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 2008-09

M.Sc. Zoology
Semester I
Paper I
Biosystematics, Taxonomy and evolution

Unit I

Definition and basic concepts of biosystematics taxonomy and classification.
- History of Classification
Trends in biosystematics : Chemotaxonomy cytotaxonomy and molecular taxonomy
Dimensions of speciation and taxonomic characters.
Species concepts : species category, different species concepts, subspecies and other infra-specific categories.
Theories of biological classification: hierarchy of categories.

Unit II

- Taxonomic Characters – Different kinds.
- Origin of reproductive isolation, biological mechanism of genetic incompatibility.
- Taxonomic procedures: Taxonomic collections , preservation ,curetting, process of identification.
- Taxonomic keys,different types of keys, their merits and demerits.
- International code of Zoological Nomenclature (ICZN): Operative principles, interpretation and application of important rules: Formation of Scientific names of various Taxa.

Unit III

- Taxonomic categories.
- Evaluation of biodiversity indices.

2019 - 2020

Dr. M. S. Singh
Ms M. Sood
Dr S. Punekar
Dr. N. Sahai
Dr. V. Sharma
Ms Anjali

2020 - 2021

Dr S. Singh
Dr. M. Sood
Dr. S. Punekar
Dr. N. Sahai
Dr. V. Sharma
Ms. Anjali

- Evaluation of Shannon – Weiner Index.
- Evaluation of Dominance Index.
- Similarity and Dissimilarity Index.

Unit-IV

- Concepts of evolution and theories of organic evolution.
- Neo Darwinism and population genetics:
- A- Hardy-Weinberg law of genetic equilibrium.
- B – A detailed account of destabilizing forces:
- i- Natural selection
- ii- Mutation
- iii- Genetic Drift
- iv- Migration
- v- Meiotic Drive.
- Trends in Evolution
- Molecular Evolution
- a) Gene evolution
- b) Evolution of gene families
- c) Assessment of molecular variation

Unit – V

- Origin of higher categories
- Phylogenetic – gradualism and punctuated equilibrium.
- Major trends in the origin of higher categories
- Micro and macro evolution.

Molecular population genetics

- Pattern of changes in nucleotide and amino and sequence.
- Ecological significance of molecular variations (genetic polymorphism)

Genetic & Speciation

- Phylogenetic and biological corcept of species.
- Patterns and mechanism of reproductive isolation.
- Modes of speciation (allopatry & sympatry)

Origin and Evolution & Economically important ~~microscopes~~ microbes and animals.

Department of Higher education, Govt. of M.P.
Semester wise Syllabus for Post Graduates
recommended by Central board of Studies and
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Session 2008-09

Class - M.Sc.
Subject - Zoology
Paper Title - Paper II STRUCTURE AND FUNCTION OF INVERTEBRATES
Semester - I

Max. Mark- 40

UNIT –I

1. Origin of metazoa
2. Organization of Coelom
   A. Acoelomates
   B. Pseudocoelomates .
   C. Coelomates
3. Locomotion.
   A. Amoeboid flagellar and ciliary movement in protozoa
   B. Hydrostatic movement in Coelenterata
   C. Annelida and Echinodermata

UNIT –II

A: NUTRITION AND DIGESTON

Patterns of Feeding and digestion in lower metazoa, Mollusca, Echinodermata Filter feeding in polychaeta.

B: Respiration

Organs of respiration : Gills, lungs and trachea, respiratory pigments. Mechanism of respiration.

UNIT – III

EXCRETION

Excretion in lower invertebrates.
Excretion in higher invertebrates.
Mechanism of Osmoregulation.

UNIT – IV

NERVOUS SYSTEM.

A. Primitive Nervous systems-Coelenterata and Echinodermata.
B. Advanced nervous system in Annelida, Arthropoda (Crustacea and Insecta) and Mollusa (Cephalopoda)

2019-2020

1. Dr. S. Singh
2. Dr. M. Sood
3. Dr. S. Punekar
4. Dr. N. Sahai
5. Dr. V. Sharma
6. Ms Anjali

UNIT – V

A. INVERTEBRATES LARVAL FORMS AND THEIR EVOLUTIONARY SIGNIFICANCE.

2020-2021

1. Dr S. Singh
2. Dr. M. Sood
3. Dr S. Punekar
4. Dr. N. Sahai
5. V. Sharma
6. Anjali

A. Trematoda and Cestoda
B. Larval forms of Crustacea
C. Larval forms of Mollusca
D. Larval forms of Echinodermata.

B. 1. Structure affinities and life history of the following minor pancoelomate Phyla -

A. Rotifera
B. Entoprocta

2. Structure affinities and life history of the following minor Phyla

A. Phoronida
B. Ectoprocta

Suggested Reading Material –

1. Hyman, L.H. The invertebrates, Nol. I.protozoa through Ctenophora, McGraw Hill Co., New York
2. Barrington, E.J.W. Invertebrate structure and function. Thomas Nelson annd Sons Ltd., London.
3. Jagerstein, G. Evolution of Metazoan life cycle, Academic Press, New York & London.
4. Hyman, L.H. The Invertebrates. Vol. 2. McGraw Hill Co., New York.
5. Hyman, L.H. The Invertebrates. Vol. 8. McGraw Hill Co., New York and London.
6. Barnes, R.D. Invertebrates Zoology, III edition. W.B. Saunders Co. Philadelphia.
7. Russel-Hunter, W.D. A biology of higher invertbrates, the Macmillan Co. Ltd., London.
8. Hyman, L.H. The Invertebrates smaller coelomate groups, Vol. V.Mc.Graw Hill Co., New York.
9. Read, C.P. Animal Parasitism. Parasitism. prentice Hall Inc., New Jersey.
10. Sedgwick, A.A. Student text book of Zoology. Vol. I,II and III. Central Book Depot, Allahabad.
11. Parker, T.J., haswell W.A. Text book of Zoology, Macmillan Co., London.

M.Sc. Zoology
First semester
Paper-III
Quantitative biology, biodiversity and wildlife

Unit I
Quantitative biology
- Distribution of the data in biology- mean, mode and median
- Measures of dispersion : range, mean deviation, IQD , standard deviation and coefficient of variation
- Chi square test
- Normal distribution
- Experimental designing and sample theory

Unit II
- Probability distribution, properties and probability theory
- Completely randomized design and randomized block design
- Analysis of variance
- Co-relation- types of correlation
- Karl pearson, coefficient correlation
- Regression

Unit III
Biodiversity
- concept and principal of biodiversity
- causes for the loss of biodiversity
- Biodiversity conservation methods
- Medicinal uses of forest plant

Unit IV
Wildlife of India, types of wildlife
- Values of wildlife, positive and negative
- Wildlife protection Act
- Conservation of wildlife in India
- Endangered and threatened species

Unit V
Wildlife and conservation
- National Parks and Sanctuaries
- Project Tiger
- Project Gir Lion and Crocodile breeding project
- Wildlife in M.P. with references to Reptiles Birds and mammals
- Biospheres reserves

Suggested Reading Materials:

- Bataschelet E. Introduction to mathematics for site scientist springer-verlag, berling
- Jorgenserr, S.E. Fundamental of Ecological moding E. sevier New York
- Lenderen D. Modelling in behavioral ecology. Chapman & Hall London U.K.
- Sokal, R.R. and F. J. Rohit Biometry Freeman San Francisco
- Snedecor, G.W. and W.G. cochran, statical methods, Affilited East, West Press New Delhi (Indian ed.)
- Muray , J.D. Methamatical Biology. Springer Verlag Berlin
- Pelon, E.C. The interpretation of ecological data : A promer on classification and ordivation.
- A. lewis . Biostatics
- B.K. Mahajan Methods in Biostatics
- V.B. Saharia wildlife in India
- S.K. Tiwari wildlife in central India
- J.D. Murrey Mathematical Biology
- Georgs & Wilians Startical method
- R.K. Tondon Biodiversity Texonomy & Ecology
- M.P. Arora An Introduction to prevantology

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 : 08-09

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Class: M.Sc.
SEMESTER - 1
Paper: IVth Paper
BIOMOLECULES AND STRUCTURAL BIOLOGY

Unit - I
Chemical Foundation of bilogy

- PH, PK, acids bases, buffers, weak bonds
- Free energy, resonance, isomerisation
- Acid soluble pool of living tissues – aminoacids, monosaccorides, oligosaccharides, nucleotides, peptides
- Nanoparticles
- Biomaterials

Unit - II

1. Primary, Secondry, tertiary and quaternary structures of proteins, protein folding and denaturation
2. DNA & RNA: Double helical structure of DNA, Structure of RNA, role of RNA in gene expression
3. DNA replication, recombination and repair
4. Functional importance of lipid storage and membrane lipids
5. Membrane channels and pumps

Unit - III

1. Basic concepts of metabolism: Coupled and interconnecting reactions of metabolism cellular energy recources and ATP synthesis
2. Glycolysis and glyconeogenesis
3. Citric acid cycle
4. Oxidative phosphorylation : Protein and it's regulation
5. Fatty acid metabolism: Synthesis and degradation of fatty acids

Unit - IV

1. RNA synthesis and splicing
2. Biosynthesis of amino acids
3. Biosynthesis of nucleotides
4. Biosynthesis of membrane lipids and steroids
5. Protein synthesis

Dr. S. Singh 26/10/13

MS. M. Sood

Dr. S. Punia – 26.10.13

V. Sharma Unit 2 26.10.13

2019-20
Dr. S. Singh
MS. M. Sood
Dr. S. Punia
Dr. N. Sahai
Dr. V. Sharma 13.4.19
MS Anjali

2020-2021
1. Dr. S. Singh
2. MS M. Sood
3. Dr. V. Sharma
4. Dr. N. Sahai
5. MS A. Verma

N. Sahai

A Verma

1. Enzymes: Terminologies, classification and basics of enzyme kinetics
2. Mechanism of enzyme catalysis
3. Regulation of enzyme action
4. Concept of free energy and thermodynamic principals in biology
5. Energy rich bonds, compound and biological energy transducers

Suggested Readings:

1. Voet, D. and J.G. Voet. Biochemistry John Wiley & Sons.
2. Freifelder, D. Physical Biochemistry W.H. Freeman & Co.
3. Segal, I.H. Biochemical calculations John Wiley and Sons
4. Creighton, T.E. Protein Structure and Molecular Properties W.H. Freeman & Co.
5. Freifelder, D. Essentials of Molecular Biology
6. Wilson, K. and K.H. Goulding A Biologists Guide to Principals and Techniques of Practical Biochemistry
7. Cooper, T.G. Tools of Biochemistry
8. Hawk, Practical Physiological Chemistry
9. Garret, R.H. and C.M. Grisham. Biochemistry. Saunders college Publishers.

2016

2016

2020-2021 42
Dr. S. Singh
Dr. M. Sood
Dr. S. Puneka
Dr. N. Sahai
Dr. V. Sharma

Department of Higher education, Govt. of M.P.
Semester wise Syllabus for Postgraduates
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Session : 08-09

Class: M.Sc. (Zoology) M.M. 40

SEMESTER - II

Paper: Ist Paper

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

5.8.11

5/8/11

2020-2021
Dr. S. Singh
Dr. M. Sood
Dr. S Puneker
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My Anjali

Department of Higher education, Govt. of M.P.
Semester wise Syllabus for Postgraduates
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Session : 08-09

M. Sc. Previous
Zoology
Semester II
Paper II

M.M. 40

Population Ecology and Environmental physiology

Unit I

1. Populations and their characters. V. Sem. Book
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

1. Environmental pollution and human health.
2. Conservation management of natural resources .
3. Environmental impact assessment.
4. Sustainable development.

17/4/15

17.4.15

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.

Environmental physiology of Animals

Pat willmer (Blackwell scienc)

2020 - 2024 (49)

(1) Dr. S. P. Singh

(2) Dr. M. Sood

(3) Dr. S. Punekar

(4) Dr. N. Sahai

(5) Dr. V. Sharma

Department of Higher education, Govt. of M.P.

Semester wise Syllabus for Postgraduates

As recommended by Central board of Studies and

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Session : 08-09

Class: M.Sc.

SEMESTER - II

Paper: IIIrd Paper (Zoology) MM 40

Tools and techniques in Biology

40

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.

17/4/15 12.4 20 5.8.11 13.4.15 5/8/11

2020 - 2021

Dr. S. Singh
Dr M. Sood
Dr N. Saher
Dr S. Bunkar
Dr. V. Sharma
Ms A. Yam Bhabi

a. Sample preparation for radioactive counting
b. Autoradiography.

2. Immunological techniques
- Immunodiffusion (Single & Double)
- Inumuno 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)

17/4/15

5.8.11

17.4.15

2020 : 2021

Dr. S. Singh
Dr. M. Sood
Dr. S. Punekar
Dr. N. Sahai
Dr. V. Sharma
Ms A. Venu Ayachi

Department of Higher education, Govt. of M.P.
Semester wise Syllabus for Postgraduates
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Session : 08-09
M.Sc. Previous Zoology

II Sem IV Paper

M.M. 40

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 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 drosophila
- 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. 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. all Essentials cell biology garland publishing Inc. New York 1998
- I.M. Barry molecular biology
- Philip E. Hartman Gene Action
- L.C. dunn, principals of Genetics
- A.M. Winchester genetics

5.8.11

Department of Higher Education, Govt. of M.P.

Post Graduate Semester wise Syllabus

Recommended by Central Board of Studies and approved by the Governor of M.P.

उच्च शिक्षा विभाग, म.प्र. शासन

स्नातकोत्तर कक्षाओं के लिये सेमेस्टर अनुसार पाठ्यक्रम

केंद्रीय अध्ययन मण्डल द्वारा अनुमोदित तथा म. प्र. के राज्यपाल द्वारा अनुमोदित

Session - 2010-2011

Subject - Zoology

Class	: M.Sc
Semester	: III
Subject	: Zoology
Title of Subject Group	: Comparative Anatomy of Vertebrates
Paper No.	: Paper- I
Max. Marks	: ~~30+10~~ 40

Unit-1	1. Origin of Chordata: Concept of Protochordata 2. Development, structure and functions of integument and its derivatives (glands, scales, feathers and hairs) 3. Respiratory system : Characters of respiratory tissue, external and internal respiration. Comparative account of respiratory organs. 4. Comparative account of Digestive System.
Unit-2	1. Evolution of heart. 2. Evolution of aortic arches and portal systems. 3. Blood circulation in various vertebrates groups. 4. Comparative account of jaw suspensorium and vertebral column.
Unit-3	1. Evolution of urinogenital system in vertebrates. 2. Comparative account of organs of olfactory and taste. 3. Comparative anatomy of brain and spinal cord (CNS). 4. Comparative account of peripheral and autonomous nervous system.
Unit-4	1. Comparative account of lateral line system. 2. Comparative account of electroreception. 3. Flight adaptations in vertebrates. 4. Aquatic adaptations in birds and mammals.
Unit-5	1. Origin, evolution general organization and affinities of Ostracoderms. 2. General organization, specialized, generalized and degenerated characters of Cyclostomes.

2019-2020
Dr. S. Singh
Dr. M. Sood
Dr. S. Punekar
Dr. N. Sahai
Dr. V. Sharma
Ms Anjali
13.9.19

2020-2021
Dr. S. Singh
Dr. M. Sood
Dr. S. Punekar
Dr. N. Sahai
Dr. V. Sharma
Ms Anjali

	3. Origin, evolution general organization of early Gnathostomes.	
	4. General account of Elasmobranchi, Holocephali, Dipnoi and Crossoptergii.	

SUGGESTED READINGS :

1. Carter, G.S. Structure and habit in vertebrate evolution – Sedgwick and Jackson, London.
2. Kingsley, J.S. Outlines of Comparative Anatomy of Vertebrates, Central Book Depot. Allahabad,
3. Kent, C.G. Comparative anatomy of vertebrates
4. Malcom Jollie, Chordata morphology. East – West Pres Pvt. Ltd., New Delhi.
5. Milton I Hildergrand. Analysis of vertebrate structure. IV. Ed. John Wiley and Sons Inc., New York.
6. Smith, H.S. Evolution of Chordata structure. Hold Rinehart and Winston Inc. New York.
7. Sedgwick, A.A. Students Text Book of Zoology, Vol.II.
8. Walter, H.E. and Sayles, L.D. Biology of vertebrates. MacMillan & Co. New York.
9. Romer, A.S. Vertebrate Body, IIIrd Ed. W.B. Saunders Co., Philadelphia
10. Young J.Z. life of vertebrates. The oxford University Press, London
11. Parker & Haswell to III Rev. by Marshall wilhams latested Macmillan Co. ltd.
12. Young J.Z. Life of mammals. The Oxford University Press, London
13. Weichert, C.K. and Presch, W. Elements of chordate anatomy, 4th Edn. McGraw Hall Book Co., New York.

Session - 2010-2011

Subject - Zoology

Class	:	M.Sc
Semester	:	III
Subject	:	Zoology
Title of Subject Group	:	Limnology
Paper No.	:	Paper- II
Max. Marks	:	~~50~~ 40

Unit-I	1.Limnology – Definition, historical development and scope of Limnology. 2.Types of freshwater habitats and their ecosystem – (a) Ponds, Streams and rivers. (b) Lakes – Origin and classification. 3.Morphometry – Use of various morphometric parameters and Zonation.
Unit-2	Physico – Chemical Characteristics. 1. Light and Temperature- (a) Light as an ecological parameter in freshwater. (b) Temperature- Radiation, Stratification and Heat Budget. 2. (a) Dissolved Solids – Carbonate, Bicarbonates, Phosphate and Nitrate (c) Physico – Chemical characteristics of freshwater with special reference to different parameters- Turbidity, dissolved gases(Oxygen, Carbon dioxide, Hydrogen Sulphide), Seasonal changes in dissolved gases and pH.
Unit-3	1. Study of Biota (a) Phytoplankton, Zooplankton and their inter-relationship. (b) Aquatic insects, birds and their environmental significance. 2. Ecological classification of aquatic fauna higher aquatic plants and their significance.
Unit-4	1. Methods of water quality testing BOD and COD. 2. Sewage – Definition, composition and its treatment. 3. Bioindicators- Aquatic flora and fauna in relation to water quality in an aquatic environment.

Unit-5	1. Causes of pollution of Aquatic Resources, their management and conservation. 2. Resource Conservation – Aquatic pollution, control, legislation, regulation on discharge of industrial effluents and domestic wastes in rivers and reservoirs. 3. Use and misuse of inland waters.

Suggested Readings :

Anathakrishnan	:	Bioresources Ecology
Goldman	:	Limnology
Odum	:	Ecology
Pawlosuske	:	Physico- chemical methods for water
Wetzal	:	Limnology
Trivedi & Goyal	:	Chemical and biological methods for water pollution studies
Welch	:	Limnology Vols. I-II
Perkins	:	Ecology
Arora	:	Fundamentals of environmental biology

Department of Higher Education, Govt. of M.P.
Post Graduate Semester wise Syllabus
as recommended by Central Board of Studies and approved by the Governor of M.P.
उच्च शिक्षा विभाग, म.प्र. शासन
केन्द्रीय बोर्ड ऑफ स्टडीज की सिफारिश अनुसार स्नातकोत्तर
शिक्षण मण्डल द्वारा अनुमोदित तथा म. प्र. के राजपत्र द्वारा अनुमोदित

Session - 2010-2011

Subject – Zoology

Class	: M.Sc
Semester	: III
Subject	: Zoology
Title of Subject Group	: ECO- TOXICOLOGY
Paper No.	: Paper- III
Max. Marks	: ~~80~~ ~~40~~ 40

Unit-1	1. General principles of Environmental Biology with emphasis on ecosystems. 2. Abiotic and biotic factors of ecosystems. 3. Communities of the environment, their structure & significance. 4. Energy flow in environment : Ecological energetics.
Unit-2	1. Productivity, Production and analysis. 2. Recycling and reuse technologies for solid and liquid wastes and their role in environmental conservation. 3. Remote sensing –basic concepts and applications of remote sensing techniques in environmental conservation. 4. Environmental indicators and their role in environmental balance.
Unit-3	1. Kinds of environmental pollution and their control methods. 2. Radioactive compounds and their impact on the environment. 3. Vehicular exhaust pollution, causes and remedies. 4. Noise pollution.
Unit-4	1. Toxicology- Basic concepts, Principles and various types of toxicological agents. 2. Toxicity testing principles, hazards, risks and their control methods. 3. Food toxicants and their control methods. 4. Public Health Hazards due to environmental disasters.

Unit-5	1. Pesticides, types, nature and their effects on environment. 2. Important heavy metals and their role in environment. 3. Agrochemical use and misuse, alternatives. 4. Occupational Health Hazards and their Control.

SUGGESTED READINGS :

1. Clark : Elements of ecology
2. Odum : Fundamentals of Ecology
3. South Woods : Ecological methods
4. Trivedi and Goel : Chemical and biological methods for water pollution studies

9/8/12

9-8-12

Dr. S. Singh 2010-11
Ms. M. Sood
Dr. S. Punekar
Dr. V. Sharma
Dr. N. Sahai
Dr. A. Verma

2019-2020
Dr. S. Singh
Ms M. Sood
Dr. S. Punekar
Dr. N. Sahai
Dr. V. Sharma
Ms Anjali

2020-2021
1. Dr. S. Singh
2. Dr. M. Sood
3. Dr S. Punekar
4. Dr N. Sahai
5. Dr. V. Sharma
6. Ms Anjali

Department of Higher Education, Govt. of M.P.
Post Graduate Semester wise Syllabus
Recommended by Central Board of Studies and approved by the Governor of M.P.
उच्च शिक्षा विभाग, म.प्र. शासन
स्नातकोत्तर उपाधि के लिये सेमेस्टर अनुसार पाठ्यक्रम
केंद्रीय अध्ययन मण्डल द्वारा अनुमोदित तथा म. प्र. के राजपाल द्वारा अनुमोदित

Session - 2010-2011
Subject - Zoology

Semester	: M.Sc
	: III
Subject	: Zoology
Title of Subject Group	: Aquaculture
Paper No.	: Paper- IV
Max. Marks	: ~~25~~ 40

Unit-1	1. Aquaculture: history, definition, scope & importance. 2. Fishery resources of India in general & Madhya Pradesh in particular. 3. Abiotic & biotic factors of water necessary for fish life. 4. Ecological characteristics of lakes & rivers. 5. General ecological characteristics of reservoirs of India.
Unit-2	1. Fish culture :- Mono, Poly, mixed and composite Fish culture. 2. Fresh water prawn culture and its prospects in India. 3. Culture of Mussels , clams,oysters & pearl culture. 4. Sewage fed fish culture, paddy cum fish culture. 5. Frog culture.
Unit-3	1. Fish breeding in natural conditions , bundh breeding, hypophysation & stripping. 2. Transport of live fish & seed. 3. Different types of crafts & gears used for fish catching. 4. Plankton- its definition, culture & indentification. 5. Common weeds of fish ponds and methods of their eradication.

Unit-4	1. Fresh water fish farm engineering: selection of site, construction of fish farm & soil chemistry. 2. Designing, layout & construction of different types of fish ponds. 3. Planning and management of fresh water aquarium. 4. Preservation & processing of fish. 5. By products of fish Industry & their utility.
Unit-5	1. Water pollution, its effects on fisheries and methods of its abatment. 2. Common fish diseases & their control. 3. Biochemical composition and nutritional value of fish. 4. Fisheries economics and marketing. 5. Fisheries managements and extension.

Suggested Readings :

1. C.B.L. Shrivastava	:	Fishes of India
2. Jhingaran	:	Fish and fisheries of India
3. S.S. Khanna	:	An Introduction to fishes
4. R.S. Rath	:	Fresh water Aquaculture
5. Gopalji Shrivastava	:	Fishes of U.P. & Bihar
6. H.D. Kumar	:	Sustainibility & Management of Aquaculture & Fisheries
7. A.J.K. Mainan	:	Identification of fishes
8. R. Sanatam	:	A Manual of fresh water Aquaculture
9. S.K. Gupta	:	Fish & Fisheries
10. P.D. Pandey	:	Fish & Fisheries
11. K.P. Vishwas	:	Fish & Fisheries

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Semester Wise Syllabus For Post Graduate Classes
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Session 2014-2015

Class	:	M.Sc.
Semester	:	IV
Subject	:	Physics
Title of subject Group	:	Condensed Matter Physics -II
Paper No.	:	I
Compulsory/Optional	:	Compulsory
Max. Marks	:	40

Particulars

Unit-I	**Super conductivity ;** Concept of super conducting state, persistent current critical temperature, meissner effect. Thermodynamics of the super conducting transitions. London equation and penetration depth, coherence length. Type I and Type II superconductors , B.C.S. theory of super conductivity. AC and DC Josephson effects Josephson Tunneling.
Unit-2	**Magnetism :** Weiss theory of ferromagnetic Heiscobery model and molecular field theory. Domain and Bloch wall energy. Spin waves and mangnons, curie weiss law for susceptibility, Ferri and anti ferromagnetic.
Unit-3	**Imperfection in crystals :** Imperfection in atomic packing, point defects, interstitial schotky and frenkel defectsIonice vacancies colour centres, explanation of experimental facts, line defects, edge and screw dislocation, mechanism of plastic deformation in solids, stress, and strain fields of screw and edge dislocation elastic energy of dislocation slip and plastic deformation. Shear strength of single crystal, burgers vector stress fields around dissolution.
Unit-4	**Thin Film :** Study of surface topography by multiple beam interferometer, conditions for accurate determination of step height and thickness (Fizeu fringe) Electrical conductivity of thin films. Expression for electrical conductivity of thin films. Hall coefficient quantum size effect in thin film.
Unit-5	**Nano Structure :** Definition and properties of nano structured material, different method of preparation of nano materials. Plasma enchanted chemical vapour deposition, electro deposition. Structure of single wall carbon nano tubes (Classification, Chiral vector Cn, Translational vector T, Symmetry vector R, Unit Cell, Brillouin Zone) Electronic, Mechanical Thermal and properties. Physics Reference

Suggested Readings :

1. Kittel : Solid State Physics.
2. Huang : Theoretical solid state Physics.
3. Weetman and weertman : Elementary dislocation theory.
4. Thomas : Multiple Electron microscopy.
5. Tolansky : Multiple beam Interferometer.

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Class	:	M.Sc.
Semester	:	IV
Subject	:	Physics
Title of subject Group	:	Laser Physics - II
Paper No.	:	II
Compulsory/Optional	:	Compulsory
Max. Marks	:	= 40

Particulars	
Unit-I	**Basic Principle of Laser :** Introduction to laser, spontaneous and stimulated emission. Einstein coefficients. Idea of light amplification. Population inversion, laser pumping schemes for two and three level system with threshold condition for laser oscillation.
Unit-2	**Properties of Laser Beams and Resonators :** Properties of Laser-Temporal coherence, spatial coherence, directionality and monochromatic of laser beam, resonators, vibrational mode of resonators laser amplification, open resonator.
Unit-3	**Types of lasers :** Solid State lasers i.e. Ruby Laser, Nd-Yag Laser, Semiconductor laser, Gas laser i.e. Carbon dioxide Laser, He-Ne Laser, Basic idea liquid laser, Dye laser and chemical laser i.e. HCl and HF lasers.
Unit-4	**Application of Lasers :** Holography and its principle, theory of holograms, reconstruction of image, characteristics of Holographs. Applications of lasers in chemistry and optics laser in industry i.e. laser welding, Hole drilling, laser cutting, application of lasers in medicine.
Unit-5	**Basic idea about non linear optics :** Harmonic generation, second and third harmonic generation, phase matching, optical mixing, parametric generation of light self-focusing of light.

Suggested Readings :

1. Laser Selio
2. Optical electronics- Yarive
3. Laser spectroscopy-demtroder.
4. Laser spectroscopy and instrumentation demotrouler.
5. Molecular spectroscopy-king.
6. Non linear optics by B.B. Laud.

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Class	:	M.Sc.
Semester	:	IV
Subject	:	Physics
Title of subject Group	:	Computer Programming and Informatics
Paper No.	:	III
Compulsory/Optional	:	Optional
Max. Marks	:	40

Particulars	
Unit-1	Conceptual framework of computer languages (Algorithm, Flowcharts) Need of structured programming. Top-down, bottom-up and modular programming design Introduction to C languages- basic structure of C Program. Character set, keyword and identifiers, C data types, variable and data type declaration. Various operators like arithmetic, relational, logical assignment, conditional, increment and decrement opearators. Evaluation of expression and operator precedence.
Unit-2	Input and output statement, control statement (if, if-else, if nested if-else statements, switch, while Do...While and for statement) Simple C programs like search of prime number between given range of numbers, finding the smallest and largest of three numbers, sum of algebraic series, factorial of given number, roots of a quadratic equation, binary to decimal and decimal to binary conversion etc.
Unit-3	Functions : need of functions, calling the function by value and by reference, category of functions : no argument no return, argument but not return, argument with return, Recursion, One and two dimensional arryns String handling functions like s print f( ), strcpy ( ), strlen ()| Strcmp () etc. Simple programs using user define functions arrays and string functions
Unit-4	**Network :** Terminals-Dumb Terminals, smart terminals, intelligent terminals. Types of Network : According to range : LAN, MAN, WAN Client Server. According to topologies : Bus, Ring, Star, Mesh Network. Internet History of Internet Service provider (ISP) Introduction to type of internet account shell/Ac. TCP I/P A/c Types of connectivity-Dialup, Leased lines. IP Address-Class A, Class B, Class C Domain Name address. URL absolute and relative
Unit-5	Web enabled technology (Email and HTML) Web Browser : Internet Explorar, Netscape Navigator Station and Dynamic Web page introduction to HTML tags : □ <HTML>, <TITLE>, <HEAD>, <BODY> □ <P>, , <ALIGN>, <I> , <B>, <DIV>, <PRE>, and their attributes. □ <IMG>, <a> and their attributes. □ Ordered and Unordered list tages

Suggested Readings :

1. Let us C — Yaswat Kanetkar
2. Programming with C — Balaguruswami
3. Internet and web page page design 'O' level module M 1.2 — Dr. P.D. Murarka
4. Internet and web page design 'O' level module M 1.2 — Pearl Software.
6. C # 2008 in simple step dreamtech press
7. C # 2008 programming black book dreamtech press

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Class	:	M.Sc.
Semester	:	IV
Subject	:	Physics
Title of subject Group	:	Communication Electronics
Paper No.	:	IV-D
Compulsory/Optional	:	Optional
Max. Marks	:	40

Particulars	
Unit-1	**Communication Electronics :** Amplitude modulation-generation of AM waves demodulation of AM waves, DSBSC modulation, Generation of DSBSC waves, coherent detection of DSBSC waves, SSB modulation, generation and detection of SSB waves vestigial sideband modulation.
Unit-2	**Propogation of waves :** Ground waves , sky waves, space wave, propagation, maximum usable frequency, skip distance, virtual height, fading of signals, satellite communication, Orbital satellite, geostationary satellites orbital pattern, look angles, orbital spacing satellite system, link modules.
Unit-3	**Microwave:** Advantage and disadvantages microwave transmission loss in free-space, propagation of microwaves, atmospheric effects on propagation, fresnel zone problem used in microwave communication system.
Unit-4	**Digital Communications :** Pulse- Modulation system, sampling theorem, Low pass and Band pass signals, PAM, Channel BW for a PAM signal, Natural Sampling, Flt top sampling, signals Recovery through Holding Quantization of signals, Quantization Differential PCM Delta Modulation, Adaptive Delta Modulation, CVSD.
Unit-5	**Data Transmission :** Base-band signal receiver, probability of error, optimum filter, white noise, matched filter and probability of error, coherent reception correlation, PSK, FSK, non coherent detection of FSK, Differential PSK, QPSK, calculation of error probability for BPSK, BFSK, and QPSK.

Book Suggested :

1.	Digital Communications	:	W Tomasi
2.	Microwave	:	K.C. Gupta
3.	Microwave Devices & Circuits	:	S.Y. Lio

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Class	:	M.Sc.
Semester	:	IV
Subject	:	Physics
Title of subject Group	:	Material Science
Paper No.	:	IV-B
Compulsory/Optional	:	Compulsory
Max. Marks	:	40

Particulars	
Unit-I	Classification of Materials : Types of Materials : Crystalline, polycrystalline, Amorphous (introduction and their structure) Elementary idea of polymers (structure and properties methods of polymerization. Glasses : Structure and properties. Types of Glasses, fractions in glasses : Composite Materials : Introduction their types and properties, different type of bonding medalung energy for ionic crystal
Unit-2	Phase Transitions : Thermodynamics of Phase transformation, Free-energy calculation, I and II order transformation, Hume Rother rule; solid solid solution and types of solid solutions, phase rule, One, Two component systems, Eutectic and Paratactic phase diagrams, Lever rule, phase diagrams of Mg-Al, Fe-C kinetics of transformations, Homogeneous and heterogeneous nucleation Growth Kinetics.
Unit-3	Diffusion in Materials : Mechanism of diffusion, energy of formation and motion, long distance motion, Rate theory of diffusion, Einstein relation (relation between diffusivity and mobility) Fick's laws of diffusion and solution of Fick's second law, kirkendal effect, diffusion of vacancies in ionic crystals, Experimental determination of Diffusion coefficient.
Unit-4	Elastic and Anelastic Behaviour : Atomic models for elastic behaviour, Elastic deformation in singal crystals, Elastic anisotropy, Elastic constant and elasticity, anelastic behavior Therno-elastic effect and relaxation process, Idea of visco elastic behaviour (Spring-Dashpot model), Determination of elastic constant of cubic crystaly by ultrasonic wave propogation.
Unit-5	Transport properties of solids : Electrical conductivity of metals and alloys, extrinsic, intrinsic, semiconductors and amorphous semiconductors, scattering of electrons by phonons, impurity, etc. Relaxation time, Carrier mobility and its temperature dependence, mathiessin's rule for resistivity, temperature dependence of metallic resistively.

Book Suggested :

1.	Introduction to solids	: L.V. Azaroff.
2.	Introduction to Solid State Physics	: C Kittle
3.	Materials and Engineering	: Raghavan
4.	Diffussion Kinetics for Atoms in crystals	: Manning
5.	Theoretical Solid State Physics	: Huang