KONGUNADU ARTS AND SCIENCE COLLEGE (AUTONOMOUS)
COIMBATORE – 641 029
Course Name: M.Sc., Zoology
Curriculum and scheme of Examination under CBCS
(Applicable to students Admitted from the Academic Year **2014-2015** onwards)

Semester	Part	Subject Code	Title of the Paper	Instruction hours/cycl	Exam. Marks			Duration of Exam (hours)	Credits
					CIA	ESE	TOTAL		
I	I	13PZO101	C.P.1 Animal physiology	6	25	75	100	3	5
		12PZO102	C.P.2 Cell and Molecular biology and Biochemistry	5	25	75	100	3	4
		14PZO103	C.P.3 Biotechnology and Bioinformatics	6	25	75	100	3	5
		13PZO104	C.P.4 Aquaculture	5	25	75	100	3	5
			Cr.P.1	4					
			Cr.P.2	4					
II	I	13PZO205	C.P.5 Biostatistics and Biophysics	6	25	75	100	3	5
		12PZO206	C.P.6 Molecular Genetics	6	25	75	100	3	5
		12PZO207	C.P.7 Microbiology and Immunology	6	25	75	100	3	4
		13PZO2CL	C.Pr.1	4	40	60	100	4	2
		12PZO2CM	C.Pr.2	4	40	60	100	4	2
		14PZO2N1	Non Major Ele. I	4	25	75	100	3	5
III	I	13 PZO308	C.P.8 Entomology	5	25	75	100	3	5
		13 PZO309	C.P.9 Bioinstrumentation	5	25	75	100	3	4
		12 PZO310	C.P.10 Developmental Biology	5	25	75	100	3	5
			C.Pr.3	4					
			C.Pr.4	4					
		14PZO3N2	**Non Major Ele. II**	3	25	75	100	3	5
		14PZO3E1	Major Ele. I	4	25	75	100	3	5
IV	I	12 PZO411	C.P.11 Biodiversity and Evolution	5	25	75	100	3	5
		12 PZO412	C.P.12 Applied Entomology	6	25	75	100	3	5
		13PZO4CN	C.Pr.3	4	40	60	100	4	2
		13PZO4CO	C.Pr.4	4	40	60	100	4	2
		14PZO4E2	Major Ele. II	6	25	75	100	3	5
		12PZO4Z1	Project and Viva voce	5	40	160	200	-	5
			Total				**2200**		**90**

APPROVED BY THE ACADEMIC COUNCIL
Date: 05/04/2014 Item No: XII Page No. PZO 1 To PZO 57

HOD OF ZOOLOGY
KONGUNADU ARTS & SCIENCE COLLEGE
COIMBATORE-641 029

MAJOR ELECTIVE PAPERS

(2 papers are to be chosen from the following 4 papers)

1. Environmental Biology
2. Wild life ecology and Management
3. Environmental Biology & Toxicology.
4. Poultry science & Management

NON -MAJOR ELECTIVE PAPERS

(2 papers are to be chosen from the following 4 papers)

1. Nutrition and Dietitics
2. Ecotourism
3. **Nanobiotechnology**
4. Human genetics & Counselling

Tally Table:

Part	Subject	No. of Subjects	Total Marks	Credits
I	Core – Theory / Practical / Project	18	1800	70
	Major Elective Paper	2	200	10
	Non Major Elective Paper	2	200	10
	Grand Total	**22**	**2200**	**90**

Note:

CBCS – Choice Based Credit System
CIA – Continuous Internal Assessment
ESE – End of Semester Examinations

25 % CIA is applicable to all theory subjects except JOC, ALC, COP and Diploma Courses, which are considered as extra credit courses.

13PZO101

I - SEMESTER

PAPER -1 ANIMAL PHYSIOLOGY

Total Credits: 5 **Total Hours: 90**

Objectives

1. To know the functions of the organ and organ system.
2. To study the catabolism of nutrients.
3. Physiological adaptation of organs at different environment.

UNIT I DIET AND NUTRITION 18Hrs

Nutritional Aspects: Role of Protein, carbohydrate, lipid, mineral and dietary fibers in nutrition.

Energy Metabolism:-Introduction, Caloric value of foods, BMR, factors influencing BMR, physiological variations of BMR, respiratory quotient, (RQ), Factors affecting respiratory quotient.

UNIT II RESPIRATION 18Hrs

Process of gaseous exchange, Transport of oxygen and CO2 ,Factors affecting O2, and CO2 transport ,Effects of Hypoxia, Oxygen therapy, Control of respiration, Regulation of respiration during exercise, Physiological adaptations at high altitude and deep sea.

UNIT III CIRCULATION 18Hrs

Composition of blood, Plasma proteins, types, characteristics, functions and clinical imporatance.Haematological abnormalities (anaemia, leucopenia, leucocytosis, Thromboctopenia) Blood pressure, cardiac cycle and ECG.

MUSCLE PHYSIOLOGY

Ultra structure of muscle fibre, muscle proteins, Mechanism of muscle contractions, Neuro muscular junction-structure and mechanism of impulse transmission.

UNIT IV EXCRETION 18Hrs

Patterns of Nitrogen elimination, Mechanism of urine formation, Composition of urine, Concurrent mechanisms, Regulation of excretion, Fluid system of the body and Constituents of extra cellular and intra cellular fluids, Edema, Regulation of body fluids by Kidney.

UNIT V ENDOCRINE GLANDS AND REPRODUCTION 18Hrs

Pituitary, Thyroid, Parathyroid, Adrenal and Pancreatic glands, Gastro intestinal hormones. Role of Hormones in Reproduction.Cibernating system of Homeostasis and Hormonal control.

Text Books:-

1. Essentials of Animal physiology-S.C. Rastogi, New Age International (P) Ltd., Publishers, (2003).
2. Text books of human physiology-Saradhasubramaniam K and P.Madhavankutty, S. Chand Company Ltd., (2007).

Reference Books:-

1. Text books of medical physiology-C.Guyton, M.D. John E. Hall. Ph.D, W.B. Saunders Company, (2006).
2. Text book of medical physiology-M.M. Chatterjee, RanaShinde, Jupee Brothers, Medical Publishers, Pvt. Ltd., (1992).
3. Text books of animal physiology-(1990) R.Nagabushanam-Emkay Publication.
4. General and Comparative Physiology-(1984) William S. Hoar, Prentice Hall of India. New Delhi.
5. Animal physiology and Biochemistry –Singh H.R and Neeraj Kumar (2007) Vishal publications, Jalandhar.
6. Text book of Physiology. (2010) R.Chandramouli Jaypee Brothers Publications.

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12PZO102

I – SEMESTER

PAPER-2 CELL AND MOLECULAR BIOLOGY AND BIOCHEMISTRY

Total Credits: 4 **Total Hours: 75**

Objective

1. To aware about cell membrane and cyto skeletons structure and functions.
2. To know about nucleus, DNA, protein synthesis, cancer and ageing.
3. To inculcate the knowledge on structure and functions of carbohydrate, protein, lipid, free radicals and anti-oxidants.

UNIT I **15Hrs**

Cell Membrane: Fine Structure, Chemical composition, Transport – Diffusion, Active Transport and Pumps, Uniports, Symports and antiports, Cell to cell adhesion – Gapjunctions, connections

Cytoskeleton and their structure and function:
Endoplasmic reticulum, Microfilaments, Microtubules

UNIT II **15Hrs**

Nucleus: Chromosomes, Giant Chromosomes, Cell cycle and cell signaling, Interphase nucleus, Chromosomal movement during cell division.

DNA: Structure and Chemistry, Nuclear DNA amounts and C value, Satellite DNA and its functions, Mobile DNA (Transposable elements)

UNIT III **15Hrs**

Protein Synthesis: DNA template, RNA types- their structure and functions,Transcription,Translation,Post translational modifications.

Special Changes and Acceptance: Biogenesis of Mitochondria, Mitochondrial genome and its function, Biology of Cancer, Biology of Aging.

UNIT IV **15Hrs**

Classification, Structure and Metabolism
Carbohydrate-Mono, di and Polysaccharides – structure of pentose (Ribose) and Hexoses (Glucose and fructose)-Glycolysis, Krebcycle, Glyconeogenesis: HMP Pathway, Glycogenolysis.

Protein: Amino acids, Structure and Classification, essential and non essential amino acid. Protein classification structure and function of Hemoglobin deamination, Transamination and transdeamination.

Lipids: Classification, saturated and unsaturated fatty acids, cholesterol structure,Metabolism of lipids,Enzymes-Classification-Mechanism of action.

UNIT V **15Hrs**

Free Radicals &Anti oxidants

Free radicals,Reactive Oxygen species conservation,Impact,Free radicals, Scavenger system,Inflammation,Respiratory diseases,Retro lentil fibroplasias,Reperfusion injury,Arterosclerosis,Peptic ulcer,skin diseases,Age related diseases,Preventive antioxidants chain breaking antioxidants.

Text books

1. Cell and Molecular Biology-P.K.Gupta-2004; Rastogi Publications.
2. Fundamentals of Biochemistry for Medical students-AmbikaShanmugam, Published by author,10,111-cross street, West C.I.T.Nagar,Madras-35

Reference books

1. Fundamentals of Biochemistry. Dr. A. C. Deb.New central Book Agency Pvt LTD. Kolkata. (2004).
2. The principles of Biochemistry. Lehninger. A.L., D.L. Nelson and M.M.Cox., CBS Publishers & Distributors, New Delhi, India. (1993).
3. Text book of medical physiology- C. Guyton and Jhon E. Hall. 11 Edition, Saunders- An Imprint of Elsevier., New Delhi, India. (2006).
4. Text book of Biochemistry. D.M. Vasudevan&SreeKumari. S, Jaypee brothers, Medical publishers (P) Ltd. New Delhi (2007).
5. The text book of medical bio chemistry M.N Chatterjee and RanaShinde, Jaypee brothers medical publishers (P) Ltd, New Delhi-(2007).

PZO 5

14PZO103

I - SEMESTER

CORE PAPER - 3 - BIOTECHNOLOGY AND BIOINFORMATICS

Total Credits: 5 **Total Hours: 90**

Objectives

1. To learn more advanced and application oriented subjects.
2. It helps to learn the various techniques by the combination of both biology and Information technology.
3. To understand the importance of Human genome project and the necessities of drug designing

UNIT I RECOMBINANT DNA TECHNIQUES 18Hrs

Cloning vectors for recombinant DNA. (Bacterial, Viral, Fungal sources -any one example) - Cloning in bacteria and Eukaryotic organisms - transfer of recombinant DNA in the bacterial cell - selection of recombinants - cloning strategy used for synthesis of insulin.

UNIT II GENE ANALYSIS AND IMMUNOLOGY 18Hrs

PCR, RFLP, RAPD – Application and significance, cDNA, Gene sequencing, Monoclonal antibodies

UNIT III ANIMAL CELL, TISSUE AND ORGAN CULTURE 18Hrs

Requirements for animal cell and tissue culture, isolation of animal material, primary cell culture - Evolution of cell lines - products obtained through cell culture system. Transgenic animals and their use.

UNIT IV INTRODUCTION TO BIOINFORMATICS 18Hrs

Historical perspectives of Bioinformatics.Application of Internet principles in Bioinformatics - Data Banks -Softwares used and its applications in Biology.

UNIT V 18Hrs

Protein structure predictions - Gene structure predictions - Phylogenetic tree clustering methods and its applications.Drug designing through Bioinformatics.

Text Books

1. A Text Book of Biotechnology - R.C.Dubey, S.Chand&Co.Publications (2006)
2. Bioinformatics - D.R.Westhead, J.H. Parish and R.M.Twyman Viva Books Private Limited, New Delhi.(2002)
3. Basic Bioinformatics - S.Ignacimuthu, S.J.Narosa Publishing House, New Delhi.(2005)
4. Bioinformatics for Beginners, Dr.K.Mani, N.Vijayaraj, Dr.D.Padmanabhan, Kalaikathir Achchagam, Coimbatore.(2002)

Reference Books

1. Advances in Bio technology - S.N.Jogdand. Fifth revised edition 2005. Published by Himalaya publishing house.
2. Gene cloning and DNA analysis - T.A.Brown, fourth edition, Blackwell Publishing 2001.
3. Introduction to Bioinformatics. Arthur M.Lesk, Second Edition, the Pennsylvania State University, Published by Oxford University Press 2005.
4. Bioinformatics. The Machine learning approach. Second Edition Pierre Baldi&SorenBrunak. The MIT press Cambridge USA First East West Press, Edition 2003.

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13PZO104

I - SEMESTER

PAPER 4 – AQUACULTURE

Total Credits: 5 **Total Hours: 75**

Objectives

1. To explore the aquatic resources of the edible and economically important organisms.
2. To provide self employment oppotunities and knowledge for students undergoing Zoology.
3. To make use of the inland waters and marine potential to substitute the protien requirements by the human population.

UNIT I **14Hrs**

The need for aquaculture, fish as a protein source, construction and maintenance of fish farm.

UNIT II **15Hrs**

Qualities of culturable species of fishes, Types of culture - Monoculture, Polyculture, sewage fish culture, Paddy fish culture. Culture of Indian major carp and air breathing fish. Ornamental fish culture.

UNIT III **15Hrs**

Types of Species cultured on brackish water, coastal water, off shore and deep sea water. Oyster culture and prawn culture.

UNIT IV **16Hrs**

Fish breeding - Bund breeding, induced breeding by Hypophysation; Breeding techniques, factors influencing induced breeding. Culture and Nutritional value of Rotifers, Artemia, copepods and Daphnia.

UNIT V **15Hrs**

Economic importance of fishes, Methods of fish Preservation. Cryopreservation. Applied genetics of cultivable fishes for live food, Common diseases of fishes and control measures.

Text book

1. Kamaheshwar Pandey and J.P. Shukla, 2005.Fish and fisheries. Rastogi Publications, Meerut, India.
2. B.Ahilan and N.Felix, 2008.Text book of Aquaculture. Daya Publishing House New Delhi, India.

Reference books

1. V.G. Jhingran, 1991.Fish and fisheries of India. Hindustan Publish Corporation, Delhi.
2. Rath. R.K, 2000. Fresh Water aquaculture. Scientific (India) Jodhpur.
3. Santhanam. R, 2008.Fisheries Science.Daya Publishing House, New Delhi.
4. S.C. Agarwal, 1990.Fishery Management. Ashish Publishing house, New Delhi.
5. Dr. V.B.Sakhave, 2009.Aquatic biology and Aquaculture.Mahalingam publications.
6. C.B.L. Srivatsava, 2002.A text book of Fishery Science and Indian Fisheries.KitabMahal. Allahabad.

13PZO205

II - SEMESTER

CORE PAPER-5- BIOSTATISTICS AND BIOPHYSICS

Total Credits: 5 **Total Hours: 90**

Objectives

1. To create awareness on collection, analysis of data and interpretation of results.
2. To know the level of significance after analysis of data and also applied in research work.
3. To know the bioelectric potentials of cell membranes and neurons.

UNIT I **18Hrs**

Biological Data: Sources, Collection, Classification and Tabulation. Diagrammatic representation and Graphical representation -Frequency curves, Frequency polygon and Ogive.

Measures of central value- Arithmetic mean, median and mode.Measures of dispersion - Standard deviation and Standard Error.

UNIT II **18Hrs**

Correlation - Introduction, Types of correlation, merits and demerits.

Regression - Definition, method of studying regression and uses. Differences between correlation and regression.

Probability- Definition, types, addition and multiplication theorems.

UNIT III **18Hrs**

Test of Samples

Sampling and sampling errors- Test of significance for small and large samples. Student't' tests. ANOVA [F-test) for one way classification only, Chi-square test.

UNIT IV **18Hrs**

Bioenergetics

Laws of Thermodynamics- Redox Potentials- Biological Oxidation- High energy compounds- Entropy.

UNIT V **18Hrs**

Bioelectricity

Membrane potential- ionic distribution of membrane Potential- Origin of membrane potential- Resting and Action Potentials of nerves. Mechanism of Action potential. Nerve impulse propagation and conduction of nerve impulse- Measurement of Action potential.

Text book

Biostatistics

1. Biostatistics for biology - Palanichamy, S. Manoharan, Paramount Publications, Palani (1992).
2. Statistics, Pillai, R.S.N. and Bhagavathi, V.S. Chand and Co. New Delhi -5. (2001).

Biophysics.

1. Biophysics – VasanthaPattabhi, N.Gautham. Narosa publishing house, New Delhi, Chennai, Mumbai & Calcutta (2002).
2. A text book of Biophysis. Dr.R.N.Roy New Central book agencies (P) Ltd. Chintamoni Das Lane, Calcutta (1996).

Reference Books

1. Satistical methods-S.P.Gupta Sultan Chand & Sons publications,New Delhi(2001).
2. An introduction to Biostatistics - P.S.S. SundarRao and J. Richard, Prentice, Hall of India Pvt. Ltd., New Delhi (2003).
3. Fundamentals of biostatistics, Irfan Ali khan and AtiyaKhanumUkaaz publications, Andrapradesh, India (2004).
4. Text book of Medical physiology- C.Guyton and John E. Hall. 11th edition Sounders – An Imprint of Elsevier, New Delhi, India (2006).
5. Text book of Medical Biophysics Dr. R.N .Roy. Books and Allied (P) Ltd. Chintamoni Das Lane, Calcutta (2001).
6. Text book of Medical physiology- C.Guyton and John E. Hall. Essentials of Animal Physiology- S.C. Rastrogi. New age International (P) Ltd. Publications, New Delhi (2001)

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~~14~~PZO206

II - SEMESTER

CORE PAPER – 6 – MOLECULAR GENETICS

Total Credits: 5 **Total Hours: 90**

Objectives:

1. To make the students understand the components of genetic material.
2. To make the students appreciate the way by which the biological information is transmitted.
3. To make the students know about the relation between diseases and genes.

UNIT I STRUCTURE OF GENETIC MATERIAL 18Hrs

Structure and Functions of genetic material: Chemical composition, Physical structure; Isolation, sequencing and synthesis. Evidences that RNA is genetic material.

UNIT II 18Hrs

DNA Replication: Enzymes of replication; DNA damage and repair mechanism; Molecular basis of Mutations – Spontaneous and induced mutations.

UNIT III FUNCTIONS OF GENETIC MATERIAL 18Hrs

Genetic Code: Triplet nature of Code, Breaking of or deciphering the code, Wobble hypothesis. Operon Model. DNA transcription, RNA translation, Peptide synthesis. Regulation of gene activity in Eukaryotes. Antibody diversity.

UNIT IV MICROBIAL GENETICS 18Hrs

Recombination in Virus; Genetic Recombination in Bacteria : Conjugation (Hfr x F and F x F) and sexduction; Transduction (generalized, specialized abortive); Transformation. Gene conversion.

UNIT V ONCOLOGY 18Hrs

Viral oncogenes – activation of proto oncogenes – tumour suppressor genes – regulation of gene expression by oncoproteins – signal transduction by oncoproteins.

Text Books

1. Gupta PK. (2005) Genetics. III Edn. Rastogi Publication, India.
3. Stanley R, John E, Cronon Jr. David Freifled. (1994). Microbial Genetics. II Edn. Jones and BrttLett Publishers. Inc.
4. Kannan.I. (2010). Immunology. MJP Publishers. India.

Reference books

1. Weaver and Hedrick. (1997). Genetics. III Edn. WMC Brown Publishers. McGraw Hill Companies. Inc.
2. Robert H. Lewin. (2002). Principles of Genetics.VII Edn. Tata Mc Graw Hill Publishing Company Ltd. New Delhi.
3. Benjamin Lewin. (1997). Genes. Tokyo University Press, Oxford New York, Tokyo.
4. Strickberger. MW.(2010). Genetics. II edn. Macmillon Publication. New York.

12PZO207

II - SEMESTER

PAPER-7 MICROBIOLOGY AND IMMUNOLOGY

Total Credits: 4 **Total Hours:90**

Objectives

1. To aware the knowledge of microorganisms of different media like water, soil, sewage and human body and sterilization techniques.
2. To know the importance of microorganisms involved in agriculture, food processing and medicine.
3. To aware the basic knowledge of immunology and disorders of human beings.

UNIT I WATER, SOIL AND SEWAGE MICROBIOLOGY 18Hrs

Microbiology of Water, soil and sewage - Normal microbial flora of the human body - Disinfection and Sterilisation: Basic concepts - Disinfection: Physical and chemical agents - Sterilisation: Filtration, Surfactants and synthetics detergents.

UNIT II AGRICULTURAL, DIARY AND FOOD MICROBIOLOGY 18Hrs

Agriculture: Biological Nitrogen Fixation - Microbial diseases of rice, cotton and sugarcane - Microbial pesticides in agriculture {Bt, NPV} -Dairy and Food Microbiology: Pasteurization-milk - Food preservation-phycico-chemical methods - Food spoilage and poisoning.

UNIT III INDUSTRIAL AND MEDICAL MICROBIOLOGY 18Hrs

Industrial Microbiology

Fermentation products- Microbes in industry - Enzymes - Antibiotics -Alcohols.

Medical Microbiology

Diseases Causing organisms-Basic structure, toxicity, symptoms and their preventive measures - Diseases of gastroentric system- Cholera, Viral hepatitis • Respiratory system-Pneumonia and Tuberculosis Nervous system-Leprosy, Tetanus, - Rabies • Genital system-Gonorrhea, Syphilis

UNIT IV IMMUNITY AND IMMUNE SYSTEM 18Hrs

Immunity: innate, acquired, passive and active - Immune system: Lymphoid organs-primary and secondary; structure and functions; cells of the immune system-Lymphocytes, T-Lymphocytes-subsets, Third population of Lymphocytes-Polymorphonuclear cells and Macrophages; Lymphokines.

UNIT-V IMMUNOLOGICAL DISORDERS, TECHNIQUES 18Hrs

Hypersensitivity: type I, II, III and IV; auto immune disorders; Immunodeficiency diseases; tumour immunity-major histo-compatibility complex; transplantation immunity. Immuno-diffusion,RIA and ELISA.

Text books

1. A textbook of Microbiology. P.Chakraborthy, New central book Agency P.L Calcutta, 700 009, India (1995)
2. General Microbiology - Vol I & II - Powar.C.B. Daginawala. H.F. Himalaya publishing House, Mumbai- 400 004.(2001)

Reference

1. Microbiology. L.Pelizar Jr. M. J.Chan, E.C.S.TataMcGraw Hill company (1993).
2. Cellular and Molecular Immunology Sixth Edition A.K.Abbas and A.Lichtman Elsevier/Saunders(2007)
3. Essential of immunology-Hidemann,W.H. Elsevier science publishing.co.inc (1980)
4. Plant pathology, R.S.Mehrotra, Tata McGraw Hill Publishing company limited, New Delhi.(1990)
5. Textbook of Microbiology- sixth Edition. R. Ananthanarayanan & C. K.Jayaram Paniker. Orient Longman Private Ltd.., Chennai. (2000)

13PZ02CL

II - SEMESTER

CORE PRACTICAL - I [1,2,5,6]

Total Credits: 2

ANIMAL PHYSIOLOGY

1. Determination of the rate of activity of salivary amylase (human saliva) by titration in relation to temperature and calculation of Q_{10}.
2. Amylase activity in relation to pH and calculation of Q_{10}.
3. Biological response of animals to various osmotic concentrations and their effects
    a. Change in weight of Earthworm in heterosmotic media
    b. Active uptake of Na^+ and Cl^- ionsof a fish from the environmental water and change in salinity.
4. Determination of rate of ammonia excretion by a fish in different media.
5. Effect of temperature on the oxygen consumption of a fish and calculation of Q_{10}

BIOCHEMISTRY

1. Quantitative estimation of carbohydrates in liver of an animal.
2. Quantitative estimation of proteins in muscles of an animal
3. Quantitative estimation of lipids in the given animal tissue.
4. Preparation of Heamin crystals from human blood.
5. Quantitative estimation of Hemoglobin in human blood.
6. Determination of urea in the given sample.

BIOPHYSICS (Demonstration only)

1. Recording of BP in man
2. Recording of ECG in Man (Demonstration only).
3. Verification of Beer Lamberts Law using spectrophotometer.
4. Separation of aminoacids by circular paper chromatography (Demonstration only).

PZO 16

MOLECULAR GENETICS AND MOLECULAR BIOLOGY

1. Study of polytene chromosome in the Drosophila larva.
2. Determination of RBC counting in Human blood.
3. Determination of differential count in Human blood.

SPOTTERS

1. pH meter
2. Haemoglobinometer
3. Spectrophotometer
4. Centrifuge
5. Spygnomanometer
6. ECG recorded strip

PZO 17

MODEL QUESTION PATTERN FOR CORE PRACTICAL I

CIA Practical Exam

Model Practical Exam	=	25 -Marks
Observation Note	=	10 - Marks
Attendance	=	5 - Marks
Total	=	**40- Marks**

END OF SEMESTER EXAMINATION

Time-3Hours **Max Marks-60**

Q I: Major Experiment	–	20 marks
Q II: Minor Experiment	–	15 marks
Q III: Spotters 3x5	_	15 marks
Q IV: Record	_	10 marks
Total	_	**60 marks**

PZO 18

12PZO2CM

II - SEMESTER

CORE PRACTICAL - II [c.p. 3, 4]

Total Credits: 2

BIOTECHNOLOGY

1. Isolation of DNA from animal Tissue
2. Electrophoretic localization of DNA on agarose gel.
3. Purification of an enzyme on gel column. (Demonstration).
4. Primary culture of animal cell / tissue.
5. Hanging drop culture.
6. Measurement of cell number in a culture.
7. Preparation of culture media for bacteria
8. Isolation of microbes from water media
9. Bacteriological testing of milk

Spotters

10. Medicinal plants
11. Bio-diesel plants
12. Use of the following instruments/ techniques
    a. Autoclave.
    b. Carrel flask
    c. Liquid N2 chamber
    d. Electrophoretic instruments
    e. Northern and Southern blot.
    f. Vermicompost

BIOINFORMATICS

1. Creating, editing and printing a document in MS-DOS.
2. Creating mail merge in MS word.
3. Dendrogram (Cluster Analysis)
4. Preparation of slides in MS powerpoint
5. Database - creation and querying in MS- Access -" Web - browsing and E-Mailing.
6. DNA Library (Demo only)

PZO 19

BIOSTATISTICS

1. Construction of frequency distribution for a given sample.
2. Construction of Histogram and frequency polygon for the frequency distribution Calculation of Mean, Median, Mode for the distribution.
3. Calculation of Standard deviation for the frequency distribution.
4. Calculation of correlation co-efficient for the given data.
5. Application of Student's t test in the given samples.
6. Calculation and F value for the given data.(One way method)

BIODIVERSITY

1. Observation of Endangered plants - in Biospheres reserves in India-By field trip.
2. Observation of Endangered animals - in National parks and sanctuaries-By field trip
3. Systematic position and Biodiversity status of the given specimen (any ten specimen)

   A detailed tour report to be submitted during the practical examination which carries 5 marks.

PZO 20

MODEL QUESTION PATTERN FOR CORE PRACTICAL II

CIA Practical Exam

Model Practical Exam	=	25 -Marks
Observation Note	=	10 - Marks
Attendance	=	5 - Marks
Total	=	**40- Marks**

END OF SEMESTER EXAMINATION

Time-3Hours **Max Marks-60**

Q I: Major Experiment	- 20 marks
Q II: Minor Experiment	- 5 marks
Q III: Spotters 3x5	- 15 marks
Q IV: Record	- 10 marks
Total	- **60 marks**

PZO 21

13PZ0308

III - SEMESTER

PAPER 8- ENTOMOLOGY

Total Credits: 5 **Total Hours: 75**

Objectives

1. To know taxonomical position and collection aspects of insects.
2. Inculcating the knowledge of morphology and physiology of insects.
3. To know the knowledge about growth and metamorphosis in insects.

UNIT I CLASSIFICATION AND INSECT COLLECTION **15Hrs**

Classification up to order with example for each order.

Identification of Insects using keys.

Insect Collection: Methods, Preservation and Significance

UNIT II COMPARATIVE MORPHOLOGY **15Hrs**

Mouth parts, Head, Thorax, Abdomen, Genitalia and Appendages

Integument-Structure, Chemistry, Synthesis of chitin, Sclerotization and Tanning

UNIT III STRUCTURE AND PHYSIOLOGY **15Hrs**

Digestive system, Respiratory system and Circulatory system

UNIT IV **15Hrs**

Excretory system, Nervous system, Sense organs and Reproductive system

UNIT V INSECT GROWTH **15Hrs**

Insect growth and development, Metamorphosis and its control.

INSECT ENDOCRINOLOGY

Endocrine Glands

Hormones and Neurohormones - their functions.

Text Books

1. Vasantharaj David .B and T.Kumarasami 1982. Elements of Economic Entomology, Popular Book depot, Madras -15
2. D.B.Tembhare (2000) Modern Entomology -Himalaya publishing house -Delhi

Reference Books

1. Nayar K.K and T.N.Anathakrishnan and B.V.David. (1983) - General and Applied Entomology,Tata McGraw Hill publishing Co. Ltd., New Delhi.pp.589.
2. Imms, A.D (1972) Text Book of Entomology. Vol. I & II Ed. by Richard & Owen. ELBS.
3. P.G. Fenemore& A. Prakash (2002) Applied Entomology. New age international (P) publishers - New Delhi-2.
4. Chapman R.F(1998) The insects structure and function, fourth edition - Cambridge university press United Kingdom.
5. V.B.Wigglesworth-(1979) The principles of insect physiology, ELBS and Chapman and Hall. U.K.

PZO 23

13PZO309

III - SEMESTER

CORE PAPER – 9. BIO-INSTRUMENTATION

Total Credits: 4 **Total Hours: 75**

Objective

1. The sample preparation and applications of the biological instruments are of vital importance in post graduate studies.
2. To know the working principles of the instruments which are necessary for the projects and research studies.
3. The instruments, which are being handled in the practical classes, the students should be aware of it thoroughly.

Principle, description, sample preparation and applications of following instruments of biological studies.

UNIT I **15Hrs**

Photomicrography, phase contrast microscope, Scanning Electron Microscope (SEM) and Haemocytometer.

UNIT II **15Hrs**

Autoclave, pH meter, calorimeter, Spectrophotometer and filteration techniques – Centrifuge.

UNIT III **15Hrs**

Histological techniques: Preparation of sample, serial sections, Microtome, Staining techniques. Immunological techniques – RIA & ELISA and Flow Cytometry.

UNIT IV **15Hrs**

Chromatography (Paper and column, Gas, High performance Liquid).

UNIT V **15Hrs**

Electrophoresis (Paper, Agarase, PAGE) and Southern blotting, Northern blotting, Western blotting

Text books

1. Bajpai, P.K., 2008. Biological Instrumentation and methodology. S. Chand & Co. Ltd. New Delhi. P. 251.
2. Asokan, P. 2002. Analytical Biochemistry (Biochemical Techniques) Chinna Publications. Melvisharam, Vellore, TN.

Reference books

1. Mahinder Singh, 2005.A Text Book of Analytical Chemistry - Instrumental Techniques Dominant Publishers & Distributors. New Delhi - p. 185.
2. Douglas A. Skoog. 1985. Principle of Instrumental Analysis. Saunders College Publishing Tokyo p. 875.
3. Currell, Graham, 2008 Analytical Instrumentation- Performance Characteristics and qualities, John Wiley & Sons. New York.
4. Robyt, J.F. and White B.J. 1987 Biochemical Techniques, Brooks and Coles.
5. Wilson K and Walker J. 2000 Practical Biochemistry Principles and Techniques. Cambridge Univ. Press.

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III - SEMESTER

CORE PAPER 10 - DEVELOPMENTAL BIOLOGY

Total Credits: 5 **Total Hours: 75**

Objectives

1. To study the first experiments on the developing embryo.
2. To study the process of repairing and malformation in embryos
3. To study the harmonic balance during embryo development.

UNIT I FERTILIZATION **15Hrs**

Syngamy, Cortex and activation of egg-Interaction and fusion-Theories of fertilization-Artificial insemination-Semen composition and formation-Parthenogenesis.

UNIT II DIFFERENTIATION **15Hrs**

Cleavage-Chaemo differentiation-molecular concepts of cleavage-Theories of cleavage-Blastulation, Fatemaps and Cell lineages - Mechanism of gastrulation - Gradients-Animal - vegetal axis.

UNIT III INDUCTION AND ORGANIZER **15Hrs**

Nature of Induction and organizer-Physiology of induction-Experiments on induction-Nucleocytoplasmic interactions.

UNIT IV EMBRYONIC NUTRITION **15Hrs**

Yolk utilization, Types of Placenta, Placental hormones-Physiology of Placenta-Hormonal control of pregnancy and lactation.

UNIT V REGENERATION AND TERTOLOGY **15Hrs**

Types of regeneration-Events during regeneration-Tertology-causes-events.

Text Books

1. Chordate embryology- P.S. Verma and V.K. Agarwal, S.Chand and Company Ltd., New Delhi 2008.
2. Developmental Biology-Veer BalaRastogi and M.S. Jayaraj, KedarnathRamnath Pub. Ed. 1. 2008.

References

1. Foundations of Embryology- Bruce M Carlson (2007) - McGraw Hill Publishing Companies.
2. Developmental Biology- Scott F. Gilbert-(2008) SinaverAmociates Sunderland.
3. An Introduction to Embryology- Balinsky BL.(2008) W.B. Sounders company Pub.2008 Philadelphia.
4. An outline of developmental physiology, CHR. P. Raven Pergamon Press. New York. London. 1959.
5. Developmental Biology. S.Banerjee(2005) Dominant Publishers and Distributers, NewDelhi.

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IV - SEMESTER

CORE PAPER -11: BIODIVERSITY AND EVOLUTION

Total Credits: 5 **Total Hours: 75**

Objectives

1. To understand the present status of Fauna and Flora.
2. If create an awareness of conservation of Endangered Fauna and Flora.
3. If helps to understand the strategies for minimizing the Global warming.

UNIT I **15Hrs**

Biodiversity definition - Values of biodiversity - Methodologies for valuation of biodiversity. Bio geographic Zones of India.

Biosphere reserves in India

Wild life of India (Study of Mammals, Birds, Reptiles, Amphibians and fishes - 5 examples in each family) Wild life management in India.Biodiversity Hot Spots.Geographical Information System and its application.

UNIT II **15Hrs**

Conservation of biodiversity- Loss of biodiversity - Factors causing the loss of biodiversity. Threatened species - IUCN - Red Data book.Conversation biotechnology - Gene bank, Cyropreservation and genetic markers.

UNIT III **15Hrs**

Conservation biology, population management , project Tiger, project Elephant, Captive breeding programme. Wild life sanctuaries and National parks in India.

UNIT IV EVOLUTION **15Hrs**

Isolation: Definition- types of isolation- isolating mechanisms: prezygotic and postzygotic; Barriers- role of isolating mechanisms in organic evolution.

Speciation: Definition: species- race- deme; Species concept: Biological species- Phylogenetic species. Modes of speciation: Instantaneous speciation- gradual speciation. Sympatric and allopatric speciation.

UNIT V **15Hrs**

Genetics and evolution: Selection- genetic load- mutation- genetic drift/ (meiotic drive) - migration pressure- their evolutionary significance. Role of transposons in evolution.

Text books

1. Evolution: P.S. Verma& V. K. Agarwal - S. Chand & Company Ltd. New Delhi.Ed.1.2008.
2. Biodiversity: Supriyochakraborty. Pointer Publishers. India. Ed.1.2007.
3. Biodiversity and sustainable development: M. L. Narasaiah. Discovery Publishing House. New Delhi- Ed.1.2005.
4. Environmental Biodiversity- P.R. Yadav and S. R. Mishra. Discovery Publishing House New Delhi.Ed.1. 2004.
5. An advanced text book of biodiversity, principles and practice Dr.K.Krishnamoorthy(2005).
6. Organic evolution by Mohan P. Arora(1998).

References

1. Genes and evolution: A.P. Jha. - Macmillan India Ltd. New Delhi..Ed.1.1993.
2. Biodiversity- RamamurthiRallapalli and Teetha Bali- APH Publishing corporation. New Delhi 2002.
3. Evolution and the Diversity of Life-Ernst Mayr.The Belknap Press Hardvard Univ.Press.London,Ed.4. 1997.
4. Evolution. Monroe W Strickberger.CBS Publishers and Distributors.Delhi.Ed.1. 1994.
5. Glimpses of Biodiversity- B.B. Hosetti(2002) Daya Publishing House.
6. Biodiversity in India-T.Pullaiah 2006 Regency.
7. Organic evolution –Rastogi 1999 kedarnath Publishing House.

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IV - SEMESTER

PAPER – 12. APPLIED ENTOMOLOGY

Total Credits: 5 **Total Hours: 90**

Objectives

1. To acquire the information on sericulture and apiculture for giving job opportunities to our students.
2. To learn knowledge on disease causing insects.
3. To inculcate knowledge on pests of agriculture, stored grain pests and their control measures.

UNIT I **18Hrs**

Sericulture - Types of silkworms - Silkworm culture- rearing techniques, Moriculure- varieties of food plants of silkworms - Silkworm diseases and control measures - Harvesting of cocoons - reeling.

UNIT II **18Hrs**

Apiculture - Kinds of honey bees - Morphology - life cycle - Bee keeping - social behaviour - Diseases and enemies of honey bees - extraction of honey. Care and management of apiary.

UNIT III **18Hrs**

Medical Entomology : Morphology, life cycle, disease caused by and control measures of Mosquitoes, House flies ,Bed bug, Head louse and Cockroach.

UNIT IV **18Hrs**

Agricultural Entomology

A. Crop pests : Biology, life cycle, damages and control measures of

1. Paddy pests :	Rice stem borer	- **Scirpophagaincertulas**
	Brown Plant hopper	- **Nilaparvatalugens**
2. Coconut pests:	Rhinoceros beetle	- **Oryctes rhinoceros**

3. Red palm weevil	:	Shoot borer	- **Chiloinfuscatellus**
		Top borer	- **Scirphophagaexcerptalis**
4.Cotton pests	:	Tobacco cut worm	- **Spodoteralitura**
		American boll worm	- **Helicoverpaarmigera**

B. Stored Produce pests

1. Rice	:	**Sitophilusoryzae**
2. Flour	:	**Triboliumcastaneum**
3. Green gram	:	**Bruchuschinensis**

UNIT V **18Hrs**

Pest control methods (General) - Cultural, mechanical, physical, legal, biological & Chemical. Recent pest control – Ionizing radiation, Chemosterilants, Genetic manipulation, hormones, insect attractants (pheromones), Repellants, antifeedants, Electromagnetic energy, manipulation of animal behaviour and Integrated Pest Management(IPM). Outline classification of pesticides, mode of action of organophosphorus and pyrethroid pesticides.

Text Books

1. Vasantharaj David. B and T.Kumarasami (1982).Elements of Economic Entomology, Popular Book depot, Madras -15
2. D.B. Tembhare (2000) Modern Entomology -Himalaya publishing house -Delhi

Reference Books

1. Nayar K.K and T.N. Anathakrishnan and B.V. David.1983-General and Applied Entomology.Tata McGraw Hill publishing Co. Ltd., New Delhi.pp.589.
2. Imms, A.D.Text Book of Entomology (1997). Vol.I & II Ed. by Richard & Owen.ELBS.
3. P.G. Fenemore,& A. Prakash (2002) Applied Entomology- New age international (P) publishers -New Delhi.2.
4. Chapman R.F(1998) The insects structure and function, fourth edition - Cambridge university press United Kingdom.
5. V.B.Wigglesworth-(1979)-The principles of insect physiology, ELBS and Chapman and Hall. U.K.

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IV - SEMESTER

PRACTICAL III - ENVIRONMENTAL BIOLOGY & TOXICOLOGY

Total Credits: 2

I. Analysis of water - Pond / Pool water; Canal / River water; Sewage/ Effluent

1. pH
2. Total dissolved solids (TDS,TSS)
3. $C0_2$
4. 0_2
5. Hardness (Temporary - Carbonates, bicarbonates, Permanent - calcium, magnesium, chlorides, sulphates and nitrate.
6. BOD and COD (Demonstration only)

II. Analysis of soil - Clayey soil. Sandy soil. Garden soil and Red soil

Determination of

1. Soil moisture
2. Soil texture
3. Chlorides
4. Sulphates
5. Nitrates
6. Total Phosphates
7. Humus

III. Biological analysis

1) Qualitative analysis of organisms (Pollution indicators) such as diatoms / algae, flagellates, ciliates, planarians, annelids, rotifers, insects and their larvae.
2) Biological analysis of sewage water and industrial effluent.
3) Estimation of chlorophyll content in the leaves as an indicator of pollution.
4) Microbiological study in water and soil.

IV. Toxicological Testing methods

LC50, LD_{50}

V. Lab and Field Study

1) Detailed study of Pond/ Lake ecosystems
    a. Physico-chemical parameters
    b. Qualitative and quantitative analysis of plankton
2) Measurement of noise pollution

VI. Field Trip

1. Visit to - Drinking water treatment Plant; Sewage water treatment plant and District Environmental Laboratory.

VII. Submission at the time of Practical Examination without which the students will not be permitted to take the exam.

1. A minimum of 5 whole mounts of Plankton - 5 marks.
2. Bonafide Record - 10 Mark

MODEL QUESTION PATTERN FOR CORE PRACTICAL III

CIA Practical Exam

Model Practical Exam	=	25 Marks
Observation Note	=	10 Marks
Attendance	=	5 Marks
Total	=	**40 Marks**

END OF SEMESTER EXAMINATION

Time-3Hours **Max Marks-60**

Q I: Estimation of water sample (Major Experiment)	–	15marks
Q II: Estimation of soil sample (Minor Experiment)	–	10 marks
Q III Estimation of Chlorophyll	–	10 marks
Q IV: Spotters (2)	_	10 marks
Q V Submission of slide	_	5 marks
Q VI: Record	_	10 marks
Total	_	**60 marks**

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IV - SEMESTER

PRACTICAL IV - ENTOMOLOGY (GENERAL & APPLIED)

Total Credits: 2

1. Identification of insects

Key to insect identification (10 insects of different orders)

2. Mounting

Mouth parts based on their types(5 types)
Genitalia-male and female(3 pairs)

3. Dissection

Digestive System, Nervous System, Reproductive System of any five insects of different orders.

4. Physiology (Cockroach)

Analysis of Digestive enzymes
Qualitative analysis of Haemocytes, protein, carbohydrate and lipid.

5. Sericulture (Silkworm-Bombyxmori)

Study of egg, larva, pupa and adult-Life cycle,Pests and Diseases.
Reeling- Assessment of Cocoon characters,Denier, Shell ratio, Renditta.

6. Apiculture

Bee hive, Honey comb, Types honey bees, Caste differentiation, Pests and diseases of honey bees.

7. Medical Entomology

Identification-Mosquitoes, Housefly, Bed bug and Head Louse.

8. Crop pests

Identification of pests (one in each) of coconut, cotton, sugarcane, paddy

9. Stored grain pests

Identification of rice pest-Sitophilus; wheat pest- Tribolium; Green gram- Bruchus

10. Submission : Insect box

i) Insects of different orders based on classification.
ii) Slides – Whole mounting of 10 small insects.

Field visit

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MODEL QUESTION PATTERN FOR CORE PRACTICAL -IV

CIA Practical Exam

Modal Practical Exam	=	25 -Marks
Observation Note	=	10 - Marks
Attendance	=	5 - Marks
Total	=	**40- Marks**

END OF SEMESTER EXAMINATION

Time-3Hours **Max Marks-60**

Q I: Major Dissection	-	15 marks
Q II: Minor Dissection	-	10marks
Q III: Spotters (2 x 5)	-	10 marks
Q IV Submission of slides	-	10 marks
Q.V Insect box	-	5 marks
Q VI: Record	-	10 marks
Total	-	**60 marks**

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NON-MAJOR ELECTIVE – 1. NUTRITION & DIETITICS

Total Credits: 5 **Total Hours: 60**

Objectives

1. Protect health and saving lives by developing knowledge and expertise in the field.
2. Procedure recognized clinical, public health and management skill.
3. Qualified to work as nutritionist and dietitian in the hospital and other specialized areas such as community and public health and food industry sector.

UNIT I BASIC PRINCIPLES OF MEAL PLANNING 12Hrs

Basic Meal pattern and its modification to suit different income levels, age and physiological stages.Food exchange list, basic dietary calculations.

UNIT II NUTRITIONAL NEEDS DURING PREGNANCY 12Hrs

Normal growth and weight changes Nutritional requirements - complications during various stages - management at family level.

UNIT III NUTRITION DURING INFANCY 12Hrs

Growth and development - Advantages of breast feeding - Difference between human milk and Cow's milk - Factors to be considered in bottle feeding - Different milk formulae. Weaning foods ; meaning - need and uses of growth chart to monitor development - Nutritional requirement of infants (upto 1 year) Weaning foods developed by different organizations.

UNIT IV NUTRITIONAL NEEDS OF PRE-SCHOOL CHILDREN (1-5 YEARS) 12Hrs

Factors to be considered in planning meals - Eating problems of children and their management - Preparation of supplementary foods using available low foods.

Nutrition for school children: Nutrition requirement - Meal planning.

UNIT V 12Hrs

Nutrition during adolescence - Growth - nutritional requirements special need for girls - menarche.

Nutritional needs of adults (Men and women) - in relation to occupation - meal planning.

Nutrition during old age - Nutritional problems of aged and their management

Text books

1. Dietetics –Sri Lakshmi.B.2011. New age International publishers New Delhi.
2. Passmore, D.P., Break, J.P.1986. Human Nutrition and Dietetics, English Language Book society, Livingston.

Reference Books

1. Anita. F.P. 1986. Clinical Dietetics and Nutrition, Anita. F., Oxford paper back edition, Calcutta.
2. Emma. S.Weighley, Donna.H, Muellar, 1997. Basic nutrition, Prantice hall INC, New Jersey.
3. Anita, F.P. 1997. Clinical Dietetics and Nutrition, 4th edition, Oxford University Press, New Delhi.
4. M.Swaminathan, 1978. Hand book of food and Nutrition, published by the Printing and Publishing Co., Ltd., Bangalore.
5. Rosi, M.S. 1987 A Laboratory hand book for Dietetics, 4th Edition, McMillan Publishing Corporation, New York.

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NON-MAJOR ELECTIVE 2 – ECO TOURISM

Total Credits: 5 **Total Hours: 60**

Objectives

1. **To learn the importance of tourism.**
2. **To understand the Laws& policies related to tourism.**
3. **To understand the benefits of tourism.**
4. **To save the environment tourism.**

UNIT I **12 Hrs**

Definition of Tourism - Terminologies Related To Tourism - Elements of Tourism -Growth of Tourism - Basic Patterns of Tourism - Special Patterns of Tourism -Sectors In The Tourism Industry.

UNIT II **12 Hrs**

Definition - Destination of A's Necessary For A Tourist Destination - Learning To Locate Places by Using Latitudes and Longitudes - International, National & Regional Organizations for Tourism.

UNIT III **12 Hrs**

Advent of Information Technology in the Tourism Industry: Impact of Information Technology in the Tourism Industry.

UNIT IV **12 Hrs**

Travel Formalities - Passport and Visa Formalities - Health Documents - Health Preventive Measures for Travelers - Travel Insurance.

UNIT V **12Hrs**

Tsunami, Earthquake, Cyclone, Flood, Global warming, Land slides, Soil erosion and volcanoes

Textbooks

1. A text book of Environmental Studies. P. Arul, Environmental Agency, Chennai. 2004.
2. Tourism Management And Marketing -A.K.Bhattia (1997).

Reference books

1. Facts On Tourism - R. ShanthaKumari
2. South India Tourist Guide - VatsalaIyengar and MalathiRagavan.
3. Ecology and Environment -P.D.Sharma, Rastogi Publications, Meerut, India.

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NON MAJOR ELECTIVE 3 - NANOBIOTECHNOLOGY

Total Credits: 5 **Total Hours: 60**

Objective

1. Understand the basic knowledge of Nanobiotechnology
2. Undersatnd the application of nanomaterials in biotechnology
3. Nanotechnological knowledge on the DNA, Proteins, Nucleic acids, drug delivery and biomedicine etc.

UNIT I NANOTECHNOLOGY 12Hrs

Nanotechnology- Introduction, Definition, History, Scope, Importance and Applications

UNIT II NANOPARTICLES 12Hrs

Silver and gold nanoparticles, green synthesis of nanoparticles and its characterization

UNIT III APPLICATIONS OF NANOPARTICLES 12Hrs

Nanoparticles in medicine and agriculture

UNIT IV INTERACTIONS OF NANOBIOMOLECULES 12Hrs

Nanobiomolecules of Proteins, Carbohydrates and Nucleic acids and their cellular interactions.

UNIT V NANOPARTICLES AND ECOSAFETY 12Hrs

Nanoparticles in relation to human health and environmental impacts

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Textbooks

1. RK, Rathy, "Nanotechnology" 1st edition, S. Chand Publisher 2009.
2. Sidharth Baliyan, "Basics of Nanotechnology" Anmol Publications PVT. Ltd.
3. CM, Niemeyer, C. A. "Nanotechnology: Concepts, Applications and Perspectives", Wiley- VCH, 2004.
4. P.P. Simeonova, N. Opopol and M.I. Luster, "Nanotechnology- Toxicological Issues and Environmental Safety", Springer 2006.

Reference

1. Vinod Labhasetwar and Diandra L. Leslie, "Biomedical Applications of nanotechnology", A john Willy & Son inc, NJ, USA, 2007.
2. Challa, S.S.R. Kumar, Josef Hormes, Carola Leushaer, "Nanofabrication Towards Biomedical Applications, Techniques, Tools, Applications and impact, Wiley- VCH, 2005.

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NON-MAJOR ELECTIVE 4 - HUMAN GENETICS AND COUNSELLING

Total Credits: 5 **Total Hours: 60**

Objectives

1. To make the students develop knowledge on the blood types, transfusion and diseases.
2. To make the students know about applications of aminocentesis, dermatoglyphics and Population genetics.
3. To make the students learn applications of Genetic engineering and Genetic counseling.

UNIT I **12Hrs**

Blood groups (major types) Blood transfusion, Erythroblastosisfoetalis.

Physiology and genetic of blood groups.

UNIT II **12Hrs**

Aminocentesis, Dermatoglyphics: Terminology, methods of observation and printing, dermatoglyphic features of syndrome.

UNIT III **12Hrs**

Population genetics, Hardy-Weinberg principle and its application in human population.

UNIT IV **12Hrs**

Genetic engineering and its applications in human being, Cancer, AIDS.

UNIT V **12Hrs**

Genetic counseling, definition, aims, procedure in genetic counseling and its limitation.Pedigree chart and its uses.

Text Books

1. Genetics. Veer BalaRastrogi. 2009 (reprint 2010) 3rd Ed. KadarnathRamnath publishers. Meerut. New Delhi.
2. Genetics. Alice Marcus.2009.MJP Publishers, Chennai.

References

1. Genetics by H. Eldon Sutton, Robert P. Wagner (1985) - Macmillan publishing company New York.
2. Basic Human Genetics. Elaine J. Mange and Arthur P. Mange (1991). 2nd Edit. Sinaver Associates Inc. publishers Sunder land.
3. Principles of Genetics. Robert H. Tamarin. 2002. 7th Ed. Tata McGraw Hill publication company Ltd. New Delhi.
4. Applied Genetics. C.Emmanuel, S. Ignachimuthu and S.Vincent. 2006. MJP Publishers, Chennai.
5. Genetics. Susan L. Elrod and William D.Stansfield. Adapted by G. Bhowmik 2009 4th Ed. McGraw-Hillpublication company Ltd. New Delhi.
6. Cell and Molecular Biology. P.J.Russel, S.L.Wolte, P.E.Hertz,C.Sterr and B.Mc Millan.2009 1st Ed. (Indianprint), Cengage learningIndia Pvt. Ltd. New Delhi.

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MAJOR ELECTIVE PAPER 1 - ENVIRONMENTAL BIOLOGY

Total Credits: 5 **Total Hours: 60**

Objectives

1. To understand the normal functioning of the relevant part of the environment.
2. To understand how an organism fits into its environment.
3. To create awareness about the conservation of natural resources.
4. To know the importance and significance of space ecology.

UNIT I ATMOSPHERE **12Hrs**

Composition and Structure, Climatic factors - Air, Light, Temperature, Atmospheric Pressure, Wind, Humidity and Rainfall

UNIT II HYDROSPHERE **12Hrs**

Water resources, hydrological cycle, physico-chemical and biological characteristics of ponds, lakes, rivers, estuaries, mangroves and sea.

UNIT III LITHOSPHERE **12Hrs**

Soil formation, components of soil, physico-chemical properties of soil, structure, texture and classification of soil, Soil organisms, Soil erosion (degradation).

UNIT IV ENERGY AND ENVIRONMENT **12Hrs**

Concept of energy, Sources of energy, Measurements of primary production, Energy flow in ecosystem. Conservation of Natural resources - Minerals, forest, Agriculture, Afforestation, Wild life management, freshwater fish culture.

UNIT V **12Hrs**

Radiation Ecology – Radiation environment – Remote sensing, Radio Telemery as a tools for ecological research, Space ecology – Exobiology – Hazards of space travel – Regenerating system.

Text Books

1. Ecology and Environment - P.D. Sharma Rastogi Publications, India, 2005.
2. Environmental Biology – Biswarup Mukerjee, Tata McGraw Hill publishing company Ltd New Delhi, 1997.

Reference Books

1. Introduction to Environmental Science - Joesph M. Moran, Michael, P. Morgan, James, H. Wiesma, Published by W.H. Freeman and Company, Sanfrancisco, 1991.
2. Environmental Biology - K.C. Agarwal, Agro Botanical Publishers (India), 1989.
3. Limnology - Charles R. Goldman, Alexander J. Horsno Mcgraw - Hill International book company, New Delhi, 1983.
4. Introduction to Soil Science - Dilip Kumar, DasKalyani Publishers, New Delhi, 2010.
5. Concept of Ecology-Edward John Kormondy - Prentice Hall Publishers New Delhi, 1969.
6. Fundamentals of Ecology - E.P. Odum, 3rd edition, W.B. Saunders & Co, Philadelphia, 1971.

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MAJOR ELECTIVE PAPER 2

WILD LIFE ECOLOGY AND MANAGEMENT

Total Credits: 5 **Total Hours: 60**

Objectives

1. To make the students understand and appreciate biodiversity and the Act to protect the wild species.
2. To make the students learn different techniques to study wild life and develop knowledge of the benefits of ecosystem.
3. To make the students analytically know about various methods to conserve biodiversity.

UNIT I **12Hrs**

Ecosystem aquatic ecosystem- Pond ,terrestrial ecosystem- forest trophic relations in ecosystems, foodchain,foodweb, ecological pyramids-productivity of ecosystem-primary and secondary production.Energy flow in ecosystem.Biotic community and ecological niche.

UNIT II **12Hrs**

Wild life of India – Ecological sub regions of India.Endangered flora and fauna.Wild life management in India-Indian board for wild life.Protected areas network.National parks and sanctuaries.Special projects for endangered species.

UNIT III BIODIVERSITY **12Hrs**

Biodiversity-kinds of biodiversity; Biogeography-continental shift, zoogeography, biodiversity hot spots, endemicity; biodiversity assessment; Endagered species-Indian Wild life protection Actl972 and International Redlist Species Criteria, concept and assessment

UNIT IV FIELD SAMPLING TECHNIQUES **12Hrs**

Population estimation-concept, line transect, quadrate sampling; Animal Trapping Techniques. -Pitfall.funnel, Sherman traps; marking and recapture techniques; use of indirect evidences in species inventory; Basic methods in behavioral and food habit studies; Wildlife management techniques.

UNIT V ECOSYSTEM SERVICES **12Hrs**

Animal plant interactions-pollinators, seed dispersal, biological pest control, vector; Wildlife products-food, medicine, Germplasm, domestication;Ecological balance-prey predator relationships.herbivory and scavengers.

Text Book:

1. Ecology and Environment. P.D.Sharma.2009/10th Ed. Rastrogi publications. Meerut.
2. Concepts in Wild Life Management Hoselli BB (2008) Daya publishing house New Delhi 110002.

References

1. Ecology and evolution of communities. Cody, M.L.and J.M Diamond 1975.Harvard University Press. Cambridge. Wildlife Management Techniques. Giles.H. 1984. Natraj Publishers, Dehra Dun.
2. Fundamentals of Wildlife Management. Gopal, R. 1992. Justice Home. Allahabad. Biodiversity-Gaston, K.J. 1996.
3. A biology of numbers and difference. Blackwell Science, Oxford. Ecology. V.K.Agarwal and Usha Gupta. 2004. 1st Ed. S.Chand and Company Ltd.New Delhi.
4. Environmental Studies. D.K.Asthana and Meerut Asthana. 2006 1st Ed. (Reprint 2007).S. Chand and company Ltd. New Delhi.
5. Fundamentals of Ecology. Madhab Chandra Desh and SathyaPrakashDesh. 2009. 3rd Ed. Tata McGraw Hill Education Pvt.Ltd. New Delhi.

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MAJOR ELECTIVE 3 – ENVIRONMENTAL BIOLOGY AND TOXICOLOGY

Total Credits: 5 **Total Hours: 90**

Objectives

1. To assess the environmental quality and management.
2. To understand the impact of environmental change on plants & animals.
3. To create awareness about environmental education, toxicity and sustainable development.

UNIT I AIR POLLUTION 18Hrs

Air pollutants, sources of Air pollution, Effects on the environment -acid rain, green house effect and ozone depletion, Effects on the living organisms including man, Control methods of air pollution.

UNIT II WATER POLLUTION 18Hrs

Water pollutants, sources of water pollution, Types of Pollution (Organic, Pesticidal, Heavy metal and Oil pollution), Effects on the living organisms including man, Control methods of water pollution.

UNIT III SOIL, NOISE, THERMAL AND RADIOACTIVE POLLUTION 18Hrs

Soil pollution - Sources and their effects on the environment and organisms including man, solid waste management.

Noise Pollution - Sources of noise and their effects on the environment, organisms including man and Control of Noise pollution.

Thermal and radioactive pollution - Sources and their effects on the environment, organisms including man and Control of Thermal and Radioactive pollution.

UNIT IV ENVIRONMENTAL QUALITY, AWARENESS AND MANAGEMENT 18Hrs

Ecoindicators and the environment, Environmental education and Awareness, Environmental monitoring and environmental impact assessment (EIA), Environmental management and bioremediation.

UNIT V TOXICOLOGY 18Hrs

Scope and significance, Classification, Toxic substances, Absorption and Excretion of toxicants, Toxicity – Acute and chronic toxicity, Toxicological testing methods – Evaluation of toxicity in organisms.

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Text Books

1. Environmental Biology and Toxicology - P.D.Sharma, Rastogi publications, India, 2009.
2. Environmental Biology - Biswarup Mukherjee, Tata McGraw Hill publishing company Ltd. New Delhi 1st reprint-1997.

Reference Books

1. Water pollution - Causes, effects and control - P.K. Goel, New Age International Pvt. Ltd. Publishers, New Delhi, 1996.
2. Environmental water pollution and its control - G.R.Chattwal, M.C. Mehra, J. Katyal, M. Satake, Mohan Katyal, T. Nagatiro, Ahmol Publications, New Delhi, 1989.
3. Environmental Air pollution and its control - G.R. Chattwal, M.C. Mehra, J. Katyal, M. Satake, Mohan Katyal, T. Nagahiro, Anmol Publications, New Delhi, 1989.
4. Environmental pollution - Jimmy Katayal and M. Satake, Anmol publication Pvt. Ltd., New Delhi, 2001.
5. Environmental Pollution - causes, effects and control - P. PurohitAgarwal, Agrobios publishes, India, 2006.
6. Concepts of Ecology- Edward John Kormondy 4th Edition- Printice Hall of India, New Delhi, 1969.
7. Toxicology principles and methods – M.A. Subramanium, M.J. Publishers, Chennai, 2004.

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MAJOR ELECTIVE PAPER – 4

POULTRY SCIENCE AND MANAGEMENT

Total Credits:5 **Total Hours:90**

Objective

1. To make the students develop knowledge on the history and the role of poultry in rural development and its structure.
2. To make the students learn methods of rearing, breeding and production of poultry.
3. To make the students know about the preparation of feed antibiotics, vaccines and marketing.

UNIT I **18Hrs**

History and importance of Poultry farming, Role of the Poultry in rural development, employment potential, Economics and contribution to national productivity, Egg production, Table bird production, manure as by-product. Anatomy and physiology of poultry birds with reference to digestive and reproductive system.

UNIT II **18Hrs**

Breeds of poultry birds and scientific methods of breeding Hybrid and cross breed. Indian and exotic selecting chicks and parents for production factors in selection, Hatching, selecting eggs for hatching, Natural and artificial incubations, Types of incubators. Maintenance of temperature and humidity sterilization of room during hatching, separation and selling.

UNIT III **18Hrs**

Poultry house and equipment, space requirement, types of house, number birds, equipments for feeding, protection from enemies and adverse conditions.

UNIT IV **18Hrs**

Nutrition of Poultry birds, requirement according to age feed formulation, classification of feed stuffs. Milling by products, distilleries and brewery by products. Availability of raw materials and their cost, food grinders and mixtures, use of antibiotics.

UNIT V **15Hrs**

Brooding and rearin, sexing, vaccination, natural and artificial breeding, types of brooding, temp. requirement culling. Debreaking, characters of good layers and broilers caponettes and and capons, rearing of chicks.

Text Books

1. A Hand book of poultry practice. Keith Wilson (2007) 2nd Ed. Agrobios (India), Jodhpur.
2. The poultry science L.C.R. Norris Elye. 2005. Biotech books.Delhi.35.

Reference Books

1 Economic Zoology: Manju Yadav.2003. 1st Ed. Discovery publishing house. New Delhi.

2 Feeding of Poultry. B.Pande.V.R.Reddy, V.R.Sadagopen and A.K.Shrinivasan.1984 (reprinted 1997), Indian council of Agricultural research. Power Printers New Delhi.

3 Poultry farm guide. Dr.R.Venkatakrishnan, 1995. 1st Ed. Balaji publications. Madras.

4 Hand book of Animal Husbandry Indian Council of Agricultural Research 1997. 2nd Ed. (reprint) published by Dr.R.D.Sharma, Director Directratre of Publications and information on Agriculture. New Delhi.

12PZO2J1

JOC-ECO TOURISM

UNIT I BASIC CONCEPTS IN TOURISM

Definition of Tourism- Technologies Related to Tourism- Elements of Tourism- Growth of Tourism- Basic Patterns of Tourism- Special Patterns of Tourism- Sectors in the Tourism Industry.

UNIT II PROTECTIVE MEASURES

Environment (protection) Act- Air (prevention & control of pollution) Act- Water (prevention & control of pollution) Act- Wild Life (protection) Act- Forest (Conservation) Act.

UNIT III ROLE OF INFORMATION TECHNOLOGY

Advent of Information Technology in the tourism industry: impact of Information Technology in the tourism industry.

UNIT IV TRAVEL FORMALITIES

Passport and Visa Formalities- Health Documents- Health Preventive Measures for Travelers- Travel Insurance.

UNIT V MITIGATION MEASURES

Tsunami, Earthquake, Cyclone, Flood, Global Warming, Land slides, Soil erosion and Volcanoes Impact of Tourism on Environment.

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Text books

1. A text book of Environmental Studies. P. Arul, Environment Agency, Chennai, 2004
2. Tourism Management and Marketing- A.K. Bhatia, Sterling publications, New Delhi, 1997.

Reference Books

1. Facts on Tourism- R. ShanthaKumari- 1st edit.- Imprint- Chennai Shantha Publishers (1996).
2. South India Tourist Guide-VatsalaIyengar and MalathiRahavan3rdEdit.Vasan book depot (1997).
3. Ecology and Environment- P.D. Sharma, Rastogi Publications, Meerut, India (1993).
4. Biodiversity – Principles and Conservation- Second Edition. U. Kumar & MahenderaJeetAsija. Student Edition Chopasani Road, Jodhpur. (2005)

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12PZO2J2

JOC- VERMITECHNOLOGY

UNIT I

Introduction to Earthworm - origin and evolution - Distribution - different species of earthworm.General body structure - External characters - Body wall - Food and feeding habits digestive system -Gut microflora and their importance -Reproductive system cocoon formation.

UNIT II

Role of Earthworms in sustainable agriculture - organic farming - Earthworm activities -soil fertility and texture - soil areation.Vermitechnology - Definition -History - in other countries -in India.

UNIT III

Advantages of vermiculture - Vermi - cast - Decomposition of bio-degradable Wastes and vermicomposing - vermiculture in pollution abatement -Miscellaneous usages of vermiculture. Vermiculture - General Planning -Selection of suitable species -Basic characteristics of suitable species - Description of suitable species - Maintenance of Base culture.

UNIT IV

Vermicomposting - Advantages of vermicomposting - small scale vermicomposting -large scale vermicomposing.Type of vermicomposing -requirements for vermicomposting - vermicomposting schemes - Maintenance of vermicomposting.

UNITV

Recycling of different wastes by vermi composting - Organic wastes - Solid wastes - Municipal wastes - Animal Drug - Agricultural wastes.Application of Vermicompost -In horticulture - in agriculture-Quality management- storage -pricing-marketing.Vermitechnology- by products- economy.

Text books

1. Vermiculture and Vermicomposting. Bhatnagar, R.K. and Palta, R.K., Kalyani publishers, New Delhi (1996).
2. A hand book of Organic Farming, Arun K. Sharma, Agrobios, Jodhpur, India (2002)
3. The Earthworm book, S.A. Ismail. Other India press, Goa - 403 507, India (2005)

Reference Books

1. Vermicompost- Crown Jewel of organic farming. R. D. Kale, Author publication, 4- Archana apartment, (S-l), 12 cross, Margosa Rd, Malleswaram, Banglore-560 003, India (2006).
2. A Hand book of organic forming, ArunK.Sharma, Agrobios, Jothpur, India (2002).
3. The Earthworm book, S.A.Ismail. other India press. Goa 403 507, India (2005).
4. Earthworms in Agriculture, Talashilkar&Dosani. Published by Agrobios (India).Chopasani Road Jodhpur- 342003.
5. The complete technology book on " Vermiculture and Vermicompost" published by National Institute of Industrial Research, Delhi(2004).

Component for Project:

CIA / ESE	Particulars	Project Out of 200 Marks (PG)
CIA	Project Review	30
	Regularity	10
	Total Internal Marks	**40**
*ESE	Project Report Present	120
	Viva Voce	40
	Total External Marks	**160**
Total Marks(CIA+ESE)		**200**

*** Project report and Viva voce will be evaluated jointly by both the Project Supervisor (faculty of the Department) and an External Examiner.**

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QUESTION PAPER PATERN for CIA and ESE

THEORY

Maximum marks 75

Section A (10X1=10marks)

Q.NO.1to10:Mutiple choice types alone with four distracters each.

Section B (5X5=25marks)

Q.NO.11to15:Either orshort notes type questions (one question 'a'or 'b'from each unit).

Section C (5X8=40marks)

Q.NO.16to20:Either or essay type questions(one question 'a'or 'b'from each unit).

Break up Marks for CIA of Theory

CIA Exam	**-**	**15**
Assignment	**-**	**5**
Attendance	**-**	**5**
Total	**-**	**25**

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16UZO508

V - SEMESTER

CORE PAPER-8- BIOSTATISTICS, BIOPHYSICS AND BIOINFORMATICS

Total Credits: 4 **Total Hours: 75**

Objectives

1. To create awareness in the collection analysis of data and interpretation of results.
2. Statistics has proved to be useful in study of all natural sciences and also applied in research work.
3. Computer application gives basic knowledge to the students and provides all kinds of information within short period through internet.

UNIT I **15Hrs**

Data Collection- Sources of Primary and Secondary data collection, Classification and Tabulations, Diagrammatic representation of data- Bar diagram, Pie diagram, Graphical presentation of data - Histogram, Frequency polygon, Frequency curve, Ogive, Pictograph.

UNIT II **15Hrs**

Measures of Central Tendency - Calculation of arithmetic mean, median and mode. Merits and demerits. Measures of dispersion - Standard deviation and standard error. Student's t- test.

UNIT III

Biophysics: Principles and Applications: P^H meter, Spectrophotometry, Electrical Conductivity, Paper Chromatography and Electrophoresis.

UNIT IV **15Hrs**

Computer operating systems: Windows - Introduction to MS Word, Excel, PowerPoint, Internet, World Wide Web (WWW), Search engines, E-mail and Computer virus.

UNIT V **15Hrs**

Bioinformatics: History, Definition and Scope, Data bases: Protein and DNA, FASTA tools and BLAST, GENBANK and EMBL.

Text books

Biostatistics

1. Palanisamy, S. and Manoharan, M. 1992. Biostatistics for biologist, Paramount Publications, Palani.
2. Ramakrishnan, P. 2009. Biostatistics, Saras publications, Nagercoil- 629002.
3. S.P. Gupta, 2006. Statistical methods. Sultan Chand and sons- 23, Daryagans, New Delhi- 110002.

Computer Applications

1. Pradeep, K. Sinha and Pritisinha. 1995. Computer Fundamentals, Concepts Systems and Applications. BPB Publications- New Delhi.

BIOINFORMATICS book

BIOINSTRUMENTATION book

Reference Books

Biostatistics

1. Gupta, S.P. 2006. Statistical methods, Sultan Chand and sons, Educational publishers, New Delhi.
2. Pillai, R.S.N. and Bhagavathi, V. 2001. Statistics, S.Chand and Co., New Delhi-5.
3. Prasad.S.2004. Elements of Biostatistics Rastogi Publications, Meeruit, India.

Computer Applications

1. Fundamentals of computers 4th edition V.Rajaram (2006). Prenlice Hall of India, Private Ltd- New Delhi- 110001.
2. Parameshwaran, R. 1997. Computer applications in Business. S. Chand and Co., New Delhi.

14UZO612

VI - SEMESTER

CORE PAPER - 12 – ANIMAL DIVERSITY

Total Credits: 5 **Total Hours: 60**

Objectives

1. To understand the present status of Fauna.
2. It creates an awareness of conservation of Endangered Fauna.
3. It helps to understand the comparison of ancient and recent information about the biodiversity.

UNIT I **12Hrs**

Biodiversity – Concept and Definition, Latitude and longitude diversity, Types of biodiversity – Problems inventorying species – Biodiversity Hot spots – Western Ghats. IUCN Threatened categories – Selected endangered animals of India.

UNIT II **12Hrs**

Peoples participation in Biodiversity conservation – Causes of decline of biodiversity – Sustainable Development – Biogeography

UNIT III **12Hrs**

Processes responsible for species richness and extinction – Metapopulation concept – Current and future species extinction rates , Biodiversity Measurement.

UNIT IV **12Hrs**

Ecosystem Diversity: Wetland ecosystem – Marine ecosystem – Estuarian ecosystem – Mangrove ecosystem, Biodiversity Act.

UNIT V **12Hrs**

Conservation of Biodiversity : Invitro conservation – DNA barcoding – Test tube gene bank – Field gene bank – Sacred groves, Stalavrikshas – Future strategy for the conservation of Biodiversity, Animal Ethics.

Text books

1. An advanced text book of biodiversity, Principles and practice. Dr. K. Krishnamoorthy, Oxford and IBH publication company Pvt. Ltd, New Delhi. 2003.
2. Organic evolution. Mohan P. Arora, Himalaya publishing house, Mumbai, 2002.
3. Biodiversity principles and conservation. U. Kumar and Mahendrajeet Asija, Student edition, Jodhpur. Ed.2. 2005.

References

1. Genes and evolution. A.P. Jha, Macmillan publishers India Ltd. New Delhi, Ed.1. 1993.
2. Biodiversity. Ramamurthy Rallapalli and Geetha Bali, APH Publishing Corporation, New Delhi, 2002.
2. Evolution and the Diversity of Life. Ernst Mayr, The Belknap Press Hardvard Univ. Press. London, Ed.4. 1997.
3. Evolution, Monroe W Strickberger, Jones and Bartlett publication, New Delhi, Ed.3. 2000.
4. Glimpses of Biodiversity. B. B. Hosetti, Daya Publishing House, New Delhi, 2002.
5. Biodiversity in India. T .Pullaiah, Regency publication, New Delhi, Vol 4, 2006.
6. Organic evolution. Veer Bala Rastogi, Kedarnath Ramnath Publishers, Uttar Pradesh, 2007.