell traffic. (5)
 - 9.1 Protein synthesis on free and bound polysomes.
 - 9.2 Uptake into ER.
 - 9.3 Membrane proteins and other proteins in ER.
 - 9.4 Post transcriptional modification and protein sorting in Golgi apparatus.
 - 9.5 Lysosomal assembly and functions.
 - 9.6 Biogenesis of mitochondria.
- 10.0 Biology of cancer- cases of cancer, cancer cell morphology and properties. (2)
- 11.0 Biology of aging : cellular mechanism of aging. (2)

Suggested Reading Material

1. B. Alberts et al. The Molecular Biology of Cell Garland Publishing Inc. New York and London.
2. De. Robertis et al. Cell and Molecular Biology. Saunders College Publishing, Philadelphia.
3. W. H. Elliot and D.C. Elliot. Biochemistry and Molecular Biology. Oxford University Press. Oxford, New York.

4. Giese A.C. Cell Physiology. Saunders College Publishing, Philadelphia.
5. P.S. Verma & V.K. Agrawal . Cell Biology, Genetics, Molecular Biology, Evolution and Ecology. S. Chand and Company, New Delhi-55
6. Sandhya Mitra. Genetic Engineering, Macmillan.
7. R.C. Dubey .A text Book of Biotechnology. S. Chand and Company, New Delhi-55.
8. Mohan Arora. Genetic Engineering. Himalaya Publishing House.
9. Becker, Klein smith. The World of the Cell. Pearson Education.
10. Geoffrey M. Cooper. Cell. A Molecular Approach. ASM Press . Washington.
11. Gerald Karp. Cell and Molecular Biology. Willey International Edition.
12. Watson et al... Molecular Biology of the Gene. Pearson Education.

M.Sc. SEMESTER - I

PAPER ZOO 104

Population genetics and evolution

Maximum marks 100

Teaching periods 40

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|---|-----|
| 1.0 Concepts of evolution and theories of organic evolution. | (5) |
| Emergence of evolutionary thoughts: Lamarck; Darwin—concepts of variation, adaptation, struggle, fitness and natural selection; Mendelism; spontaneity of mutations; the evolutionary synthesis. | |
| 2.0 Neo Darwinism. | (3) |
| 2.1 Hardy - Weinberg Law of genetic equilibrium. | |
| 2.2A Detailed account of destabilizing forces a) Natural selection b) Mutation c) Genetic drift d) Migration e) Meiotic drive | |
| 3. 0 Quantitative genetic variability. | (4) |
| 3.1 Phenotype variations. | |
| 3.2 Models explaining changes in genetic structure of populations. | |
| 3.3 Factors affecting human disease frequency. | |
| 4.0 Molecular population genetics. | (4) |
| 4.1 Patterns of change in nucleotide and amino acid sequences. | |
| 4.2 Ecological significance of molecular variations. | |
| 4.3 Emergence of Neo-Darwinism-neutral hypothesis. | |
| 5.0 Genetics of quantitative traits in populations. | (4) |
| 5.1 Estimation of heredity. | |
| 5.2 Genotype-environment interactions. | |
| 5.3 Inbreeding depression and heritability. | |
| 5.4 Molecular analysis of quantitative traits. | |
| 6.0 Genetics of speciation. | (4) |
| 6.1 Phylogenetic and biological concept of speciation. | |
| 6.2 Patterns and mechanisms of reproductive isolation. | |
| 6.3 Models of speciation (Allopatric, Sympatric Parapatric). | |
| 7.0 Molecular evolution. | (4) |
| 7.1 Gene evolution. | |
| 7.2 Evolution of gene families, Molecular drive in evolution. | |
| 7.3 Assessment of molecular variation. | |

- 8.0 Origin of higher categories. (4)
- 8.1 Phylogenetic gradualism and punctuated equilibrium.
 - 8.2 Major trends in the origin of higher categories.
 - 8.3 Micro and macro evolution.
- 9.0 Population genetics and ecology. (4)
- 9.1 Metapopulations.
 - 9.2 Monitoring natural populations.
 - 9.3 Why small populations become extinct?
 - 9.4 Loss of genetic variation.
 - 9.5 Conservation of genetic resources in diverse taxa.
 - 9.6 Genomic studies in biodiversity.
- 10.0 Paleontology and evolutionary history: The evolutionary time scale; eras, periods and Epoch; major events in the evolutionary time scale; origins of unicellular and multicellular organisms; (4)

Suggested Reading Material

1. Hart, D.L. A primer of Population Genetics. Suinuaer associates, Inc. Massachusetts.
2. King. M. Species Evolution. The Cambridge University Press, Cambridge.
3. Smith J.M. Evolutionary Genetics. Oxford University Press. Oxford, New York.
4. Merrel D.J. Evolution and Genetics. Holt, Rinchart and Winston, Inc.
5. Jha A.P. Genes and Evolution. John Publication, New Delhi.
6. Boylan. Genetic Engineering: Science and Ethics on the New Frontier. Pearson Education. Delhi
7. Human Biology : G.A. Harrison , G.M. Tanner, D.R. Pilbeam , P.T. Baker ; Oxford Science Publication. 1988.
8. Evolution The triumph of an Idea : Carl Zimmer Harper Collins Publishers 2001
9. PBS Org. Website for Evolution concept

M.Sc. SEMESTER – I

PRACTICAL PAPER ZOO 105

(Based on Theory papers 101 & 102)

BIOSYSTEMATICS

Marks 100

1. Calculation diversity indices to zooplankton populations from freshwater resources.
2. Study of museum specimens and slides invertebrates phyla (one representative from each class) for biosystematics & biodiversity.
3. Study of museum specimens of chordates phylum (one representative from each class) for biosystematics and biodiversity
4. Study of types of invertebrate larvae –Peculiarities and evolutionary significance.
5. Identification of poisonous and Non poisonous snakes.

6. Study of temporal vacuities in skulls of reptiles.
 7. Identification of insects/ molluscs with the help of keys up to orders.
 8. Identification of animals with the help of keys up to families (fish/ amphibian with the help of preserved specimens / models / pictures).
 9. Study of endangered species. (Models, pictures, charts.).
 10. Study of adaptations in animals from pieces, amphibian, reptilian, birds & mammals (2-3 examples from each).
 11. Visit to ZSI, Seashore/ National Institutes /Wildlife Sanctuary/ National Parks/ Water reservoirs
 12. Any other practical set by the department
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TOOLS AND TECHNIQUES

1. Study of different microscopes & laboratory equipments
 2. Light Microscope
 3. Florescent Microscope
 4. Phase Contrast Microscope
 5. Cell separation by density gradient centrifugation
 6. Separation of amino acids by paper chromatography.
 7. Separation of Sugars by paper chromatography.
 8. Isolation of active ingredients from natural resources by using column chromatography.
 9. Sub cellular fractionation by using ultra centrifugation.
 10. DNA Extraction and Isolation.
 11. Analysis of DNA samples by gel electrophoresis.
 12. To find absorption spectrum of hemoglobin, bovine serum albumin, Tyrosine and (UV-visible).
 13. Any other practical set by the department
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M.Sc. SEMESTER – I

PRACTICAL PAPER ZOO 106

(Based on Theory papers 103 & 104)

Cell and Molecular Biology

1. Sub cellular fractionation of Rat Liver.
2. Estimation of marker enzyme – succinic dehydrogenase in mitochondrial fraction.
3. Demonstration of collagen in Liver section.
4. Metaphasic chromosome preparation of mitosis
5. Demonstration of meiosis in grasshopper testis.
6. Preparation of Drosophila Culture.
7. Preparation of Polytene chromosomes from salivary glands of Chyromous/ Drosophila larva.
8. Any other practical set by the department.

Population genetics and evolution

1. Migration influenced examples identification with pictures.
2. Isolation influenced examples identification with pictures.
3. Evolution influenced examples identification with pictures.
4. Estimation of genes & genotypic frequencies in light of Hardy Weinberg law based on fecal traits, ABO Blood group data.
5. Construction of Phylogenetic trees based on DNA, RNA and RFLP
6. Prezygotic Isolation in some Sp. of Drosophila.
7. Case studies related population genetics and evolution.
8. Any other practical set by the department.

M.Sc. SEMESTER – II

PAPER ZOO 201

Computational Biology

Maximum marks 100	Teaching periods 40	
1.0 Measures of		(8)
1.1 Central Tendency		
Central tendency mean		
Central tendency-median		
Central tendency-mode		
1.2 Dispersion- Concept of variation, standard deviation, variance, CV		
2.0 Correlation and regression of ungrouped data scattered diagram, Rank correlation		(7)
3.0 Introduction to Probability Distribution		(5)
3.1 Elements and classical definition of probability,		
4.0 Distribution and Hypothesis testing		(5)
4.1 Binomial distribution, Normal distribution, Definition and properties		
4.2 Tests of simple hypothesis using normal and t- distribution		
5.0 Significance tests		(7)
5.1 Student's 't' test		
5.2 Chi-square test for goodness of fit		
5.3 Z test		
6.0 One way Analysis of variance		(4)
7.0 Sequencing software.		(4)
8.1 Sequencing analytical techniques for DNA, amino acids & proteins synthesis.		

Suggested Reading Material

1. Sokal R.R. and F.J. Rohit. Biometry, Freeman, San Francisco.
2. Gupta- Fundamentals of Statistics.
3. Snedecor, G.W. and W.G. Cochran, Statistical Methods, East-West Press, New Delhi.
4. Green, R.H. sampling design and statistical methods for environmental biologist. John Wiley & sons, New York.

5. Pranab Kumar Banerjee. Introduction to Biostatistics. S. Chand and Company, New Delhi-55.
 6. Zar. Biostatistician Analysis. Pearson Education. Delhi.
 7. Deshpande A.V. Introduction to Probability and Statistics. Vipul Prakashan.
 8. Arora P.N. and Malhan P.K. Biostatistics. Himalaya Publishing House.
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M.Sc. SEMESTER - II

PAPER ZOO 202

General and Comparative endocrinology

Maximum marks 100	Teaching periods 40	
1.0 Endocrinology: General consideration.		(6)
1.1 Discovery of hormones.		
1.2 Classification and chemical nature of hormones.		
1.3 Experimental methods of hormone study.		
2.0 Neuroendocrine system and neurosecretion.		(4)
3.0 Biosynthesis and mechanism of hormone secretion.		(7)
3.1 Biosynthesis of amino acid derivative peptide and steroid hormones.		
3.2 Hormones: Secretion, transport and degradation.		
4.0 Physiology and mechanism of hormone action.		(7)
4.1 Hormones and homeostasis.		
4.2 Hormone receptors and mechanism of hormone action.		
4.3 Hormonal regulation of metabolism.		
5.0 Hormone action in different facets of life.		(6)
5.1 Development and metamorphosis.		
5.2 Growth		
5.3 Migration and color change.		
6.0 Hormones and reproduction.		(5)
7.0 Hormones of gastrointestinal tract.		
8.0 Hormones and behavior.		(5)

Suggested Reading Material

1. E.J.W. Barrington. General and Comparative Endocrinology. Oxford , Clarendon Press.
2. Twiner C.D. General Endocrinology,
3. A. Gorbman et al. Comparative Endocrinology. John Wiley & Sons.
4. R.H. Williams. Text Book of Endocrinology.
5. C.R. Martin. Endocrine Physiology. Oxford University Press. Oxford, New York.
6. Turner, C.D. and Bangara J.T. General Endocrinology
- 7 .Mac E. Hadley. Endocrinology. Pearson Education.
- 8 Burch, Warner M.; Burch; Endocrinology, Lippincott Williams & Wilkins.
- 9 Felig; Endocrinology And Metabolism .McGraw-Hill ISE.
- 10 Prosser Brown . Comparative Animal Physiology. Saunders Publication.
11. Endocrinology :An integrated approach S.S. Nussey and S.A. Whitehead (NCBI)

M.Sc. SEMESTER - II
PAPER ZOO 203
Developmental Biology

Maximum marks 100

Teaching periods 40

1. Evolution of sexual reproduction in Eukaryotes.
 2. Multicellularity in animal kingdom.
 3. Capacitation and Fertilization.
 4. Study of egg, blastula, gastrula and three germ layers in Amphioxus, Frog, Chick and Mammals.
 5. Development and regulation of limbs in fishes, amphibians, birds, and mammals.
 6. Introduction to Organogenesis.
 7. Development of anteriority to posteriority in Drosophila and Chordates.
 8. Differentiation and growth
 9. Role of programmed cell death in development with special reference to Coenorhabditis. Cell apoptosis in development of human limbs.
 10. Cloning experiments in Mammals
 11. Embryonic stem cells and their applications.
 12. Regeneration
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Suggested Reading Material

1. Turner, C.D. and Bangara J.T. General Endocrinology
 2. R.G. Edwards. Human Reproduction.
 3. Austen C.R. and Short R.V. Reproduction in Animals.
 4. F.T. Longo. Fertilization, Chapman & Hall.
 5. Mathur, Ramesh. Embryology, Anmol Publications .
 6. Morgan, T. H. .Embryology And Genetics. Agrobios India
 7. Balanski. Introduction to Embryology.
 8. Developmental Biology ;Scott F Gilbert Sixth Edition, Sinaur Publications
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M.Sc. SEMESTER - II
PAPER ZOO 204
Environmental Physiology

Maximum Marks 100

Teaching periods:40

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| 1.0 Homeostasis and physiological regulations. | (5) |
| 1.1 Concept of homeostasis | |
| 1.2 Acclimatization- acclimatization and adaptation | |
| 2.0 Physiology of stress. | (6) |
| 2.1 Fundamental concept of stress. | |
| 2.2 Causes and effects of stress. | |

- 2.3 Stress, strain and fatigue.
- 2.4 Environmental stresses (temperature, light, humidity, vibration, noise and toxins).
- 2.5 Physiological responses to stresses.
- 2.6 Stress management.
- 3.0 Digestive system: Digestion, absorption, energy balance, BMR. (4)
- 4.0 Cardiovascular System: Comparative anatomy of heart structure, myogenic heart, specialized tissue, ECG – its principle and significance, cardiac cycle, heart as a pump, blood pressure, neural and chemical regulation of all above. (5)
- 5.0 Respiratory system: Comparison of respiration in different species, anatomical considerations, transport of gases, exchange of gases, waste elimination, neural and chemical regulation of respiration. (5)
- 6.0 Physical work and adaptation to stress. (4)
 - 6.1 Occupational stresses.
 - 6.2 Causes, effects and prevention.
- 7.0 Adaptation to the environment. (5)
 - 7.1 Concept of adaptation and levels of adaptation.
 - 7.2 Organ systems in adaptation.
 - 7.3 Cellular level of adaptation
 - 7.4 Mechanisms of adaptation.
- 8.0 Environment and Health. (4)
 - 8.1 Environmental health hazards.
 - 8.2 Industrial health hazards.
 - 8.3 Occupational diseases.
- 9.0 Space physiology (2)

Suggested Reading Material

1. Echert R. Animal Physiology: Mechanisms and Adaptations. W.H. Freeman and Company, New York.
2. Hoar W.S. General and comparative Animal Physiology, Prentice Hall of India.
3. Pummer L. Practical Biochemistry , Tata McGraw –Hill.
4. Wilson K. and Walker J. Practical Biochemistry.
5. Strand F.L. Physiology : A Regulatory System Approach. Macmillan Publishing Co. New York.
6. Wilma P.G. et al. Environmental Physiology, Blackwell Sci. Oxford, UK.
7. Frederic Martini. Fundamentals of Anatomy and Physiology. Prentice Hall.
8. Tortora. Principles of Anatomy and Physiology. Wiley Publications.
9. Ezeilo, Gabriel C. .Textbook of Physiology. Oxford University Press.

M.Sc. SEMESTER – II
PRACTICAL PAPER ZOO 205
(Based on Theory papers 201 & 202)

Computational Biology

1. Example Based on Regression.
2. Example Based on Probability.
3. Example Based on Chi-square test.
4. Example Based on Student 't' test.
5. Use of BLAST," sequencing amino acids & DNA & vice versa internet may be used.
6. Examples based on Correlation coefficient.
7. Examples based on Coefficient of variance.
8. Examples based on ANOVA.
9. Any other practical set by the department.

General and Comparative endocrinology

14. Study of testicular cells- Sertoli cells, Interstitial cells and sperm cells in the sections of testis.
 15. Insulin, Epinephrine, Glucose tolerance tests.
 16. Demonstration of pituitary cell types,
 17. Demonstration of neurosecretory cells.
 18. Bioassay of estrogen by vaginal smear technique.
 19. Effect of Adrenalin and Atropine Sulphate on fish chromatophores.
 20. Effect of eye stalk removal on blood sugar level
 21. Effect of eye stalk removal on oxygen consumption in crab.
 22. Any other practical set by the department
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M.Sc. SEMESTER – II**PRACTICAL PAPER ZOO 206****(Based on Theory papers 203 & 204)****Developmental Biology**

1. Grasshopper Spermatogenesis.
2. Sperm motility test and analysis.
3. Study of Different Phases of Oestrus Cycle in Rat.
4. To demonstrate acrosomal development in Rat testis by PAS method.
5. Effect of temperature on chick heart rate.
6. To trace wing development in chick embryo
7. To trace eye and development of heart in chick embryo
8. To track development in Drosophila – Egg to Larva up to pupation
9. Study of placental type
10. Teratogenic development in Chick embryo
11. Any other practical set by the department.

Environmental Physiology

1. Heart perfusion and Recording cardiogram of Frog
2. Estimation of rate of O₂ consumption by the freshwater fish.

3. Effect of Temperature on pulse rate
4. Effect of Temperature on heart rate.
4. Mounting of Spiracle and Trachea.
5. Estimation of Blood lactic Acid in frog
6. To study digestive enzymes (Amylase, Protease and lipase) of frog / Cockroach.
- 7 To study effects of various Physical and chemical factors on enzyme Activity and to demonstrate the protein nature of enzyme.
- 8 Visit to CATH Laboratory, Physiotherapy centre, Yoga center
- 9Any other practical set by the department.