

5/10/12-17

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 ~~2015-16~~ 2016-17

Max.Marks. 100  
Theory 85  
C.C.E. 15

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

GENERAL AND COMPARATIVE ANIMAL PHYSIOLOGY AND  
ENDOCRINOLOGY

Unit - I

1. Respiratory pigments through different phylogenetic 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, poikilotherms 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. Bioluminescence 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

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Unit - V

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

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MSc Previous  
Subject: Zoology  
SEMESTER -II  
Paper-I List of Books

SUGGESTED READING MATERIAL

1. EJW Barrington-General & comparative Endocrinology-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. Damell, 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.

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M. Sc. Previous  
Zoology  
Semester II  
Paper II

Max.Marks. 100  
Theory 85  
C.C.E. 15

Population Ecology and Environmental physiology

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 adaptations, 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 pollution and human health.

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

  
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Unit V

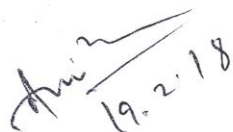
1. Concept of homeostasis.
2. Endothermi and physiological mechanism of regulation of the body temperature.
3. Physiological response to oxygen deficient stress.
4. Physiological response to body exercise.
5. Meditation, yoga and their effects.

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.



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

Max.Marks. 100  
Theory 85  
C.C.E. 15

Unit - I


1. ✓ Microscopy. 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

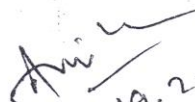
Unit - II

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.

  
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Sample preparation for radioactive counting

✓ Autoradiography

2. ✓ Immunological techniques


- Immunodiffusion (Single & Double)
- Immunoelectrophoresis
- 3. Techniques immuno detection
  - Immunocyto / histochemistry
  - Immunoblotting, immunodetection, immunofluorescence.
- 4. Surgical techniques.
  - ✓ Organ ablation (eg. Ovariectomy, adrenalectomy)
  - Perfusion techniques
  - Stereotaxy
  - Indwelling catheters
  - Biosensors.


Unit - IV

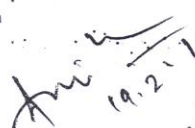
1. Histological techniques
  - Principles of tissue fixation
  - Microtomy
  - Staining
  - Mounting
  - Histochemistry
2. Cell culture techniques.
  - Design and functioning of tissue culture laboratory
  - Culture media, essential components and Preparation
  - Cell viability testing.

Unit - V

1. Cytological techniques
  - Mitotic and meiotic chromosome preparations from insects and vertebrates.
  - Chromosome banding techniques (G.C.Q. R. banding)
  - ✓ Flow cytometry.
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)

  
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Dr. C. S. Shrivastava

  
Dr. M. M. P. Shrivastava

  
19.2.18  
Dr. Anita Jagannakar

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M.Sc. Previous Zoology

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Theory 85  
C.C.E. 15

II Sem IV Paper

Topic Molecular Cell Biology and genetics

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 kinesin and dynein

Unit - II Cell - Cell signaling

- ✓ Cell surface receptors
- ✓ Second messenger system
- ✓ Signaling from plasma membrane to nucleus
- ✓ Gap junctions and connexins
- ✓ Integrins ✓

Unit - III Cell - Cell adhesion and communication

- ✓  $Ca^{++}$  dependant homophilic cell - cell adhesion
- ✓  $Ca^{++}$  independant homophilic cell - cell adhesion
- ✓ Gap junctions and connexins ✓
- Genome organization, hierarchy in organization

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- Chromosomal organization of genes and non-coding DNA

#### Unit - IV Sex determination

- Sex determination in Drosophila
- Sex determination in mammals
- ✓ Basic concept of dosage compensation
- Cytogenetic of human chromosomes
- ✓ Human genome project (HGP) purpose & Implications

#### Unit - V Genetic Diseases and Genomics

- ✓ Human gene therapy
- Prenatal diagnosis & genetic counseling
- Genetic screening
- ✓ Structural Genomics
- ✓ Functional Genomics
- ✓ Gene libraries
- ✓ Transgenic 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. Watson. molecular biology of the cell. Garland Publishing Inc. New York.
- John R. W. animal cell culture A practical approach masters. Irl. Press
- Alberts et al 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

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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

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Dr. Anita Daganter

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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. Spectrophotometer	
iii. Ultracentrifuge	
iv. ESR and NMR spectrometer	
v. Microtomy	
vi. Chymographic 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 isozyme polymorphism in some insect population.	5
6. Viva - Voce	5
7. Practical Record	5
Total Marks	<u>50</u>

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