COURSEWISE SCHEME - II[ND] SEMESTER

1. Course Code :
2. Course Name : M.Sc. Zoology
3. Total Subject : 4
4. Compulsory Subject : 4
5. Optional Subject : 1

7. Maximum marks : 500
8. Minimum Passing percentage : 36

Sub. code	Subject Name	Theory									Practical		Total	
		Paper					CCE		Total Marks					
		1st	2nd	3rd	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
Compulsory														
	General and comparative animal physiology and endocrinology	85	0	0	85	31	15	5	100	36	0	0	100	18
	Population Ecology and environmental physiology	85	0	0	85	31	15	5	100	36	0	0	100	18
	Tools and techniques in biology	85	0	0	85	31	15	5	100	36	0	0	100	18
	Molecular cell Biology and genetics	85	0	0	85	31	15	5	100	36	0	0	100	18
	Practical – I Related to Theory Paper – I & II	0	0	0	0	0	0	0	0	0	50	18	50	18
	Practical – II Related to Theory Paper – III & IV	0	0	0	0	0	0	0	0	0	50	18	50	18

Department of Higher education, Govt. of M.P.
Semester wise Syllabus for Postgraduates
As recommended by Central board of Studies and
Approved by HE the Governor of M.P.

Class: M.Sc. Zoology
SEMESTER - II
Paper: Ist Paper

MM-85

GENRAL AND COMPARATIVE ANIMAL PHYSIOLOGY AND ENDOCRONOLOGY

Unit – I

1. Respiratory pigments through different phylogenic groups
2. Transport of oxygen and carbon dioxide in blood and body fluids
3. Regulation of respiration
4. Physiology of impulse transmission through nerves and synapses
5. Autonomic nervous system, neurotransmitters and their physiological functions

Unit – II

1. Patterns of nitrogen excretion in different animal groups
2. Comparative physiology of digestion
3. Osmoregulation in different animal groups
4. Thermoregulation in homeotherms, poikilothermas and hibernation
5. Physiology of pregnancy, placental hormones, pregnancy diagnosis tests, parturition and breast and lactation

Unit – III

1. Comparative study of mechanoreception
2. Comparative study of photoreception
3. Comparative study of phonoreception
4. Comparative study of chemoreception
5. Comparative study of equilibrium reception

Unit – IV

2. Bioliminescence as means of communication among animals
3. Pheromones and other semiochemicals as means of communication among animals
4. Chromatophores and regulation of their function among animals
5. Hormones, their classification and chemical nature
6. Mechanisms of hormone action

Unit –V

1. Phylogeny of endocrine glands (pituitary, pancreas, adrenal, thyroid)
2. Ontogeny of endocrine glands
3. Neuroendocrine sysyem
4. Hormone receptors – signal transaction mechanisms
5. Hormones and reproduction
    a. Seasonal breeders
    b. Continuous breeders

Department of Higher education, Govt. of M.P.
Semester wise Syllabus for Postgraduates
As recommended by Central board of Studies and
Approved by HE the Governor of M.P.

Class : MSc Zoology
SEMESTER -II
Paper-I List of Books

SUGGESTED READING MATERIAL

1. EJW Barrington-General & comparative Endoctrinology-Oxford, Claredon Press
2. R.H. Williams-Text Book of Endocrinology-W.B. Saunders
3. C.R. Martin- Endocrine Physiology-Oxford University Press.
4. Molecular CellBiology-J. Darnell, H. Lodish and D. Baltimore-Scientific American Book USA
5. Molecular Biology of the cell-B. Alberts, D-Bray, J.Lewis, M. Raff, K. Roberts and J.D. Watson, Garland Pub. New York.

Department of Higher education, Govt. of M.P.
Semester wise Syllabus for Postgraduates
As recommended by Central board of Studies and Approved by HE the Governor of M.P.

Session : [illegible]

M. Sc. Zoology
Semester II
Paper II
Population Ecology and Environmental physiology

MM -35

Unit I

1. Populations and their characters.
2. Demography : Life tables, generation time, reproductive value.
3. Population growth: Growth of organisms with non-overlapping generations,stochastic and time lag models of population growth, stable age distribution.
4. Population regulation: Extrinsic and intrinsic mechanisms.

Unit II

1. Adaptations : Levels of adaptions, significance of body size.
2. Aquatic environments : Fresh water, marine, shores and estuarine environments.
3. Eco-physiological adaptations to fresh water environments.
4. Eco-physiological adaptations to marine environments.
5. Eco-physiological adaptations to terrestrial environments.

Unit III

1. Environmental limiting factors.
2. Inter and intra-specific relationship.
3. Predatory- prey relationship, predator dynamics, optimal foraging theory (patch choice, diet choice, prey selectivity, foraging time).
4. Mutulism , evolution of plant pollinator interaction.

Unit IV

Environmental poliution and human health.

1. Conservation management of natural resources .
2. Environmental impact assessment.
3. Sustainable development.

Unit V

1. Concept of homeostasis.
2. Endothermi and physiological mechanism of regulation of the body temperature.
3. Physiological response to oxygen deficient stress.
4. Physiological response to body exercise.
5. Meditation, yoga and their effects.

SUGGESTED READINGS:

1. Cherrett,J.M. Ecological Concepts. Blackwell Science Publication, Oxford, U.K.
2. Elseth,B.D. and K.M. Baumgartner,population Biology,Van Nostrand Co., New York.
3. Jorgensen,S.E. Fundamentals of ecological modeling. Elsevier, New York.
4. Krebs, C.J. Ecology. Harper and Row, New York.
5. Krebs,C.J. Ecological Methodology. Harper and Row , New York.
6. Eckert, R. Animal Physiology: Mechanism and Adaptation. W.H. Freeman and Co., New York.
7. Hochachka, P.W. and G.N., Somero. Biochemical adaptation. Priceton, New Jersey.

Department of Higher education, Govt. of M.P.
Semester wise Syllabus for Postgraduates
As recommended by Central board of Studies and
Approved by HE the Governor of M.P.

Class: M.Sc. Zoology
SEMESTER - II
Paper: IIIrd Paper
Tools and techniques in Biology

MM -85

UNIT – I

1. **Microsocopy, principle & applications**
   - Light microscope and phase contrast microscope
   - Fluorescence microscope
   - Electron microscope
   - Confocal microscopy
2. **General Principle and applications of**
   - Colorimeter
   - Spectrophotometer
   - Ultra centrifuge
   - Flame photometer
   - Beer and Lambert's law.
3. **Microbiological techniques**
   - Media Preparation and sterilization
   - Inoculation and growth monitoring.
   - Microbial assays.
   - Microbial identification (cytological staining methods for bacterial and fungal strains)
   - Use of fermentors

UNIT – II

1. Computer aided techniques for data presentation data analysis, statistical techniques.
2. Cryotechniques
   - Cryopreservation of cells, tissues, organs and organisms.
   - Cryosurgery
   - Cryotomy
   - Freeze fracture and freeze drying.
3. Separation techniques. Chromatography, principle type and applicants.
   - Electrophoresis, Principles, types and applications PAGE and agarose gel electrophoresis.
   - Organelle separation by centrifugation.

UNIT – III

1. Radioisotope and man isotope techniques in biology.
   a. Sample preparation for radioactive counting
   b. Autoradiography.
2. **Immunological techniques**
   - Immunodiffusion (Single & Double)
   - Immuno electrophoresis
3. **Techniques immuno detection**
   - Immunocyto / histochemistry
   - Immunioblotting, immunodetection, immunofluroscence.
4. **Surgical techniques.**
   - Organ ablation (eg. Ovariactomy, adrenalectomy)
   - Perfusion techniques
   - Stereotaxy
   - Indwelling cathethers
   - Biosensors.
   -

UNIT –IV

1. **Histological techniques**
   - Principles of tissue fixation
   - Microtomy
   - Staining
   - Mounting
   - Histochemistry
2. **Cell culture techniques.**
   - Design and functioning of tissue culture laboratory
   - Culture media, essential components and Preparation
   - Cell viability testing.

UNIT – V

1. **Cytological techniques**
   - Mitotic and meiotic chromosome preparations from insects and vertebrates.
   - Chromosome banding techniques (G.C.Q. R. banding)
   - Flowcytometry.
2. **Molecular cytological techniques**
   - In site hybridization (radio labeled and non-radio labeled methods)
   - Fish
   - Restriction banding
3. **Molecular biology techniques**
   - Southern hybridization
   - Northern hybridization
   - DNA Sequencing
   - Polymerase chain reaction (PCR)

Department of Higher education, Govt. of M.P.
Semester wise Syllabus for Postgraduates
As recommended by Central board of Studies and Approved by HE the Governor of M.P.

[redacted]

MSc Zoology
SEMESTER -II
Paper-III
Tools & Technique Books

SUGGESTED READING MATERIAL

1. Introduction to instrumental analysis-Robert Braun-McGraw Hill.
2. A biologist Guide to principles and Techniques of Practical Biochemistry-K, Wilson and K.H. Goulding ElBS Edn.
3. Clark & Swizer. Experimental Biochemistry. Freeman, 2000.
4. Locquin and Langeron. Handbook of Microscopy. Butterwaths, 1983
5. Boyer. Modern Experimental Biochemistry. Benjamin, 1993
6. Freifelder. Physical Biochemistry. Freeman, 1982.
7. Wilson and Wlaker. Practical Biochemistry. Cambridge, 2000.
8. Cooper. The Cell-A Molecular Approach. ASM, 1997
9. John R.W. Masters. Animal Cell culture- A practical approach. IRL Press.
10. Robert Braun. Introduction to instrumental analysis. McGraw Hill

Department of Higher education, Govt. of M.P.
Semester wise Syllabus for Postgraduates
As recommended by Central board of Studies and
Approved by HE the Governor of M.P.

[redacted]

M.Sc. Zoology
IInd SEMESTER
IVth Paper

Topic – Molecular Cell Biology and genetics

MM - 85

Unit – I Biomembrane

- Molecular composition arrangement and functional consequences
- Transport across cell membrane diffusion active transport, pumps, uniports, symports and antiports
- Micro filaments and microtubules structure and dynamics
- Cell movements intracellular transport, role of kinesis and dynein

Unit – II Cell – Cell signaling

- Cell surface receptors
- Second messenger system
- Signaling from plasma membrane to nucleus
- Gap junctions and connexius
- Entegrius

Unit – III Cell – Cell adhesion and communication

- Ca^{++} depandant homophilic cell – cell ahension
- Ca^{++} indepandant homophilic cell – cell ahension
- Gap junctions and connexius
- Genome organization, hierarchy in organization
- Chromosomal organization of genes and non-coding DNA
-

Unit –IV Sex determination

- Sex determination in dtosophila
- Sex determination in mammals
- Basic concept of dosage compensation
- Cytogenetic of humen chromosoms
- Human genome project (HGP) purpose 2 Implicatic

Unit – V Genetic Diseases and Genomics

- Human gene therapy
- Prenatal diagnosis & genetic counseling
- Genetic screening
- Structural Genomics
- Functional Genomics
- Gene libraries
- Trasgenic animals & their applications

SUGGESTED READINGS

- J. Darnell, H. Lodish and D. Baltimore molecular cell biology scientific American book. Inc. USA
- B. Alberts D. Bray, J. Lewis, M. raff, K. roberts and J.D. Wattson. molecular biology of the cell. Garland Publishing Inc. New York.
- John R. W. animal cell culture A practical approach masters. Irl. Press
- Alberts et. all Essentials cell biology garland publishing Inc. New York 1998
- J.M. Barry molecular biology
- Philip E. Hartman Gene Action
- L.C. dunn, principals of Genetics
- A.M. Winchester genetics
- Edgar Alterbrg Genetics
- L.C. Dunn genetics and the oregin of species
- Bengt A. Kihlman actions of chemicals of dividing cells

Department of Higher education, Govt. of M.P.
Semester wise Syllabus for Postgraduates
As recommended by Central board of Studies and
Approved by HE the Governor of M.P.
Session : [redacted]

Class: M.Sc.
SEMESTER - II
Practical : Ist

M,M, 50

General & Comarative Physiology and Endocrinology Population Ecology and Environmental Physiology.

EXERCISE :

1. Experiment on Hematology Blood group, Total and different counts.	5
2. Demonstration of Enzyme Action, and chromatography	10
3. Estimation of pH.	5
4. Detection of protein carbohydrate and fats.	5
5. Endocrinological spots comments on prepared histological slides.	10
6. Detection of Nitrogenous products in given samples.	5
7. Viva Voce	5
8. Practical Records and collection.	5
Total Marks	**50**

Department of Higher education, Govt. of M.P.
Semester wise Syllabus for Postgraduates
As recommended by Central board of Studies and
Approved by HE the Governor of M.P.

[redacted]

Class: M.Sc.
SEMESTER - II
Practical : IInd

M,M, 50

Tools and Techniques for biology.
Molecular cell Biology and Genetics

1. Comments upon the structure and application of analytical instruments 10
   - i. Colorimeter
   - ii. Sectrophotometer
   - iii. Ultacentrifrige
   - iv. ESR and NMR spectrometer
   - v. Microtomy
   - vi. Chymogrophic Instruments
2. Problem and based on genetics 10
3. Estimation techniques based for RNA and DNA 10
4. Estimation of Gene and Genotypic frequencies in light of hardy weinbecey law based on facial traits. 5
5. Demonstration of chromosome polymorphism isozyze polymorphism in some insect population. 5
6. Viva – Voce 5
7. Practical Record 5

Total Marks **50**