



UNIVERSITY OF JAMMU

NOTIFICATION
(11/Aug/ ADP/34)

It is hereby notified for the information of all concerned that the Vice-Chancellor, in anticipation of the approval of the Academic Council, has been pleased to authorize adoption of the revised Syllabi and Courses of Study in Zoology (given in annexure) for the examination to be held in the years as under alongwith %age of change:-

<u>Class</u>	<u>Semester</u>	<u>For the Examinations to be held in the year</u>	<u>%age of Change</u>
M.Sc.	I	Dec. 2012, 2013, 2014	as per annexure 'A'
M.Sc.	II	May 2012, 2013, 2014	as per annexure 'A'
M.Sc.	III	Dec. 2012, 2013, 2014	as per annexure 'A'
M.Sc.	IV	May 2012, 2013, 2014	as per annexure 'A'

The alternative question papers are required to be set as per the University regulation given as under:-

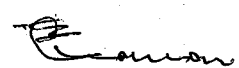
- If the change in the Syllabi and Courses of Study is less than 25%, no alternative question papers be set.
- if the change is 25% and above but below 50% alternative question papers be set for one year.
- If the change is 50% and above or whole scheme is changed, alternative question papers be set for two years.

Sd/-
REGISTRAR

F.Acd./24/11/ 6151-75
Dated: 23-09-2011

Copy for information and necessary action to:

1. Special Secretary to Vice-Chancellor, University of Jammu.
2. P.S. to Dean Academic Affairs
3. Sr. P.A. to Registrar/ Controller of Examinations;
4. Dean, Faculty of Sciences
5. Convener, Board of Studies in Zoology/Head P.G. Department of Zoology
6. Members of the Board of Studies concerned
7. C.A. to Controller of Examinations.
8. I/c Deputy (Exams. P/G /Pub.);
9. A.R. (Conf./PRI/Admissions);
10. S.O (Confidential)
11. Content Manager, University Website.


Asst. Registrar (Academic)

22/9/11

W

First Semester

<u>Course No.</u>	<u>Title of the Course</u>	
416	Fundamentals of Biochemistry	10%
421	Ecology and Environmental Biology	20%
422	Microbiology	20%
423	Insect Diversity and Physiology	20%
424	Ichthyology	15%

Second Semester

466	Human and Wild-life Ecology	20%
468	Cell and Molecular Biology	20%
469	Genetics and Cytogenetics	No change
473	Basic Endocrinology	15%
475	Biosystematics and Taxonomy	20%

Third SemesterTheory Courses –Special Optionals

510	Cell biology and Cytogenetics-I	20%
511	Fish and Fisheries-I	10%
512	Limnology-I	20%
513	Entomology-I	15%
514	Wild-life biology, conservation	
515	and Management-I	15%

Theory Courses-General Core

520	Reproductive and Developmental biology	10%
527	Functional Anatomy of Animals	10%
528	Fundamental of Computer and its application in Zoology	20%
529	Animal Behaviour	15%

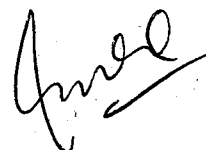
W

Fourth Semester

575	Cell biology and Systematics-II	20%
576	Fish and Fisheries-II	20%
577	Limnology-II	20%
578	Entomology-II	10%
580	Wild-life biology, conservation and Management-II	20%

Theory Courses-General Core

586	Principles of Human Genetics	15%
587	Animal Physiology	20%
589	Biotechnology	20%
591	Aquaculture	10%
592	Population genetics and Evolution	15%



(Prof. Kadambri Gupta)
Head of the Department

SEMESTER I

COURSE NO. 416

**Course title: Fundamentals of
Bio-chemistry**

CREDITS: 4

MAXIMUM MARKS: 100

DURATION OF EXAM: 3Hrs.

a) Semester Examination: 80

b) Internal Assessment : 20

**Syllabus for the examination to be held in
December, 2011; December, 2012 and December, 2013.**

OBJECTIVES

The course has been designed to expose the students of Zoology to modern functional approach in relation to structure including the organ systems, an approach that would necessarily involve Biochemistry (of cellular activities).

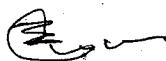
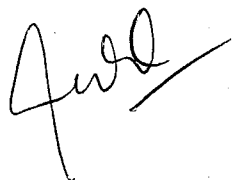
UNIT I Proteins : structure, function & Metabolism 10 Hrs.

- 1.1 General features and classification
 - 1.1.1 General Features
 - 1.1.2 Classification
- 1.2 Levels of organization
 - 1.2.1 primary
 - 1.2.2 Secondary
 - 1.2.3 Tertiary
 - 1.2.3.1 Globular protein (Specialized proteins)
 - 1.2.4 Quaternary.
 - 1.2.4.1 Fibrous protein (Specialized proteins)
- 1.3 Protein metabolism
 - 1.3.1 Catabolism of Amino Acid Nitrogen.
 - 1.3.2 Transamination & Deamination.
 - 1.3.3. Formation of Ammonia and its transport.
 - 1.3.4 Biosynthesis of Urea, Uric Acid & Creatinin.
- 1.4. Denaturation.

UNIT II

Enzymes : Structure & Function

10 Hrs.

- 2.1 General properties and classification.
 - 2.2 Coenzymes and their types.
 - 2.3 Isoenzymes.
 - 2.4 Kinetic properties of enzymes.
 - 2.5 Mechanism of enzyme activity.
 - 2.6 Inhibition of enzyme activity.
- 
- 

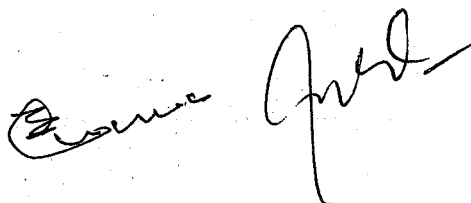
5.5.8 Citric acid cycle.

Note for the paper setting:

The question paper will contain two questions from each unit (total ten questions) and the candidate will be required to answer one question from each unit (total questions to be attempted will be five) i.e. there will be internal choice within each unit.

Books Recommended:

1. Lehninger, A.L. (1984) : Principles of Biochemistry with publication (Indian Ed.)
2. Harper, H. (2008) : Maruzoon Asian Ed.
3. Sturkei, J.W. : Introduction to biochemistry, H it, Richart and Winasarton, Tokyo.
4. Prosser & Brown : Comparative animal physiology.
5. Prosser, C.L. : Text Book of animal physiology.
6. Marshall : Introduction to animal physiology.
7. Bell, Smith & Paterson: Text book of physiology and biochemistry.
8. Eckert and Randall : Animal physiology.
9. Hoar : Animal physiology.
10. Nagabhushanam : Text book Animal Physiology.



SEMESTER I

COURSE NO. 421

Course title: **Ecology & Environmental
Biology**

CREDITS: 4

MAXIMUM MARKS: 100

DURATION OF EXAM: 3Hrs.

a) Semester Examination: 80

b) Internal Assessment : 20

**Syllabus for the examination to be held in
December, 2011; December, 2012 and December, 2013.**

OBJECTIVES

Plants, animals and the microbes are parts of a well orchestrated life. They interact with one another and with their abiotic environment to produce the symphony of the biosphere of which man is only a small part. Yet, this exquisite harmony is threatened by man through his limitless greed and unwise exploitations of the natural resources. This course has been designed to make a student appreciate in general and broad terms that any unwise tinkering with the delicate balance of nature is bound to counter productive, with adverse effect, erupting elsewhere in the ecosystem.

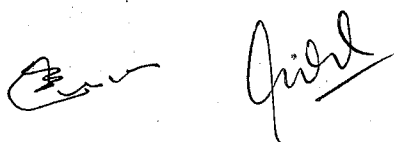
UNIT I

10 Hrs.

- 1.1 Concept of eco-system, ecological niche, habitat and ecological equivalents.
- 1.2 Hydrological cycle.
 - 1.2.1 Impact on Environment.
 - 1.2.2. Impact on biota
 - 1.2.3 Man's impact on hydrological cycle
- 1.3 Generalized model of energy flow through an ecosystem laws of thermodynamics
- 1.4 Primary productivity, methods of determining primary production.
- 1.5 Secondary productivity
- 1.6 Limiting factors, Law of minimum and law of tolerance.

UNIT II

- 2.1 Organization of communities: the biotic community concept.
- 2.2 Intra-community classification and ecological dominance.
- 2.3 Species diversity in communities ecotones and edge effect
- 2.4 Patterns in communities
- 2.5 Succession : concept and types of pioneer species and climax communities; climax concept and mechanism of succession.
- 2.6 Vegetation. Structure, classification units and systems; classifying vegetation by using differential – species and association concept.
- 2.7 The terrestrial biota, permeants.
- 2.8 Soil sub-system.
- 2.9 Global biomes



UNIT III

- 3.1 Attributes of population, natality and mortality.
- 3.2 Age distribution, biotic potential, population growth forms and carrying capacity concept, life tables and survivalship curves.
- 3.3 Population structure, Aggregation & Allee's principle, Isolation and territoriality, dispersal, disperson.
- 3.4 Biological invasions (Ecesis).
- 3.5 Negative interaction – competition, predation and parasitism, social behaviour.
- 3.6 Positive interaction – Commensalism, cooperation and proto-cooperation and mutualism.

UNIT IV

- 4.1 Soil Pollution: Sources, types, effects and control measures
- 4.2 Water pollution: Sources, types, effects and control measures
- 4.3 Air Pollution: Sources, types, effects and control measures
- 4.4 Noise Pollution: Sources, types, effects and control measures
- 4.5 Bioindicators of pollution

UNIT V

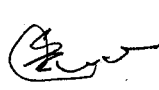
- 5.1 Forests as a natural resource.
- 5.2 Wildlife as a natural source, its conservation and management
- 5.3 Fishery as a natural source, its conservation and management
- 5.4 Mineral as a natural source, its conservation and management
- 5.5 Non-conventional sources of energy
- 5.6 Dwindling freshwater resources: Source, causes and conservation of dwindling Freshwater resources
- 5.7 Solid waste management, transportation, dispersal, reuse and recycling
- 5.8 Remote sensing: Importance and applications

Note for the paper setting:

The question paper will contain two questions from each unit (total ten questions) and the candidate will be required to answer one question from each unit (total questions to be attempted will be five) i.e. there will be internal choice within each unit.

Books Recommended:

- 1. Phillipson, J. 1966. Ecological Energetic, Edward Arnold Ltd. London.
- 2. Odum, E.P. 1970 : Ecology, Amerind Publ. Co. New Delhi.
- 3. Odum, E.P. 1971. Fundamentals of Ecology, W.B. Saunders, USA.
- 4. Kormondy, E.T. 1971. Concept of Ecology. Prentice Hall of India, New Delhi.
- 5. Ricklefs, R.E. 1973. Ecology. Thomas Nelson and sons Ltd.
- 6. Colinbaux, P.A. 1985 Introduction to ecology. John Wiley & Sons.
- 7. Wiegert, R.G. 1976. Ecological Energetics Dowden, Hutchinson & Ross. Inc. ennsylvani.
- 8. Scuthwick, C.H. 1976. Ecology and the quality of our environment. D. Van Nestrand



SEMESTER I

COURSE NO. 422

CREDITS: 2

DURATION OF EXAM: 3Hrs.

Course title: Microbiology

MAXIMUM MARKS: 50

a) Semester Examination: 40

b) Internal Assessment : 10

**Syllabus for the examination to be held in
December, 2011; December, 2012 and December, 2013.**

OBJECTIVES

Role of micro-organisms in health and diseases of plants, animals and man needs emphasis. The course has been designed to expose the students to the present state of our knowledge of the characterization, application and ecology of micro-organisms

UNIT I

10 Hrs.

- 1.1 Introduction to Microbiology
- 1.2 Classification of Bacteria: General characteristics of each groups with examples
- 1.3 General characters of Rickettsias, Chlamydiae and Mycoplasma alongwith the diseases caused by the each group
- 1.4 Plasmids and their characteristics
- 1.5 Nature of virulence, toxins and extra cellular enzymes of pathogenic bacteria.
- 1.6 Viroids and prions

Unit II


10 Hrs

- 2.1 Morphology and ultra structure and Viruses
- 2.2 Replication of Bacteriophage
- 2.3 tropic diseases
 - 2.3.1 AIDS
 - 2.3.2 Hepatitis (A,B,C , Delta)
- 2.4 Neurotropic Viral Disease'
 - 2.4.1 Rabies
 - 2.4.2 Polio
- 2.5 Modern concept of Oncogenic viruses and Oncogenesis

Unit III

10 Hrs.

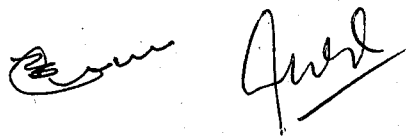
- 3.1 Scope and application of Microbes in
 - a) Agriculture with special reference to Biological nitrogen fixation
 - b) Industry (types of fermentation)
 - c) Food (source of food and feed)
 - d) Pollution
 - e) Degradation of pesticides and hydrocarbons in soils
- 3.2 General account of immunity: Innate and acquired, allergy and types of allergies, properties of antigens and antibodies, serology



- 3.3 Bacterial diseases of human: Etiology, Pathogenecity and prophylaxis of:
- 3.3.1 Food borne and water borne diseases
- a) Salmonella
 - b) Shieglla
 - c) Botulism
 - d) Cholera
 - e) Infantile and travelers diarrhoea
- 3.3.2 Air borne bacterial diseases
- a) Streptococcal diseases
 - b) Diphtheria
 - c) Whooping cough
 - d) Tetanus
 - e) Tuberculosis
 - f) Pneumonia
- 3.4 Control of Microorganisms
- a) Physical control
 - b) Chemical control

Note for Paper Setting

The question paper will contain two questions from each unit (total six questions) and the candidate will be required to answer one question from each unit (total questions to be attempted will be three) i.e. there will be an internal choice within each unit.



SEMESTER I

COURSE NO. 423

Course title: Insect diversity and Physiology

CREDITS: 2

DURATION OF EXAM: 2Hrs.

MAXIMUM MARKS: 50

a) Semester Examination: 40

b) Internal Assessment : 10

Syllabus for the examination to be held in
December, 2011; December, 2012 and December, 2013.

OBJECTIVES

The course has been designed to provide the students with a sufficient information about the morphology, diversity and physiology of insects which form the basis for any type of entomological studies which would be undertaken by the students subsequently

UNIT I

10 Hrs

- 1.1 Basis of insect classification
- 1.2 Bionomics of insect orders of economic importance with examples from J&K State
 - 1.2.1 Subclass Apterygota, Thysanura, Collembola
 - 1.2.2 Subclass Pterygota:
 - 1.2.2.1 Exopterygota: Odonata, orthoptera, Dictyoptera, Dermaptera, Hemiptera, Homoptera
 - 1.2.2.2 Endopterygota: Lepidoptera, Diptera, Coleoptera, Hymenoptera

UNIT II

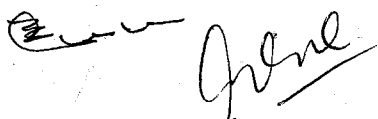
10 Hrs

- 2.1 Insects general organization. Why a most successful group
- 2.2 Evolutionary relationship of insects with other arthropod groups
- 2.3 The mouth part and their diversity
- 2.4 Types of Antennae in insects
- 2.5 Types of leg modifications in insects
- 2.6 Wings and wing coupling mechanism
- 2.7 Compound eye
- 2.8 Male and female external genitalia

UNIT III

10 Hrs

- 3.1 Metamorphosis: Types and its control:
- 3.2 Types of larvae and pupae
- 3.3 Diapause
- 3.4 Stridulation and atridulatory organs
- 3.5 Structure and physiology of the following systems:



- 3.5.1 Digestive system
- 3.5.2 Reproductive system
- 3.5.3 Nervous system
- 3.5.4 Excretory system
- 3.5.5 Respiratory system

Note for Paper Setting

The question paper will contain two questions from each unit (total six questions) and the candidate will be required to answer one question from each unit (total questions to be attempted will be three) i.e. there will be an internal choice within each unit.



SEMESTER I

COURSE NO. 424

Course title: Ichthyology

CREDITS: 4

DURATION OF EXAM: 3Hrs.

MAXIMUM MARKS: 100

a) Semester Examination: 80

b) Internal Assessment : 20

**Syllabus for the examination to be held in
December, 2011; December, 2012 and December, 2013.**

OBJECTIVES

The course has been designed to provide the students with a sufficient information regarding fish classification, structure and adaptation to various ecological conditions alongwith feeding, nutrition and reproduction so that they may appreciate better the biology of this fascinating and useful group of aquatic animals.

UNIT I

10 Hrs.

1. Morphology and classification
 - 1.1 Morphological studies
 - 1.1.1 Distinctive characteristics of fishes
 - 1.1.2 Body form and its diversity
 - 1.1.3 Fins
 - 1.1.3.1 Theories of origin of fins
 - 1.1.4 Structure skeletal support, modification and functions of paired fins
 - 1.1.5 Structure skeletal support, modification and functions of un-paired fins
 - 1.2. Outline classification of fishes with special reference to distinctive features, geographical distributions, classification and typical examples of the following sub-divisions:
 - 1.2.1 Chrodrichthyes
 - 1.2.2 Actinopterygia
 - 1.2.3 Crossopterygia
 - 1.2.4 Dipnoi

UNIT II

10 Hrs

1. Sense organs and some special features
 - 2.1 Scales; types, structure and functions of scales
 - 2.2 Coloration; chromatophores, pigments and biological significance of coloration in fishes
 - 2.3 Bioluminescence in fishes and its significance
 - 2.4 Electric organs; their structure and use in fishes.

- 2.5 Venomous and poisonous fishes
- 2.6 Sense organs
 - 2.6.1 Eye
 - 2.6.2 Lateral line
 - 2.6.3 Internal ear

UNIT III

10 Hrs

- 2. Feeding and Respiration
 - 3.1 Food, feeding habits and feeding adaptations
 - 3.2 Alimentary canal and its diversity on fishes
 - 3.3 Respiratory organs
 - 3.3.1 Structure, modifications and functions of gills
 - 3.3.2 Structure and development of air breathing organs in fishes
 - 3.3.3 Structure and function of swim bladder

UNIT IV

10 Hrs

- 3. Reproduction
 - 4.1 Sexuality, hermaphroditism, Uni and bi-sexuality
 - 4.2 Reproductive organs and Accessory sex organs
 - 4.3 Secondary sexual characters
 - 4.4 Oviparity, vivparity (Aplacenta and placental)
 - 4.5 Breeding habits (nest building and parental care)
 - 4.6 Types of eggs
 - 4.7 Hatching and metamorphosis

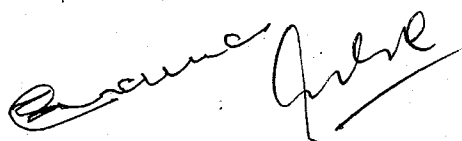
UNIT V

10 Hrs

- 4. Adaptations to special condition of life
 - 5.1 Deep sea fishes
 - 5.2 Hill stream fishes
 - 5.3 Cave dwelling fishes
 - 5.4 Arctic and Antarctic fishes (avoidance of freezing)
 - 5.5 Migration in fishes
 - 5.6 Osmoregulation in fishes

Note for the paper setting:

The question paper will contain two questions from each unit (total ten questions) and the candidate will be required to answer one question from each unit (total questions to be attempted will be five) i.e. there will be internal choice within each unit.



DETAILED SYLLABUS

SEMESTER II

COURSE NO .466

TITLE: HUMAN &
WILDLIFE ECOLOGY

CREDITS : 4

Duration of

Examination : 3 hrs.

Maximum marks :100

a) Semester Examination : 80

b) Sessional assessment : 20

Syllabus for the examination to be held in May 2010 May 2011 May 2012

OBJECTIVES

Human population explosion has led to scarcity of space and food and threatened the basic socio-economic statues besides exerting unwanted pressure on natural resources. Thus, the present course has been designed to introduce the students the concept of population, impact of human population on environment and natural resources.

Wildlife being a natural resource and the one with which man has interacted from the very early days has been chosen as an easily understandable example.

SYLLABUS

Unit I	General introduction to human ecology	10 Hrs.
1.1	Finite World	
	1.1.1 Biosphere; its composition and potential	
	1.1.2 Human need vis-à-vis limited eco-system	
1.2	Man and his environment	
	1.2.1 Hunters and gatherers as natural ecologists	
	1.2.2 Early man, his attitude towards environment	
	1.2.3 Modern man his optimism and onset of despair	
1.3	Population Ecology and dynamics	
	1.3.1 Population demography; life tables	
	1.3.2 population dynamics	
	1.3.2.1 World population; its patterns of growth	
	1.3.2.2 Indian population; growth structure; population regulation; life history strategies, sexual and parasexual parameters (sex; age; fertility; social behaviour; urbanization and competition)	
UNIT II	Future trends in Human Ecology	10 Hrs.
2.1	Man's increasing impact on climate	
2.2	Withering terrestrial ecosystem; preservation of habitats	
2.3	Dangerous developments and monoculturing – its impact and remedies	
2.4	Environmental Management	
	2.4.1 Status of environment vis-à-vis Population explosion	
	2.4.2 Natural resources and their rational utilization by the modern man	

Signature

Signature

- UNIT III Wild life and its Ecology 10 Hrs.**
- 3.1 Wildlife; its significance, from conservation & Management point of view
 - 3.2 Wildlife habitats with their characteristic fauna
 - 3.2.1 Forests
 - 3.2.2 Grasslands
 - 3.2.3 Deserts
 - 3.3 Forest types: its types and distribution pattern in India
 - 3.4 Plant – animal inter relationship
 - 3.5 Methods of studying wildlife (birds and Mammals) in their natural habitat

- UNIT IV 10 Hrs.**
- 4.1 Properties of wildlife population
 - 4.1.1 Population growth, exponential and logistic pattern
 - 4.1.2 Population cycle and equilibrium
 - 4.2 Role of social behaviour in population regulation
 - 4.3 Density, saturation and carrying capacity
 - 4.4 Cover: its types and functions; methods of control
 - 4.5 Clutch size; factors governing its size
 - 4.6 Wildlife census: Direct, Indirect and miscellaneous methods of enumerating the mammalian and avian population.

- UNIT V 10 HRS.**
- 5.1 Zoogeographical subdivisions of India based on mammalian distribution
 - 5.2 Important wildlife of J&K state with special reference to mammalian and avian fauna
 - 5.3 Causes of wildlife resource depletion in India
 - 5.4 Important national parks, wildlife sanctuaries and biosphere reserves in India with their characteristic wildlife
 - 5.5 Endangered mammals of India

Note for Paper Setting

The question paper will contain two questions from each unit (total ten questions) and the candidate will be required to answer one question from each unit (total questions to be attempted will be five) i.e. there will be an internal choice within each unit.

Books recommended

1. Allen H. Benton, W.E. Werner Jr. (1976): Field Biology and Ecology. Tata McGraw Hill Publ. Co. Ltd New Delhi
2. C.H. Southwick Dnon Nastrand (1976): Ecology and quality of environment. New York
3. T.N. Khushoo: Environment concerns and strategies. Ashish Pub. House, NDL
4. R.R. Trevedi Gurdeep Raj (1992) : Environmental biology. Akashdeep Pub. House
5. C. Sheshadri; I.I. Pandey (ed) (1989) : Population education N.C.E.R.T, NDL
6. Tej Ver Singh (1989): Impact of tourism development in mountain areas, Himalayan Books, NDL
7. Nicholas Polunin (ed) 1977: Growth without eco-disasters, I.B.T. NDL
8. R.F. Dasman 1982) : Wildlife Biology Pub. Wiley Eastern Ltd. NDL
9. R.H. Giles (ed) (1980): Wildlife management techniques Pub. Natral Publ. Dehradun

[Signature]

[Signature]

DETAILED SYLLABUS

SEMESTER II

COURSE NO .468

**TITLE: CELL AND
MOLECULAR BIOLOGY**

CREDITS : 2

Maximum marks :50

Duration of

a) Semester Examination : 40

Examination : 2 hrs.

b) Sessional assessment : 10

Syllabus for the examination to be held in May 2008 May 2009 May 2010

OBJECTIVES

Molecular biology is relative a very recent field of biological Studies which emerged a couple of decades back, essentially as a consequence of enormous research work that followed the Successful cracking of the genetic codes. Much of the knowledge generated on molecular aspects of life at cellular level is fascinating and worth of knowing by all students of biology . The course is designed to present an essential but simplified account of the current situation of them cell and the molecular biology for the students of Zoology of Master Degree Programme.

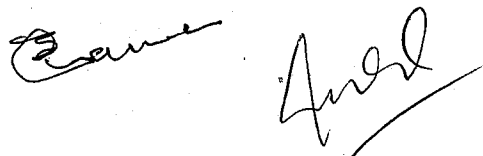
SYLLABUS

Unit I

- 1.1 Tools and methods
 - 1.1.1 Optical microscopy, Stereomicroscopy and Confocal microscopy
 - 1.1.2 Electron microscopy, Transmission electron microscopy, Scanning electron microscopy
 - 1.1.3 Fluorescence microscopy
 - 1.1.4 Flow cytometry
 - 1.1.5 Cell fractionation
 - 1.1.5.1 Centrifugation
 - 1.1.5.2 Ultracentrifugation
- 1.2 Sequencing proteins and nucleic acids: Principal and application
 - 1.2.1 Southern, Northern blotting techniques
 - 1.2.2 South-western blotting techniques
 - 1.2.3 Dots blots and slot blots
 - 1.2.4 Polymerase chain reaction

UNIT II

- 2.1 Cell Membrane
 - 2.1.1 Structure and models of membrane organization
 - 2.1.2 Composition of cell membrane
 - 2.1.3 Function of cell membrane
- 2.2 Transport across membranes
 - 2.2.1 Active and Passive transport
 - 2.2.2 Endocytosis and exocytosis



- 2.2.3 membrane transport proteins
- 2.3 Transport of macromolecules: Semi permeability; Osmosis
- 2.4 Modification of cell membrane
 - 2.4.1 Microvilli
 - 2.4.2 Cilia
 - 2.4.3 Flagella

UNIT III

Cellular basis of immunity

10 Hrs.

- 3.1 Human Immune system : with trillions of lymphocytes
 - 3.1.1 Humoral antibody responses
 - 3.1.1.1 Lymphocyte development and reaction
 - 3.1.1.2 Distinguishing T and B cells
 - 3.1.1.3 Working of immune system
 - 3.1.1.4 Immunological memory
 - 3.1.1.5 Antigen specific receptors on B-cells
 - 3.1.1.6 B-cells stimulation to make antibodies
 - 3.1.1.7 Antibody genes and B cell development
 - 3.1.2 T-Lymphocyte and cell mediated immunity
 - 3.1.2.1 T cell receptors and classes of T-cells
 - 3.1.2.2 Cytotoxic T cells and virus infected T cells.
 - 3.1.2.3 MHC molecules and their role in tissue graft rejection, classification of MHC molecules
 - 3.1.2.4 Cytotoxic T cell recognition
 - 3.1.2.5 Helper T cells and their role in B cell activation.

Note for Paper Setting

The question paper will contain two questions from each unit (total six questions) and the candidate will be required to answer one question from each unit (total questions to be attempted will be three) i.e. there will be an internal choice within each unit.

Books Recommended

1. De Robertis, E.D.F. and De Robertis, E.M.F. 1981. Cell and Molecular Biology. Saunders International Edition.
2. De Robertis, E.D.F. and De Rebertis, E.M.F. Essential of Cell and Molecular Biology. Saunders Intention. Edition.
3. De witt 1977. Biology of the cell- an Evolutionary Approach. Saunders Co.
4. Avers, C.J. 1976. Cell Biology. D. Van Nostrand, Co. New York.
5. Korenberg, 1974 DNA Replication W.H. / Freeman and Co. San Francisco
6. Graland, A. 1983. Molecular Biology of the cell A, Bestrisetical, Garland Pub. Inc. New York.
7. Watson *et al.* 1987 Molecular Biology of Genes Vol I and II.
8. Jones and Bartlett, 1980. Cells : Principle of Molecular Structure and function, Prescott.
9. Gene- Watson 1987. Molecular biology
10. Karenbeg, 1980. Replication
11. Alberts, 1983. Molecular Biology of the Cell.
12. Maniatis 1983. Molecular cloning
13. Watson, 1983. Recombinant DNA. A short course.

Signature

DETAILED SYLLABUS

SEMESTER II

COURSE NO .469

CREDITS : 4

Duration of

Examination : 3 hrs.

TITLE: GENETICS
AND CYTOGENETICS

Maximum marks :100

a) Semester Examination : 80

b) Sessional assessment : 20

Syllabus for the examination to be held in May 2011 May 2012 May 2013

OBJECTIVES

Genetics and Cytogenetics provide scientific basis to the art of plant and animal breeding. Genetic improvement of crop plants and farm animals cannot be perfect and have lasting effect, unless their genetic architecture has been fully understood. This course aims at arming the student with upto date knowledge of the nature and structure of genetic material and principles of heredity in diploid, polyploidy and aneuploid organisms.

SYLLABUS

Unit I Structure and organization of chromosome 10 Hrs.

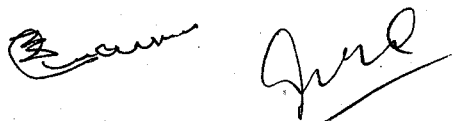
- 1.1 Chromosome structure in pro-and eukaryotes, nucleosome model, telomere structure.
- 1.2 Specialized chromosome types-lampbrush and polytene chromosomes.
- 1.3 Accessory chromosomes, occurrence, behaviour, transmission and origin.
- 1.4 Organization of chloroplast and mitochondrial genomes.

UNIT II Numerical Chromosome Variation 10 Hrs.

- 2.1 Polyploidy-induction and types. Autopolyploids meiotic behaviour, Segregation. Effect of autopolyploidy.
- 2.2 Allopolyploids – classification, meiotic behaviour, Role of allopolyploidy in evolution of wheat, potato, tobacco and cotton.
- 2.3 Aneuploidy: types of aneuploids; induction of trisomics, monosomics and nullisomes-their role in chromosome mapping.
- 2.4 Alien addition and substitution- Their role in gene transfer.

UNIT III Structural chromosome alterations 10 Hrs.

- 3.1 Types of structural chromosome alterations- deletion, duplication, meiotic behaviour and utility
- 3.2 Identification, meiotic behaviour and induction of inversions.
- 3.3 Identification, meiotic behavior and induction of translocations.



- 3.4 Significance of structure alterations of chromosomes in evolution.

UNIT IV Gene Structure and Function

10 Hrs.

- 4.1 Concept of gene; dis-trans test. rII Locus of T4 phages; complex loci in eukaryotes,
4.2 Gene function; transcription and translation in pro-and eukaryotes.
4.3 Regulation of gene expression in pro and eukaryotes.
4.4 Gene controlled biosynthetic pathway --antho-cyanin, phenylalanine-tyrosine, haemoglobin biosynthesis.

UNIT V Genome in flux

10 Hrs.

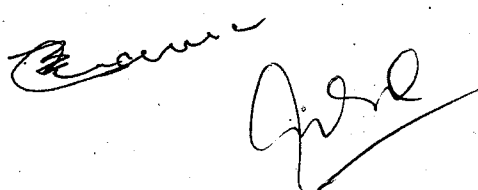
- 5.1 Gene mutations-molecular basis of mutations, mechanism of DNA repair. Evolutionary significance.
5.2 Gene amplification; mechanism and significance; C-value paradox; evolutionary significance.
5.3 Mobil genetic elements in prokaryotes; insertion elements and transposons in bacteria.
5.4 Mobil genetic elements in eukaryotes Ty elements in yeast; P and Copia in Drosophila; Ac-Ds, SPM (En) and Mu elements in maize; molecular characteristics and their significance.

Note for Paper Setting

The question paper will contain two questions from each unit (total ten questions) and the candidate will be required to answer one question from each unit (total questions to be attempted will be five) i.e. there will be an internal choice within each unit.

Books recommended

1. Brown, T. A. (1989): Genetics : A Molecular Approach, VNR International.
2. Burnham, C.R. (1962) : Discussions in Cytogenetics Burgess Publ. Co. Minneapolis.
3. Garber, G.B. (1972): Cytogenetics. McGraw Hill. Pub. Co. Ltd.
4. Grardner, E.J. Simmons: M.J. and Shaatad, D.P. (1991) : principles of Genetics 8th Edn., John Wiley and sons, New York.
5. Hexter, W. and Yost: The science of Genetics. Prentice Hall Inc.
6. Srb. A.M. Owen, R.D. and Edgar, R.S. Generasl genetics, W.H. Freeman and Co., San Fransisco.
7. Sinnett, E.W., Dunn, L.C. and Debzhanski, Th (1958): Pronciples of genetics. Kugakusha. Co. Inc. Ltd. Japan.
8. Strickbarger, M.W. (1976): Genetics. Mc. Millan Publ. Co. Inc. New York.
9. Swanson, R.C.P. Mertz, T. and Young, W.J. (1967): Cytogenetics, Prentice Hall of India, Pvt. Ltd.



DETAILED SYLLABUS

SEMESTER II

COURSE NO .473

CREDITS : 4

Duration of

Examination : 3 hrs.

TITLE: BASIC

ENDOCRINOLOGY

Maximum marks :100

a) Semester Examination : 80

b) Sessional assessment : 20

Syllabus for the examination to be held in May 2011 May 2012 May 2013

OBJECTIVES

The course is designed to afford the student a broad understanding in the important branch of animal physiology. A comparative approach is useful in that it highlights basic commonness in hormonal activity in response to particular physiological situation, irrespective of diversity of the organisms involved.

SYLLABUS

Unit I Hormones: their nature and assaying 10 Hrs.

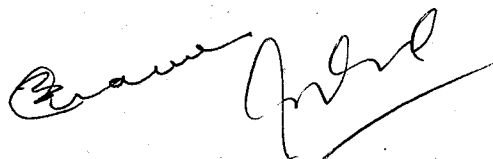
- 1.1 Neurochemical coordination
 - 1.1.1 Neural versus hormonal coordination
 - 1.1.2 Homeostasis
 - 1.1.3 Feed back mechanism
 - 1.1.4 Pheromones-structure, types and functions.
- 1.2 Hormone Assaying
 - 1.2.1 Ablation or impairment
 - 1.2.2 Bio-assays
 - 1.2.3 Immunological and radio-immunoassays.

Unit II Comparative Morphology and Physiology of Endocrine 10 Hrs. tissues / Glands in invertebrates.

- 2.1 Morphology and Physiology of Neuroendocrine system in Crustacea
 - 2.1.1 Neurosecretary cells/ organs.
 - 2.1.2 Neurohaemal organ (Sinus gland)
 - 2.1.3 Non-neural endocrine organs (Y-organs)
- 2.2 Morphology and Physiology of Neuroendocrine system in Insecta
 - 2.2.1 Neuro –secretary organ/cells.
 - 2.2.2 Non-neural endocrine organs (Corpora cardiac)
 - 2.2.3 Prothoracic gland.
- 2.3 Neuroendocrine system in annelids and molluscs

Unit III Comparative Morphology, anatomy and functions 10 Hrs. of endocrine glands

- 3.1 Organized glands



- | | | |
|----------------|--|----------------|
| Unit IV | Chemical structure synthesis and functional importance of following types of hormones | 10 Hrs. |
|----------------|--|----------------|

- | | | |
|---------------|---------------------------------|----------------|
| Unit V | Life history of Hormones | 10 Hrs. |
|---------------|---------------------------------|----------------|

- ### Note for Paper Setting

Books recommended

1. Turner, S.L. (1966): General endocrinology E.S. Saunders, Toppan Co. Ltd. Tokyo Japan.
2. Bantley, P.J. (1976) : Comparative vertebrate Endocrinology, Cambridge Univ. Press, U.K.
3. Barrington, E.E.W. : An introduction to comparative endocrinology, Willey Eastern Pvt. Ltd. USA.
4. Tombs: Neuroendocrine system in invertebrates
5. A.J. Matty: Fish endocrinology
6. Roger Lewin: Hormones
7. J.G. Lewis: The endocrine system
8. Guyton & Hall : Text book of medical physiology

Ernest Jones

DETAILED SYLLABUS

SEMESTER II

COURSE NO .475

CREDITS : 2

Duration of

Examination : 2 hrs.

**TITLE: BIOSYSTEMATICS
AND TAXONOMY**

Maximum marks :50

a) Semester Examination : 40

b) Sessional assessment : 10

Syllabus for the examination to be held in May 2011 May 2012 May 2013

OBJECTIVES

The course is designed to make students aware not only of the great diversity which is being displayed by animals around us but also to prepare them theoretically and practically to study and arrange the Bio-diversity in scientific and natural manner. The theoretical background of systematics and taxonomy, thus will go a Long way in elucidating the natural grouping which exists in the biodiversity around us

SYLLABUS

Unit I

10 Hrs

- 1.1 Definition and basic concept of Biosystematics taxonomy and classification
- 1.2 History of taxonomy, systematics
- 1.3 Importance and application of biosystematics in biological studies
- 1.4 Systematics as a profession and its future perspectives
- 1.5 Theories of biological classifications

UNIT II

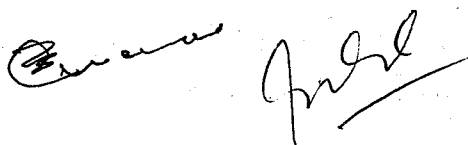
10 Hrs.

- 2.1 Species categories and species concept.
 - 2.1.1 Typological species concept.
 - 2.1.2 Nominalistic species concept
 - 2.1.3 Biological species concept
 - 2.1.4 Evolutionary species concept.
- 2.2 Difficulties in application of Biological species concept.
- 2.3 Intraspecific categories & Taxons
 - 2.3.1 variety
 - 2.3.2 Subspecies
 - 2.3.3 super species
 - 2.3.4 Sibling species
- 2.4 The new systematics

UNIT III

10 Hrs.

- 3.1 Taxonomic Procedures
 - 3.1.1 Taxonomic collections
 - 3.1.2 Curating of collections
 - 3.1.3 Identification



- 3.2 Taxonomic Keys
- 3.3 Taxonomic Publication
 - 3.3.1 Major features of taxonomic publication
 - 3.3.2 Forms and styles of taxonomic Article
 - 3.3.3 Kinds of publications
- 3.4 International code of zoological nomenclature
 - 3.4.1 Important properties
 - 3.4.2 The interpretation and application of code

Note for Paper Setting

The question paper will contain two questions from each unit (total six questions) and the candidate will be required to answer one question from each unit (total questions to be attempted will be three) i.e. there will be an internal choice within each unit.

Books Recommended

1. G.G. Simpson : Principles of animal taxonomy, Oxford IBH Pub. Co.
2. E. Mayer : Principles of systematic zoology. Tata McGraw Pub.
3. E. Mayer: Principles of animal systematics. Tat McGraw Pub.
4. E.O. Wilson : The diversity of life W.W. Northern & Co.

Examine *here*

Semester III

Detailed Syllabus

Course No. 510

**TITLE : CELL BIOLOGY
AND CYTOGENETICS-J**

CREDITS: 4

MAXIMUM MARKS: 100
a) Semester Examination: 80
B) Sessional Assessment: 20

Duration of Examination 3 hrs.

**Syllabus for the examination to be held in
Dec. 2011, Dec. 2012 and Dec.2013**

OBJECTIVES

Cell Biology and Cytogenetics are fascinating branch of biological studies and Genetics in particular is today making roads increasingly into new areas of biology if only to make man understand the mysteries of life and its activities and find answers to questions which have remained unanswered for a long time. The courses prescribed in this syllabus are meant for students with some background of the cell structure and principles of inheritance and designed to help students in acquiring knowledge for further comprehension of the cytological phenomenon and principles of Genetics as understood today and keeping abreast of a rapidly advancing field

Unit I Cell in multicellular organisms

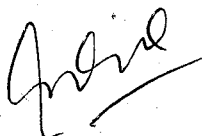
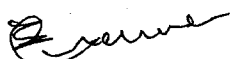
10 Hrs.

- 1.1 Cell associations
- 1.2 Cell-cell recognition and adhesion
- 1.3 Extra-cellular Matrix
- 1.4 Cell signalling
 - 1.4.1 Remote signalling
 - 1.4.2 Contact signalling by plasmamembrane bound molecules
 - 1.4.3 Contact signalling via gap junctions
 - 1.4.4 single transduction
- 1.5 Growth factors

Unit II: Differentiation

10 Hrs.

- 2.1. Differentiation of specialized cells-muscles & neurons cells
- 2.2. Epigenetic control of differentiation
- 2.3. Differentiation - mechanism
- 2.4. Molecular basis of differentiation
 - 2.4.1 Nucleo-cytoplasmic interaction



- 2.4.2 Induction
- Role of maternal RNA in early stage of development
- 2.5. Homeobox-significance in differentiation

Unit-III Cell cycle and programmed cell death

10 Hrs

- 3.1 Cell cycle in eukaryotes
 - 3.1.1. Cell cycle and its components
 - 3.1.2 Spindle organization and Chromosome movements Synaptonemal complex,
 - 3.1.3 Crossing over, Chiasma formation
- 3.2 Cell cycle regulation/control
- 3.3 Programmed cell death
 - 3.3.1 Mechanism and regulation of Apoptosis

Unit -IV Cancer cells

- 4.1. Origin
 - 4.1.1. Transformation of normal cell to cancer cell.
 - 4.1.2. Immortalization of cancer cell.
- 4.2. Difference of normal and cancer cells
 - 4.2.1. Membrane changes
 - 4.2.2. Bio-chemical changes]
 - 4.2.3. Nuclear and chromosomal changes
- 4.3. Cancer inducing agents
 - 4.3.1. Tumour viruses
 - 4.3.2. Oncogenes
 - 4.3.3. Environmental factors

UnitV

10 Hrs

- 5.1. Biological factors that influence Human mutations
 - 5.1.1. Paternal age
 - 5.1.2. Sex
 - 5.1.3. Genotype.
- 5.2. Environmental factors that influence Human mutations.
 - 5.2.1 Radiations
 - 5.2.2 Chemical mutagens
 - 5.2.3 Temperature
 - 5.2.4 pollutants.
- 5.3. Somatic mutations and Human health

Note for paper setting

The question paper will contain two questions from each unit (total ten questions) and the candidate will have to answer one question from each unit (total questions to be attempted will be five) i.e. there will be internal choice within each unit.

Signature

BOOKS RECOMMENDED:

1. Nigyi Human Genetics: Principles practice
2. Arora Genetics
3. Powar Cell Biology
4. Prasad Mutagenesis basic and applied
5. M.J.D. White Animal Cytology and Evolution
6. Sinha Trends in Molecular Genetics
7. Levine Genes
8. Hanawalt Molecules to living cells Levine Genetics
9. Levine Genes
10. Stent Molecular Genetics
11. Kunchler Animal Cell Culture and Viriology
12. Whilcox Molecular approach to Eukaryotic Genetics systems.
13. Strange Cell surface receptors
14. Ruthman Methods in Cell Research
15. Gall Electrophoresis in tile separation of .Biological
Macromolecules
16. Kent New approaches to Genetics.

Prasad

Kent

Semester III

DETAILED SYLLABUS

Course No: 511
Credits: 4

Title: **Fish & Fisheries-I**
Maximum Marks: 100
a) Semester Examination: 80
b) Sessional assessment: 20

Duration of Examination: 3 Hrs.

Syllabus for the examinations to be held in Dec. 2011, 2012 and 2013

OBJECTIVES

The present course on Fish and Fisheries is, designed to acquaint the students with information on different types of water bodies, their changing physico-chemical nature, their influence on inhabiting biota and fish production. This course aims to provide sufficient knowledge regarding life of fishes, their breeding potentials and culturing methods. The course is spread over to the semester programme, with a course titled Fish and Fisheries II stated for semester IV.

SYLLABUS

UNIT I Introduction to Fishery Science and Classification of Fishes 10Hrs.

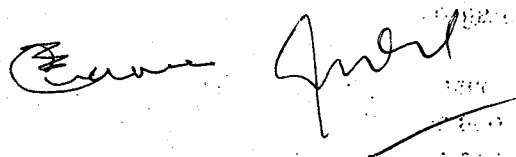
- 1.1 Importance of fishery Science
- 1.2 Fishery Science as an integrated study
- 1.3 Outline classification of fishes-A detailed study of the sub-class Teleostei with special reference to following orders
I) Clupeiformes II) Cyprinodontiformes III) Ophichthiformes
IV) Cypriniformes V) Perciformes VI) Syngnathiformes VII) Tetraodontiformes

UNIT -II Fish Environment (Abiotic) 10 Hrs.

- 2.1 Physical:
 - 2.1.1 Bottom : Composition, sources and diversity
 - 2.1.2 Temperature : Effect on vital biological processes and thermal stratification
 - 2.1.3 Light : Sources, factors influencing light penetration, methods of measuring penetration and its relationship with aquatic organisms
 - 2.1.4 Turbidity : causes and impact on aquatic organisms
- 2.2 Chemical
 - 2.2.1 pH – definition, distribution and significance
 - 2.2.2 CO₂ : Sources, methods of determination and significance
 - 2.2.3 DO₂ : Sources, methods of determination and significance
 - 2.2.4 Nitrates, Nitrites and Ammonia: Sources and significance
 - 2.2.5 Silicates : Sources and impact on aquatic organisms

Unit III Fish Environment (Biotic) 10 Hrs

- 3.1. Plankton



- 3.1.1. Definition, classification and its role in fishery
- 3.1.2. Diurnal and seasonal variation
- 3.2. Benthos
 - 3.2.1 Definition, classification and its role in fishery
 - 3.2.2 Common benthic organisms
- 3.3. Pollution of aquatic environment-sources, effect and remedial measures.

UNIT-IV Fisheries of India

10Hrs.

- 4.1 Freshwater fishery
 - 4.1.1. Riverine fishery
- 4.2. Lacustrine fishery
 - 4.2.1 Lake origin, classification and diversity
 - 4.2.2 Productivity and Eutrophication
- 4.3 Reservoir fishery
- 4.4. Effects of darns on revirine fishery

UNIT -V Population Growth and Age

10Hrs.

- 5.1 Population Growth and Age
 - 5.1.1. Population density, mortality and survival
 - 5.1.2. Population structure (year class recruitment.) and Estimation.
 - 5.1.3. Fecundity, Definition, Types and its estimation.
- 5.2. Growth and Age
 - 5.2.1 Bioenergetics of Growth /
 - 5.2.2 Methods for measurement of growth, Growth rates, Marking and tagging method, length-weight relations.
 - 5.2.3 Age determination through hard parts.
 - 5.2.4 Environmental factors in relation to age & growth.

Note for Paper Setting

The question paper will contain two questions from each unit (total ten questions) and the candidates will be required to answer one question from each unit (total questions to be attempted will be five) i.e. there will be internal choice within each unit.

Books Recommended

1. Alexander, R.M. 1967. Functional design in fishes. Hutchinson, London.
2. Bagenal, T. 1978 Methods for assessment offish production in fresh water. International Biological Programme Handbook No.3 Blackwell Scientific Publications, Oxford and Edinburg.
3. Berg. L.S. 1947. Classification of fishes. Both recent and fossil, I.M. Edwards, Alm, Al-bor, Michigan.
4. Boyd, C.E. 1979, biology of fishes Saunders, Philadelphia.
5. Boyd. C.E. 1982, Water quality management for pond fish culture. Development in aquaculture and fisheries science. G. Elsevier, Amsterdam.
6. Preeder, C.M. alld Rosen, D.E 1960. Modes of reproduction in fishes: how fishes breed, Natural history press, New-York.
7. Brown, M.E. (ed.). 1957. The physiology of fishes. Vols. I and II. Academic press, New York.
8. Chandy, M. 1970. Fishes. National Book Trust of India, New Delhi.
9. Colbert, E.H. 1970. Evolution of vertebrates Wiley Eastern Pvt, New Delhi.
10. Compagno, J.S.V. (1977). Phyletic relationships of living sharks and rays. American Zoologist 17, 303-322.

Signature

DETAILED SYLLABUS

Semester III

Course No.512

Credits: 4

TITLE: LIMNOLOGY-I

Maximum Marks: 100

a) Semester Examination: 80

b) Sessional assessment: 20

Duration of Examination: 3 Hrs.

Syllabus for the examinations to be held in Dec. 2011,2012 and 2013

OBJECTIVES

Ever increasing demand for food has forced man to explore and harvest aquatic biota to ameliorate food deficiency. This in turn demands a thorough insight into the delicately balanced insipid system of relationships of biotic and abiotic parameters. The present course and its adjunct Limnology – II in semester IV are, therefore, designed to provide the students, offering this course, information and different types of Inland waters., their changing physico-chemical profile, biotic characterization and the applicability of the information to provide to the commercial exploitation of such water bodies.

SYLLABUS

UNIT I

10 Hrs.

- 1.1 Limnology, its history and scope.
- 1.2 Limnology in India
- 1.3 Hydrological cycle,
- 1.4 Dwindling fresh water resources and their conservation
- 1.5 Freshwater resource management.

UNIT II Limnological factors-physical

10 hrs.

- 2.1 Current: causes, types and significance
- 2.2 Turbidity: causes and impact on aquatic organisms
- 2.3 Bottom: Composition, sources and diversity
- 2.4 Light.: Sources, factors affecting light penetration, methods of measuring light penetration and its relationship with aquatic organisms
- 2.5 Temperature: Effect on various biological processes and thermal stratification.

UNIT III Limnological factors-chemical

- 3.1 pH- definition, distribution and significance
- 3.2 Dissolved oxygen: Sources, methods of determination, distribution and significance
- 3.3 Carbon dioxide: Sources, different forms, methods of determination, distribution and significance
- 3.4 Nitrate, nitrite and Ammonia: sources and significance
- 3.5 Silicates: Sources and impact on aquatic organisms
- 3.6 Calcium and Magnesium: Sources, methods of determination, distribution and significance
- 3.7 Phosphate-sources, methods of determination and significance

UNIT IV

10 hrs.

- 4.1 Wetland-Introduction
- 4.2 Management techniques of wetlands.
- 4.3 Lakes
 - 4.3.1 Origin.
 - 4.3.2 Classification.
 - 4.3.3 Eutrophication and restoration methods.
- 4.4 Ponds:
 - 4.4.1 Origin.
 - 4.4.2 Types.

UNIT V

10 hrs.

- 5.1 Rivers:
 - 5.1.1 Origin, Classification, Water flow and Stream channels.
 - 5.1.2 Physico-chemical characteristics of flowing waters.
 - 5.1.3 Biotic characteristics of flowing waters.
- 5.2 Estuaries: Definition, origin and classification.
- 5.3 Bogs: Origin, types, abiotic and biotic characteristics
- 5.4 Marshes: Origin, abiotic and biotic characteristics and their future
- 5.5 Vernal pools: definition and significance

Note for paper setting

The question paper will contain two questions from each unit (total ten questions) and the candidate will have to answer one question from each unit (total questions to be attempted will be five) i.e. there will be internal choice within each unit.

BOOKS RECOMMENDED

1. Cole, A.A. 1974. text book of Limnology. The G.V. Mosby Company Saint Louis.
2. Olepper, H. 1979. Careers in conservation. A Ronaldn Press publication John Wiley and Sons, New York.
3. Davies, B.R. and Walker, K.E. 1986. The Ecology of River Systems. Dr. W. Junk Publishers, Bostan
4. Goldman, C.R. and Horne, A.J. 1983. Limnology. Mc Graw Hill International Book Company, New Delhi.
5. Hutchinsonl, G.E. 1977. A treatise on Limnology Vol. I John Willey and Sons, New York
6. Hutchinson, G.E. 1977. A treatise on Limnology Vol. II John Willey and Sons, New York.
7. Hutchinson, G.E. 1975. Limnological Botany John Willey and Sons, New York
8. Hybes, H.B. N. 1979. The Ecology of running waters. Liver Pool University Press.
9. Jhingran, V.G. 1982. Fish and Fisheries of India. Hindustan Publishing corporation, India.

Same

Good

COURSE NO. 513

CREDITS: 4

DURATION OF EXAM: 3Hrs.

Course title: Entomology I

MAXIMUM MARKS: 100

a) Semester Examination: 80

b) Internal Assessment : 20

**Syllabus for the examination to be held in
December, 2010; December, 2011 and December, 2012.**

OBJECTIVES

This course and its adjunct (Entomology I) in semester IV has been designed to introduce the students to various useful and harmful species of insects found in this area. Topics concerning insect behaviour, insect plant interactions, insect ecology and biology alongwith control measures studies such as chemical, abnormal biological etc. have been included in order to make the students aware of the importance of these studies in insect pest management. (IPM) which is an area of considerable relevance in an agriculture based, economy like ours.

UNIT I Agriculturally important insects. Studies on important 10 Hrs.

Species of insect pests with special reference to J&K State. Emphasis to behold on any two of each of the following categories

- 1.1 Cereal crop pests (Maize, Wheat, Paddy).
- 1.2 Fruit and vegetable pests (apple, cucurbits, mango)
- 1.3 Stored grains and household pests.
- 1.4 Forest pests.
- 1.5 Pests of fibrous crops (cotton).

UNIT II Medically important insects 10 Hrs.

- 2.1 Insect nuisance phobia
- 2.2 Insect venoms and allergens
- 2.3 Insects as vectors of human diseases
- 2.4 Mode of transmission and epidemiology of major vector borne diseases such as malaria, yellow fever, kalazer, typhus and plague.

UNIT III Insects of commercial importance and their culture 10 Hrs.

- 3.1 Honey bees
 - 3.1.1 Different species of honey bees
 - 3.1.2 Castes of honey bees and their morphology and biology
 - 3.1.3 Honey formation and types of honey.
 - 3.1.4 Chemical composition and economic value of honey
 - 3.1.5 Apitoxin (bee venom), its composition, secretion and importance.
 - 3.1.6 Other important products of honey bees; bee wax, glue, Royal jelly and their uses.
- 3.2 Silk and Tassar worms
 - 3.2.1 Kinds of silk and their producer insects
 - 3.2.2 Bionomics and morphology of mulberry silk worm at different stages
 - 3.2.3 Silk gland and its importance
 - 3.2.4 Silkworm rearing techniques including equipment and other infrastructure



- 3.2.5 Silkworm diseases, pests and their management
- 3.2.6 Bionomics and rearing of tussar silk moth.
- 3.3 Lac insect
 - 3.3.1 Distribution, morphology, biology and life cycle of lac insects
 - 3.3.2 Host plants and lac culture techniques
 - 3.3.3 Composition, properties

UNIT IV Insect Pest Control and Management 10 Hrs.

- 4.1 Culture control
- 4.2 Chemical control
 - 4.2.1 Insecticides of plant origin
 - 4.2.2 Inorganic insecticides
 - 4.2.3 Organic insecticides
 - 4.2.3.1 Organochlorine compounds
 - 4.2.3.2 Organophosphorus compounds
 - 4.2.3.3 Carbamate compounds
 - 4.2.3.4 Fumigants
- 4.3 Hazards of Insecticides

UNIT V Newer methods of insect control 10 Hrs.

Newer Methods of Insect Control

- 5.1 Chemical modifiers of development & behaviour in insects
 - A. Disrupting normal growth & development:
 - 5.1.1 Hormonal control
 - B. Modifying behaviour patterns:
 - 5.1.2 Tactics involving insect attraction
 - 5.1.3 Insect repellants
- 5.2 Sterile Insect & other genetic tactics in insect control
- 5.3 Plant resistance to insects:
 - 5.3.1 Mechanism of resistance (Nonpreference, antibiosis, ~~KXIFN~~ tolerance)
 - 5.3.2 Use of plant resistance in pest management
- 5.4 Biological control of insect pest:
 - 5.4.1 Agents of biological control (Predators, parasitoids, pathogens)
 - 5.4.2 Practice of biological control (Introduction, augmentation, conservation of natural enemies)
- 5.5 Pest management-Theory & Practice
 - 5.5.1 The concept of insect pest management (IPM)
 - 5.5.2 Tools of Pest management
- 5.6 Biotechnological approach in pest management.

Note for Paper Setting : The question paper will contain two questions from each unit (total six questions) and the candidate will be required to answer one question from each unit (total questions to be attempted will be three) i.e. there will be an internal choice within each unit.

[Signature]

[Signature]

O^o
Que

SEMESTER III

COURSE NO. 515

CREDITS: 4

DURATION OF EXAM: 3Hrs.

**Course title: Wildlife,
Conservation & Management I**

MAXIMUM MARKS: 100

a) Semester Examination: 80

b) Internal Assessment : 20

**Syllabus for the examination to be held in
December, 2011; December, 2012 and December, 2013.**

OBJECTIVES

There is a growing need for knowing what wildlife means and what's its importance in the balance of nature. The designed course is intended to convey the desirous students information regarding wildlife in India, its management along biological lines and the techniques associated with it. The course highlights major approaches for problem – solutions and the ways of implementing those solutions, with ever-ridding goal of giving students a scientific point of view in understanding management of wildlife resources and its importance in India

UNIT I

10 Hrs.

- 1.1 Introduction of Wildlife and Wildlife Habitats
 - 1.1.1 Definition of Wildlife and importance of its study
- 1.2 Wildlife Habitats
 - 1.2.1 Definition, types and importance of Habitats
 - 1.2.2 Plant succession
 - 1.2.3 Climax vegetation
- 1.3 Forest as major habitats
 - 1.3.1 Forests types of India
 - 1.3.2 Distribution pattern of forests in India
 - 1.3.3 Their ecological characteristics
- 1.4 Wildlife in Aquatic habitat


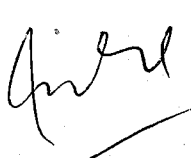
UNIT II

10 Hrs.

- 2.1 Habitat analysis and evaluation
 - 2.1.1 Forest range evaluation
 - 2.1.2 Wetland: evaluation, Significance and Management
- 2.2 Wildlife management principles
- 2.3 Management problems in tropics
- 2.4 Procedure for food habit analysis
- 2.5 Environment impart amusement methods

UNIT III

10 Hrs.

- 3.1 Importance of Wildlife and forests
 - 3.2 Natural resources and their conservation
- 


- 3.3 Conflict between man and wildlife
- 3.4 Influence of Human activities on sedimentary and non-sedimentary nutrient cycles.
- 3.5 Industrialization and its consequences on wildlife ecology
- 3.6 Impact of environmental pollutants on wildlife

UNIT IV

10 Hrs.

- 4.1 Habitat improvement with respect to :
 - 4.1.1 Food production
 - 4.1.2 Water development
 - 4.1.3 Cover and structural improvement
 - 4.1.4 Wetland improvement
 - 4.1.5 Structural improvement
- 4.2 Impact of changed Land Use pattern on wildlife
- 4.3 New tools and techniques in wildlife research
- 4.4 Important Wildlife diseases: viral, Bacterial, parasitic and helminthe diseases of mammals and birds

UNIT V

10 Hrs.

- 5. Techniques in wildlife study
 - 5.1. Capturing techniques
 - 5.1.1. Bait and scents
 - 5.1.2 Trapping: Killed and live mammals and birds
 - 5.2 Handling and marking techniques
 - 5.2.1 Handling of live trapped animals
 - 5.2.2 Marking of captured birds and mammals
 - 5.2.3 Marking of birds and mammals without capturing
 - 5.3 Preservative techniques
 - 5.3.1 Common preservatives and their efficacy
 - 5.3.2 Preservation of game trophies and their meat.

Note for the paper setting:

The question paper will contain two questions from each unit (total ten questions) and the candidate will be required to answer one question from each unit (total questions to be attempted will be five) i.e. there will be internal choice within each unit.



DETAILED SYLLABUS

Semester III

COURSE NO. 520

Maximum Credits: 4

Duration of Examination: 2 hours

Title: Reproductive and
Developmental Biology

Max. Marks: 100

a) Semester Examination: 80

b) Sessional assessment: 20

Syllabus for the examination to be held in May 2011 May 2012 May 2013

Objectives

The details of reproductive processes differ in various species. As reproductive events are regulated by a complex of interlocking extroceptive and interceptive (neuroendocrin e) factors, it becomes essential to acquaint students with the basis of reproductive functioning of the end organs and synchronization of the functioning of the sex mechanisms. The present course is, therefore, designed to provide basic concepts of sex, reproduction, and hormonal and other signaling systems that have evolved in the different species. This course also prepares the students to visualize and understand the principles of development. The fundamental and universal processes of vertebrate development from the comparative stand point alongwith examples of typical forms are stressed so as to provide a thorough understand of the structural and other aspects of the embryo to the students.

SYLLABUS

Unit-I

10hrs

- 1.1. Modes of reproduction in animals.
- 1.2 Reproductive cycles, their hormonal regulation in non -mammalian vertebrates
- 1.3 Exteroceptive and endogenous factors influencing reproductive Cycles in vertebrates.
- 1.4. Estrous cycles,
- 1.5 Menstrual cycle.
- 1.6 Induced breeding in fish and frog.

UNIT II

10hrs.

- 2.1. Endocrinology of reproduction
 - 2.1.1 Endocrine glands in relation to reproduction.
 - 2.1.2 Gonadotropin and sex hormones.
- 2.2 Hormonal control of ovulation.
- 2.3. Corpora lutea, their structure and function.
- 2.4. Atresia, its methods of formation and significance in animal reproduction.

UNIT-III

10 hrs

- 3.1 Origin of primordial germ cells
- 3.2. Spermatogenesis, process, ultrastructure
 - 3.2.1 Process
 - 3.2.2 Ultra-structure of a typical sperm & their types.
 - 3.2.3 Capacitation. .:
- 3.3. Process ^{of} _h ^{oocytes}
 - 3.3.1 Growth oocytes

- 3.3.2 Vitellogenesis
- 3.3.3 Egg membranes
- 3.3.4 Egg polarity
- 3.4. Fertilization: process
 - 3.4.1 Recognition between male and female gamete.
 - 3.4.2 Acrosome reaction of sperm.
 - 3.4.3 Cortical reaction of egg.
 - 3.4.4 Sperm penetration into egg.
 - 3.4.5 Union of Male and female pronuclei.

UNIT-IV .

10 hrs.

- 4.1. Cleavage and blastulation
 - 4.1.1 Characteristics and mechanism of cleavage.
 - 4.1.2 Patterns of cleavage.
 - 4.1.3 Types of blastula; factors involved in shaping the blastula (blastulation in sea-urchin, frog, chick, mammals).
- 4.2. Gastrulation
 - 4.2.1 Presumptive fates in chordates.
 - 4.2.2 Process of Gastrulation
 - 4.2.3 Kinds of mechanism of gastrulation.
- 4.3. Neurulation in vertebrates.
 - 4.3.1 Mechanism of Neural tube formation.
 - 4.3.2 Segregation of neural tube formation

UNIT-V

10 hrs.

- 5.1. Development and organogenesis in chick
 - 5.1.1. Early development.
 - 5.1.2. Excretory organs.
 - 5.1.3. Sense organs (eye, ear).
- 5.2. Tissue interaction and induction in organogenesis.
- 5.3. Endocrine control of metamorphosis of frog

Note for Paper Setting

The question paper will contain two questions from each unit (total ten questions) and the candidates will be required to answer one question from each unit (total questions to be attempted will be five) i.e. there will be internal choice within each unit.

Books Recommended: '

1. Baccio Daccett: (1970) Comparative Spermatology Acad, Press New York and London. .
2. H.H. Cole and P. T. Cupss (1969): Reproduction in Domestic Animals. Acad. Press, New York, London.
3. P .H. Bently: Comparative Vertebrate Endocrinology. 4.Nalvando, B. Reproductive Physiology. 5.Marshall, Physiology of Reproduction.
6. Cohen: Reproduction.
7. W.S. Hear, Randall, Fish Physiology Vol. III and Vol. IX, a.b.
8. Blinsky, B.I. (1981): Reintroduction to Embryology, Saunders College Pub. Philadelphia
9. Saunders, J. W. (1982): Developmental Biology Patterns, Principles, Problems, Macmillan Pub. Co. Inc. New York
10. Deuchar, E.M.1975: Cellular Interaction
11. Berrill N.J: Developmental Biology. Mcgraw Hill, New Delhi.

Signature

DETAILED SYLLABUS**Course No.527**

Credits: 4

Duration of Examination: 3 Hrs.

**TITLE: FUNCTIONAL
ANATOMY OF ANIMALS**
Maximum Marks: 100
a) Semester Examination: 80
b) Sessional assessment: 20

Syllabus for the examinations to be held in Dec. 2011,2012,and 2013**OBJECTIVES:**

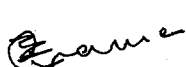
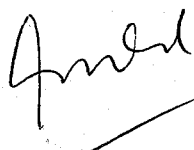
The course is designed with the main objectives of conveying to the students of Zoology the co-ordination within animal organization between the structure and functioning of the various organs and organ system. The course highlights a streak of commonness in apparently highly diversified animal world and highlights many anatomical features which during the course of evaluation have, as a consequence of loss of their functioning, undergoing marked reduction or even complete exclusion.

SYLLABUS**UNIT I Movement and Locomotion 10 hrs.**

- 1.1 Principles of hydrostatic skeleton
 - 1.1.1 Locomotion based on hydrostatic skeleton, with special reference to Coelenterate, Planaria and Nemertinea.
 - 1.1.2 Functional significance of coelom in locomotion in Echinodermata and Mollusca.
- 1.2 Metamerism and its significance in movement
- 1.3 Principles of flight in
 - 1.3.1 Insects
 - 1.3.2 Birds
 - 1.3.3 Mammals

UNIT II Food and Feeding 10 hrs..

- 2.1 Mechanism of food intake .
 - 2.1.1 Fluid/liquid feeding
 - 2.1.2 Particulate solid feeding mechanism
- 2.2 Basic digestive mechanisms
 - 2.2.1 Ultra-Cellular digestion
 - 2.2.2 Extra-Cellular digestion
- 2.3 Filter Feeding mechanism in:
 - 2.3.1 Polychaetes
 - 2.3.2 Crustaceans

2.2.3 Mollusca .

UNIT III Functional aspects of basic physiological activities

10 hrs.

3.1 Respiration –comparative morphology organs in:

3.1.1 Branchial

3.1.2 Tracheal

3.1.3 Pulmonary

3.1.4 Cutaneous

3.2 Excretion -comparative study of excretory organs in

3.2.1 Invertebrates

3.2.2 Vertebrates

3.3 Osmotic & Ionic regulation in Marine, Freshwater and Land animals

3.4 Thermoregulation

UNIT IV Co-ordination in body functioning

10 hrs.

4.1 Primitive nervous system

4.1.1 Nerve net in coelenterata

4.1.2 Nervous system in Echinodermata

4.1.3 Nervous system in Hemichordata

4.2 Advanced nervous system

4.2.1 Metameric Nervous system in Annelids

4.2.2 Nervous system in Arthropods

4.2.3 Nervous system in Mollusca

4.2.4 Comparative central Nervous system in vertebrates (through fish to mammals) with special reference to brain.

UNIT V Reproductive and larval forms

10 hr

5.1 Patterns of reproduction

5.1.1 Asexual reproduction in invertebrates with special reference to

5.1.1.1 Fission

5.1.1.2 Budding

5.1.1.3 Regeneration .

5.1.2 General account of sexual reproduction in animals (Invertebrates and vertebrates)

5.2 Larval forms and their functioning in:

5.2.1 Crustacean

5.2.2 insects

5.2.3 Echinodermata

Note for paper setting

The question paper will contain two questions from each unit (total ten questions) and the candidate will have to answer one question from each unit (total questions to be attempted will be five) i.e. there will be internal choice within each unit.

Answer
[Signature]

COURSE NO. 528

CREDITS: 2

DURATION OF EXAM: 2Hrs.

Semester III

**Course title: Fundamentals of
Computers & its Application in
Zoology**

MAXIMUM MARKS: 50

a) Semester Examination: 40

b) Internal Assessment : 10

Syllabus for the examination to be held in Dec., 2011; Dec., 2012 and Dec., 2013.

OBJECTIVES

The course is designed to make the students aware of the fundamentals and basics of computers which includes all the relevant operations of the system alongwith as to how they can be used to help researchers and students of Zoology in carrying on the desired operation.

UNIT I

10 Hrs.

- 1.1 Introduction to computers (Classification & History)
- 1.2 Computers and its components
- 1.3 Windows operating system and features
- 1.4 Computer terminology: (Bit, Byte, Word, Network, Software, Hardware, Softcopy, Hardcopy, Database, field, record, compilers, interpreters program etc.)
- 1.5 Conversion from Binary to decimal number system and vice-versa.

UNIT II

10 Hrs.

- 2.1 Utility of Computers in Zoology
- 2.3 Introduction to Power Point and Microsoft Word
- 2.4 Graphical representation of data and its various types using MS Word/ power point /excel
- 2.4 Basics of Internet and its applications

UNIT III

10 Hrs.

- 3.1 Statistical Techniques; Probability; Discrete and continuous distribution; estimation of parameters;
- 3.2 Hypothesis testing;
- 3.3 ANOVA testing;
- 3.4 Linear; Polynomial regression
- 3.5 Correlation; (* Problems /theoretical aspect is covered)

Note for Paper Setting

The question paper will contain two questions from each unit (total six questions) and the candidate will be required to answer one question from each unit (total questions to be attempted will be three) i.e. there will be an internal choice within each unit.

Semester III

COURSE NO. 529

CREDITS: 2

DURATION OF EXAM: 2Hrs.

Course title: Animal Behavior

MAXIMUM MARKS: 50

a) Semester Examination: 40

b) Internal Assessment : 10

**Syllabus for the examination to be held in
December, 2011; December, 2012 and December, 2013.**

OBJECTIVES

The syllabus aims at introducing the students of post-graduate level to the study of animal behavior. It is an exciting area of research and an active field of animal science and the course contents introduces the basic ideas and concepts of the modern ethology set in a histological context and concentration putting across these as briefly and lucidly as possible without claiming coverage on all the facts of this branch of animal science.

UNIT I Ethology the Science of Behaviour

10 Hrs.

Ethology defined and differentiated from psychology and behavior.
Histological perspectives of ethology; Pre-Darwinism, Darwinism and Post-Darwinism
Biological signals and communications

Visual signals

Offactory signals

Auditory signals

Special communication mechanism

Electrolocation

Echolocation

Pheromones

Learning and nits types

Habitation

Classical conditioning

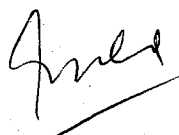
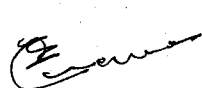
Instrumental conditioning

Imprinting

UNIT II Motivation and Behavioural Development

10 Hrs.

- 2.1 Motivation defined; Loren's modal of motivation; factors influencing motivation
- 2.2 Orientation types and their role in navigation.
- 2.3 Innate realizing mechanism



- 2.4 Current concept and importance of instinct behaviour
- 2.5 Regressing and its types.
- 2.5.1 Dominance hierchies
- 2.5.2 Territoriality
- 2.6 Sexual selection
- 2.6.1 Intrasexual selection (Male0Male competition)
- 2.6.2 Inter sexual selection (female choice)
- 2.7 Neural and hormonal control behaviour

10 Hrs.

UNIT III Social Organization

- 3.1 The evolution of societies; cost and benefit of social living
- 3.2 Mating system in birds
- 3.3 Social life in primates
- 3.4 Insect societies and their life.
- 3.5 Courtship and display in birds
- 3.6 Group selection, kin selection, altruism, reciprocal altruism, inclusive fitness

Note for Paper Setting

The question paper will contain two questions from each unit (total six questions) and the candidate will be required to answer one question from each unit (total questions to be attempted will be three) i.e. there will be an internal choice within each unit.

Exam *Final*

Course No. 575

CREDITS : 4

Duration of

Examination : 3 hrs.

SEMESTER IV

Title: Cell biology and Cytogenetics-II

Maximum marks :100

a) Semester Examination : 80

b) Sessional assessment : 20

Syllabus for the examination to be held in May 2011 May 2012 May 2013

OBJECTIVES

Cell Biology and Cytogenetics are fascinating branches of biological studies and Genetics in particular is today making inroads increasingly into new areas of Biology if only to make man understand the mysteries of life and its activities and find answers to questions that have remained unanswered for a long time. The courses prescribed in this syllabus are meant for students with some background of the cell structure and principles of inheritance and designed to help students in acquiring knowledge for further comprehension of the cytological phenomenon and principles of Genetics as understood today and keeping abreast of a rapidly advancing field.

10 Hrs

Unit I

- 1.1 Chromosome Banding Techniques
 - 1.1.1 G-Banding, C-Banding, NOR Staining, R-Banding and Q-Banding
 - 1.1.2 Significance and applications of chromosome banding techniques
- 1.2 ISH
- 1.3 FISH
- 1.4 GISH
- 1.5 Comparative Genomic Hybridization/ Chromosomal Microscopy Analysis
- 1.6 Computer Assisted Chromosome Analysis

10 Hrs

Unit II

- 2.1 Sex chromosome polymorphism:
 - 2.1.1 In plants
 - 2.1.2 In animals
- 2.2 Variability in structure of sex chromosomes and related anomalies in man
- 2.3 Variability in number of sex chromosomes and related anomalies in man
- 2.4 Hyperactivity of sex chromosomes in *Drosophila*
- 2.5 Ring chromosomes
 - 2.5.1 Formation
 - 2.5.2 Detection
 - 2.5.3 Behaviour at meiosis
- 2.6 Telocentric and Isochromosomes

10 Hrs

Unit III

- 3.1 Stem cell research and cloning
 - 3.1.1 Source and isolation of stem cells
 - 3.1.2 Use of stem cells in human welfare
 - 3.1.3 Making stem cell lines
 - 3.1.4 Methodology
 - 3.1.5 Whole body cloning
 - 3.1.6 Organ cloning

Erume *Ind*

- 3.2 Gene therapy
- 3.3 Genetic basis of following:
 - 3.3.1 Huntington's disease
 - 3.3.2 Cystic fibrosis
 - 3.3.3 Duchenne Muscular Dystrophy
 - 3.3.4 Hemophilia
 - 3.3.5 Thalassemia
 - 3.3.6 G-6PD
 - 3.3.7 Fragile-X

10 Hrs

Unit IV

- 4. Human Genetics
 - 4.1 Current topics in Human Genetics
 - 4.1.1 Medical Cytogenetics
 - 4.1.2 Biochemical Genetics
 - 4.1.3 Pharmacogenetics
 - 4.1.4 Prenatal diagnosis and birth defects

10 Hrs

Unit V

- 5.1 Human Genome Project
 - 5.1.1 History, Organization and goals of Human Genome Project
 - 5.1.2 Human Genome Project: Friend or Foe
- 5.2 Genetic counseling
 - 5.2.1 Purpose of Counselling
 - 5.2.2 Eugenics
 - 5.2.3 Euphenics
- 5.3 Genomic and Gene diversity

NOTE FOR PAPER SETTING

The question paper will contain two questions from each unit (total ten questions) and the candidate will be required to answer one question from each unit (total questions to be attempted will be five) i.e. there will be internal choice within each unit.

Books Recommended

- | | | | |
|-----|--------------|---|--|
| 1. | Niggyi | : | Human Genetics: Principles practice |
| 2. | Arora | : | Genetics |
| 3. | Powar | : | Cell Biology |
| 4. | Prasad | : | Mutagenesis basic and applied |
| 5. | M.J.D. White | : | Animal Cytology and Evolution |
| 6. | Sinha | : | Trends in molecular Genetics |
| 7. | Levine | : | Genes |
| 8. | Hanawalt | : | Molecules to Living Cells |
| 9. | Stent | : | Molecular Genetics |
| 10. | Kunchler | : | Animal Cell Culture and Virology |
| 11. | Levine | : | Genetics |
| 12. | Whilcox | : | Molecular approach to Eukaryotic Genetic Systems. |
| 13. | Strange | : | Cell Surface Receptors |
| 14. | Ruthman | : | Methods in Cell Research |
| 15. | Gall | : | Electrophoresis in the separation of Biological Macromolecules |
| 16. | Kent | : | New Approaches to Genetics |

Q. name

Q. mark

SEMESTER IV

Course No. 576

CREDITS : 4

Duration of

Examination : 3 hrs.

FISH & FISHERIES II

Maximum marks :100

a) Semester Examination : 80

b) Sessional assessment : 20

Syllabus for the examination to be held in May 2011 May 2012 May 2013

OBJECTIVES

The present course on fish and fisheries is , designed to acquaint the students with information on different types of water bodies, their changing physicochemical nature, their influence on inhabiting biota and fish production. This course aims to provide sufficient knowledge regarding life of fishes, their breeding potentials and culturing methods. The course is spread over to the semester programme with a course entitled Fish & Fisheries I stated for Sem III.

SYLLABUS

Unit I **Fish Breeding** 10 Hrs.

- 1.1 Natural Breeding of Indian major carps
 - 1.1.1 Location of breeding grounds
 - 1.1.2 Factors responsible for natural breeding
- 1.2 Wet and dry bund breeding techniques for breeding Indian major carps
- 1.3 Induced breeding of fish through Hypophysation
 - 1.3.1 Principle techniques and advantages of Hypophysation
 - 1.3.2 Control of sex through sex hormones
- 1.4 Selective breeding and hybridization
 - 1.4.1 Important fish hybrids

Unit II 10 Hrs.

- 2.1 Biological Principles underlying Pisciculture
 - 2.1.1 Requisite for suitability of species to fish farming
 - 2.1.2 Culturable fish species
- 2.2 Culture of Indian major carps
 - 2.2.1 Rohu
 - 2.2.2 Mrigal
 - 2.2.3 Catla
- 2.3 Composite culture: its principle, techniques and significance
- 2.4 Cold-water fisheries
 - 2.4.1 Trout culture
 - 2.4.2 Present status and scope of cold water fisheries development in J&K State

Unit III 10 Hrs.

- 3.1 Culture of air breathing fishes

Exame *Indel*

- 3.1.1 Cage and pen culture of air breathing fishes
- 3.2 Integrated fish culture
 - 3.2.1 Paddy cum fish culture
 - 3.2.2 Duck cum fish culture
 - 3.2.3 Piggery cum fish culture
- 3.3 Prawn culture
- 3.4 Introduction of frog culture
- 3.5 Symptoms, Etiology, Prophylaxis and treatment of some common diseases of fishes.
 - 3.5.1 Bacterial diseases
 - 3.5.2 Viral diseases
 - 3.5.3 Fungal diseases
 - 3.5.4 Helminthe diseases

Unit IV Biochemical composition and preservation of fish

10 Hrs.

- 4.1 Biochemical composition of fish-an overview
- 4.2 Nutritional value of fishes
 - 4.2.1 Poisoning toxicity and allergies from fish as food
- 4.3 Fish processing techniques
 - 4.3.1 Post mortem changes and rigor mortis in fish
 - 4.3.2 Fish spoilage- bacterial and chemical
 - 4.3.3 Principles and process of :
 - 4.3.3.1 Drying and salt curing
 - 4.3.3.2 Freezing and Refrigeration
 - 4.3.3.3 Smoking
 - 4.3.3.4 Canning and Packing
 - 4.3.4 Problem in fish preservation
 - 4.3.5 Fish Products and by products

Unit V Fishing methods and Fish Aquaria

10 Hrs.

- 5.1 Crafts and gears used in India for fishing in Inland and marine water
- 5.2 Recent advances in fishing methods
 - 5.2.1 Sonar
 - 5.2.2 Trawling
- 5.3 Fish transport
- 5.4 Fish marketing
- 5.5 Importance of Inland aquaculture in rural economy
 - 5.5.1 Socio-economic condition of fisherman, present status and need for improvement
- 5.6 Aquarium fish setting up aquaria, their maintenance and uses
 - 5.6.1 Setting of fish aquaria. Ornamental fishes and their breeding
 - 5.6.1.1. Tank structure and accessories
 - 5.6.1.2 Aquaria maintenance
 - 5.6.2 Biological notes on some common aquarium fishes
 - 5.6.3 Modes of breeding aquarium fishes

Signature

Signature

Note for Paper Setting

The question paper will contain two questions from each unit (total ten questions) and the candidate will be required to answer one question from each unit (total questions to be attempted will be five) i.e. there will be an internal choice within each unit.

1. Alexander, R.M. 1967. Functional design in fishes. Hutchinson, London.
2. Bagenal, T. 1978. Methods for assessment of fish production in fresh water. International Biological Programme Handbook No. 3 Blackwell Scientific Publications, Oxford and Edinburgh.
3. Berg, L.S. 1947. Classification of fishes. Both recent and fossil. J.M. Edwards, Ann Arbor, Michigan.
4. Boyd, C.E. 1979. Biology of fishes Saunders, Philadelphia.
5. Boyd, C.E. 1982. Water quality management for pond fish culture. Development in aquaculture and fisheries science. G. Elsevier, Amsterdam.
6. Prieder, C.M. and Rosen, D.E. 1960. Modes of reproduction in fishes: how fishes breed. Natural history press, New York.
7. Brown, M.E. (ed). 1957. The physiology of fishes. Vols. I and II. Academic press, New York.
8. Chandy, M. 1970. Fishes. National Book Trust of India, New Delhi.
9. Colbert, E. H. 1970. Evolution of vertebrates. Wiley Eastern Pvt., New Delhi.
10. Compagno, L.J.V. (1977). Phyletic relationships of living sharks and rays. American Zoologist 17, 304-322.
11. Datta Munshi, J.S. and Srivastava, M.P. 1988. Natural history of fishes and systemics of fresh water fishes. Narendra publishing House, Delhi.
12. Day, F. 1958. (Reprint of 1878). The fishes of India: being a natural history of fishes known to inhabit the seas and the fresh waters in India, Burma and Ceylon. Vols. I and II, William Dawson and Sons, London.
13. Goodrich, E.S. 1958 (reprint of 1930). Studies on structure and development of vertebrates, Vols. I and II. Dover Publications, New York and Constable Company, London.
14. Greenwood, P.H., Rosen D.E., Weitzman, S.H. and Myres, G.S. 1966. Phyletic studies of teleostean fishes, with a provisional classification of living forms. Bull. Amer. Mus. Nat. Hist. 131: 399-456.
15. Gulland, J.A. (ed) 1977. Fish population dynamics. John Wiley and Sons, New York.
16. Halver, J.E. (ed) 1971. Fish nutrition. Academic Press London and New York.
17. Harder W. 1975. Anatomy of fishes. E. Schweizerbart'sche Verlagsbuchh and lung, Stuttgart.
18. Harvey, B.J. and Hoar, W.S. 1979. Theory and practice of induced breeding in fish. International Development Research Centre, Ottawa.
19. Hoar, W.S. and Randall, D.J. (eds) 1969-1988. Fish physiology, Vols I to X. Academic Press, New York and London.

Exame

Int

Course No. 577
Credits: 4

SEMESTER IV
Title: Limnology II
Max. Marks: 100
a) Semester Examination: 80
b) Sessional assessment: 20

Duration of Examination: 2 hours

Syllabus for the examination to be held in May 2011 May 2012 May 2013

Objectives

This course is the continuation of Entomology I already dealt in semester III. In view of the importance of insect behaviour and insect plant relationship in the management of insect pests, this course is designed to make the students aware regarding these aspects. In addition, the major roles of insects in ecology have been incorporated in this part of the syllabus

SYLLABUS

10 Hrs

Unit-I

- 1.1 Plankton –Definition and classification
- 1.2 Distribution of plankton in aquatic ecosystem
- 1.3 Phytoplankton
 - 1.3.1 Seasonal periodicity
 - 1.3.2 Horizontal and vertical distribution
 - 1.3.3 Role of light and temperature in phytoplanktonic growth
 - 1.3.4 Role of organic nutrients in phytoplanktonic growth
 - 1.3.5 Floating adaptation in phytoplankton
 - 1.3.6 Phytoplanktonic associations
- 1.4 Macrophytes
 - 1.4.1. Composition and ecological classification
 - 1.4.2. Seasonal dynamics
 - 1.4.3. Economic importance and control measures

10 Hrs

UNIT II

- 2.1 Zooplankton
 - 2.1.1 Composition and distribution (Horizontal and vertical) in rivers
 - 2.1.2 Composition and distribution (Horizontal and vertical) in lakes
 - 2.1.3 Cyclomorphosis
 - 2.1.4 Seasonal variations in lakes
 - 2.1.5 Seasonal variations in rivers
 - 2.1.6 Role of zooplankton in fish culture

10 Hrs

UNIT III

- 3.1 Benthos (Macrobenthos)
 - 3.1.1 Composition seasonal variations in Lakes
 - 3.1.2 Composition if seasonal variations in Rivers
 - 3.1.3 Composition if seasonal variations in Ponds
- 3.2 Interrelationship between benthos and vertebrates

- 3.3 Interrelationship between fish and invertebrates with special reference to:
- 3.3.1 Protozoa
 - 3.3.2 Rotifers
 - 3.3.3 Coelenterates
 - 3.3.4 Worms
 - 3.3.5 Crustaceans

10 Hrs

UNIT IV

- 4.1 Limnology and Human
- 4.2 Water Use
 - 4.2.1 Domestic
 - 4.2.2 Aquaculture
 - 4.2.3 Irrigation
 - 4.2.4 Industrial
 - 4.2.5 Navigation
 - 4.2.6 Recreation
 - 4.2.7 Hydroelectricity
- 4.3 Fisheries
 - 4.3.1 Indian riverine fisheries
 - 4.3.2 Indian lacustrine fisheries
 - 4.3.3 Indian reservoir fisheries
- 4.4 Integration of freshwater uses

10 Hrs

UNIT V

- 5.1 Aquatic pollution
 - 5.1.1 Sources and kinds
 - 5.1.2 Effect of pollution on physico chemical parameters of water
 - 5.1.3 Effect of pollution on biota
- 5.2 International problems and future
 - 5.2.1 Translocation
 - 5.2.2 Acidification
 - 5.2.3 Global warming
 - 5.2.4 The future of freshwaters

Note for the paper setting:

The question paper will contain two questions from each unit (total ten questions) and the candidate will be required to answer one question from each unit (total questions to be attempted will be five) i.e. there will be internal choice within each unit.

Chame

J. J. J.

Course No. 578
Credits: 4

SEMESTER IV

Title: Entomology II

Max. Marks: 100

a) Semester Examination: 80

b) Sessional assessment: 20

Duration of Examination: 2 hours

Syllabus for the examination to be held in May 2011, May 2012, May 2013

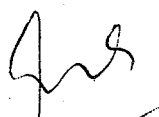
Objectives

This course is the continuation of Entomology I already dealt in semester III. In view of the importance of insect behaviour and insect plant relationship in the management of insect pests, this course³ is designed to make the students aware regarding these aspects. In addition, the major roles of insects in ecology have been incorporated in this part of the syllabus

SYLLABUS

- Unit-I Insect behaviour and Insect – Plant relationship 10 Hrs**
- 1.1 Social insects: Social organization, cost differentiation and evolution of social instinct. Honey bees and termites as social units.
 - 1.2 Luminiscent insects
- Unit-II Patterns of Insect-Plant relationship 10 Hrs**
- 2.1 Host selection
 - 2.2 Attractants and repellants
 - 2.3 Plant characteristics in host plant selection
 - 2.4 Behavioural and physiological components in insect plant relationship
 - 2.5 Plant stimuli and insect response
- Unit-III Insect Communication 10 Hrs**
- 3.1 Chemical communication
 - 3.1.1 Pheromones, Kairomones, Allomones, Synomones
 - 3.1.2 Chemoreception
 - 3.2 Audio communication
 - 3.2.1 Sound production
 - 3.2.2 Sound reception
 - 3.3 Visual communication
 - 3.3.1 Compound eye and ocelli
 - 3.3.2 Light production
 - 3.4 Tactile communication
 - 3.4.1 Mechanoreceptors





Unit-IV Major ecological role of insects 10 Hrs

- 4.1 Insects and herbivores (Phytophagy)
 - 4.1.1 Leaf-chewing
 - 4.1.2 Plant mining and boring
 - 4.1.3 Sap-sucking
 - 4.1.4 Gall formation
- 4.2 Insects as pollinators
- 4.3 Insects as predators and parasites
 - 4.3.1 Prey-Host location
 - 4.3.2 Prey-Host acceptance
- 4.4 Role of termites in forestry
- 4.5 Role of insects in aquatic eco-system
- 4.6 Role of insects in forensic science
- 4.7 Ground dwelling insects
 - 4.7.1 Insects of soil and litter
 - 4.7.2 Dung insects
 - 4.7.3 Insects-carrion interaction
 - 4.7.4 Insect-fungal interaction
- 4.8 Insects Biotic potential, environmental resistance
- 4.9 Insects as human food

Unit-V Defence Mechanism in Insects 10 Hrs

- 5.1 Behavioral Defence
 - 5.1.1 Defence by hiding
- 5.2 Structural defence
 - 5.2.1 Mechanical defence
- 5.3 Chemical defence
 - 5.3.1 Chemical structure of defence components
 - 5.3.2 Sources and organs of chemical defence
- 5.4 Colouration defence

- 5.4.1 Cryptic colouration
- 5.4.2 Flash patterns
- 5.4.3 Warning coloration
- 5.5 Mimicry
 - 5.5.1 Batesian mimicry
 - 5.5.2 Mullerian mimicry

Note for the paper setting:

The question paper will contain two questions from each unit (total ten questions) and the candidate will be required to answer one question from each unit (total questions to be attempted will be five) i.e. there will be internal choice within each unit.

Examiner *Int'l*

Course No. 580

**SEMESTER IV
WILDLIFE ECOLOGY,
CONSERVATION &
MANAGEMENT II**

CREDITS : 4
Duration of
Examination : 3 hrs.

Maximum marks :100
a) Semester Examination : 80
b) Sessional assessment : 20

Syllabus for the examination to be held in May 2011 May 2012 May 2013

OBJECTIVES

There is a growing need for knowing what wildlife means and what its importance is in the balance of nature. The designed course is intended to convey the desirous students information regarding wildlife in India, its management along biological lines and the techniques associated with it. The course highlights major approaches for problem-solutions and the ways for implementing these solutions, with the overriding goal of giving students a scientific point of view in understanding management of wildlife resources and its importance in India.

SYLLABUS

10 Hrs.

Unit I

- 1.1 Distribution of Wildlife in India
 - 1.1.1 The Himalayan Mountain system
 - 1.1.2 The Peninsular Indian subregion
 - 1.1.3 The Indian Desert
 - 1.1.4 The tropical rain forest region
- 1.2 Endangered fauna of India
 - 1.2.1 Mammals
 - 1.2.2 Birds
 - 1.2.3 Reptiles
- 1.3 Endemic Wildlife in India

10 Hrs

UNIT II

- 2.1 Criteria of sex and age
 - 2.1.1 Determining age and sex in game birds
 - 2.1.2 Determining age and sex in mammals
- 2.2 Bio-genomic regions of world with their characteristic wildlife
- 2.3 vegetation sampling methods for use in wildlife habitat manipulation
- 2.4 Rangeland habitat; its evaluation and management for wildlife
- 2.5 Ecotourism- costs and benefits

10 Hrs

UNIT III

[Handwritten signatures]

- 3.1 Wildlife conservation projects of Govt. of India, their scope and success
 - 3.1.1 Project tiger
 - 3.1.2 Project Gir lion
 - 3.1.3 Project Hangul
 - 3.1.4 Project Muskdeer
 - 3.1.5 Project Manipur Deer
- 3.2 Wildlife status in J&K State
- 3.3 Wildlife damage: assessment and control
- 3.4 Habitat management for water fowl and other Wildlife

UNIT IV

10 Hrs

- 4.1 Birds as bio-control agents
- 4.2 Pairing bonds in birds
- 4.3 Interspecific interaction (Predator - prey relationship)
- 4.4 Intraspecific interaction
- 4.5 Behaviour in relation to Wildlife Management
- 4.6 Social Life in animals

UNIT V

10 Hrs

- 5.1 Biodiversity, its meaning, assessment and conservation
- 5.2 Enlisting of mammals, birds, reptiles and amphibians of various SCHEDULES of wildlife (Protection) Act (1972) amended upto 2006
- 5.3 Role of non—government organization like; IUCN, CITES, WWF, BNHS etc. in wildlife conservation
- 5.4 India's National Parks and important Wildlife sanctuaries; and biosphere reserves with their characteristic Wildlife
- 5.5 Protected areas of J&K State

Note for Paper Setting

The question paper will contain two questions from each unit (total ten questions) and the candidate will be required to answer one question from each unit (total questions to be attempted will be five) i.e. there will be an internal choice within each unit.

Books recommended

1. Eugene, P. Odum, 1971. Fundamentals of Ecology, Pub. W.B. Saunders Co. Ltd.
2. Henery, C. Champion and S.K. Seth, 1968. A revised survey of the forest types of India, Pub. Manager, COL Press-Nasik, Manager of Pub Delhi-6
3. R.D. Teague (ed.) A manual of wildlife conservation, Pub. The Wildlife Society, Washington DC.
4. R.K. Giles(Ed.) Wildlife Management and Techniques, Pub. The Wildlife Society, Washington DC.
5. R.F. Dassan, 1982. Wildlife Biology (IInd.) Pub. Wiley Eastern Ltd. NDL.
6. S.H. Prater, 1980. The Book on Indian Animals, Pub. BNHS Calcutta
7. George B. Scheller, 1967. The Deer and the Tiger. Pub. ZSI, Calcutta
8. B.K. Tikadar, 1983. Threatened Animals of India, Pub. ZSI, Calcutta
9. R.L. Smith, Ecology and Field Biology. Pub. Harper and Row, NDL
10. J. Sparke, 1970. Bird Behaviour, Pub. Govosset and Dunlop, Inc. NDL.

Enam

Indel

Examination : 2 hrs.

b) Sessional assessment : 10

- 3.1 Human Haredity & Social welfare
3.1.1 Colour, form & distribution of hair on the head
3.1.2 Colour and vision of Eye

Erasmus

Good

- 3.1.3 Shape & Size of hands & Feet
- 3.1.4 Abnormalities and their inheritance

- 3.1.4.1 Skin
- 3.1.4.2 Muscles
- 3.1.4.3 Bones
- 3.1.4.4 Mental

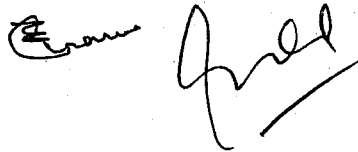
- 3.2 Study of Eugenics
 - 3.2.1 Negative Eugenics
 - 3.2.2 Positive Eugenics

Note for Paper setting

The question paper will contain two question from each unit (total six question) and the candidates will be require to answer one question from each unit (Total question to be attempted will be three) ie there will be internal choice within each unit

BOOKS RECOMMENDED

- 1 Gardner and Snustad 1984 principal of Genetics .
- 2 Strickberger Genetics
- 3 lewis 1985, Genes
- 4 Nagle, 1984, heredity and Human Affairs
- Novitski 1982, Human Genetics



SEMESTER IV

Course No. 587
Credits: 4

Title: Animal Physiology

Max. Marks: 100

a) Semester Examination: 80

b) Sessional assessment: 20

Duration of Examination: 3 hours

Syllabus for the examination to be held in May 2011 May 2012 May 2013

Objectives

The course has been designed as equal to the course No. 416 of semester I and supplements the understanding of the functioning of organ systems of animals, after having exposed the students to the understanding of the Bio-chemistry of cellular activities of the animal organization, through course No. 416

SYLLABUS

Unit-I

10 hrs

- 1.1 Animal food and its composition
- 1.2 Modes of animal nutrition
- 1.3 Digestion and its control
 - 1.3.1 Salivary digestion
 - 1.3.2 Gastric digestion
 - 1.3.3 Intestinal digestion and digestion enzymes
- 1.4 Absorption in GIT
 - 1.4.1 Carbohydrates
 - 1.4.2 Amino acids
 - 1.4.3 Lipids and other substances

Unit-II

10 hrs

- 2.1 Blood
 - 2.1.1 Composition and functions
 - 2.1.2 Blood coagulation
 - 2.1.3 Blood groups and transfusion
 - 2.1.4 Buffer system
- 2.2 Heart and its working
- 2.3 Heart Beats (in mammals)
 - 2.3.1 Origin, rhythmicity and conduction
 - 2.3.2 Nervous regulation
 - 2.3.3 Chemical regulation
 - 2.3.4 Electro-cardiogram
 - 2.3.5 Cardiac cycle in man
 - 2.3.6 The exchange vessels

UNIT III

10 Hrs

- 3.1 Respiratory Physiology

Exam *Full*

- 3.1.1 Nervous regulation of respiration (in mammals)
- 3.2 Physiological adaptations to different environments
 - 3.2.1 Environmental influences over respiratory process (in mammals)
 - 3.2.2 Extreme temperature & limits to life
 - 3.2.2.1 Tolerance to cold and freezing
 - 3.2.2.2 Tolerance to high temperature

UNIT IV Excretory and neurophysiology

10 Hrs

- 4.1 Excretory physiology (in mammals)
 - 4.1.1. Detailed structure of nephron
 - 4.1.2. Glomerular functions
 - 4.1.3. Tubular functions
 - 4.1.4. The rennin angiotens
 - 4.1.5. Aldosteron system
- 4.2 Neurophysiology
 - 4.2.1 Nerve cell organization
 - 4.2.2 Nerve impulse origin and propagation
 - 4.2.3 Synapsis and transmitters

UNIT V

10 Hrs.

- 5.1 Structural basis of contraction
 - 5.1.1 Muscle. Types, their gross structure
 - 5.1.2 Hierarchy and skeletal muscles organization (vertebrates)
 - 5.1.3 Myofibrils: Ultra- structure
 - 5.1.4 Chemical composition of myofibril
- 5.2 Muscle contraction-striated muscles
 - 5.2.1 Sliding, filament theory and cross bridges activity
 - 5.2.2 Cross-bridge attachment and muscle contraction
 - 5.2.3 Energy cycle, role of ATP, phosphogen

Note for the paper setting:

The question paper will contain two questions from each unit (total ten questions) and the candidate will be required to answer one question from each unit (total questions to be attempted will be five) i.e. there will be internal choice within each unit.

Exam *Prepared*

Course No. 589

SEMESTER IV

Title: Biotechnology

SEMESTER IV

Course No. 589

Credits: 2

Title: Biotechnology

Max. Marks: 50

a) Semester Examination: 40

b) Sessional assessment: 10

Duration of Examination: 2 hours

Syllabus for the examination to be held in May 2011 May 2012 May 2013

Objectives

Progress in understanding biology until middle of the current century was restricted to pherminological studies. The discovery of the molecule DNA and its contribution to the organization, maintenance and prepatuation of the species, ushered in a phenomenal change in the kingdom of biological science. Molecular studies of the biological structure led to the rise of specialized branches of the studies like Molecular biology and more recently to development of techniques based on the igenious mental concepts of immense importance to mankind.

SYLLABUS

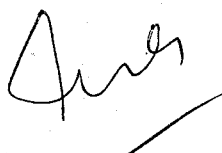
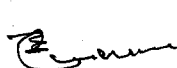
Unit-I Animal and Cell tissue Culture 10 hrs

- 1.1, Primary culture, cell lines and cloning
 - 1.1.1 Disaggregation (enzymatic and mechanical) of tissue and primary culture
 - 1.1.2 Cultured cells and revolution of cell lines
 - 1.1.3 Maintenance of cultures-cell lines
 - 1.1.4 Cloning of cell lines
 - 1.1.5 Large scale cell cultures in Biotechnology
 - 1.1.6 Somatic cell fusion
- 1.2 Tissue and organ culture: Primary explanations Techniques.
 - 1.2.1 Tissue culture (slidfe, flask and test tube cultures)
 - 1.2.2 Organ culture
 - 1.2.3 Whole embryo culture
 - 1.2.4 Tissue engineering (artificial skin and artificial cartilage)

Unit-II

10 hrs

- 2.1 Origin, definition and scope of Biotechnology
- 2.2 Recombinant of DNA and gene cloning



- 2.2.1 Cloning and expression vectors
 - 2.2.1.1 Cloning vectors of recombinant DNA- Plasmids, bacteriophage, phagemids, cosmids, transposons, artificial chromosomes (YAC and MAC) and importance of vectors
- 2.2.2. Chemeric DNA molecular probes and gene libraries:
 - 2.1.3.1 Restriction enzymes from cloning : types, classifications, examples of endonucleases
 - 2.1.3.2 Isolation of DNA
 - 2.1.3.3 Ligation of insert vector
 - 2.1.3.4 Introduction of Recombinant DNA into host cells
 - 2.1.3.5 Screeing of Recombinant DNA
 - 2.1.3.6 Restriction mapping
 - 2.1.3.7 Nicle translation
 - 2.1.3.8 DNA sequencing

Unit-III

10 hrs

- 3.1 Biotechnology in medicine
 - 3.1.1 Animal and Human Health care
 - 3.1.2 Development of vaccines for immunity
 - 3.1.3 Diagnosis of diseases: Antenatal diagnosis of congenital diseases
 - 3.1.4 Pharmaceutical drugs through biotechnology
 - 3.1.5 Gene therapy in human welfare
- 3.2 Biotechnology in agriculture
 - 3.2.1 Bio-fertilizers
 - 3.2.2 Bio-insecticides
 - 3.2.3 Transgenesis
- 3.3 Biotechnology in Industry
 - 3.3.1 Enzyme biotechnology: Uses of enzymes; isolation and purification of enzymes, immobilization of enzymes, enzyme engineering
 - 3.3.2 Single cell proteins from micro-organisms: Production of antibiotics by micro-organisms
- 3.4 Biotechnology in environmental
 - 3.4.1 Sewage treatment
 - 3.4.1.1 Aerobic process trickling/ percolating filters activated sludge

Ernam

Amel

- 3.4.1.2 Anaerobic digestion process/
- 3.4.2 Biological processing of industrial waste: Waste from dairying industry
- 3.4.3 Removal of spilled oil and grease deposits

NOTE FOR PAPER SETTING:

The question paper will contain two questions from each unit (total six questions) and the candidates will be required to answer one question from each unit (total questions to be attempted will be three) i.e. there will be internal choice within each unit.

Exam *Final*

SEMESTER IV

Course No. 591
Credits: 2

Title: Aquaculture
Max. Marks: 50
a) Semester Examination: 40
b) Sessional assessment: 10

Duration of Examination: 2 hours

Syllabus for the examination to be held in May 2011 May 2012 May 2013

Objectives

The doubling of world's population by the year 2000 is forecast, which will add more problems of food deficiency. The FAO estimates that through aquaculture are aquatic agriculture food production can be increased many times through optimum use of existing resources and the application of science. The present course is, therefore designed to acquaint the biotic factors in aqua culture and culturing of some aquatic organisms towards meeting the demand.

SYLLABUS

Unit-I

10 hrs

- 1.1.1 Definition and history of aquaculture
- 1.1.2 Aim, Importance and scope of aquaculture
- 1.1.3 Present status of aquaculture
- 1.2 Water quality and quantity
- 1.3 Water as a medium for aquaculture and natural water resources.
- 1.4 Source, measurement and importance of
 - a) Dissolved oxygen
 - b) Free carbon dioxide
- 1.5 Types of aqua farms.
 - 1.5.1 Land based farms
 - 1.5.2 Open water forms
 - 1.5.3 Selection of sites for Aquaculture
 - 1.5.4 Sources of pollution and user conflict

Unit-II

10 hrs

- 2.1 Selection of species for culture
 - 2.1.1 Biological characteristics of aquaculture species
 - 2.1.2 Economic and market considerations
 - 2.1.3 General characters of some culturable species
 - 2.1.3.1 Indigenous fishes
 - 2.1.3.2 Exotic fishes
- 2.2 Nutrition & feeds
 - 2.2.1 Energy requirement and sources
 - 2.2.1.1 Carbohydrates

- 2.2.1 .2 Proteins
- 2.2.1 .3 Lipids
- 2.2.1 .4 Vitamins and minerals
- 2.2.1.5 Feed conversion efficiency
- 2.2.2 Live feed for fishes
- 2.2.3 Artificial feed and their types
 - 2.2.3.1 Supplementary food ingredients
 - 2.2.3.2 Feed preparation methods
 - 2.2.3.3 Feed distribution methods

10 hrs

Unit-III

- 3.1. Crab fishery
- 3.2. Pearl farming
- 3.3. Lobster fishery
- 3.4. Cage fish culture
- 3.5. Trout culture
- 3.6. Sewage fed fishery
- 3.7. Sea weed culture and its uses

NOTE FOR PAPER SETTING:

The question paper will contain two questions from each unit (total six questions) and the candidates will be required to answer one question from each unit (total questions to be attempted will be three) i.e. there will be internal choice within each unit.

Books Recommended

1. Bardson. J.E. J.H. and Meharney, W.O. Aquaculture. The3 farming and husbandry of freshwater and marine organisms.
2. Goldman, C.R. and Horne, AJ 1983: Limnology Mc Graw Hill International Book Company, New Delhi
3. Jhingran. V.G. 1982 Fish and fisheries of India. Hindustan Publ. Corp. New Delhi.
4. Kurian, C.V. and Subastian, 1976: Prawns and Prwn fisheries of India. Hindustan Publishing Corp. New Delhi.
5. Singh, V.P.P and Ramachaqndran, U: 1985: Freshwater fish culture. ICAR, New Delhi
6. Stickney, R.R 1979: Principles of warm water aquaculture John Wiley and Sons New Delhi
7. Nickolsky, R.R/ 1979: The ecology of fishes Academic Press London
8. Welch. P.S. 1952 Limnology Mc Graw Hill Books o. New York
9. Wetzel, R.G. 1975: Limnology. W.B. Saunders Co: Philadelphia
10. Pillay, P.V.R. 1988. Aquaculture Principles and Practices, Fishing News Books, 54 Univ. Street Carlton, toria 30539 Australia.

[Signature]

[Signature]

SEMESTER IV

Course No. 592

Credits: 2

Duration of
examination: 2 hours

**Title: Population Genetics and
Evolution**

Maximum marks: 50

a) Semester Examination: 40

b) Sessional assessment: 10

Syllabus for the Examination to be held in May 2011 , May 2012 , May 2013

Objectives:

The Course is designed with the main objective of conveying to the students the principles of Population genetics and evolution. How these animals are inter-related with one another. The syllabus deals with evolutionary thought in biology, how in nature the variations are developed which subsequently lead to the formation of new taxa.

Detailed Syllabus

Unit- I Molecular Population Genetics and Genetics of Quantitative 10 Hrs

traits in populations

- 4.1. Patterns of change in amino acid sequences
- 4.2. Drawing and Interpreting a Pedigree
- 4.3. Hardy -Weinberg Equilibrium and Genetic polymorphism
- 4.4. Genotype-Environment Interaction
- 4.5. Inbreeding depression and Heterosis
- 4.6. Ethnic and Cultural Diversity
- 4.7. Immunogenetic basis of Variation and disease susceptibility
- 4.8. Phenotypic Plasticity

UNIT-II Concepts of Evolution:

10 Hrs

- 2.1. Concepts of Evolution
 - 2.1.1. Historic development of the concept of evolution
(Theory of special creation, Greek theories, pre-modern theory, Modern theories)
 - 2.1.2. Evidences of Organic evolution
- 2.2. Origin of Life
- 2.3. Darwin's theory of Natural Selection
- 2.4. Neo-Darwinism and current concept of evolution (Modern Synthesis of evolution)

UNIT-III Modes of Speciation

10 Hrs

- 3.1 Isolating mechanisms and their role in evolution
- 3.2. Genetic drift, Founder's Principle, Bottle Neck effects as factors in speciation.
- 3.3. Animal distribution
 - 3.3.1. Aspects and patterns of animal distribution

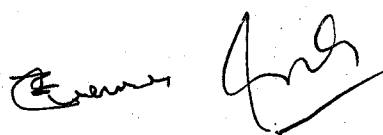
- 3.3.2. Dispersal: Means of Dispersal and barriers to dispersal of animals
- 3.4. Zoogeographical Distribution of animals:
 - 3.4.1. Zoogeographical realms of the world
 - 3.4.2. Distribution of vertebrate fauna in different zoogeographical realms.
 - 3.4.3. Continental Drift
- 3.5. Evolution of Man

Note for Paper setting

The question paper will contain two question from each unit (total six question) and the candidates will be require to answer one question from each unit (Total question to be attempted will be three) ie there will be internal choice within each unit

BOOKS RECOMMENDED

1. Dobzhansky, Th. Genetics and Origin of Species. Columbia University press
2. Hartl, D.L. A Primer of population Genetics. Sinauer associates, Inc. Massachusetts.
3. Dobzhansky, Th. F.J. Ayala, I.L. Stebbins and J.M. valentine. Evolution. Surjeet Publication, Delhi.
4. Futuyama, D.J. Evolutionary Biology, Sinauer Associated, INC Publishers, Dunderland.
5. Jha, A.P. Genes and Evolution. John Publication, New Delhi
6. King, M. Species Evolution-The role of chromosomal Change. The Cambridge University Press, Cambridge.
7. Merrel, D.J. Evolution and genetics; Holt, Rinchart and Winston, Inc.
8. Smith, J.M. Evolutionary Genetics, Oxford university Press, New York
9. Strickburger, N.W. Evolution, Jones and Bartett Publishers, Boston London.
10. Mayer, E. 1982. The growth of Biological thought. The Pulknap Press of Harward University, Masvachusetts.



6/11/19

1