BHARATHIDASAN UNIVERSITY, TIRUCHIRAPPALLI – 620 024.

B.Sc. Zoology - Course Structure under CBCS

(For the candidates admitted from the academic year 2010-2011 onwards)

Semester	Part	Course	Title	Instru Hours/ Week	Credit	Exam Hours	Marks		Total
							Int.	Extn.	
I	I	Language Course – I (LC) – Tamil*/Other Languages ** #		6	3	3	25	75	100
	II	English Language Course - I (ELC)		6	3	3	25	75	100
	III	Core Course – I (CC)	Invertebrata	6	5	3	25	75	100
		Core Course – II (CC)	Practical I-Covering the Core Courses I & III	4	-	***	-	-	-
		First Allied Course –I (AC)	-	5	4	3	25	75	100
		First Allied Course – II (AC)	Practical	3	-	***	-	-	-
				30	15				400
II	I	Language Course – II (LC) - – Tamil*/Other Languages ** #		6	3	3	25	75	100
	II	English Language Course – II (ELC)		6	3	3	25	75	100
		Core Course – II (CC)	Practical I-Covering the Core Courses I & III	2	4	3	40	60	100
	III	Core Course – III (CC)	Chordata	5	5	3	25	75	100
		First Allied Course – II (AC)	Practical	2	2	3	40	60	100
		First Allied Course – III (AC)	--	5	4	3	25	75	100
	IV	Environmental Studies		2	2	3	25	75	100
	IV	Value Education		2	2	3	25	75	100
				30	25				800
III	I	Language Course – III (LC) – Tamil*/Other Languages ** #		6	3	3	25	75	100
	II	English Language Course - III (ELC)		6	3	3	25	75	100
	III	Core Course – IV (CC)	Cell and Molecular biology	**6**	5	3	25	75	100
		Core Course – V (CC)	Practical II–Covering the Core Courses IV & VI	**3**	-	***	-	-	-
		Second Allied Course – I	.	5	4	3	25	75	100
		Second Allied Course – II	Practical	2	-	***	-	-	-
		Non Major Elective I - for those who studied Tamil under Part I a) Basic Tamil for other language students b) Special Tamil for those who studied Tamil upto +2 but opt for other languages in degree programme	Communicable Diseases and Management.	2	2	3	25	75	100

				30	17				500
IV	I	Language Course –IV (LC) - Tamil*/Other Languages ** #		6	3	3	25	75	100
	II	English Language Course – IV (ELC)		6	3	3	25	75	100
	III	Core Course – V (CC)	Practical II–Covering the Core Courses IV & VI	2	3	3	40	60	100
		Core Course – VI (CC)	Physiology and Biochemistry	5	5	3	25	75	100
		Second Allied Course - II	Practical	2	2	3	40	60	100
		Second Allied Course - III		5	4	3	25	75	100
	IV	Non Major Elective II - for those who studied Tamil under Part I a) Basic Tamil for other language students b) Special Tamil for those who studied Tamil upto +2 but opt for other languages in degree programme	Basic Nutrition	2	2	3	25	75	100
	IV	Skill Based Elective I		2	**4**	3	25	75	100
				30	**26**				800
V	III	Core Course – VII (CC)	Genetics &Evolution	5	5	3	25	75	100
		Core Course – VIII (CC)	Environmental Biology & Biodiversity	5	5	3	25	75	100
		Core Course – IX (CC)	Biophysics & Biostatistics.	5	5	3	25	75	100
		Core Course – X (CC)	Practical III covering the core courses VII, VIII & IX	6	4	3	40	60	100
		Major based Elective – I	Economic Entomology	5	5	3	25	75	100
	IV	Skill based Elective –II		2	**4**	3	25	75	100
		Skill based Elective – III		2	**4**	3	25	75	100
				30	**32**				700
VI	III	Core Course – XI (CC)	Developmental Biology&Immunology.	**6**	5	3	25	75	100
		Core Course – XII (CC)	Microbiology & Biotechnology	**6**	5	3	25	75	100
		Core Course – XIII (CC)	Practical IV – Covering the Core Courses XI & XII	6	4	3	40	60	100
		Major based Elective II	Aquaculture	**6**	5	3	25	75	100
		Major based Elective III	Apiculture	**5**	4	3	25	75	100
	IV	Extension activities		-	1	-	-	-	-
		Gender Studies		1	1	3	25	75	100
				30	25				600
			Total	180	140				3800

Note:

	Internal Marks	External Marks
1. Theory	25	75
2. Practical	40	60

3. Separate passing minimum is prescribed for Internal and External marks

The passing minimum for CIA shall be 40% out of 25 marks [i.e. 10 marks]
The passing minimum for University Examinations shall be 40% out of 75 marks [i.e. 30 marks]

* for those who studied Tamil upto +2 (Regular Stream)

** Syllabus for other Languages should be on par with Tamil at Degree level

those who studied Tamil upto 10^{th} or +2, but opt for other languages in degree level under Part I should study special Tamil in Part IV

*** Examination at the end of the next semester.

Extension activities shall be out side the instruction hours.

List of Allied Courses

Group – I (Any one)	**Group – II**
1. Chemistry	1. Botany
2. Physiological Chemistry / Basic Biochemistry	

Note: Either Group of Allied courses may be offered in the I year / II year.

செய்முறை பாடங்கள் உள்ள இயைபுப் பாடங்களுக்கு (4+2+4) தரபுள்ளிகள்

செய்முறை பாடங்கள் இல்லாத இயைபுப் பாடங்களுக்கு(3+3+4) தரபுள்ளிகள்

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CCI -- INVERTEBRATA

UNIT – I

Introduction to principles of Taxonomy; Phylum **Protozoa:** General characters and classification upto class level, giving examples. Detailed Study: Paramecium. General Topics: 1. Protozoan parasites 2. Plasmodium 3. Entamoeba - life history, pathogenesis and control measures.

UNIT – II

Phylum Porifera : Detailed Study: Ascon sponge. General Topic:
Canal system in sponges. **Phylum: Coelenterata**: General characters and classification upto class level giving examples. Detailed Study: Obelia. General Topics : Polymorphism in Hydrozoa, Corals & Coral reef.

UNIT – III

Phylum Platyhelminthes: General characters and classification upto class level with examples. Detailed study: Taenia solium. General Topic: Parasitic adaptation in Platyhelminths, **Phylum Nematoda** : Detailed Study: Ascaris. General Topics: Nematode parasites : Life history, Pathogenicity and Control measures of Ancylostoma, Enterobius, Wuchereria and Dracanculus; Parasitic adaptations in nematodes.

UNIT – IV

Phylum Annelida: General characters and classification upto class level with examples. Detailed Study: Nereis. General Topic: Adaptive Radiation in Annelida. **Phylum Arthropoda**: General characters and classification upto class level with examples. Detailed Study: Prawn. General Topics: Crustacean Larvae, Beneficial and harmful insects.

UNIT – V

Phylum Mollusca: General characters and classification upto class level with examples. Detailed Study: Pila. General Topics: Adaptive radiation in Gastropada; Economic importance of Mollusca.
Phylum Echinodermata: General characters and classification upto class level with examples. Detailed Study: Star fish. General Topic: Larval forms of Echinoderms.

Reference Books:

1. Ekambaranatha Iyar and T.N.Ananthakrishnan. 1992. A Manual of Zoology, Vol.I(Invertebrata). Parts I & II. Viswanathan & Co.
2. Barrington, E.J.W.1979. Invertebrates. Structure and Function 2nd edn. ELBS and Nelson.
3. Jordon, E.L. and P.S.Verma. 1995 Invertebrate Zoology. 12th edn. Sultan Chand & Co.
4. Barnes, R.D. Invertebrates. W.B.Saunders.
5. Kotpal, R.L., (All Series) Protozoa, Porifera, Coelenterata, Annelida, Arthropoda, Mollusca & Echinodermata - Rastogi Publications.

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CC II --PRACTICAL –I -- INVERTEBRATA & CHORDATA

INVERTEBRATA

Dissections:
1. Earthworm – Nervous systems
2. Cockroach / Prawn – Nervous system

Mountings:
1. Earthworm : Body setae, penial setae
2. Cockroach : Mouthparts
3. Prawn : Appendages

Spotters:
1. Protozoa : Paramecium, Paramecium. Conjugation, Paramecium. Binary fission, Euglena
2. Porifera : Sponge gemmule, Sponge spicules, Sycon
3. Coelenterata : Obelia entire, Physalia, Porpita, Sea anemone, Aurelia, Madrepora, Fungia
4. Platyhelminthes: Liverfluke, Tapeworm, Tapeworm scolex, Planaria
5. Nematyhelminthes: Ascaris (Male and female), Filarial worm, Enterobius
6. Annelida : Nereis, Nereis parabodium, Heteronereis, Cheatopterus, Sabella, Arenicola Leech, Trocophore larva.
7. Arthropoda : Prawn, Nauplius larva, Zoea Larva, Mysis larva, Balanus, Crab, Limulus, Bombyx mori, Honey bee, Lac insect, Peripatus, Scolependra, Scorpion, Spider.
8. Mollusca : Pila, Radula, Pearl oyster, Sepia, Chiton, Dentalium, Octopus.
9. Echinodermata : Starfish, Pedicellaria, Sea urchin, Bipinnaria larva, Aristotle's lantern, Sea urchin, Hiothurian, ophiuroid

CHORDATA:

Dissections: Rat – Demonstration of Digestive, Arterial, Venous & Reproductive Systems.

Mountings: Placoid scales, Cycloid / ctenoid scales

Spotters:
1. Prochordata : Amphioxus, Ascidian Balanoglossus Tornaria larva
2. Pisces : Shark, Ray, Clarius, Echnies, Hippocampus Exocoetus, Gambusia, Crap
3. Amphibian : Alytes, Axolotl larva, Hyla, Salamander, Ichlyophis
4. Reptilia : Naja naja, viper, Draco, Chelone mydas
5. Aves : Pigeon, quill feather
6. Mammalia : Bat, Rabbit
7. Dentition : Rabbit, Dog & Man
8. Osteology : Pigeon - Synsacrum
   Rabbit – pectoral & pelvic girdles, forelimb & hind limb bones

Students be introduced to learning of dissections / anatomy adapting CDS / Web sources.

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CC III - CHORDATA

UNIT – I

General characters of Chordata and its outline classification

Prochordata : General characters and its outline classification.

Detailed study : Amphioxus and Ascidian.

UNIT – II

Vertebrata : General characters **Cyclostomata :** Petromyzon. Pisces : General characters and classification upto orders with common examples. Detailed study: Scoliodon

General Topics : Accessory respiratory organs in fishes, Migration in fishes.

UNIT – III

Amphibia : General characters and classification upto orders. Detailed study : Frog. Parental care in Amphibia Neoteny in Salamanders Gymnophiona and their affinities.

Reptilia : General characters and classification upto orders. Type study : Calotes.

General Topics: Identification of poisonous and non-poisonous snakes of South India, Poison apparatus and biting mechanism, Nature of venom and antidotes.

UNIT – IV

Aves : General characters and classification upto sub orders with examples.

Detailed Study : Pigeon

General Topics : Flightless Birds and their distribution, Migration in birds, Flight adaptations in birds.

UNIT – V

Mammalia : General characters and classification upto orders with examples.

Detailed Study : Rabbit. General Topic : Aquatic mammals. Brief study of Monotrames and Marsupials.

Reference Books:

1. Ekambaranatha Iyar, E.K.and T.N.Ananthakrishnan. 1992. A Manual of Zoology, Volume II Chordeta. Viswanathan & Co.
2. Dhami. D.S.and J.K.Dhami. 1978 Chordate Zoology. R.Chand & Co.
3. Jordon, E.L. and P.S.Verma 1995. Chordate Zoology and Elements of Animal Physiology.. S.Chand & co.
4. Muthukumarasami, P. and K. Palanivel.1990. Thandudaiya Vilangugal. BARD.
5. Thangamani T and N. Arumugam 1992 A Text Book of Chordates. Saras Publications.

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CORE COURSE-IV – CELL AND MOLECULAR BIOLOGY

UNIT I

Microscopy – Principles and applications of light and electron microscopes - SEM and TEM. Principles and applications of phase contrast and fluorescent microscopes.
Centrifugation – Differential and density gradient centrifuges : Principles, types and application. Cell types – viruses, prokaryotic and eukaryotic cells – ultrastructural organization.

UNIT II

Plasma membrane – ultrastructure – unit membrane model – fluid mosaic model – functions; permeability, osmosis, passive transport, active transport, permease system, endocytosis, exocytosis, modifications of plasma membrane.
Cytoplasm – Physical and biological properties. Endoplasmic reticulum : ultrastructure, types and functions.

UNIT III

Golgi complex – Morphology, structure, role in secretion and other functions.
Lysosome and Centrosome – Morphology, chemistry and functions.
Mitochondria – Ultrastructure, mDNA and functions, oxidative phosphorylation, Kreb's cycle, fatty acid oxidation, ATP production.
Ribosomes – Ultrastructure and functions – Role in protein synthesis.

UNIT IV

Ultrastructure of interphase Nucleus and nucleolus; chromosome – structure and functions; Giant chromosomes.
Cell divisions – Mitosis and Meiosis; Cell cycle

UNIT V

Molecular structure of DNA.
DNA – Replication, repair mechanisms.
RNA – Types
Transcription and Translation; Genetic code; Cancer Biology.

Reference Books :

1. De Roberties, E.D.P. and E.M.F. De Rohertis 1987. Cell and Molecular Biology
2. Power, C.B., 1989. Essentials of Cytology. Himalaya Publishing House.
3. Verma, P.S. and V.K.Agarwal. 1985. Cytology, S.Chand & Co.,
4. Powar, C.B. (1983), Cell Biology, Himalaya Publishing House, Bombay.
5. Tomar & Singh.(1999). Cell Biology. Rastogi Publication, Meerut.

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CORE COURSE V - PRACTICAL –II - CELL AND MOLECULAR BIOLOGY PHYSIOLOGY AND BIOCHEMISTRY

Cell and Molecular Biology

1. Onion root tip – squash preparation and study of mitosis
2. Grasshopper tests - squash preparation and study of meiosis
3. Chironomous larva - squash preparation of giant chromosome.
4. Spotters : Columnar, Ciliated, squamous epithelium, Cardiac, striated, Nonstraited Muscle, Nervecell, Blood of man and frog. Compound Microscope, Centrifuge, Micrometer, Camera lucida.

Physiology

1. Salivary amylase activity of human saliva in relation to temperature and pH.
2. Enumeration of RBC & WBC
3. Qualitative tests for Ammonia, Urea and Uric acid.
4. Spotters:Haemoglobinometer, kymograph, Sphygmomanometer.
5. Qualitative tests for proteins, carbohydrates and lipids.

Biochemistry

1. Qualitative tests for proteins, carbohydrates and lipids
2. pH measurement of various samples.
3. Spotters: Models of haemoglobin, Amino acids and ATP.

A record of lab work should be maintained and submitted at the time of the practical examination.

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CORE COURSE-VI -- PHYSIOLOGY AND BIOCHEMISTRY

UNIT – I

Nutrition – types – digestion in man – malnutrition – peptic ulcer – appendicitis – liver cirrhosis.
Respiration – transport of O2 and CO2 in man – control – pneumonia – bronchitis.
Circulation – blood composition - types of heart – origin and conduction of heart beat in man – blood pressure – coronary blood vessels – myocardial infarction – ECG, Angiogram, Angioplasty, Bye pass surgery.

UNIT – II

Excretion – types of nitrogenous wastes – structure of the mammalian kidney and urine formation – renal failure – kidney stone – kidney transplantation.
Osmo-ionic regulation in fresh water, marine, estuarine and terrestrial organisms (one example for each)
Muscle Physiology – types of muscles – ultra structure of skeletal muscle – chemistry and energetics of muscle contraction – physical principles of muscle contraction.

UNIT – III

Co-ordinating systems – Nerve physiology- neuron – types – impulse transmission – synapse – synaptic transmission- reflex action. Phono and Photoreception in man.
Endocrine Physiology – endocrine glands in man – secretions and disorders.

UNIT – IV

Structure, composition and classification of carbohydrates, proteins and fats. Calorific values – balanced diet – source, function and deficiency diseases of the vitamins.

UNIT – V

Metabolism – carbohydrates, proteins and fats – energy kinetics.
Enzymes – characteristics – mode of action – theories – factors affecting enzyme action.

Reference:

1. Lehninger L. 1990. Biochemistry. W.H. Freeman & Co.,
2. Hoar, W.S. 1983. General and Comparative Physiology. Prentice Hall of India.
3. Harper, H.A. 1993. Review of Physiological Chemistry. Muruzen Ascian Ed.
4. Nagabushanam R. 1991. Animal Physiology. S. Chand & Co.
5. Agarwal.R.A,A.K.Srivastava and Kaushal Kumar.2005. Animal Physiology and Biochemistry.S.Chand&Co. New Delhi.
6. Berry.A.K. A text book of Animal Physiology Emkay Publications, New Delhi-51.

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CORE COURSE VII – GENETICS AND EVOLUTION

UNIT – I

Linkage, crossing over and chromosomal mapping : Definition – Mechanism with Drosophila as example - Chromosome mapping – 3 point test cross – problems. Chromosome: – Numerical changes : Aneuploidy, euploidy (haploidy and poly ploidy). Human chromosome : Sex chromosome – Barr bodies – Heterochromatinization – chromosomal – abnormalities.

UNIT – II

Microbial genetics : DNA as the genetic material Recombination in bacteria : Transformation, conjugation sexduction – Transduction – Recombination in bacteriophage – Mechanism of recombination, lytic and lysogenic cycles.

UNIT – III

Molecular genetics : Fine structure of gene – cistron, recon and muton - Gene expression and regulation in prokaryotes – Operon model – Lac and Trp Operon – Gene regulation in Eukaryotes – Britten and Davidson's model; histones and gene amplification. Gene mutations – spontaneous mutation: Base pair substitution,Frame shift mutation, and inducible mutations: Nitrous oxide, DMS, Acridine orange; suppressor mutations. Mutagens.

UNIT – IV

Chemical origin of life; Lamarckism; Darwinism; de Vries theory of mutation; Modern synthetic theory of evolution.

UNIT – V

Mimicry and animal colouration; Species concept; Isolating mechanisms; Evolution of horse; Evolution of man.

Text Books :

1. Verma P .S. and Agarwal, V.K. 1997 – Genetics S.Chand & Co., New Delhi.

Reference:

1. Friefelder. D. 1997. Microbial Genetics; Narosa Publishing, New Delhi.
2. Goodenough, U.1997. Genetics. Saunders Coelege Publishing International, NewYork.
3. Kumar, H.D. 1998. Molecular Biology and Biotechnology. Vikas publishing House,New Delhi
4. Lewin, B. 1998. Gene VI . Wiley Eastern Ltd., New Delhi.
5. Rothwell, N.V.1979. Human Genetics. Prentice Hall of India, New Delhi.
6. Verma, P.S. and V.K. Agarwal. 1997. Genetics. S.Chand & Co. New Delhi.
7. Gupta P.K. 1995-96 Genetics, Rastogi publication, Shivaji Road, Meerut 250 002.
8. Strickberger, M.W. 2002 Genetics (3rd edition). Prentice Hall of India, New Delhi.
9. Arumugam, N. 1989. Organic Evolution –. Saras publication, Nagercoil.
10.Strickberger, M.W. 2000. Evolution. Jones and Bartlett Publishers.

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CORE COURSE VIII - ENVIRONMENTAL BIOLOGY & BIODIVERSITY

UNIT – I

Ecology and Environmental Science – Definition - Scope – Branches – Abiotic factors – Water – Soil – Temperature – Light. Biotic factors – Animal relationship – Symbiosis – Commensalisms – Mutualism –Antagonism – Antibiosis – Parasitism – Predation – Competition

UNIT – II

Ecosystem –Definition Structure – Pond ecosystem – Primary production – Secondary production –Food chain – Food web – Trophic levels – Energy flow – Pyramid of biomass – Pyramid of energy – Biogeochemical cycle – Nitrogen and phosphorus.
Community Ecology: Characteristics, Ecological succession.

UNIT – III

Population Ecology – Definition – Density – Estimation –Natality – Mortality – Age distribution - Age pyramids – Population growth – Population equilibrium – Pollution – Types – Sources – Effects- Air – Water – Land – Noise – Thermal – Pesticide – Radioactive – Green house effect - Ozone and its importance – Global warming – Acid rain – Bio accumulation – Bio magnification, Biological control.

UNIT –IV

Biodiversity : Concept, types and components, Global "biodiversity hotspots". IUCN species categories – rare, endangered and threatened; Animal extinction – causes.
Wild life conservation and management – Remote sensing techniques;

UNIT – V

Diversity of Invertebrate: A brief account of Diversity among Invertebrates and Chordates.
Animal Biodiversity Policy and Management in India: National Biodiversity Act of India.
Biodiversity Register.

References:

1. Clarke, G.L. 1954 – Elements of Ecology, John Wiley & Sons. N.Y.
2. Kendeigh, S.C., 1961 – Animal Ecology, Prentice Hall.
3. Odum, E.P., 1971 – Fundamentals of Ecology., W.B. Saunders Company, Philadelphia.
4. Rastogi, V.B. and M.S. Jayaraj, 1989 – Animal Ecology and distribution of animals, Kedarnath Ramnath.
5. Sharma, P.D., 1990 – Ecology and Environment, Rastogi Publications, Meerut.
6. Southwick, C.H., 1976 – Ecology and Quality of Environment D. Van Nostrand Co.
7. Verma, P.S. and V.K. Agarwal, 1996 – Principles of Ecology, S.Chand & Co., New Delhi.
8. S.S. Purohit, D.H. Shanmi and A.K.Agarwal, 2004 – Environmental Sciences : A New Approach, Agrobix, Jodhpur.
9. Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad.
10. Krishnamurthy, K.V. 2003, Introduction to Biodiversity. Oxford and IBH.

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CORE COURSE IX -- BIOPHYSICS AND BIOSTATISTICS

UNIT – I

Colloids – description – types, properties: electrokinetic properties, Donnan equilibrium, Tyndall effect, surface tension, Brownian movement, filtration, osmosis, dialysis, adsorption. Components of light: Beer and Lambert's law of light absorption.

UNIT – II

Laws of thermodynamics, Biophysical principles in neuro muscular function and vision – Bioelectricity – electrical phenomena – membrane transport.

UNIT – III

Biostatistics: Primary and secondary data. Type of sampling: Random and stratified random sampling. Tabulation of data: Histogram, polygon, pie diagram. Types of variables: Continuous and discontinuous variables, Qualitative and quantitative variables.

UNIT – IV

Measures of Central tendency: Mean, Mode, Median - Uses and calculation of: Mean, SD, SE, variance and CV.

UNIT – V

Common statistical tools: Chi-square, t test, Tests of significance – ANOVA – Correlation and Regression.

References:

1. Daniel, M. 1992 – Basic Biophysics and Biologists, Wiley International, New Delhi.
2. Das, D. 1996 – Biophysics and Biological Chemistry, Academic Publishers, Calcutta.
3. Snedecor, G.W. and W.G. Cochran (1967) – Statistical Methods, Oxford & IBH Publishing, New Delhi.
4. Zar, J.H. (1974) – Biostatistical analysis – Prentice Hall Inc., New Jersey, USA.

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CORE COURSE-X PRACTICAL –III GENETICS, EVOLUTION, ENVIRONMENTAL BIOLOGY, BIODIVERSITY BIOPHYSICS AND BIOSTATISTICS.

Genetics

1. Drosophila – male and female identification, Mutant forms (from pictures),Genetic importance.
2. Observation of simple Mendelian traits in man.
3. Human Karyotypes : normal, Down's, Klinefelters and Turner, is syndrome.
4. Recording of Mendelian traits in humans.

Evolution

1. Animals of evolutionary importance: Peripatus, Limulus, Archaeopteryz.
2. Homologous organs: Forelimbs of Frog, Pigeon and Whale.
3. Analogous organs organs: Wings of Insects and Birds.
4. Fossils: Trilobite, Nautilus.
5. Mimicry: Leaf insects, Stick insects, Monarch and Viceroy butterfly.
6. Colouration: Chameleon, Lycodon.

Environmental Biology

1. Estimation of dissolved oxygen
2. Estimation of salinity
3. Estimation of Calcium.
4. Mounting and identification of plankton (fresh water / marine)
4. Spotters: Animal association, Intertidal fauna, Secchi disc,Maximum and minimum thermometer, Barometer, Luxmeter.
5. Visit to a local polluted area – Solid waste / sewage treatment plant
6. Construction of a food web diagram based on a field visit.

Biodiversity

Field collection methods; Identification of common animals - Soil invertebrate diversity, diversity of birds and mammals in parks / botanical gardens, threats to local biodiversity – Field visit is compulsory.

Biophysics

1. Verification of Beer-Lambert's law using Photocolorimeter.
2. Paper chromatographic separation of amino acids.
3. Spotters: Spectrophotometer, pH meter, and electrophoretic unit.

Biostatistics

1. Construction of graph and bar diagram.
2. Calculation of mean, median, mode, standard deviation and standard error Chi-Square test using plant leaves or molluscan shells.
3. Calculation of correlation between shell length and weight.

A record of lab work should be maintained and submitted at the time of the practical examination

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CORE COURSE XI – DEVELOPMENTAL BIOLOGY AND IMMUNOLOGY

UNIT I

Gametogenesis – Spermatogenesis – Cells in seminiferous tubules, spermiogenesis, structure and types of sperm.

Oogenesis – Growth of oocyte, vitellogenesis, organization of egg cytoplasm. Polarity and symmetry – Maturation of egg, egg envelops. Types of chordate eggs.

Fertilization – External and internal fertilization, sperm – egg interaction, physiological changes in the organization of egg cytoplasm, theories of fertilization.

UNIT II

Cleavage – Patterns of cleavage – radial, spiral and bilateral; Types – meroblastic, holoblastic and superficial Factors affecting cleavage; Chemodifferentiation.

Blastulation – Types of blastula – Presumptive organ forming areas in frog and chick – Fate maps.

Gastrulation – Gastrulation in frog and chick. Morphogenetic movements – Epiboly, emboly;

Organogenesis – Development of eye

Organizer concept; Embryonic induction.

UNIT III

Foetal membranes in chick; Placentation in mammals; Concept of test-tube baby; Nuclear transplantation; Factors involved in teratogenesis.

UNIT – IV

History and scope of immunology – Immunity : types, innate and acquired, passive and active. Lymphoid organs : primary and secondary (thymus, bone marrow, Bursa, spleen, tonsil, lymph node, Payer's patches).

UNIT – V

Immunoglobulins, structure, functions – Antigen – antibody reaction – Immunology of infectious diseases, AIDS.

A brief account of Humoral immune response – cell mediated immune response.

Reference Books:

1. Arumugam.N. 1998. Developmental Biology, Saras Publications, Nagercoil.
2. Balinsky, B.I. 1981. An Introduction to Embryology. W.B. Saunders Company. Philadelphia.
3. Berry.A.K.2007. An Introduction to Embryology, Emkay Publications, New Delhi-51.
4. Verma, P.S. and Agarwal V.K. 2005. Chordate Embryology (Developmental biology) S.Chand & Company Ltd., New Delhi.
5. Berry.A.K. 20005 AText book of Immunology, Emkay Publications, New Delhi-51.
6. Dulsy Fatima &N.Arumugam, 2000. Immunology, Saras Publications, Nagercoil.
7. Nandhini, S. (1994) – Immunology : Introductory Text Book, New Age Int (P) Ltd. Publications, New Delhi.
8. Chakravarthy, A.K. (1996) – Immunology, Tata Mc Graw Hill Publishing Co. Ltd., New Delhi.
9. Stites, D.P. and Abbas, I. (1991) – Basic and Clinical Immunology, Prentice Hall International Inc.

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CORE COURSE XII -- MICROBIOLOGY AND BIOTECHNOLOGY

UNIT – I

Introduction - History and scope of microbiology – General structure of microbes (bacteria, viruses, algae, fungi and protozoans) – Outline classification of each group and identification – Bacterial growth, culture media, continuous and batch culture techniques, bacterial growth curve.

UNIT – II

Food microbiology : food poisoning, food spoilage, food preservation. Industrial microbiology : production of antibiotics with reference to penicillin, industrial production of methanol. Soil microbiology : role of soil microbes in Nitrogen fixation. Medical microbiology : diseases caused by bacteria, cholera, tuberculosis, leprosy, tetanus; viruses, jaundis, small pox, AIDS, Poliomyeletis, causative organisms, symptoms, impact on the host and control measures.

UNIT – III

Definition – Scope – Biotechnology in India – Gene cloning vectors - Plasmids PBR 322 - cosmids PJB 8 – SV40 - Principles and Methods of gene cloning – application. Importance of Gene Bank.

UNIT – IV

Transgenic plants – herbicide, insecticide and virus resistant plants – Transgenic animals mice, cattle, fishes and poultry. Socio-economic issues of Biotechnology.

UNIT – V

DNA finger printing – methodology and application – methods of gene therapy – biosensors – types and application of biochips. Recombinant Vaccines.

Reference Books:

1. Ananthanarayanan, R and Jayaram Panicker, C.K. (1999) – A Text Book of Microbiology, Orient Longman.
2. Mani, A., Narayanan, L.M., Selvaraj, A.M. and Arumugam, N. (1996) – Microbiology, Saras Publications.
3. Sharma, P.D. (1995) – Microbiology, Rastogi & Company, Meerut.
4. Balasubramania. D. 1996. Concepts of Biotechnology, University Press (India) Ltd., Hyderabad.
5. Dubey, R.C. 1995. Text Book of Biotechnology. S. Chand & Co.
6. Arumugam. Biotechnology. Saras Publications.
7. Vijayaraman, Chellammal K.S and Manikkili. P. 1998. Uyiriyae Thozhilnutpam. Chimeeraa, Trichy.

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CORE COURSE-XIII PRACTICAL –IV DEVELOPMENTAL BIOLOGY&IMMUNOLOGY. MICROBIOLOGY & BIOTECHNOLOGY.

Developmental Biology

1. Observation of the structure of live spermatozoa of Calotes/Bull.
2. Observation of prepared micro slides to study
   a. Egg, cleavage, blastula and yolk plug stage in frog.
   b. Egg, 24 hrs, 36 hrs, 48 hrs, 72 hrs and 96 hrs developmental stages in chick.

Immunology

1. ABO Blood grouping and the immunological basis of blood grouping.
2. Rh blood typing and its immunological significance.
3. Observation of lymphoid organs in rat.
4. Spotters: Immuno Electrophoresis, Rocket electrophoresis (from picture),

Microbiology and Biotechnology

1. Preparation of culture medium.
2. Fixing and staining of bacteria using simple stain.
3. Observation of bacteria structure in a smear using negative staining.
4. Differentiation of bacteria in a smear using Gram staining.
5. Serial dilution technique- Demonstration.
5. Spotters: Autoclave, Petriplate, Micropipette, Laminar flow, Inoculation loop.

Biotechnology

1. Isolation of DNA- Demonstration only.
2. Transgenic plants –Observation from pictures.
3. Transgenic animals –Observation from pictures.
4. Spotters: Biogas unit, Bioreactor, Particle bombardment gun.

A record of lab work should be maintained and submitted at the time of the practical examination.

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MAJOR BASED ELECTIVE – I ECONOMIC ENTOMOLOGY

UNIT – I

Classification of familiar pest and beneficial insects up to orders and their diagnostic characters.

UNIT – II

DESTRUCTIVE INSECTS: - Bionomics and life cycle of the common pests of paddy and coconut. Common pests of brinjal – pests of stored products.

UNIT – III

INSECT PESTS MANAGEMENT: Insect pest control- Natural ; applied –mechanical, culturalcontrol,chemical control and Biological control. Integrated pest management.

UNIT – IV

HOUSEHOLD INSECT PESTS: Mosquito, cockroach, housefly, termites – damages caused and their control measures.

UNIT – V

BENEFICIAL INSECTS:

1. Economic importance of honey bee, silkworm and lac insect.
2. Insects as pollinators, predators, parasites, weed killers, soil builders and scavengers.

Reference:

1. Chapman R.F., 1993. The Insects. Structure and Funcations. ELBS., London.
2. Chandler A.C. and Read C.P. 1961. Introduction to Parasitology. John Wiley and Sons, New York.
3. David, B.V., Muralirangan, N.C. and Meera Muralirangan. 1992. Harmful and beneficial Insects. Popular Book Depot.
4. David, B.V. and T. Kumaraswami. 1998. Elements of Economic Entomology. Popular Book Depot, Madras.
5. David, B.V. 1992. Pest management and pesticides: Indian Scenario, Namrutha publications.
6. Krishnan, N.T., 1993. Economic Entomology. JJ. Publications, Madurai.
7. Mani, M.S., 1973. General Entomology. Oxford & IBH.
8. Nayar, K.K., Ananthakrishnan T.N. and David, V.D. 1990. General and applied Entomology. Tata Mc Craw Hill, New Delhi.
9. Ramakrishnan Ayyar, T.V., 1984. Handbook of Economic Entomology for South India. International Books and Periodicals Supply Service, New Delhi.
10. Shukla.G.S & V.B.Upadhyay,1998. Economic Zoology,Rastogi Publication, Meerut.

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MAJOR BASED ELECTIVE –II –AQUACULTURE

UNIT – I

Importance of aquaculture – over - exploitation of wild fish stocks – advantages of aquaculture – production trends in the world and in India. Scope for aquaculture in India. Basic Fish farm design : selection of site, grow - out and nursery ponds.

UNIT – II

Cultivable species of fish, crustaceans, molluscs and algae. Selection of candidate species for aquaculture. Types of farming: extensive, intensive and semiintensive culture. Integrated farming. Advantages of polyculture, monosex and monoculture.

UNIT – III

Culture of carp species –oyster culture: pearl oyster. Prawn culture: the problems in penaeid prawn culture due to socio-economic and environmental problems. Freshwater prawn culture. Potential for ornamental fish culture. Common species for ornamental fish farming.

UNIT – IV

Fish disease management : Common bacterial, viral, fungal, protozoan and crustacean diseases, their symptoms and treatment. Water quality maintenance. Importance and composition of feeds; types of feed: wet and dry feeds.

UNIT – V

Marketing the products: Marketing the fish to local markets and for export. Harvesting and transport. Quality control and norms of MPEDA for export of fishes. CANNING AND FREEZING.

References:

1. Arumugam.N. 2008. Aquaculture Saras Publications, Nagercoil.
2. Rath, R.K. (2000) Freshwater Aquaculture. Scientific Publishers, (India), PO. Box.91, Jodhpur.
2. Jhingran, AVG (1991) Fish and Fisheries of India. Hindustan Publishing Co.
3. Baradach, JE, JH Ryther and WO Mc Larney (1972) Aquaculture. The farming and Husbandry of Freshwater and Marine Organisms. Wiley Interscience, New York.

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MAJOR BASED ELECTIVE –III – APICULTURE

UNIT – I

Honeybee – Systematic position – Species of Honey bees – Life history of Honey bee – behaviour – swarming – Pheromone.

UNIT – II

Bee colony – Castes – natural colonies and their yield – Types of bee hives – Structure – location, care and management.

UNIT – III

Apiary – Care and Management – Artificial bee hives – types – construction of space frames – Selection of sites – Handling – Maintenance – Instruments employed in Apiary – Extraction instruments.

UNIT – IV

Honey – Composition – uses – Bee wax and its uses – yield in national and international market – Diseases of honey bees and their control methods.

UNIT – V

Apiculture as Self - employment venture – Preparing proposals for financial assistance and funding agencies – Economics of bee culture.

Reference:

1. Cherian, R. & K.R. Ramanathan, 1992 – Bee keeping in India
2. Mishra, R.C., 1985 – Honey bees and their management in India, ICAR
3. Singh, S. 1982 – Bee Keeping – ICAR
4. Sharma, P. and Singh L. 1987 – Hand book of bee keeping, Controller Printing and Stationery, Chandigar.
5. Rare, S. 1998 – Introduction to bee keeping, Vikas Publishing house.
6. Shukula,G.S. and Upadhyay V.B. (1997) Economic Zoology, Rastogi Publications,Meerut

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NON MAJOR ELECTIVE I- COMMUNICABLE DISEASES AND MANAGEMENT.

UNIT – I

Air borne diseases: Influenza-Measles-Mumps-Small pox- Tuberculosis-Diphtheria-Meningitis-Whooping cough.-Treatment – Prophylaxis -Control measures.

UNIT – II

Food , water and air borne diseases: Polio – Cholera-Botulism-typhoid-Amoebosis-Tetanus-Anthrax.-Treatment- Prophylaxis- Control measures

UNIT – III

Insect borne diseases: Yellow fever- Dengue fever- Malaria- Filariasis-Sleeping sickness-Treatment- Prophylaxis management.- Control measures

UNIT – IV

Sexually transmitted diseases:Gonorrhea- Chancroid- Vaginitis- Syphilis. Treatment – Prophylaxis

UNIT – V

Direct contact disease: Viral hepatitis- Rabies- Cold sores- AIDS. Treatment – Prophylaxis.

References:

1. M.J.Pelezar and R.D.Reid, Microbiology – McGraw Hill Pub.
2. Larry McKane and Judy Kandel . Microbiology – McGraw Hill Publ. New York.
3. R.C.Dubey and D.K.Maheshwari. A Text Book of Microbiology – S.Cand & co. Ltd. New Delhi.
4. Mani.A, A.M.Selvaraj,L.Narayanan, N.Arumugam. Microbiology – Saras Publ. Nagercoil.
5. Shukla.G.S and V.B.Upadhyay. Economic Zoology.Rastogi publ. Meerut

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NON MAJOR ELECTIVE II BASIC NUTRITION

UNIT – I

Introduction and scope. Carbohydrates, proteins and lipids – classification – sources – digestion and absorption – daily requirements –

UNIT – II

Essential amino acids – essential fatty acids. Vitamins and Minerals – sources and functions – deficiency status.

UNIT – III

Calorific values of food – Basal metabolic rate – Energy requirements of infants, children and Adult human.

UNIT – IV

Nutritional requirements: infants, school children, pregnant and lactating mothers and the aged – Health education – Malnutrition- Kwashiorkor and Marasmus

UNIT – V

Nutritional value of foods: Cereals, fruits, milk, egg, meat, fish. Balanced diet.

Reference:

1. Gopalan C., B.S.Ramasastri, and S.C.Balasubramanian. 1971. Nutritive value of Indian foods. National Institute of Nutrition, Hyderabad.
2. Gopalan, D. and K.Vijayaragavan. 1971, Nutrition atlas of India. ICMR., New Delhi.
3. Ghosh,S. 1981. The feeding care of infants and young children. UNICEF, New Delhi.
4. Mudambi, S.R. 1995. Fundamentals of Food and nutrition. New age International, New Delhi.
5. Swaminathan, M., 1989. Handbook of food and nutrition. Bappco., Bangalore.
6. Swaminathan, M., 1974. Essentials of food and nutrition. Vol. I and II. Ganesh and company, Madras.

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