

# Chhindwara University, Chhindwara (M.P.)

SYLLABUS OF M.A./M.Com./M.Sc./M.H.Sc. PREVIOUS/FINAL OR SEMESTER II

Name of Paper	Title of paper	Max. Marks			Minimum Marks			Total Marks
		Theory	CCE	Practical	Theory	CCE	Practical	
First	General and comparative animal physiology & endocrinology	40	10		15	04		50
Second	Population Ecology and environmental physiology	40	10		15	04		50
Third	Tools and Techniques in Biology	40	10		15	04		50
Fourth	Molecular Cell Biology & Genetics	40	10		15	04		50
Practical-Ist	Practicals related to First and Second Paper			50			20	50
Practical-II <sup>nd</sup>	Practicals related to Third & fourth paper			50			20	50
							Total	300

### Board of Studies :

- I. Chairman - Adelkera
- II. Subject Expert -
  1. Dr. P.R. Mishra
  2. Dr. R.K. Srivastava
  3. Dr. V.K. Krishan
  4. Dr. Sunila Singh

(Dr. S.R. Chandelker)

5. Dr. N.S. Manjari
- 6.
- 7.

# CHHINDWARA UNIVERSITY, CHHINDWARA

M.Sc. Zoology  
Second -semester

Max. Marks 40

Paper-I

## 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

1. Bioluminescence as means of communication among animals
2. Pheromones and other similar chemicals as means of communication among animals
3. Chromatophores and regulation of their function among animals
4. Hormones, their classification and chemical nature
5. Mechanisms of hormone action

### 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

### Suggested Reading Materials:

1. EJW Barrington-General & comparative Endocrinology-Oxford, Clarendon 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.

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*Handwritten signature: Dr. P.R. Chandekar*

*Chairman*

*1. Dr. P. R. Chandekar*

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*3. [Handwritten signature]*  
*4. [Handwritten signature]*  
*5. [Handwritten signature]*

# CHHINDWARA UNIVERSITY, CHHINDWARA

M. Sc Zoology  
Second Semester

Max. Marks 40

Paper II

## 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.

### Unit V

1. Concept of homeostasis.
2. Endothermic 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 Reading Materials:

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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# CHHINDWARA UNIVERSITY, CHHINDWARA

## M. Sc Zoology Second Semester Paper III

Max. Marks 40

### Tools and techniques in Biology

#### 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 applications.
  - Electrophoresis, Principles, types and applications PAGE and agarose gel electrophoresis.
  - Organelle separation by centrifugation.

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#### Unit III

1. Radioisotope and main 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
  - Immunoblotting, immunodetection, immunofluorescence.
4. Surgical techniques.
  - Organ ablation (eg. Ovariectomy, adrenalectomy)
  - Perfusion techniques
  - Stereotaxy

Unit IV

- Indwelling catheters
- Biosensors.

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 labelled and non-radio labelled methods)
  - FISH
  - Restriction banding
3. Molecular biology techniques
  - Southern hybridization
  - Northern hybridization
  - DNA Sequencing
  - Polymerase chain reaction (PCR)

Suggested Reading Materials:

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 EIBS 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

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# CHHINDWARA UNIVERSITY, CHHINDWARA

## M. Sc Zoology Second Semester Paper IV

Max. Marks 40

### 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<sup>++</sup> dependant homophilic cell . cell adhesion
- Ca<sup>++</sup> independant homophilic cell . cell adhesion
- Gap junctions and connexins
- Genome organization, hierarchy in organization
- 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 Reading Materials:

- 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 oregon of species
- Bengt A. Kihlman actions of chemicals of dividing cells

Abhikant

# Chhindwara University chhindwara

M.Sc. IIInd sem (zoology ) 2020-21

## Practical 1<sup>st</sup>

1. Experiment on hematology blood group ,total and different count	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 product in given samples	5
7. Viva -voce	5
8. Practical record and collection	5
	Total 50

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Mohit Kumar

Prof. S.

# Chhindwara University chhindwara

M.Sc. IIInd sem (zoology )2020-21

## Practical IIInd

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| 1. Comments upon the structure and application of analytical instrument :-                   | 10 |
| i) Colorimeter   |    |
| ii) spectrophotometer  |    |
| iii) ultra centrifuge  |    |
| iv) ESR and NMR spectrophotometer  |    |
| v) Microtomy   |    |
| chymographic instrument  |    |
| 2. Problem based on genetics   | 10 |
| 3. Estimation techniques based for RNA and DNA   | 10 |
| 4. Estimation of Gene and genotypic frequencies in light of Hardy Weinberg's law             |    |
| Based on facial traits   | 5  |
| 5. Demonstration of chromosome polymorphism,, isozyme polymorphism in some insect population | 5  |
| 6. viva voce   | 5  |
| 7. practical records   | 5  |

Total marks 50





