FOLDER-7

# बिलासपुर विश्वविद्यालय

## बिलासपुर ( छत्तीसगढ़ )

## पाठ्यक्रम

विज्ञान - संकाय
नियमित एवं पाठ्यक्रम
एम. एस. सी. (पूर्व/अंतिम)
प्राणी शास्त्र

**परीक्षा : 2014**

:: प्रकाशक ::

कुलसचिव बिलासपुर विश्वविद्यालय

बिलासपुर ( छत्तीसगढ़ )

# ORDINANCE NO 39

## Master of Science Examination

1. The examination for the degree of Master of Science consist of two parts
   (A) The Previous examination and
   (B) The Final Examination.
2. A candidate who after obtaining the degree of Bachelor of science from the University or an examination of any statutory University in India which has been recognised by the University as equivalent to B.Sc. degree of the University and has completed a regular course of study for one academic year in a teaching department of the University or in a college affiliated to the University, shall be admitted to the Previous Examination for the degree of Master of Science.

   Provided however every candidate shall offer for the Previous Examination one of the subjects offered by for him/her B.Sc.Degree.

   Provided further (i) for admission in M.Sc. Previous (Physics) the candidate must have offered Maths as one of the subject in B.Sc. (ii) for admission in M.Sc. Previous (Chemistry) preference will be given to those candidates who offered Maths as one of their subject in B.Sc.
3. A candidate who after passing the M.Sc .previous Examination of the University has completed a regular course of study for one academic year in a teaching department of the University or in a College affiliated to the University shall be admitted to the Final Examination for the degree of Master of Science in the subject in which he/she has passed the Previous Examination.

   A Candidate who has passed the Previous Examination for the degree of Master of Science of another University may also be admitted to the final Examination for the degree of Master of Science after obtaining necessary permission from the Kulpati, provided that he offered for his previous Examination a course of study of an equivalent standard with almost identical syllabus as is required for the Previous Examination of this University, and has attended a regular course of study for one academic year in a College affiliated to the University or teaching department of the University.
4. The examination shall be partly by means of paper and partly practical including sessionals, except in the case of Mathematics where the examination shall be paper only.
5. Besides regular students and subject to other compliance with this



ordinance, ex-students and non collegiate candidates shall be eligible for admission to the examination as per provision of ordinance No. 6 relating to Examination (General).

Provided that non- collegiate candidate shall be permitted to offer only such subjects/papers as are taught to the regular students at any of the University Teaching Department or College.

6. The Subject of the Examination shall be one of the following :
   (i) Mathematics (ii) Physics
   (iii) Chemistry (iv) Zoology
   (v) Botany (vi) Geology

   A candidate who has passed the M.Sc. Examination of the University in any subject shall be allowed to present himself for the M.Sc. Examination in any one or more of the optional papers in the subject not taken by him at the said examination and if successful will be given a certificate to that effect.

   Provided that no candidates shall be allowed to offer more than two additional papers in any one year and in subjects other than Mathematics, a candidate shall undergo a practical test in respect of the paper concerned
7. From the session 1986-87 for the Previous Examinatin, candidate must obtain for a pass atleast 36% in each theory paper and Practical paper and 36% of the aggregate marks in the Theory and Practical separately in each examination. The above provision of 20% in each paper shall be applicable for Final Examination from the academic session of 1987-88 .
8. No division will be assigned on the result of the Previous Examination. The division in which a candidate is placed shall be determined on the basis of aggregate of marks obtained in total in the M. Sc. Previous and M.Sc. Final Examination.
9. Successful candidates who obtain 60% or more of the aggregate marks shall be placed in the First Division, those obtaining less than 60% but not less than 48% in the Second Division and all other successfull candidate obtaining less than 48% shall be placed in the Third Division.
10. Candidates who have passed the M.Sc Examination of the University in any subject in Third or Second Division and desire to appear at the M.Sc. Examination in the same subject for improving division without attending a regular course of study in a College affiliated to the University or in a Teaching Department of the University be allowed to appear at the aforesaid examination as non-collegiate student on the following conditions.

(i) There shall be only two Division for such candidates the First division and second Division. The Marks required for obtaining these division shall be the same as prescribed in this ordinance i.e. examinees who are successful in Final of the Examination and have obtained 60% or more aggregate of the marks in Previous and Final Examination taken together shall be placed in the First Division and Examinees who are successful in Final Examination and have obtained less than 60% but not less than 48% of aggregate marks in previous and Final examination taken together shall be placed in the Second Division.

(ii) The result of the candidates obtaining less than 48% of the agreegatemarks in previous and Final Examination taken together shall not be declared.

(iii) Candidates shall have the option to appear at both the Previous and Final examination in one and the same year and for being successfull at the examination, the candidates shall obtain 48% of the aggregate marks.

Provided that such candidates who opt to appear in previous and final examination separately shall have to obtain minimum aggregate required for the previous examination but he will have to obtain atleast 48% in the aggregate of previous and final examination taken together or else his result will be cancelled.

(iv) The syllabus for the examination shall be same as prescribed for the year in which the examination is held.

(v) Not more than to attempts shall be allowed two such a candidate. Failure or non-appearance at the examination after permission has been accorded by the University shall be counted as an attempt.

Provided however such candidates who opto appear at the previous and final examination separately will be allowed only one attempt at the previous examination and two attempts at the final examination.

(vi) Candidates who wish to avail the opportunity given in fore going paras will have to apply for permission as required in the Ordinance relating to admission of non - collegiate students to the University examination along with registration fee.

(vii) In case, a student Improves his division under provision of this para, the fresh Degree will be issued after cancealing his first Degree.



# U.C.G. MODEL CURRICULUM

Session 2007-08

***SCHEME FOR THE THEORY PAPER'S :***

- The Syllabus shall comprise of four paper's.
- Each paper is divided in the four units.
- Students will have to atten one question from each unit, thereby a total of four questions from each paper.
- Duration of each paper for the examination purpose shall be three hour's.
- Maximum marks for each theory paper will be hundred.

***SCHEME FOR PRACTICAL EXAMINATION :***

- There will be two practical examination in M.Sc. Prev. class.
- The I Examination will be largely based on syallabi of theory paper's I & II.
- The II examination will be based on syallbbai of Paper's III & IV.
- Each Practical Examination will be of 100 marks credit.

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# M.Sc. Previous (Zoology) - 2007-08

A-1529 **PAPER - I**

Time - 3hrs. ~~8577~~ ~~AL-6623~~ MM. 100

## Invertebrate Structure & function, Minor phyla, Animal Behaviour Population Ecology

**Unit - I MINOR PHYLA :** ~~4557~~ ~~AM-1589~~

i) Organisation and general character's of Phoronida, Brachipoda and Acanthocephala.

**LOCOMOTION :**

i) Flagella and Cilliary movement in Protozoa.

ii) Hydrostatic movements in coelenterates, Annelida and Echinodermata.

**NUTRITION & DIGESTION :**

i) Pattern's of feeding and digestion in lower metazoa.

ii) Filter feeding in polycheata, mollusca and Echinodermata.

**RESPIRATION :**

i) Orgons of Respiration, gills, lungs and trachea.

ii) Respiratory pigments.

iii) Mechanism of Respiration in invertebrate phyla.

**Unit-II Excretion -**

i) Orgons of excretion, Coelom, Coelomoduct, Nephridia and malpighian tubules.

ii) Mechanism of excretion.

**Nervous System :**

i) Primitive nervous system : Coelenterata and Echinodermata.

ii) Adavanced nervous system : Annelida, Arthropoda, (Crustacea & Insecta) and mollusca (Cephalopda)

**Invertebrate Larvoe :**

i) Larval forms of free living invertebrates. (Crustacea & Echinodermata)

ii) Larval Forms of parasites invertebrates.

**Unit-III Animal Behaviour :**

i) Innate behaviour



ii) Neural and hormonal control of behaviour.

iii) Learning and memory : conditioning Habituation, insight learning Association learning.

iv) Neural Mechanism of learning.

v) Biological rhythms.

vi) Social behaviour (Organisation) in Insects and Primates.

**UNIT-IV POPULATION ECOLOGY :**

i) Population Growth : Exponential growth, logistic growth model, stochastic and time lag models of population growth.

ii) Demography : Life tables, net reproduction rates, reproductive value.

iii) Population regulation : Extrinsic and intrinsic mechanism

iv) Model's of prey - Predatory dynamics.

v) Role of predation in nature.

**Recommended Books :**

# M.Sc. Previous (Zoology) - 2007-08

**PAPER - II** A-1530

## Quantitative Biology and Environmental Psysiology

**Unit - I BIOSTATISTICS-** ~~AL-6624~~ ~~8573~~

- Probability distribution and their their properties.
- Hypothesis testing
- Analysis of frequencies. ~~AM-1590~~
- Analysis of Variance ~~4552~~
- Correlation
- Regression
- Probability theory

**Unit-II BASIC MATHEMATICS :**

- Matrices and Vectors.
- Exponential Functions.
- Mathematical Modelling
- Properties of Models.
- Cycling of Nutrients in an ecosystem.
- Eutrophication model

- Optimal Clutch Size in birds.
- Morphogenesis.

**Unit-III Adoptation Environmental physiology :**

- Levels of adaptation.
- Mechanism of adaptation.
- Significance of body size, Physiological adaptations to different environments, namely.
- Marine
- Extreme aquatic and extreme terrestrial environments.
- Freshwater
- Terrestrial life.

**Unit-IV Stress Physiology :**

- Adaptation, acclimation and acclimatization.
- Concept of homeostasis.
- Endothermy and physiological mechanism of regulation of body temperature
- Osmoregulation in aqueous and terrestrial environments.
- Physiological response to Oxygen deficient stress.
- Physiological response to body exercise, meditation, yoga and effects.

**Recommended Books :**

## M.Sc. Previous (Zoology) - 2007-08

## PAPER - III

## Endocrinology and Gamete Biology MM.100

**Unit - I AIMS AND SCOPE OF ENDOCRINOLOGY**

- Discovery of hormones
- Classification of hormones.
- Hormones as messengers.
- General Principls of hormonal action and Neuroendocrine system.
- Nature of Harmone action.
- Hormones and Homeostasis.
- Hormonal regulation of carbohydrate, Nitrogen and lipid metabolism.

A-1531



**Unit-II Biosynthesis and Secration of Hormones -**

- Biosynthesis of Steroid hormones de-novo.
- Biosynthesis and Aminoacid derived small size hormones (example T4, epinephrine etc.)
- Biosynthesis and simple peptide hormones - pre and pro hormones.
- Metabolism of hormones.
- Hormones and Behaviour.
- Hormones and Reproduction.
- Seasonal breeders.
- Continuous breeders.

**Unit-III Heterogamy in Eukaryotes-**

- Comparative account of differentiation of gonads in a mammal and an invertabrate.

**Leyding Cells-**

- Morphology
- Differentiation
- Function and its regulation in Spermatogenesis,
- Morphological basis in Rodents.
- Morphological basis in any invertebrate.

**Fertilization**

- Prefertilization events
- Biochemistry of fertilization.
- Post fertilization events.
- Collection and cryopreservation pf gametes and embryos.
- Ovarian follicular growth and differentiation.
- Morphology, Endocrinology, Oogenesis and Vitellogenesis
- Ovulation.
- Biology of Sex determination and differentiation a comparative account.

**Unit-IV Mutiple ovulation and embryo transfer technology (MOET)**

- In Vitro oocyte maturation.
- Super ovulation.

- In vitrofertilization - Assisted reproduction technologies.
- Embryo sexing and cloning.
- Secreening for genetic disorders.
- GIFT etc.
- Cloning of animals by Nuclear transfer.
- GAMETE specific antigens.
- Surgical Methods.
- Hornonal Methods.

**Recommeded Books - Given in Syllabus of 2003-04 paper III.**

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## M.Sc. Previous (Zoology) - 2007-08

## PAPER - IV

**Molecular Cell Biology and Tools & Techniques for Biology**

MM.-100

**Unit - I INTRODUCTION** - Experimental Systems in Cell Biology.

**Biomembranes**

- Molecular Composition and arrangement, functional Consequences.
- Transport across cell membrance diffusion, active transport and pumps, uniports, symports and antiports.

**Cytoskelton-**

- Micro filaments and microtubules structure and dynamics.
- Microtubules and mitosis.
- Cell movements interacellular transport role of kinesin and dynein, signal transduction mechanisms.

**Cell-Cell Signalling :**

- Cell Surface receptors.
- Second messenger system.
- Signalling from plasma membrane to nucleurs.

**Cell-cell adhesion and Communication :**

- Ca++ dependent homophillic cell-cell adhesion.
- Ca++ independent homophillic cell-cell adhesion.



**Cell Matrix adhesion :**

- Integrins
- Collagens

**Unit-II Genome Organization :**

- Chromosomal Organization of genes and non-coding DNA.
- Morphological and functional elements of eukaryotic chromosomes.

**Interacellular Protein Traffic -**

- Protein synthesis on free and bound polysomes.
- Uptake into ER
- Biogenesis of Mitochondria and nuclei
- Trafficking mechanisms

**Biology of cancer**

**Biology of aging**

**Apoptosis - definition, mechanism and significance.**

**Unit-III Tools and techniques for Biology-**

- Principles and uses of analytical instruments, Balances, Phmeter Colorimeter, Spectrophotimeter, Ultracentrifuge, Micriscopy : Principle of light microscopy, phase contrast microscopy, electronmicroscopy, Microbiological Techniques.
- Media Preparation : Inoculation and growth monitoring Microbial assays.

**Cell Culturer techniques -**

- Design and functioning of tissue culture laboratory.
- Culture media preparation and cell harvesting methods.

**Unit-IV Cryotechniques -**

- Cryopreservation for Cells, tissue organisms.
- Cryorechniques for microscopy.
- Molecular separations by chromatography, electrophoresis precipitation etc.
- Organelle separation by centrifugation etc.

Immunological techniques; based on antigen antibody interactions.

**Surgical Techniques :**

- Organ ablations (e.g. Ovariectomy adrenolectomy etc.)
- Indwelling catheters.

## M.Sc. Previous (Zoology) - 2007-08
## PRACTICAL EXAMINATION-I (GENERAL)

1. Study of Nochordates through museum specimens.
2. Study of permanent slides of nonchordates.
4. Nephridium and Spermatheca in Earthworm, (Mounting) S. Gills, Trachea and Booklung (Mounting).
   Permanent & Suitable stained micropreparation.
5. Exercise on animal behaviour.
6. Exercise on Ecology.
7. Experiments on perfused heart of frog using Kymograph/ Oscilloscope.
8. Study of the rate of Oxygen consumption by aquatic animals under various environmental stresses.
9. Determination of Respiratory quotient of an air breathing animal at different temperatures.

### DISTRIBUTIONS OF MARKS IN GENERAL PRACTICAL EXAMINATION-I

Time-6 Hrs. M.M. 100

| | | | |
|---|---|---|---|
| 3. | Micropreparation | - | 10 |
| 4. | Spots-10, Slides-5, Specimens-5 | - | 20 |
| 5. | Excercise in Ecology | - | 10 |
| 6. | An Excercise on Animal Behaviour | - | 05 |
| 7. | Viva-voce | - | 10 |
| 8. | Sessional | - | 15 |



## M.SC. PREVIOUS PRACTICAL EXAMINATION-II

1. Demonstration of "DNA ladder" formation during apoptotic death.
2. Preparation of liposomes.
3. Estimation of gene and genotypic frequencies in light of Hardy Weinberg-Law based on facial traits, ABO blood group data.
4. Demonstration of Chromosomal Polymorphism, isozyme, polymorphism in some insect population.
5. Numericals based on H-W law; Natural Selection forces changing gene frequencies in natural populations.
6. Calorimatic estimation of glucose, protein, RNA, DNA.
7. Absorption spectrum of any Coloured Solution of a Substance.
8. Light microscopic examination and preparation of tissue sections (Microtomy)
9. Use of different microscopes.
10. Sample preparation for SEM and TM.
11. Growth curve for E. coli, Neurospora crassa.
12. Bioassay for hormones.
13. Subcellular fractionation of rat liver.
14. Separation of amino acids by paper chromatography & TLC.
15. Appearance of Heat Shock proteins demonstration using electrophoresis.
16. Comparison of RBC and WBC in different groups of Vertebrates.
17. Determination and respiratory quotient in a terrestrial animal; effect of temperature.
18. Experiment with Gilson's respirometer.
19. Histology of Gonads.
20. Bioassay for Androgens estrogens and pituitary gonadotrpohins.

### DISTRIBUTION OF MARKS IN PRACTICAL EXAM.-II

Time-6 Hrs. Max. Marks - 100

1. (i) An experiment related to quantitative genetics, genotypic - frequencies in light of Hardy Weinbery Law.
   (ii) ABO blood group data 10 Marks.
2. Numerical exercise related to
   (i) Natural Selection.

(ii) Changing gene frequencies.

(iii) Chromosomal polymorphism 10 Marks

3. Colorimetric estimation of biochemicals (eg. glucose, protein, RNA, DNA)

OR

Bioassay for hormones (For androgens, estrogens, and pituitary gonadotropins) 10 Marks

4. Sepctrophotometric studies (absorption spectrum of any coloured solution of a substance)

OR

(i) Determination of Respiratory Quotient with the help pf respirometer (Preferably Gilson's Respirometer).

(ii) Effect of temperature on R.Q. 05 Marks

5. Separation of biomocules by

(i) Paper Chromatography & TLC

(ii) Electrophoresis

OR

(i) Preparation of Liposomes

(ii) Demonstration of DNA ladder formation apoptolic death. 10 marks

6. An exercise based on haematology, microbiology and molecular biology.

(i) Haematological experiment (eg.Comparison of R.B.C. and W.B.C. in different group of Vertebrates.

(ii) Growth curve of E.Coli/Neurospora Crassa.

(iii) Sub cellular fractionation of Rat Liver 05 Marks

7. Microtomy (Histology of gonads etc.) 15 marks

8. I. Application of different types of microscopes

OR

II. Sample preparation for SEM & TEM 05 marks

9. Viva 10 marks,

10. Sessional 20 Marks

**Total- 100 marks**

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# M.Sc. Final (Zoology)
## w.e.f. Session 2007-08

There will be four theory papers, each of three hours duration and each carrying 100 marks and two practical examination, each of 100 marks. Paper I and II will be compulsory. Paper III and Paper IV will be on Special subjects such as Entomology Icthyology, cytology and cytogenetics and parasitology, etc. out of which a candidate will offer only one.

## M.Sc.FINAL ZOOLOGY - 2007- 08

### BIOSYSTEMATICS, TAXONOMY AND POPULATION GENETICS

### PAPER - I

**UNIT-1** **MM. 100**

**Definition and basic concepts of biosystematics and Taxonomy**

* Historical resume of systematics
* Importance and applications of biosystematics in biology
* Material basis of biosystmetics different attributes. Trends in biosystematics- Concepts of different conventional and never aspects.
* Chemotaxonomy
* Cytotaxonomy
* Molecular taxonomy

**Dimentions of speciation and taxonomic charecters**

* mechnaisms of speciation panmictic and apomictic species.
* Species concepts species Category, different species concepts sub species and other infra specific categories.
* Theories of biological classification, hierarchy of categories.
* **Toxonomic charecters-** different kinds, Origin of reproductive isolation biological mechanism of genetic incompatibility.

**Unit -II Procedure keys in taxonomy -**

* **Taxonomic procedures-** taxonomic collections, preservation, curetting process of identification.
* **Taxonomic keys -** different kinds of Taxonomic keys. their merits and demerits.
* Process of typification and different Zoological types.
* International Code of Zoological Nomenclature (ICZN) - its operative principles interpretation and application of important rules, Zoological nomenclature, formation of scientific names of various taxa.

**Evalution of biodiversity indices-**

* Similarity and dissimilarity index.
* Association Index.

Population Genetics and Evalution -

**Unit- III**

Concepts of evalution and theories of organic evolution with an emphasis on Darwinism.

* Neo- Darwinism
* Hardy- Weinberng Law of genetic equilibrium.
* A detailed account of destabilizing forces (i) Natural - selection (ii) Mutation (iii) Genetic drift (iv) Migration (v) Meiotic drive Genetic of speciation.
* Patterns and mechanisms of reproductive isolation.
* Models of speciation (Allopatric, Sympatric, Para patric),

**Molecular Evolution-**

* Gene Evolution
* Assesment of molecular variation Origin of Higher Categories.
* Major trends in the origin of higher categories Micro and Macroevolution.

**Moleculare Phylogenetics -**

* How to construct Phylogenetic trees /
* Amino acid Sequence and phylogeny
* Molecular clocks.

**Unit- IV**

**Quantifying genetic variability**

* Genetic Structures of natural populations
* Phenotypic Variation.

**Molecular Population genetics -**

* Patterns of change in nucleotide and amino acide sequences
* Emergence of Non Darwinism - Neutral Hypothesis
* Genetic and quantitative traits in population
* Analysis of quantitative traits
* Quantitative traits and natural selection
* Genotype environment interactions
* Inbreeding depression and heterosis.

**Population genetics and ecology-**

* Metapopulations
* Why small populations become extinct ?
* Conservation of genetic resources in diverse taxa.



A-1534 ~~AM-1574~~

~~4556~~ **M. Sc. FINAL - 2007-08** ~~AL-6628~~

**PAPER - II**

**(VERTEBRATE ANATOMY, PHYSIOLOGY, IMMUNOLOGY, BIOMOLECULES & METABOLIC REGULATION**

**Unit-I Comparative anatomy of Vertebrates :** ~~3576~~

(i) **Circulation :** General plan of circulation, Evolution of Heart and Evolution of aortic arches.

(ii) **Respiration :** Comparative account of respiratory organs, gills and and lungs and respiratory pigments.

(iii) **Skeletal system** Comparative account of jaw suspensorium and limb girdles in Vertebrate series.

(iv) Types of palate in Birds.

(v) Evolution of Urinogenital system in vertebrate series.

(vi) Comparative anatomy of Brain inrelation to its functions.

**Unit-II Physiology**

(i) Comparative physiology of Digestion.

(ii) Pattern of nitrogen excretion among different Chordatc groups.

(iii) **Receptor physiology :** Photoreception and Phonoreception.

(iv) **Communication among animals :** Bioluminescence, Pheromones.

(v) Chromatophores and regulation of their function.

(vi) Osmoregulation in different vertebrate groups.

**Unit-III Immunology**

(i) Innate and Acquired immunity.

(ii) Organisation and structure of Lymphoid organs.

(iii) Cells of immune system and their differentiation.

(iv) Antigen : Antibodies interactions in vitro and in vivo.

(v) Structure and function of different antibodies.

(vi) Cytokines : Structure and functions.

**Unit-IV Biomolecules and metabolic Regulators**

(i) **Concept of molecules :**

**(a) Saccharides :** General properties and structure of Monosaccharides (glucose & Fructose), Di-saccharides (Lactose & Sucrose), Polysaccharides.

**(b) Amino acids :** Occurrence, biological importance and general chemistry.

**(c) Proteins :** Occurrence, structure and biological importance of primary, secondry, tertiary and quaternary proteins.

**(d) Biological significacnce and properties of fats.** phospholipids and steroids.

**(e) Primary and secondary structure of nucleic acids.**

**(ii) Enzymes :**

(a) Classification and nomenclature of enzyme.

(b) Regulation of enzyme activity by non-genetic mechanism. and Competitive inhibition of enzyme activity.

(c) Immobillised enzymes and their application.

## M. Sc. FINAL
## Special Group - Entomology
## Paper -III
## (Morphology and Physiology of Insects)

A-1536 ~~AM 1515~~ ~~AL-6629~~ MM - 100

**Unit-I**
1. Cephalisation and theories about cephalisation.
2. Head capsule, type of antennae and types of mouth parts.
3. Thorax, legs in locomotion and functional modification of legs.
4. Integument - selerotization and moulting.
5. Wing venation - General and in the orders - Lepidoptera, Diptera, Hymenoptera, Coleoptera & Hemiptera.

**Unit-II**
1. Digestive system and physiology of digestion.
2. Excretory organs, excretion and osmoregulation.
3. Respiratory structure and respiration.
4. Respiratory adaptation in aquatic and endoparasitic insects.
5. Circulation, Heamocytes and blood coagulation.

**Unit-III**
1. Nervous system - principle modifications.
2. Photoreception, mechanoreception and chemoreception.
3. Sound producting structure and sound production.
4. Endocrine structure and functions.
5. Bioluminiscence, reproduction and metomorphores and



Diapause.

**Unit-IV**
1. Internal and External organisation of reproductive organs.
2. Endocrine control of reproduction and metamorphores.
3. Development - Embryonic and post embryonic.
4. Types of larvae.
5. Types of pupae.

## ENTOMOLOGY PAPER-IV ~~AL-6630~~
## (Taxonomy, Economic entomal & Pest control)

A-1537 ~~AM-1591~~ ~~1558~~

**Unit-I**
1. History of Insect classification, Basis of Clasification.
2. Brief Concept of all insect orders.
3. Characters and classification upto principal families of following orders -
   (a) Thysanura (b) Collembola (c) Orthoptera
   (d) Hemiptera (e) Mallophaga (f) Lepidoptera
   (g) Diptera (e) Hymenoptera and (i) coleoptera

(Insect Classification as per Essig's college Entomology)

**Unit-II** Classification, Life-Cycle, Control measures, and Ecomomic importance of the following-
(a) Important pests of paddy
(b) Important pests of sugarcane
(c) Importatant pests of pulses in the field e.g. Gram, Pea, Arhar.
(d) Important pests of Vegtables - Bringel, Cabbage, Cauli flower, Lady-finger and Cucumber.

**Unit-III** (a) Classification, Life-Cycle, ecomomic - importance and control measures of stored - Grain pests, namely - Sitophilusoruzae; Corcyre cephalonica; Tregederma granarium; Tribolium casfeneum; Callosobruchus ctinensis, & sitostroga Cerellella.
(b) Life cycle, Bionomics, Damage potential and control meusures of Aphids and its phases.
(c) Phases of the locust - Schistocerca gregarin; phase theory of locust.
(d) Social life in Insects.
(e) Parasitism in Insects.

**Unit-IV Pest Control**
(a) Physical and cultural control

10

(b) Chemical control

(c) Biological control.

(d) Integrated pest control.

## Practical Course in Entomology

(1) Collection, Preservation, and Classification of the Insects of the orders :- Thysaneura, Collembola, Orthoptera, Hemiptera, Lepidoptera, Mallophoaga, Diptera, Hymenoptera and coleoptera.

(3) Whole mounts of small insects e.g. Collembola, Thysaneura, bedbug, louce, stored grain pests.

(4) Whole mounts of differant types of leges, antannae, wings, mouth parts, salivary glands and scales.

(5) Microtomy of insect materials.

(6) Simple experiments on insect physiology.

(7) Identification of common insect pest.

(8) Collection of life cycle of the pest of any economic crop.

## DISTRIBUTION OF MARKS IN ENTOMOLOGY PRACTICAL

Time : 6 Hours M.M. : 100

| | | |
|---|---|---|
| 3. | Spotting (10 Spots - Slides -6, Specimens-4) | 20 marks |
| 4. | Permanent Mounting of Slide | 5 Marks |
| 5. | An experiment on insect Physiology | 10 Marks |
| 6. | Microtomy | 10 Marks |
| 7. | Viva-Voce | 10 Marks |
| 8. | Sessional Marks | 15 Marks |
| | **Total** | **100 Marks** |



## SPECIAL GROUP ICHTHYOLOGY
## PAPER-III 2007-2008

A-1538 **FISH BIOLOGY**

**Unit-I**

1. **Classification** - Evolutionary classification proposed by Berg & Romer.
2. **Agnatha** - Ostracoderms - Classification, & Affinities Cyclostomes - Classification General Organisation, Development & Affinities.
3. **Holocephali & Dipnoi** - General organisation, distribution and affinities.
4. **Teleostomi** - Character's Crossopterygii, Latimeria chalumnae, Actinopterygii, Teleosts, Provisional classification of teleosts.
5. **Evolution and Phylogeny** - Agnatha, Gnathostomata, evlution of cartilagenous fishes & lengfishes.

**Unit-II**

1. **Skin and scales** - Structure and function, cosmoid scale Ganoid scale, placord scale, Bony ridge scales, modification uses of scales, colouration, sources of colour, colour changes, significance.
2. **Fins and Locomotion** - Median fins, caudal fins, paired fins, origin of paired fins, locomotion.
3. **Migration** - Migration, Advantages of migration, factors influencing migration.
4. **Food & Alimentary canals** - Food of fishes, feeding habits, modification of alimentary canal, taste buds & mucus secreting cells.
5. **Respiration** - Accessary respiratory organs and air bladder.
6. **Exceration and osmoregulation** - Structure of kidney. Histology, Osmoregulation in fresh water fishes in marine fihes, in diadromous fishes, control of osmoregulation.

**Unit-III**

1. **Blood vascular system** - Structure of heart, working of heart, heart in teleosts, Arterial system, venours system.
2. Reproduction and development.
3. Endocrine glands.
4. Nervous system.
5. Sense organs.

**Unit-IV**

1. **Weberian ossicles** - Structure, Functions & Homalogies.
2. **Electric organs** - Structure in different fishes and their function.

3. **Deep sea fishes -** Physical character's fish fauna of deep sea, adaoptive modifications.
4. **Hill stream fishes -** Origin, modifications
5. Parental care infishes.

## SPECIAL GROUP : ICHTHYOLOGY
## PAPER-IV 2007- 08
## (INDIAN FISHERIES)

**Unit-I**
1. **Introduction**
2. **Colouration in Fishes -** Physical colour's Chemical colour's mixed colour's factor's (Temperature, stimulation, light) Adapitve singnificance.
3. **Common diseases of Fishes and their care -** Skin para sites and diseases, Diseases of gills, Diseases caused by Bacteria and viruses.
4. **Economic value of Fishes -** Fish as human food, as food of cattle, fishmanaure, fish glue and insinglass fish leather.
5. Luminous orgons.

**Unit-II**
1. Fresh warer fishes of chattisgarh and their culture.
2. Maintennance of nursery rearing and stocking ponds.
3. marine fisheries - Coastal fisheries, deep sea and off shore fisheries.
4. Fishing methods in sea water - Crafts of east coast, crafts of west coast, other methods (Electriefishing, light fishing)
5. Riverine and cold water fisheries.

**Unit-III**
1. **Reservoir fisheries -** Distribution of reservoir fisheries.
2. **Laustrine fisheries -** Lake types, principal lakes, fisheies.
3. Estuarine fisheries.
4. Fishfarming
5. Principal cultivable fishes.

**Unit-IV**
1. Larvivorius fishes.
2. Exotic & Transplanted fishes.
3. Plankton its role infisheries and pollution of water.
4. Prepartion and maintenance of Aquarium.
5. Induced Breeding.



## PRACTICAL (SPECIAL SUBJECT) FISHES

B. Osteology of fishes.
C. Microscpie preparations
D. Microtomy in fish, tissues and embryoes Taxonomic study of fishes through museum specimens and collection.
E. Identification of fresh water fishes of Chhattisgarh up to species level.

## SCHEDULES FOR PRACTICAL EXAMINATION
## PRACTICAL-II
## SPECIAL GROUP (SUBJECT FISH & FISHERIES)

Duration 8 Hours (Spread over one or two days)

| | | |
|---|---|---|
| 3. | Spots (Speciments 4, Bones-3, - slides -3) | 20 |
| 4. | Identification of a local fish | 05 |
| 5. | Microtomy | 15 |
| 6. | Slide Prepartion | 05 |
| 7. | Viva | 10 |
| 8. | Sessional | 20 |
| | **Total-** | **100** |

**Books Recommended-**


Zingron - Fish & Fisheries in India.
Gavelander - Fish Biology
Karl egler - Fresh water fisheries.
Ali kual - Piscriculture
Nikolaski - Fish Ecology
Mishra - Identification of fishes of India
Identification of Fishes - Day's fauna
Hear & Rendal - Fish Physiology
E. Kanna - Introduction to fish
Khana - Introduction to fishes.
C.B.L. Srivastava - Fish & Fisheries
Parihar - Fish Biology
Norman - Introduction to Fishes.

## Special Group - 2007 - 08
## Cytology and Cytogenetics
## Paper - III
### (Cell biology and General and Microbial Genetics)

**Unit-I Principal of cellular Organization and Function**

1. History of cell biology - its history and present perspective with special reference to molecular biology.
2. Cytoplasmic vacuolar system including endoplasmic reticulum and Golgicomplex.
3. Ribosome structure biogenesis function and polyribosomes.
4. Lysosome structure and function.
5. Lysosome and diseases.
6. Mitochondria and its functions.

**Unit-II Cell cycle and cell nucleus**

1. Cell cycle
2. Structure of Chromosomes, C-value paradox, detailed acount of eukaryotic genome
3. DNA structure
4. Different kinds of RNA structure and function.
5. Special types of chromosomes : Structure and function.
6. Structure of protein : Protein size, shape and determination of protein conformation.

**Unit-III Allelic and Non-allelic interactions of genes & Cytogenetics**

1. Mendels Laws of inheritance and Interaction of genes.
2. Cytogenetic implications and consequences of structural changes and numerical alteration of chromosomes.
3. Human cytogenetic Techniques in human chromosome analysis, Human karyotype, Numerical and structural abnormalities of human chromosomes, Syndromes.
4. Linkage maps.

**Unit-IV Microbial Genetics and extranuclear inheritance.**

1. Bacterial transformation, Transduction, Conjugation.
2. Bacterial Chromosome.
3. Bacteriophages : Type structure and morphologyh of T4 phage.



4. Extranuclear Inheritamce.
5. Nucleo-Cytoplasmic interaction.

## PAPER-IV - 2007 - 08
## MOLECULAR-BIOLOGY, DEVELOPMENTAL BIOLOGY & BIOINFORMATICS MM. 100

**Unit-I Moleculer Biology**

1. Genetic code
2. DNA replication : Prokaryotic and eukaryotic DNA replication.
3. Enzymes and accessary proteins involved in DNA replication.
4. Moleculer cytogenetic techniques : DNA finger pringing. Flow cytometery Karyotyping, Molecular markers in genome analysis RFLP.

**Unit-II Protein synthesis and Genetic regulation**

1. Transcription : Prokaryotic and eukaryotic transcription. RNA polymerases and transcription factors.
2. Translation : prokaryotic and eukaryotic translation.
3. Genetic regulation of Protein synthesis.
4. DNA repair mechanisms.
5. DNA recombination.

**Unit-III Development and Bioinformatics**

1. Genes and Differentiation.
2. Cell Diversification in early animal embryo.
3. Bioinformatics : Computer analysis of DNA sequence and its biological significance.
4. Methods of protein structure prediction.

**Unit-IV Genetic Rearrangements and Genetic engineering**

1. Transpos able elements,
2. Genetic engineering and genome analysis.
3. DNA technology.
4. Genes in evolution.

**RECOMMENDED BOOKS:-**


1. D Voet and J.G. Voet Biochemistry, Jonn Willey & Sons.
2. D. Freifelder, Essentials of Molecular Biology.
3. Benjamin Lewin, Genes VII, Oxford University Press.
4. Molecular Biology of Gene J.D. Watson. N.H.Hopkins, J.W. Lewis, J.W. Roberts, J.A. Steritz and A.M. Weiner, The Bengamin Commings Pub. Co. Inc. California.
5. Molecular Biology J. Darnell, H- Lodish and D. Baltimore,

Scientific American Books inc. USA.
6. Molecular Biology of the Cell B. Alberts, D, Bray, J.Lewis, M. Raff K. Roberts and J.D. Watson Garland Publishing Inc.New York.
7. Molecular Biology and Biotechnology A Comprehensive desk reference, R.A. Meyers (Ed.) VCH Publishers Inc, New York.
8. Genetics: Analysis and Principles Benjamin/Cummings. Longman Inc.
9. Principles of Genetics. Gardner, E, J. M.J. Simmons and D.P. Snusted John Willey and Sons, Inc. NY.

## PRACTICAL (SPECIAL SUBJECT) : CYTOLOGY & CYTOGENETICS

1. Examination of different cell types in vertebrate tissues.
2. Phase contrast microscopy.
3. Photomicrography.
4. Study of permanent cytological preparations.
5. Squash preparation of chromosomes and preparing karyotypes..
6. Preparation of Giant Chromosomes and demonstration of puffs.
7. Golgi material and mitochondria preparation.
8. Demonstration of Barr body and drum stick.
9. Histochemical demonstration of RNA DNA phospholipids, Enzymes Viz, Acid phosphatse, esterase, peroxidase use of freezing microtome.
10. Microbial culture media preparation and microbial growth.
11. Molecular separation by Chromatography/Electrophoresis.

**Cytology & Cytogenetics : Scheme of marks.**

Duration 8 hours (Spread over one or two days): M.M. 100

| | | |
|---|---|---|
| 1. | Indentification and comments on premanent cytological preparations. | 20 Marks |
| 2. | Squash preparation or supravital staining | 10 Marks |
| 3. | A histochemical preparation. | 10 Marks |
| 4. | Microtomy of a paraffin embedded material (For Golgi, Mitochondria or Chromosomes) | 10 Marks. |
| 5. | Karyotype study or Chromatography or Microbial culture | 20 Marks |
| 6. | Viva- | 10 Marks |
| 7. | Sessional | 20 Marks. |

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A-1542



## Special Paper - Parasitology - 2007 - 08
## Paper-III (General parasitology) 4563

AM-1607 AL-6635 100 Marks

**Unit-I** **Bionomics** - Variety in host parasite relationship micro and macro environment of parasites Autecology ad synecology of parasitic helminths Host specificity (Defination and kind of host specificity)

**Unit-II** Pathophysiology and Immunoparasitology

1. **Immunopathology parasitic intections :** Immunulogical control of vector borne and nonvector borne disease, with reference to Ichthyophtthrriasis. Trypanosomiasis, Gundiasis. Theiteviasis and coecidiaisis.
2. **(a) Immunodignosis and Immunoprophylaxis** - odiffusion. Fluorescent outbody techniques. Scrological diagnosis, Diagnistic techniques (Coprological, Urine and blood.)

   (b) Hyperparasitism and Hypersensitivity Anthelminthies.

**Unit-III** **Protozoology-**

**Introduction, Classification :** host parasitic relationship, pathogenic mechanisms, transmission and life cycles of parasitic Protozoas - Ichthyopheria, Giardia, Theileria, Toxoplazsma, Cryptosporidium, Leishmania, Trichomonass & Trypanosoma.

**Unit-IV** **Medical and veternary Entomology**

1. Epidemiology and zoonotic significance of parasitic Arthropods e.g. Ticks, Ixodes, Mites, sarcoptes, demodex, Fleas (Hypodema, Tabanus); Lice (Pulex, Cimx) and these.
2. Parasitic Toxicosis in Arthropods.
3. Mechanism at diseas transmission with particular reference to vectors and diseases in India, Vector control measures.

## 4564 PAPER- IV - 2007 - 08
## PARASITOLOGY
## (SYSTEMATICS AND APPLIED PARASITOLOGY)

A-1543 AM-1608 AL-6636 100 Marks

**Unit-I** General systematics as (a) Platyhelminthes (b) Aschelminthes Evolution of Parasitism in various groups of Helminthes.

**Unit-II** Epidermiology, Life cycle, Pathogenecity and control of panasitic helinthes e.g.

**(1) Cestodes and Trematodes :**

Schistocephhalus solidus; Ligula intestinalis; Proteocephalus, Duthiersia; Hymenolepis; Clonorchis sinesis; Polystomum integlinum.

**(2) Nematodes :**

Ancyclostoma duodenale; Haemonchus contortus. Trichinella, spiralis. Dicrocoaelium dendriticum Role of plant Parasitic Nematodes in Agriculture.

**Unit-III** 1. Adhesive organs in Parasitic helminths and their significance in systematics.

2.. Significance of excretory organs in classification of parsitie helminths.

3. Biology of eggs at parasitic helminths, Penetration and growth in difinitive hosts, Biology of Hydatic organs.

4. Larval stages of Parasitic helminths, Biology and kind of larvae.

5. Role of intermediate hosts in spread of helminthic infections.

**Unit-IV** 1. **Parasitic infection in immuno -** compromised hosts and AIDS patients.

2. **Laboratory techniques in parasitology -** Examination of faces for ova and cysts; Worm - burden assessment concentration methods; Floatation and sedi mentation techniques, staining by cron hacatoxyline method Blood, Smear eaxmination, Cultivation of protozoan parasites.

## PRACTICAL WORK IN PARASITOLOGY (SPECIAL PAPER)

2. Host stool examination and slide Preparation of eggs and cysts of helminth parasites occuring in hosts.
3. Search, slide preparation and indentification of nematodes from plant - roots of agricultural and ornamental plants.
4. Identification, taxonomy and comment on parasitic specimens of protozoan, Helminths and nematode parasites of man and other animals, with the help of slide and museum specimens.
5. Identification, taonomy and comment upon Vector arthopodas of human diseases.
6. Search of larval stages of Helminthes from infected snails and bee flies.

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7. Assessment of worm burden in their host.
8. Blood smear examination for blood protozoans.
9. Use of camera lucida for micrometric measurement of Parasites body structures.
10. Microtomy of a helminth or nematode worm.

## DISTRIBUTION OF MARKS IN PARASITOLOGY PRACTICAL

Time : 7 hours M.M. 100

| | | |
|---|---|---|
| 1. | Indentification and comment sports (Slide-6, Specimens-4) | 20 Marks |
| 3. | Preparation of plant nematode slide from given plant material | 5 Marks |
| 4. | Measurement of alloted body part of a helminth, through camera lucida | 10 Marks |
| 5. | Mounting, Identification and comment on a given nematoda or Helminthic material | 10 Marks |
| 6. | Mounting, Identification and comment upon given vector arthopod. | 10 Marks |
| 7. | Microtomy | 10 Marks |
| 8. | Viva-voce | 10 Marks |
| 9. | Sessional Marks | 15 Marks |
| **Total** | | **100 Marks** |

## M.Sc.FINAL PRACTICAL EXAMINATION
## PAPER - I (GENERAL)

1. Study of Chordates through Museum specimens

3. Osteological study of Limb Girdles & Vertebrae of Vertebrates.
4. Palate types in birds
   Reptilian skull based on temporal vacuties.
5. Permanent & Suitable stained micropreparation (Test of Ascidia showing spicules, blood ampullae, scales of Fishes, Salpa, Doliolum, Bugula ets.)
6. Composition assessment of the faxonomic diversity/ Bio- diversity in a habitat (eg grassland, aridland, wetland etc)
7. Influence of climate conditions on taxonomic diversity in a given habitat.
8. Preparation of Models showing the status of certain taxa or species in a particular habitat.
9. Morphological variation and its genetic basic in humans, insects plants or other taxa.
10. Domestration of effect of natural and artificial selection on gene frequencies in Drosophila wild and mutant strains,
11. Demonstration of sewall wright effect in small samples of Drosophila population.

### SCHEME OF MARKS

Time 6hrs. M.M. 100

| | | |
|---|---|---|
| | | 15 |
| 3. | Micro Preparation | 05 |
| 4. | Sports -10(Museum Specimens 6, Bones- 4) | 20 |
| 5. | Genetic basis of morphological variations in population - Demonstration of natural and artificial Selection on gene frequencies in Drosophila wild and Mutant. | 05 |
| 6. | Application of biostatistical principles in biological population. | 10 |
| 7. | An experiment related to taxonomic diversity bio diversity of an animal | 05 |
| 8. | Viva | 10 |
| 9. | Sessional | 20 |
| | **Total** | **100** |

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