स्नातकोत्तर पाठ्यक्रम की परीक्षा योजना
2016-2017
प्रथम सेमेस्टर सत्र ~~2015-16~~ के लिए

विषय – प्राणीशास्त्र प्रथम सेमेस्टर

M.Sc. Zoology

प्रश्नपत्र	प्रश्नपत्र का शीर्षक	अधिकतम अंक		न्यूनतम उत्तीर्णांक	
		सैध्दांतिक	सी. सी.ई	सैध्दान्तिक	सी.सी.ई
प्रथम	Biosystematics, Taxonomy and evolution	85	15	28	05
द्वितीय	Structure and Function of Invertebrates	85	15	28	05
तृतीय	Quantitative biology, biodiversity and wildlife	85	15	28	05
चतुर्थ	Biomolecules and structural Biology	85	15	28	05
	1- Practical -I	50	–	17	–
	2- Practical -II	50	–	17	–

विषय – प्राणीशास्त्र द्वितीय सेमेस्टर

प्रश्नपत्र	प्रश्नपत्र का शीर्षक	अधिकतम अंक		न्यूनतम उत्तीर्णांक	
		सैध्दांतिक	सी. सी.ई	सैध्दान्तिक	सी.सी.ई
प्रथम	Genral and Comparative animal Physiology and Endocronology	85	15	28	05
द्वितीय	Population Ecology and Environmental physiology	85	15	28	05
तृतीय	Tools and techniques in Biology	85	15	28	05
चतुर्थ	Molecular Cell Biology and Genetics	85	15	28	05
	1- Practical -I	50	–	17	–
	2- Practical -II	50	–	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

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

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

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.

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

Origin and Evolution & Economically important microscopes and animals.

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

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

SUGGESTED READING MATERIAL

1. M. Koto-The. Biology of biodiversity-Springer
2. E.O. Wilson-Biodiversity-Academic Press Washington.
3. G.G.-Simpson-Principle of animal taxonomy Oxford IBH Publication company.
4. E-Mayer-Elements of Taxonomy
5. Bastchelet-F-Introduction to mathematics for lite scientists Springer Verlag, Berling.
6. Skoal R.R. and F.J.Robiff Biometry-Freeman, San-Francisco.
7. Snecdor, G.W. and W.G. Cocharan Statisical Methods of affiliated-East-West Press, New Delhi.
8. Murry J.D. Mathematical Biology-Springer, Verlag, Berlin.

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Session ~~2013-15~~ 2016-17

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

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

UNIT –I

1. Origin of metazoa
2. Organization of Coelom
   A. Acoclomates
   B. Pscudocoelomates
   C. Cociomates
3. Locomotion.
   A. Amoeboid flageller and cillary 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, Mollusea, 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.

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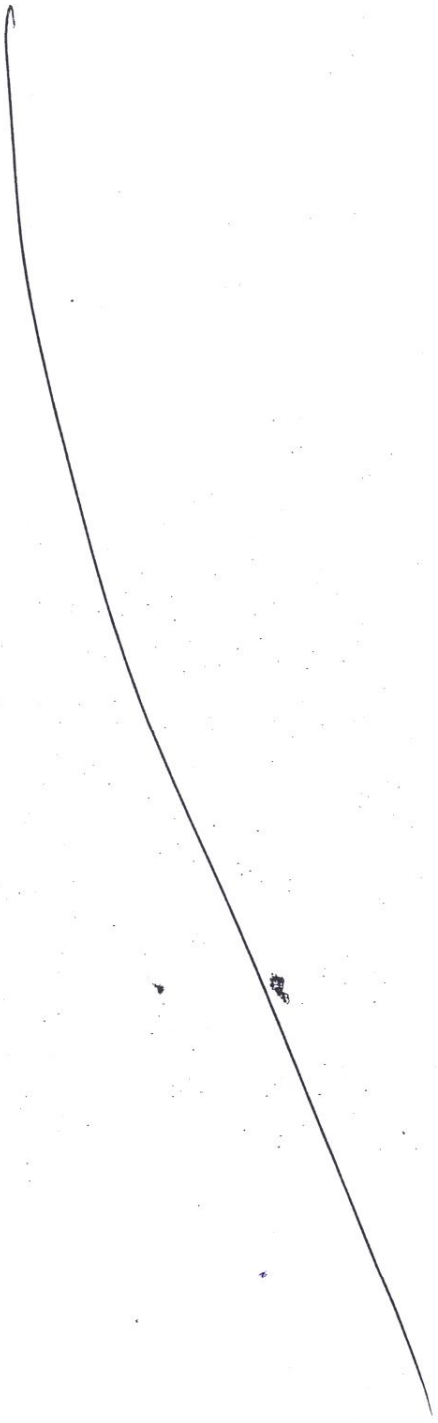
A. Primitive Nervous systems-Coelenterata and Echinodermata.
B. Advanced nervous system in Annelida,
Arthropoda (Crustacea and Insecta) and Mollusa (Cephalopoda)



UNIT – V

A. INVERTEBRATES LARVAL FORMS AND THEIR EVOLUTIONARY SIGNIFICANCE.

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

B. 1. Structure affinities and life history of the following minor noncoelomate 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 anmd 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.

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Semester wise Syllabus for Post Graduates

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M.Sc. Previous

I Sem III Paper

Quantitative biology, biodiversity and wildlife

Unit – I Quantitative biology

- Basic mathematics for biologists
- matrices and vectors
- Exponential functions
- Differential equations integration
- Periodic functions
- Sprobability distribution properties and probability theory

Unit – II

- Experimental designing and sampling theory
- Completely randomized design and randomized block design
- Analysis of variance
- Co-relation, types of correlation
- Karl personls coefficient correlation
- Regression

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Unit – III Biodiversity

- concept and principal of biodiversity
- causes for the lose of biodiversity
- Biodiversity conservation method
- 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 spices

Unit – V Wildlife and conservation

- National Parks and Sanctuaries
- Project Tiger
- Project Gir lion ang Crocodile breeding project
- wildlife in M.P. with references to Reptiles Birds and mammals
- Biospheres reserves

Suggested Readings Materials

- Bataschelet. E. Introduction to mathematics for site scientist springer-verlag, berling
- Jorgenserr, S.E. Fundamental of Ecological modling 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
- P.C. Kotwal Biodiversity and conservation

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Ist Semester

Suggested reading materials:

1. M. Koto : The Biology of Biodiversity. Springer.
2. E. O. Wildon : Biodiversity. Academic Press Washington.
3. G.G. Simpson : Principles of Animal Taxonomy. Oxford IBH Publication Company.
4. E. Mayer : Elements of Taxonomy.
5. Dobzansky : Biosystematics.
6. Dallela and Sharma : Animal Taxonomy and Museology.
7. Dodzhansky: The Genetics and origin of species. Columbia University Press.
8. Futuyama D.I. Evolutionary Biology. INC Publishers Dunderland.
9. Jha A.P. : Genes and Evolution – John Publication, New Delhi.

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

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

Unit – I
Chemical Foundation of bilogy — 73

- PH, PK, acids bases, buffers, weak bonds
- Free energy, resonance, isomerisation
- Acid soluble pool of living tissues – aminoacids, monosaccorides, oligosaccharides, nucleotides, peptides. — 104, 105, 106, 207
- Nanoparticles
- Biomaterials

Unit – II

1. Primary, Secondry, tertiary and quaternary structures of proteins, protein folding and denaturation — 64, 69, 1
2. DNA & RNA: Double helical structure of DNA, Structure of RNA, role of RNA in gene expression — 121, 129
3. DNA replication, recombination and repair — 745
4. Functional importance of lipid storage and membrane lipids — 324
5. Membrane channels and pumps — 345

Unit – III

1. Basic concepts of metabolism: Coupled and interconnecting reactions of metabolism cellular energy recources and ATP synthesis — 31
2. Glycolysis and glyconeogenesis - 425
3. Citric acid cycle - 465 — 491
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 — 781
2. Biosynthesis of amino acids - 665
3. Biosynthesis of nucleotides - 693
4. Biosynthesis of membrane lipids and steroids - 715 – 726
5. Protein synthesis — 873

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Unit – V

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.

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

M,M, 50

1. Spotting – Classification and identification of various phylum. 10
2. One major dissection of various systems of invertebrates – 10
   Squilla, Prawn, Sepia, Loligo.
3. One minor dissection- Grosshopper, Honeybee, Echinus, Starfish, Aplysia. 5
4. Mounting material - permanent balsum mount 5
5. Spottings related with Adaptation. Homologics, Analogics and modification of month parts :
   5
6. Viva Voce.
   10
7. Pratical Records, collection 5

Total Marks 50

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

M,M, 50

1.	Problem based on Biodiversity and wild life. Mammals and Fishers group (Spots 5 +5)	20
2.	Exercise on mean, mode, & Median.	5
3.	Cell division preparation of slid on Meiosis & Mitosis.	5
4.	Preparation of different types of chromosomes.	5
5.	Viva – Voce	10
6.	Practical Record and collection.	5
Total Marks		50

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Session ~~2011-12~~ 2016-17

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

Class: M.Sc.
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

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MSc Previous
Subject: 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.

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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 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.

P.S.
Govt. P.

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. 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.

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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)

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M.Sc. Previous Zoology

Max.Marks. 100
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 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 Integrins

Unit – III Cell – Cell adhesion and communication

- Ca^{++} depandant homophilic cell – cell ahension
- Ca^{++} independant homophilic cell – cell ahension
- ~~Gap junctions and connexius~~
- Genome organization, hierarchy in organization

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- 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

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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

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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.	Sectrophotometer	
iii.	Ultacentrifrige	
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 isozyze polymorphism in some insect population.	5
6.	Viva – Voce	5
7.	Practical Record	5
Total Marks		50

24.5.16 14.7.16 14.7