

**ST. JOSEPH'S COLLEGE OF ARTS & SCIENCE (AUTONOMOUS)
CUDDALORE-1**



**DEPARTMENT OF ZOOLOGY
SYLLABUS 2018-2019**

DETAILS OF THE BOARD OF STUDIES (2018-2019)

DEPARTMENT OF ZOOLOGY

NAME OF THE BOARD : UG Board

S. No	Category	Name	Affiliation	Term
1.	Chairman	Mrs. P. Thenmozhi	Asst. Professor & Head, Department Of Zoology St. Joseph's College of Arts & Science (Autonomous)Cuddalore-1	
2.	University Nominee	Dr. R. Kannan	Prof and Head & Department of Zoology, Periyar Govt. Arts. College, Cuddalore-1	3 Years
3.	Subject Expert	1. Dr. G. Gunasekaran	Professor Department of Zoology Annamalai University, Chidambaram	
		2. Dr.M.Thirumavalavan	Associate Professor Dept of Zoology Bharathidasan College of Arts& Science for Women, Pondicherry.	
4.	Subject Expert (Industry/ corporate Sector)	-	-	
5.	Alumni Rep..	-	-	
6.	Members (Internal)	1. Dr. A. Arulprakash	Asst. Professor Department of Zoology St. Joseph's College of Arts & Science (Autonomous)Cuddalore-1	
		2. Mr. T. Ganeshkumar	Asst. Professor Department of Zoology St. Joseph's College of Arts & Science (Autonomous)Cuddalore-1	

**ST. JOSEPH'S COLLEGE OF ARTS & SCIENCE (AUTONOMOUS)
CUDDALORE-1**

DEPARTMENT OF ZOOLOGY

MINUTES OF THE BOARD OF STUDIES

The board of studies meeting for the Academic year 2018-'19 was conducted in the Department of Zoology on **20.02.2018** at **10.30 am.** in the presence of the University Nominee **Dr. R. Kannan**, Asst. Professor & Head, Department of Zoology, Periyar Arts College, Cuddalore, The Subject Experts **Dr. G. Gunasekaran**, Professor, Department of Zoology, Annamalai University, Chidambaram, **Dr. M. Thirumavalavan**, Associate Professor, Dept of Zoology, Bharathidasan College of Arts & Science for Women, Pondicherry. **Mrs. P. Thenmozhi**, Asst. Professor & Head, Department of Zoology, St. Joseph's College Of Arts & Science (Autonomous) Cuddalore, **Dr. A. Arulprakash**, Asst. Professor, Department of Zoology, St. Joseph's College Of Arts & Science (Autonomous) Cuddalore and **Mr. T. Ganeshkumar**, Asst. Professor, Department of Zoology, St. Joseph's College Of Arts & Science (Autonomous) Cuddalore. Various discussions were carried out regarding the syllabus and the curriculum and finally it was resolved to retain the existing syllabus without any addition, deletion or modifications for the allied papers Classical Genetics and Biostatistics, Solid Waste Management for II B.Sc. Microbiology and Advanced Zoology for II B.Sc. Biochemistry and Environmental studies skill paper.

The following resolutions were made in the board of studies meeting

1. Minor changes were suggested in the credit based hours for each paper.
2. As far as the syllabus is concerned some new topics were added and a very few topics were deleted after detailed discussions by the subject experts.
3. Certain minor modifications were suggested in the elected papers of the core subjects and also the skill based papers.
4. Few recommendations were put forth by the university nominee in terms of some generalized points for reforms.
5. It is also resolved that the II and III year core and elective papers may be scrutinized again it required in the forthcoming board of studies meetings.

The meeting came to the end around 2.30 p.m.

**ST. JOSEPH'S COLLEGE OF ARTS & SCIENCE (AUTONOMOUS)
CUDDALORE-1
B.Sc. ZOOLOGY DEGREE COURSE**

**CURRICULUM DESIGN TEMPLATE (TENDATIVE)
B. Sc. Zoology – Course of study and Scheme of Examinations**

(With effect from 2018 - 2019)

SEME-STER	SUBJECT CODE	SUBJECT	PAPER	HOURS	CREDITS	EXAM HOURS	MARKS
I	LT101T	Language - I		4	3	3	100
	LE101T	English – I		4	3	3	100
	18ZO101	Core - I	Invertebrata	8	5	3	100
	ACH101T	Allied - I (Compulsory)	Chemistry - I	5	3	3	100
	VE101T	Skill Based Subject	Value Education	3	2		100
	18ZOP21	Core practical- I	Practical-I Invertebrata and Chordata	3			
	ACHP101	Allied Chemistry	Practical – I	3	2	3	100
		Total for Semester I			30	18	
II	LT202T	Language – II		4	3	3	100
	LESOST	English – II		4	3	3	100
	18ZO201	Core – II	Chordata	8	4	3	100
	ACH202T	Allied – II (Compulsory)	Analytical Chemistry -II	5	3	3	100
	EPD201T	Skill Based Subject	Dynamics of Personality	3	2	3	100
	18ZOP21	Core Practical – I	Practical – I Invertebrata and Chordata (Contd.)	3	5	3	100
	ACHP202S	Allied Chemistry	Practical – II	3	2	3	100
		Total for Semester II			30	22	
III		Language – III		4	3	3	100
		English – III		4	3	3	100
		Core – III	Cell and Molecular Biology	8	4	3	100
		Allied - III	Botany I	5	4	3	100

		(Compulsory)						
		Skill Based Subject	Environmental Studies	3	2	3	100	
		Core Practical – II	Practical – II Cell and Molecular biology, Genetics and Biotechnology	3	-	3		
		Allied Practical – III	Botany Practical	3		3		
		Total for Semester III		30	16			
IV		Language – IV		4	3	3	100	
		English – IV		4	3	3	100	
		Core – IV	Genetics and Biotechnology	8	4	3	100	
		Allied – IV (Compulsory)	Botany II	5	4	3	100	
		Skill Based Subject (Optional)	1	Bio fertilizer Production	3	2	3	100
			2	Apiculture				
		Core Practical – II	Practical – II Cell and Molecular biology, Genetics and Biotechnology (Contd.)	3	5	3	100	
		Allied Practical – III	Botany Practical	3	2	3	100	
	Total for Semester IV		30	23				
V		Core – V	Biostatistics and Computational Biology	5	5	3	100	
		Core – VI	Developmental Biology and Immunology	5	5	3	100	
		Core – VII	Animal Physiology	5	5	3	100	
		Elective – I (Compulsory)	Applied Entomology	5	5	3	100	
		Elective (Optional)	I I Biophysics	4	4	3	100	

			A				
			I				
			I	Biochemistry			
			B				
			I				
			I	Microbiology			
			C				
		Core Practical – III		Practical – III Animal Physiology, Developmental Biology and Immunology	3	-	
		Core Practical – IV		Practical – IV Environmental Biology and Economic Zoology	3	-	100
		Total for Semester V			30	24	3
VI		Core – VIII		Environmental Biology	5	5	3
		Core – IX		Economic Zoology	5	5	3
		Core – X		Evolution	5	5	3
		Elective –III (Compulsory)		Aquaculture	5	5	3
		Skill based subject(optional)		A)Sericulture	4	4	3
				B)Public Health and Hygiene			
		Core Practical – III		Practical – III Animal Physiology and Developmental Biology and Immunology (Contd.)	3	5	3
		Core Practical – IV		Practical – IV Environmental Biology and Economic Zoology (Contd.)	3	5	3
		Extension Activities				3	
		Total for Semester VI			30	37	

PROGRAMME OUTCOMES (POs)

UNDER GRADUATE PROGRAMME OUTCOMES (POs)

PO1: The Students find their footings in life through wholesome and integral education.

PO2: The Students are encouraged to climb the academic ladder by pursuing Post Graduate Education in different domain.

PO3: The Students are academically and technically equipped to steer the Nation along the path of progress and peace.

PO4: The Students are trained to be Employable and Entrepreneurial Citizen of the Nation.

PO5: The Students are fortified intellectually, ethically and socially to face the challenges in life.

PROGRAMME SPECIFIC OUTCOMES (PSOs)

PROGRAMME SPECIFIC OUTCOMES (PSOs)

PSO1: *Disciplinary knowledge*

The students will develop their ability to understand the basic concepts of zoology viz., animal kingdom, systematic classification, anatomy, morphology, physiology, embryology, evolution, ecology etc.

PSO2: *Critical thinking*

The students will obtain knowledge to express their concepts effectively by understanding their subject with various disciplines.

PSO3: *Scientific reasoning*

The students will have ability to identify, classify and describe various organisms from different phylum by understanding their structure and function of various organ system and relationship with their environment

PSO4: *Research-related skills*

The students will develop ability to explain structure and functions of a cell and organ (from molecular level to the organ system level) as well as the process of development of an embryo

PSO5: *Problem solving*

The students will acquire knowledge in cell biology, molecular biology, genetics, biotechnology, microbiology, biochemistry, biostatistics, developmental biology, immunology, animal physiology, environmental biology, evolution etc., which helps to

develop their ability to analyse and solve various biological problems.
PSO6: <i>Cooperation/Team work</i>
The students will able to work effectively and respectfully with diverse team during vermiculture and mushroom culture practices
PSO7: <i>Information/digital literacy</i>
The students will able to use various biological softwares to analyze the data by obtaining knowledge in biostatistics, computational biology and biotechnology.
PSO8: <i>Self-directed learning</i>
The students will able to work independently to enhance their expertise through various activities like seminars, assignments, etc., and they can manage a project like vermiculture, mushroom culture, aquaculture etc., on completion of the course.
PSO9: <i>Moral and ethical awareness/reasoning</i>
The students will have the knowledge to minimize the environmental issues like global warming, pollution, degradation of natural resources, and helps in conservation endangered species, afforestation etc.
PSO10: <i>Lifelong learning</i>
The students will able to apply their knowledge of biological sciences in various disciplines like vermiculture, mushroom culture, aquaculture, apiculture, agriculture and medicine. And contribute the knowledge for Nations development.

COURSE OUTCOME

I B.Sc (Zoo)	INVERTEBRATA	18ZO101
SEMESTER - I		HRS/WK - 8
CORE - I		CREDIT - 4

Objective:

- Enlightening the knowledge classification of animals by understanding the basic concepts of biosystematics
- To identify invertebrates and classify them up to the classes with the basis of systematic

Course Outcome

On completion of the course students will be able

CO1: To describes the principles of taxonomy and the phylum protozoa

CO2: To identify the phylum Porifera and Coelenterate with taxonomic keys

CO3: To classify the phylum Helminthes and Annelida upto classes with examples

CO4: To classify the phylum Arthropoda upto classes with examples

CO5: To describe the phylum Mollusca and their economic importance and Echinodermata

SEMESTER I	COURSE CODE:					INVERTEBRATA										HOURS: 8	CREDITS: 4
	PROGRAMME OUTCOMES(PO)					PROGRAMME SPECIFIC OUTCOMES(PSO)											
COURSE OUTCOMES	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8	PSO 9	PSO 10		
CO1	5	5	5	5	4	5	5	5	4	4	5	4	5	4	5	4.7	
CO2	5	5	5	5	4	5	5	5	4	4	5	3	5	4	5	4.6	
CO3	5	5	5	5	4	5	5	5	4	4	5	3	5	4	5	4.6	
CO4	5	5	5	5	4	5	5	5	4	4	5	3	5	4	5	4.6	
CO5	5	5	5	5	4	5	5	5	4	4	5	3	5	4	5	4.6	
Mean Overall Score																4.6	

This Course is having **VERY HIGH** association with Programme Outcome and Programme Specific Outcome

Association	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%
Scale	1	2	3	4	5
Interval	0<=rating<=1	1.1<=rating<=2	2.1<=rating<=3	3.1<=rating<=4	4.1<=rating<=5
Rating	Very Poor	Poor	Moderate	High	Very High

UNIT – I

Principles of Taxonomy – Binomial nomenclature-rules of nomenclature – classification of the animal kingdom. **PROTOZOA:** General characters and classification upto classes with examples. **Type study- paramecium**, parasitic protozoans [Entamoeba, Trypanosoma and plasmodium]

UNIT – II

PORIFERA: General characters and classification upto classes with examples. **Type study - sycon**, spicules and canal system in sponges. **COELENTERATA:** General characters and classification upto classes with examples. **Type study – Obelia**, polymorphism in coelenterates – corals and coral reefs.

UNIT – III

HELMINTHES: General characters and classification upto classes with examples. **Type study – Taenia solium**. helminthes parasites (Wuchereria bancrofti, Ascaris and Faciola). **ANNELIDA:** General characters and classification upto classes with examples. **Type study: Earthworm**, metamerism in Annelids, parasitic adaptations of Leech.

UNIT – IV

ARTHROPODA: General characters and classification upto classes with examples. **Type study – Prawn**, Peripatus and its affinities, Mouth parts of insects. Crustacean larvae and their importance.

UNIT – V

MOLLUSCA: General characters and classification upto classes with examples. **Type study – Fresh water Mussel**, Economic importance of mollusca, torsion in mollusca. **ECHINODERMATA:** General characters and classification upto classes with examples. **Type Study- Star fish**, Echinoderm larvae and their significance. **Reference Books:**
Ekambaranatha Ayyar.M. and T.N. Ananthkrishnan, 1992. Manual of Zoology Vol.1 [Invertebrata], Viswanathan [Printers and Publishers] Pvt. Ltd.; Madras.
Jordan, E.L. and P.S.Verma, 1993. Invertebrate Zoology, 12th Edition. S.Chand and Co.Ltd., NewDelhi.
Kotpal, R.L. 1988-1992 Protozoa, Porifera, Coelenterata, Helminthes, Annelida, Arthropoda, Mollusca, Echinodermata. Rastogi Publications, Meerut.
Parker and Haswell, 1964 Test Book of Zoology. Vol.1 [Invertebrata]. A.Z.T; B.S.Publishers and distributors, New Delhi.
L.A Borradiile and F.A.Pott, 1972 The Invertebrates. Cambridge University Press. UK.
Adam Sedgwick. A student text book of Zoology. Vol.I and II. Central book Depot. Allahabad.
P.S.Dhami and J.K.Dhami. 1969 Invertebrate Zoology, S.Chand and Co. New Delhi.
Hyman L.H. The Invertebrate Vol.I-IV. 1955, McGraw Hill Co. New York.
Barrington, E.J.W.. Invertebrate structure and function. ELBS Publication.
Barnes. Invertebrate Zoology. Toppan International Co.

QUESTION PATTERN

Written paper Max Marks: 75 Marks

Time :3 Hours

A Question paper consists of three parts

Part-A

10 very short answer question without choice .Each question is to be answered in about 50 words. Each answer is to be valued out of 2 marks.

Part-B

5 questions are to be answered out of 8 given .Each question is to be answered in about 300 words . Each answer is to be valued out of 5 marks.

Part-C

Essay questions, containing internal choice to be answered in about 1200 words. Each answer is to be valued out of 15 marks.

Part-A

Very Short Answers (50 words) 10 questions each 2 marks.

Part-B

Short Answers (300 words) 5 question each 5 marks.

Part-C

Essay questions (1200 words) 2 questions each 15 marks.

I B.Sc (Zoo)	CHORDATA	18ZO201
SEMESTER - II		HRS/WK - 8
CORE - II		CREDIT - 4

Objective:

To acquire knowledge on classification of chordates and their characteristic features

Course Outcome

On completion of the course students will be able

CO1: To describes the salient features and classification of Phylum chordata and prochordata

CO2: To know classification of phylum Pisces and Amphibians

CO3: To classify the phylum Reptilia and biting mechanism of poisonous snakes

CO4: To understand the classification of aves and features of Archaeopteryx

CO5: To describe the classification of mammals and egg laying mammals

SEMESTER II	COURSE CODE:					CHORDATA										HOURS: 8	CREDITS :4
	PROGRAMME OUTCOMES(PO)					PROGRAMME SPECIFIC OUTCOMES(PSO)											
COURSE OUTCOMES	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8	PSO 9	PSO 10		
CO1	5	5	4	4	4	5	5	5	3	4	4	4	5	4	4	4.3	
CO2	5	5	4	4	4	5	5	5	4	4	4	3	5	4	4	4.3	
CO3	5	5	4	4	4	5	5	5	4	4	4	3	5	4	4	4.3	
CO4	5	5	3	4	4	5	5	5	4	4	4	3	5	4	4	4.3	
CO5	5	5	3	4	4	5	5	5	4	4	4	3	5	4	4	4.3	
Mean Overall Score																4.3	

This Course is having **VERY HIGH** association with Programme Outcome and Programme Specific Outcome

Association	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%
Scale	1	2	3	4	5
Interval	0<=rating<=1	1.1<=rating<=2	2.1<=rating<=3	3.1<=rating<=4	4.1<=rating<=5
Rating	Very Poor	Poor	Moderate	High	Very High

UNIT – I

Salient Features and General classification of Phylum chordata upto orders. Origin of Chordata.- Sub phylum: Prochordata: Type study: Amphioxus (Cephalochordata) - General Characters and affinities of - Balanoglossus (Hemichordata) & Ascidian (Urochordata).

UNIT –II

Class PISCES General characters and classification upto orders. **Type study: Shark.** Accessory respiratory organs in fishes, Migration in fishes - **Class AMPHIBIA** General characters and classification upto orders. **Type study : Frog** - Adaptive features of Anura, Urodela & Apoda. Parental care in Amphibia – Neoteny.

UNIT – III

Class REPTILIA- General characters and classification upto orders. **Type study – Calotes.** Poison apparatus and biting mechanism of poisonous snakes. Identification of poisonous and non – poisonous snakes. Conservation of turtles and crocodiles.

UNIT – IV

Class AVES - General characters and classification upto orders. **Type study –Pigeon.** Features of Archaeopteryx, Ratitae, Migration in birds, Flight adaptation.

UNIT – V

MAMMALIA - General characters and classification upto orders. **Type study – Rabbit.** Egg laying mammals. Dentition in mammals. Aquatic mammals.

Reference Books:

Ekambaranatha Ayyar, M and T.N Anantha Krishnan 1992, A manual of zoology Vol. II [Chordata]. S. Viswanathan [Printers and publishers] Pvt. Ltd., Madras.

Jordan E. L. and P.S. Verma 1995. Chordate Zoology and elements of Animal Physiology. S. Chand and co., New Delhi.

Kotpal R.L. 1992. Vertebrata, Rastogi publication, Meerut.

Nigam. H.C 1983 Zoology of chordates, Vishal publications, Jalandhar.

Waterman, Allyn J.et al. 1971, Chordate Structure and functions, Mac. Millan and co., New York.

Jollie. M. 1968. Chordate Morphology. East west press Pvt. Ltd., New Delhi.

Hyman. L.H. Comparative vertebrate zoology. McGraw Hill co. New York

QUESTION PATTERN

Written paper Max Marks: 75 Marks

Time :3 Hours

A Question paper consists of three parts

Part-A

10 very short answer question without choice .Each question is to be answered in about 50 words. Each answer is to be valued out of 2 marks.

Part-B

5 questions are to be answered out of 8 given .Each question is to be answered in about 300 words . Each answer is to be valued out of 5 marks.

Part-C

Essay questions, containing internal choice to be answered in about 1200 words. Each answer is to be valued out of 15 marks.

Part-A

Very Short Answers (50 words) 10 questions each 2 marks.

Part-B

Short Answers (300 words) 5 question each 5 marks.

Part-C

Essay questions (1200 words) 2 questions each 15 marks.

I B.Sc (Zoo)	CORE PRACTICAL – I INVERTEBRATA AND CHORDATA	18ZOP21
SEMESTER - II		HRS/WK - 3
CORE PRACTICAL – I		CREDIT - 5

DISSECTIONS

Earthworm – Digestive system

Cockroach – Digestive, Nervous system and Reproductive system, **Prawn** – Nervous system, **Fish** – Digestive system

MINOR PARCTICAL

MOUNTING -Insect Mouth parts : Cockroach, Honey bee, House Fly and Mosquito
Prawn – Appendages, **Shark** - Placoid scales, **Earthworm** – Body setae

SPOTTERS

Study of the following specimens

1.Classify by giving reasons

Paramecium, Sycon, Obelia, Taenia solium, Neries, Prawn, Freshwater mussel, Seastar, Amphioxus, Shark, Hyla, Rhacophorus, Calotes, Pigeon, Rat/Rabbit.

2.Adaptations to their respective modes of life

Entamoeba, Trypanosoma, Plasmodium, Corals [any 2], Ascaris, Fasciola, Wuchereria bancrofti, Cheatopteris, Leech, Limulus, Nauplius, Mysis, Zoea, Balanoglossus, Ascidian, Ichthyophis, Draco, sea snake and Bat.

3.Biological significance:

Paramecium conjugation and binary fission, physalia, Trochophore Larva, Peripatus, Sacculina On Crab, Sea Anemone on Hermit Crab, Pearl Oyster, Bipinnaria Larva, Anabas, Hippocampus, Narcine, Echeneis, Arius, Exocoetus, Eel, Amblystoma, Axolotl Larva, Bufo, Cobra, Krait, Russels Viper, Echis Carinata, Turtle, Parrot, Woodpecker, King Fisher and Ant eater

4. Relate structure and function:

Sponge Spicules, Obelia-Polyp, Taenia-Scolex, Nereis - Parapodium, Book lungs of scorpion/Honey bee sting apparatus, Pedicellaria of Sea star, Ctenoid Scale and Quill Feather of pigeon.

5.Draw labeled sketches:

T.S. of Nereis, T.S. of Leech, Obelia medusa, T.S. of Amphioxus through Pharynx, T.S. through arm of Sea star.

6.Osteology

Skeleton - Pectoral girdles of Frog and Pigeon., Pelvic Girdles of Frog and Pigeon.

Fore and Hind limbs of Frog and Pigeon., Synsacrum of Pigeon. **Dentition** - Dog, Rabbit and Man.

Reference Books:

Verma. P.S. 2011 A Manual of Practical Zoology INVERTEBRATES Chand & Co, Ltd, Ram Nagar -New Delhi.

Verma. P.S. 2011 A Manual of Practical Zoology CHORDATES, Chand & co, Ltd. Ram Nagar – New Delhi.

Jayanpa Sinha . 2010 Advanced Practical Zoology, Books & Allied (p) Ltd. No.1. Subham Plaza IFloor, Calcutta.

II B.Sc (Zoo)	CELL AND MOLECULAR BIOLOGY	
SEMESTER - III		HRS/WK - 8
CORE - III		CREDIT - 4

Objective:

- Have an enhanced knowledge on cytological techniques, structure and functions of cell and cell organelles
- To provide a basic information on molecular biology

Course Outcome

On completion of the course students will be able

CO1: To understand the cytological techniques, biochemical and cell culture techniques

CO2: To describe the structure and functions cell and cell organelles

CO3: To recognize the properties of cytoplasm and ultra-structure of nucleus and types of chromosomes.

CO4: To explain cell cycle, cell division and cancer biology

CO5: To obtain knowledge on structure and functions of DNA and RNA and protein synthesis

SEMESTER III	COURSE CODE:					CELL AND MOLECULAR BIOLOGY										HOURS: 8	CREDITS: 4
	PROGRAMME OUTCOMES(PO)					PROGRAMME SPECIFIC OUTCOMES(PSO)											
COURSE OUTCOMES	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8	PSO 9	PSO 10		
CO1	5	5	5	5	4	5	5	5	5	5	5	5	5	2	5	4.7	
CO2	5	5	5	5	4	5	5	4	5	5	5	4	5	2	5	4.6	
CO3	5	5	5	5	4	5	5	5	5	5	5	4	5	2	5	4.7	
CO4	5	5	4	5	4	5	5	4	5	5	5	3	5	2	5	4.5	
CO5	5	5	5	5	4	5	5	4	5	5	5	4	5	2	5	4.6	
Mean Overall Score																4.6	

This Course is having **VERY HIGH** association with Programme Outcome and Programme Specific Outcome

Association	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%
Scale	1	2	3	4	5
Interval	0<=rating<=1	1.1<=rating<=2	2.1<=rating<=3	3.1<=rating<=4	4.1<=rating<=5
Rating	Very Poor	Poor	Moderate	High	Very High

UNIT – I

History of Cell and Molecular Biology – Principles of microscopes light and electron, **Cytological techniques** - cell fractionation, Homogenization Centrifugation, Isolation of Sub-cellular components. **Biochemical techniques** – Electrophoresis and their applications. **Cell culture techniques** and applications.

UNIT – II

Cell – Cell theory, Ultra structure of animal cell – structure, composition and functions – cell components – Plasma Membrane – Endoplasmic reticulum, Ribosomes, Golgi Complex, Lysosomes, Glyoxisomes, peroxisomes, centrioles and Mitochondria.

UNIT – III

Cytoplasm – Physical, chemical and biological properties. **Nucleus** – Ultrastructure, Composition and Function – **Chromosomes structure** –Heterochromosome, Euchromatin - **Giant chromosomes** (Polytene and Lamp brush chromosomes).

UNIT – IV

Cell cycle and cell division – Amitosis, Mitosis and meiosis and their significance. **Cancer biology** – structure of cancer cell, carcinogenesis. **Aging** – Cell death and apoptosis.

UNIT – V

Structure and functions of DNA & types of RNA [mRNA, tRNA, rRNA]. Semi conservative replication, mechanism and enzymology of DNA replication, **Protein synthesis**.

Reference Books:

- Cohn, N.S., 1979, Elements of Cytology, Freeman Book co., New Delhi.
De Robertis, E.D.P. and E.M.F. De Robertis, 1988. Cell and molecular Biology, 8th Edition, International edition Informes Hongkong. 734p.
Gies, A.C., 1979. Cell Physiology, Saunders co., Philadelphia, London, Toronto.
Powar, C.B., 1989. Essentials of Cytology, Himalaya Publishing House, Bombay.
Verma, P.S., and V.K. Agarwal, 1995. Cell and Molecular Biology, 8th Edition, S. Chand & Co., NewDelhi.
Rastogi. S.C. 2008 Cell and Molecular Biology, 2nd Edition, New Age International (p) Ltd., New Delhi.
Jayanthi .G.P. 2009 Molecular Biology, M.J.P Publ. Chennai.

QUESTION PATTERN

Written paper Max Marks: 75 Marks

Time :3 Hours

A Question paper consists of three parts

Part-A

10 very short answer question without choice .Each question is to be answered in about 50 words. Each answer is to be valued out of 2 marks.

Part-B

5 questions are to be answered out of 8 given .Each question is to be answered in about 300 words . Each answer is to be valued out of 5 marks.

Part-C

Essay questions, containing internal choice to be answered in about 1200 words. Each answer is to be valued out of 15 marks.

Part-A

Very Short Answers (50 words) 10 questions each 2 marks.

Part-B

Short Answers (300 words) 5 question each 5 marks.

Part-C

Essay questions (1200 words) 2 questions each 15 marks.

II B.Sc (Zoo)	BOTANY- I	
SEMESTER - III		HRS/WK - 5
ALLIED-III		CREDIT - 4

Objective:

- To teach of basic idea of plant science through traditional disciplines such as plant anatomy, morphology, life history and economic importance of some plants species.

Course Outcome

On completion of the course students will be able

CO1: To understand the cell organelles in plants

CO2: To describe anatomy of plant cells.

CO3: To get knowledge on bacteria and viruses

CO4: To describe Structure and life history of some plant species

CO5: To acquire knowledge on Structure, life history and economic importance of Chlorella, Penicillium and Agaricus

SEMESTER I & IV	COURSE CODE:					BOTANY-I										HOURS: 5	CREDITS: 4
	PROGRAMME OUTCOMES(PO)					PROGRAMME SPECIFIC OUTCOMES(PSO)											
COURSE OUTCOMES	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8	PSO 9	PSO 10		
CO1	5	5	5	5	4	5	4	4	2	3	5	1	5	1	5	4.0	
CO2	5	5	5	5	4	5	4	3	4	4	5	1	5	1	5	4.1	
CO3	5	5	4	5	4	5	4	3	3	4	5	1	5	2	5	4.0	
CO4	5	5	4	5	4	5	4	3	3	3	5	1	5	3	5	4.0	
CO5	5	5	4	5	4	5	4	3	2	4	5	2	5	3	5	4.1	
Mean Overall Score																4.0	

This Course is having **HIGH** association with Programme Outcome and Programme Specific Outcome

Association	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%
Scale	1	2	3	4	5
Interval	0<=rating<=1	1.1<=rating<=2	2.1<=rating<=3	3.1<=rating<=4	4.1<=rating<=5
Rating	Very Poor	Poor	Moderate	High	Very High

UNIT-I: Cell Biology

Prokaryotic and Eukaryotic cell (plant cell)

Cell organelles - Chloroplast, Mitochondrion and Nucleus.

Cell division – Mitosis.

UNIT-II: Anatomy

Tissues - Meristematic and permanent tissues. Primary and Normal Secondary thickening of Dicot stem.

UNIT-III: Bacteria and Viruses

Bacteria - General characters - shape - flagellation - Structure of E. Coil - reproduction - (Vegetative

and asexual), Economic importance. Structure of Tobacco Mosaic Virus, Bacteriophage.

UNIT-IV: Structure and Life History of

a) Chlorella and Gracilaria

b) Albugo, Penicilium and Agaricus

UNIT-V: Structure and Life History of

a) Funaria

b) Lycopodium

c) Cycas

Economic importance of Chlorella, Penicillium and Agaricus.

QUESTION PATTERN

Written paper Max Marks: 75 Marks

Time :3 Hours

A Question paper consists of three parts

Part-A

10 very short answer question without choice .Each question is to be answered in about 50 words. Each answer is to be valued out of 2 marks.

Part-B

5 questions are to be answered out of 8 given .Each question is to be answered in about 300 words . Each answer is to be valued out of 5 marks.

Part-C

Essay questions, containing internal choice to be answered in about 1200 words. Each answer is to be valued out of 15 marks.

Part-A

Very Short Answers (50 words) 10 questions each 2 marks.

Part-B

Short Answers (300 words) 5 question each 5 marks.

Part-C

Essay questions (1200 words) 2 questions each 15 marks.

II B.Sc (Zoo)	GENETICS AND BIOTECHNOLOGY	
SEMESTER - IV		HRS/WK - 8
CORE - IV		CREDIT - 4

Objective:

- To provide basic knowledge in the field of genetics and applications of biotechnology.

Course Outcome

On completion of the course students will be able

CO1: To acquire basic information Mendelian laws, multiple alleles and pedigree analysis

CO2: To understand linkage and crossing over and fine structure of gene

CO3: To acquire knowledge on mutation and population genetics

CO4: To understand the scope and applications of biotechnology

CO5: To describe the transgenic plants and animals and application of rDNA technology

SEMESTER IV	COURSE CODE:		GENETICS AND BIOTECHNOLOGY													HOURS: 8	CREDITS :4
	PROGRAMME OUTCOMES(PO)					PROGRAMME SPECIFIC OUTCOMES(PSO)											
COURSE OUTCOMES	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8	PSO 9	PSO 10		
CO1	5	5	5	5	4	4	5	3	3	5	5	2	5	2	4	4.1	
CO2	5	5	5	5	4	4	5	3	3	5	5	3	5	2	4	4.2	
CO3	5	5	5	4	4	4	5	3	3	5	5	2	5	2	4	4.1	
CO4	4	5	4	4	4	4	5	3	3	5	5	2	5	2	4	4.0	
CO5	5	5	4	5	4	4	5	3	3	5	5	3	5	2	4	4.1	
Mean Overall Score																4.1	

This Course is having **VERY HIGH** association with Programme Outcome and Programme Specific Outcome

Association	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%
Scale	1	2	3	4	5
Interval	0<=rating<=1	1.1<=rating<=2	2.1<=rating<=3	3.1<=rating<=4	4.1<=rating<=5
Rating	Very Poor	Poor	Moderate	High	Very High

GENETICS

UNIT – I

Introduction to genetics – Basis of Mendelian Inheritance and Mendelian Laws – Interaction of Genes – Complementary Factors, Inhibitory and lethal Factors Atavism. **Multiple Alleles** – Blood Groups and their Inheritance in man. **Pedigree analysis** in human traits.

UNIT – II

Linkage and crossing over – Drosophila – Morgan's Experiments - Cytological Evidence for Crossing Over. **Sex determination and sex linkage** in Drosophila and Man. **Non – Disjunction and Gynandromorphs**– Cytoplasmic Inheritance Maternal effect on Limnaea [shell coiling], **Fine Structure of Gene** – Cistron –Recon, Muton – **Gene Regulation** – Operon concept – Lac Operon.

UNIT – III

Mutation – chromosomal Aberrations – examples from Human. **Applied Genetics** – Animal Breeding – Heterosis, Inbreeding, Out breeding, Out Crossing, Hybrid Vigour. **Population Genetics:** Hardy weinberg Law – factors affecting Hardy Weinberg Law.

BIOTECHNOLOGY

UNIT – IV

Definition – Scope and applications – isolation of DNA – cloning – Tools of Genetic Engineering – Enzymes, Linkers and Adaptors, Cloning vectors, [plasmids, pBr322, Phage I, Cosmids and phagemids]. Techniques of Genetic Engineering - recombinant DNA Technology and gene Cloning in prokaryotes [**cdNA and Genomic Library**]. Basics of human genome project.

UNIT – V

Transgenic plants and animals – DNA finger printing – gene therapy – biocensors – biochips – Production of Transgenic plant (Bt. Cotton) and transgenic animal (mice) - **Application of Recombinant DNA technology** in Medicine & Agriculture – Socio economic issues of Biotechnology in India

Reference Books:

- Verma, P.S. and V.K. Agarwal, 1995 Genectis, 8th edition, S. Chand & Co, New Delhi.
Gunther S. Stent 1986. Molecular Genetics. Macmillan Publishing Co Inc.
Higgins II, Best GJ and Jones J 1996 Biotechnology – Principles and application Black well scientific Publication Oxford London.
Gupta, P.K. 2001 Elements of Biotechnology Rastogi publication, Meerut.
Dubey,R.C 2006 Text Book of Biotechnology S. Chand & co. New Delhi.
Gardener. 1991. Principles of Genetics. 8th edition. John wiley & sons Inc. New York. Chichester,Brisbane, Toronto, Singapore.
Monroe. W. Strick Berger 2004 Genetics. Printice Hall of India New Delhi.
Kumar H. D.1998 A text book of Biotechnology, affiliated East West pvt. Ltd., New Delhi.
Nicholls. 2002 Genetic Engineering, Cambridge University Press. UK.
S. Gladis Helen Hepsyba and CR. Hemalatha 2009 Basic Bioinformatics MJP Publ. Chennai.
Vijayaraman, Chellammal K.S and Manikkili. P 1998. Uyiriyae Thozhilnutpam. Chimeeraa, Trichy.

QUESTION PATTERN

Written paper Max Marks: 75 Marks

Time :3 Hours

A Question paper consists of three parts

Part-A

10 very short answer question without choice .Each question is to be answered in about 50 words. Each answer is to be valued out of 2 marks.

Part-B

5 questions are to be answered out of 8 given .Each question is to be answered in about 300 words . Each answer is to be valued out of 5 marks.

Part-C

Essay questions, containing internal choice to be answered in about 1200 words. Each answer is to be valued out of 15 marks.

Part-A

Very Short Answers (50 words) 10 questions each 2 marks.

Part-B

Short Answers (300 words) 5 question each 5 marks.

Part-C

Essay questions (1200 words) 2 questions each 15 marks.

II B.Sc (Zoo)	BOTANY- II	
SEMESTER - III		HRS/WK - 5
ALLIED-IV		CREDIT - 4

Objective:

- To teach of basic idea of plant science through traditional disciplines such as plant taxonomy, physiology, embryology, evolution and ecology.

Course Outcome

On completion of the course students will be able

CO1: To understand the taxonomy of plants

CO2: To describe embryology of plants.

CO3: To understand plant physiology and tissue culture

CO4: To describe fresh water ecosystem and pollution

CO5: To acquire knowledge on plant genetics and evolution

SEMESTER I & IV	COURSE CODE:					BOTANY-II										HOURS: 5	CREDITS :4
	PROGRAMME OUTCOMES(PO)					PROGRAMME SPECIFIC OUTCOMES(PSO)											
COURSE OUTCOMES	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8	PSO 9	PSO 10		
CO1	5	5	5	5	4	5	4	4	2	3	5	1	5	1	5	4.0	
CO2	5	5	5	5	4	5	4	3	4	4	5	1	5	1	5	4.1	
CO3	5	5	4	5	4	5	4	3	3	4	5	1	5	2	5	4.0	
CO4	5	5	4	5	4	5	4	3	3	3	5	1	5	3	5	4.0	
CO5	5	5	4	5	4	5	4	3	2	4	5	2	5	3	5	4.1	
Mean Overall Score																4.0	

This Course is having **HIGH** association with Programme Outcome and Programme Specific Outcome

Association	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%
Scale	1	2	3	4	5
Interval	0<=rating<=1	1.1<=rating<=2	2.1<=rating<=3	3.1<=rating<=4	4.1<=rating<=5
Rating	Very Poor	Poor	Moderate	High	Very High

UNIT-I: Taxonomy

General outline of Bentham and Hooker's system of classification. Study of the range of characters and economic importance of the following families: Annonaceae, cucurbitaceae, Apocynaceae, Euphorbiaceae and Liliaceae.

UNIT-II: Embryology

Structure of mature anther. Structure of mature ovule and its types. Fertilization.

UNIT-III: Plant Physiology & Plant Tissue Culture

Physiological role of micro and macro elements their deficiency symptoms Photosynthesis - lightreaction - Calvin cycle Respiration - Glycolysis - Kreb's cycle - electron transport system. Growth hormones – Auxins. Tissue culture and its principles.

UNIT-IV: Ecology

Ecosystem - fresh water ecosystem. Environmental pollution. Major pollutants - types of pollution - Air pollution, water pollution, soil pollution - control measures.

UNIT-V: Genetics & Evolution

Mendelism - Monohybrid and dihybrid crosses. Theories of evolution - Lamarckism, Darwinism.

QUESTION PATTERN

Written paper Max Marks: 75 Marks

Time: 3 Hours

A Question paper consists of three parts

Part-A

10 very short answer question without choice .Each question is to be answered in about 50 words. Each answer is to be valued out of 2 marks.

Part-B

5 questions are to be answered out of 8 given .Each question is to be answered in about 300 words . Each answer is to be valued out of 5 marks.

Part-C

Essay questions, containing internal choice to be answered in about 1200 words. Each answer is to be valued out of 15 marks.

Part-A

Very Short Answers (50 words) 10 questions each 2 marks.

Part-B

Short Answers (300 words) 5 question each 5 marks.

Part-C

Essay questions (1200 words) 2 questions each 15 marks.

II B.Sc (Zoo)	CORE PRACTICAL – II CELL AND MOLECULAR BIOLOGY, GENETICS AND BIOTECHNOLOGY	
SEMESTER - IV		HRS/WK - 3
CORE PRACTICAL – II		CREDIT - 5

CELL AND MOLECULAR BIOLOGY

Cytometry

Compound microscope, Camera Lucida, Stage and Ocular Micrometers

Blood Smear Preparation – Differential count of W.B.C.

Total count of RBC using Haemocytometer.

Total count of WBC using Haemocytometer.

Slide Preparation

Buccal Smear.

Mitosis in onion root tip squash.

Squash preparation of Grass hopper testes.

Study of prepared slides of histology.

Columnar Epithelium, Ciliated epithelium, Glandular Epithelium. Cartilage T.S., Bone T.S., Cardiac Muscle, Striated muscle, Non Striated muscle, Neuron, C.S of mammalian Testis and Ovary.

GENETICS

Squash preparation of Salivary glands of chironomous larva (Giant chromosome).

Male & Female identification of Drosophila.

Observation of common Mutants of Drosophila.

Human Blood Grouping.

BIOTECHNOLOGY

Study of prepared slides, Models or specimen.

Escherichia coli, Bacteriophage, Plasmid.

Demonstration of P.C.R technique: Southern blot, Electrophoresis.

Visit to Biotechnology lab and Report – compulsory.

II B.Sc (Zoo)	ALLIED PRACTICAL - III BOTANY	
SEMESTER - IV		HRS/WK - 3
ALLIED PRACTICAL -III		CREDIT - 2

Description of plants in technical terms belonging to the families mentioned in the theory part.

To study the internal structure of Anatomy material, Pteridophytes and Gymnosperms.

Identification and Description of Micro Preparation materials mentioned in the theory part.

Description of experimental setup of plant physiology.

BOOKS SUGGESTED

Ashok Bendre, A.K. and Pandey P.C. (1975) Introductory Botany. Rastogi Publication Meerut.

Ganguly, A.K. and Kumar. N.C. (1971) General Botany Vol. I & Vol. II, Emkay Publication, Delhi.

Rev. Fr. Ignacimuthu, S.J. (1975) Basic Biotechnology – Tata Mcraw till publication co., New Delhi.

Rao,K.N.Krishnamoorthy,K.V. and Rao. G.(1975) Ancillary Botany. S. Viswanathan Private.Ltd.,Chennai.

III B.Sc (Zoo)	BIostatistics AND COMPUTATIONAL BIOLOGY	
SEMESTER - V		HRS/WK - 5
CORE - V		CREDIT - 5

Objective:

- To learn basics of Biostatistics and their application in biology
- To acquire knowledge on Bioinformatics

Course Outcome

On completion of the course students will be able

CO1: To acquire knowledge on scope and sampling methods in biostatistics

CO2: To understand the measure of central tendency and measures of dispersion.

CO3: To understand types of computers, operating systems and its applications

CO4: To acquire knowledge on biological databases like NCBI, GenBank etc.

CO5: To gain knowledge on DNA and RNA sequencing

SEMESTER V	COURSE CODE:					BIostatistics AND COMPUTATIONAL BIOLOGY										HOURS: 5	CRE DITS :5
COURSE OUTCOMES	PROGRAMME OUTCOMES(PO)					PROGRAMME SPECIFIC OUTCOMES(PSO)										MEAN SCORE OF CO'S	
	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8	PSO 9	PSO 10		
CO1	5	5	4	5	4	5	5	4	5	5	4	1	5	2	5	4.3	
CO2	5	5	4	5	4	5	5	3	5	5	4	1	5	2	5	4.2	
CO3	5	5	4	5	4	4	5	2	5	5	4	2	5	4	5	4.3	
CO4	5	5	4	5	4	5	5	3	4	5	4	1	5	2	5	4.1	
CO5	5	5	4	5	4	4	5	3	4	5	4	1	5	1	5	4.0	
Mean Overall Score															4.2		

This Course is having **VERY HIGH** association with Programme Outcome and Programme Specific Outcome

Association	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%
Scale	1	2	3	4	5
Interval	0<=rating<=1	1.1<=rating<=2	2.1<=rating<=3	3.1<=rating<=4	4.1<=rating<=5
Rating	Very Poor	Poor	Moderate	High	Very High

BIOSTATISTICS

UNIT – I

Definition and Scope, Census and sampling methods – collection and presentation of data. Diagrams and graphs; bar, pie, Histogram, Line graph – concept of Statistical population and sample characteristics of frequency distribution.

UNIT – II

Measures of central tendency: mean, median and mode. Measures of Dispersion, Range, Quartile deviation, mean deviation & Standard deviation. Test of significance (t- Test).

COMPUTATIONAL BIOLOGY

UNIT – III

Introduction – computer – types of modern computers – operating systems – applications of MS-WORD, MS-EXCEL and MS-PPT- Documentation and Presentation of Bio Statistical data– Browsers – search engines - Use of Internet, Messenger and E-mail – Basic Knowledge of Medical transcription.

UNIT- IV

Biological databases – definition – Literature databases- NCBI – Pubmed, Medline, Protein and Nucleic acid Sequence, databases and their relationship – PIR, Swiss – Prot, GeneBank, DDBJ – Structural Databases – PDB, SCOP, CATH, Structural visualization tools, RasMol, Swiss PDB viewer.

UNIT – V

DNA and RNA sequencing - Pairwise sequence Alignment –Scoring Matrices - PAM and BLOSUM- statistics of alignment scored Dot Plot – local and global alignment – Database searching – FASTA and BLAST multiple sequence alignment clustal W- Phylogenetic Tress – PHYLIP.

Reference Books:

Gupta SP 1996. Statistics –S. Chand and Co., New Delhi.

Jerold H. Zar 1984. Bio Statistical analysis [2nd edition] printice Hall of International edition.

Goutham Roy 2002. Introduction to Computing and computing lab and Cad Books and allied [pvt]ltd. Kolkata.

Christine Solomon. MS. OFFICE for Win – Microsoft office press. Developing Application with MS-OFFICE – Microsoft Office Press.

Cynthia Gibbs. Developing Bioinformatics Computer Skills. Sheoff Publishers & Distributors Pvt.Ltd., Mumbai.

Arthur. M. Lesk 2003. Introduction to Bioinformatics, Oxford University Press, New Delhi.

Arthur. M. Lesk, Introdution to protein Structures Oxford University Press, New Delhi, 2000

Baxevanis, A and Outllette 2005. Bioinformatics a practical guide to the analysis of genes and proteins, Willy – Interscience, Hoboken, NJ. USA.

QUESTION PATTERN

Written paper Max Marks: 75 Marks

Time: 3 Hours

A Question paper consists of three parts

Part-A

10 very short answer question without choice. Each question is to be answered in about 50 words. Each answer is to be valued out of 2 marks.

Part-B

5 questions are to be answered out of 8 given .Each question is to be answered in about 300 words . Each answer is to be valued out of 5 marks.

Part-C

Essay questions, containing internal choice to be answered in about 1200 words. Each answer is to be valued out of 15 marks.

Part-A

Very Short Answers (50 words) 10 questions each 2 marks.

Part-B

Short Answers (300 words) 5 question each 5 marks.

Part-C

Essay questions (1200 words) 2 questions each 15 marks.

III B.Sc (Zoo)	DEVELOPMENTAL BIOLOGY & IMMUNOLOGY	
SEMESTER - V		HRS/WK - 5
CORE - VI		CREDIT - 5

Objective:

- To learn basic concepts of developmental biology and artificial reproductive technology
- To acquire knowledge on immune system and immune deficiency diseases

Course Outcome

On completion of the course students will be able

CO1: To acquire knowledge on gametogenesis and parthenogenesis

CO2: To understand the process of cleavage and blastulation.

CO3: To realize embryonic adaptation and artificial reproductive technology.

CO4: To describe lymphoid organ and immune system

CO5: To gain information regarding immunoglobulin and immune deficiency diseases

SEMESTER V	COURSE CODE:					DEVELOPMENTAL BIOLOGY & IMMUNOLOGY										HOURS: 5	CREDITS: 5
	PROGRAMME OUTCOMES(PO)					PROGRAMME SPECIFIC OUTCOMES(PSO)											
COURSE OUTCOMES	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8	PSO 9	PSO 10		
CO1	5	5	4	5	4	5	5	4	5	5	4	1	5	2	5	4.3	
CO2	5	5	4	5	4	5	5	3	5	5	4	1	5	2	5	4.2	
CO3	5	5	4	5	4	4	5	2	5	5	4	2	5	4	5	4.3	
CO4	5	5	4	5	4	5	5	3	4	5	4	1	5	2	5	4.1	
CO5	5	5	4	5	4	4	5	3	4	5	4	1	5	1	5	4.0	
Mean Overall Score															4.2		

This Course is having **VERY HIGH** association with Programme Outcome and Programme Specific Outcome

Association	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%
Scale	1	2	3	4	5
Interval	0<=rating<=1	1.1<=rating<=2	2.1<=rating<=3	3.1<=rating<=4	4.1<=rating<=5
Rating	Very Poor	Poor	Moderate	High	Very High

DEVELOPMENTAL BIOLOGY

UNIT – I

Gametogenesis – Fertilization - polarity & symmetry of eggs – types of eggs – Fertilization Mechanism, Physiology & theories – parthenogenesis – Natural – artificial – Experiments on Artificial Parthenogenesis.

UNIT – II

Cleavage – Factors influencing cleavage – fate map – blastulation and gastrulation in amphioxus, frog and chick – Experimental works of Speeman and Mangold- Development of brain and eye in frog.

UNIT – III

Embryonic adaptations; Embryonic membranes and their functions in chick – placentation in mammals. Puberty – Menstrual cycle-contraception – family welfare reproductive technology; Artificial insemination - cryopreservation - IVF - Embryotransfer – Test tube babies – Bioethics.

IMMUNOLOGY

UNIT- IV

Introduction - **Lymphoid organs**, cells of immune system – their role in immune response. Types of immunity – their role in parasitic, bacterial & Viral Infection, in hyper – sensitivity and graft rejection. –Antigen – Antibody reaction.

UNIT – V

Immunoglobulin – types, structure, Physico chemical and biological properties – Immunoprophylaxis – Immunization schedule of children. Immuno deficiency – AIDS, Immunotechniques.

Reference Books:

Balinsky, B.L., Introduction to embryology 1981. Saundeers, Philadelphia.

Berril & Corp Developmental Biology. McGraw Hill Book Company, MC., New York.

M.S. Jayaraj An Introduction to embryology Veer Bala Rastogi Publication.

Verma, P.S., V.K. Agarwal and Tyagi, 1995. Chordate embryology. S. Chand & co., New Delhi.

Majumdar, N.N. 1990. Text Book of Vertebrate embryology. Tata McGraw – hill Publishing company Ltd. New Delhi.

McEwen, R.S., 1969. Vertebrate Embryology. Oxford and IBH Publishing Co., New Delhi.

Jain, P.C 1998, Elements of Developmental Biology. Vishal Publication, New Delhi.

R.C. Dubey 2006 Text book of Biotechnology S. Chand and Co., New Delhi.

Roitt. I.M 2000 Essential Immunology, Blackwell Scientific Publishers.

Paul, W.E.M. 1989, Fundamental Immunology, Raven Press, New York.

Kuby. J. 1999, Immunology. W. H. Freeman and Co. New York.

Current protocols in Immunology – 3 Volumes 1994 Wiley Publications.

Roitt. I, Brostoff, J. and Male. D. 2002. Immunology, Mosby, New York.

Richard, A. Golds, Thomas I, Kindt & Barbara A. Osborne 2000 Kuby Immunology, Freeman and Co. New York.

Madhavee Latha. P, 2012. Text book of Immunology, S. Chand & Company, New Delhi.

QUESTION PATTERN

Written paper Max Marks: 75 Marks

Time: 3 Hours

A Question paper consists of three parts

Part-A

10 very short answer question without choice .Each question is to be answered in about 50 words. Each answer is to be valued out of 2 marks.

Part-B

5 questions are to be answered out of 8 given .Each question is to be answered in about 300 words . Each answer is to be valued out of 5 marks.

Part-C

Essay questions, containing internal choice to be answered in about 1200 words. Each answer is to be valued out of 15 marks.

Part-A

Very Short Answers (50 words) 10 questions each 2 marks.

Part-B

Short Answers (300 words) 5 question each 5 marks.

Part-C

Essay questions (1200 words) 2 questions each 15 marks.

III B.Sc (Zoo)	ANIMAL PHYSIOLOGY	
SEMESTER - V		HRS/WK - 5
CORE - VII		CREDIT - 5

Objective:

- To impart an overview of basic physiological functions of various organ system in human.

Course Outcome

On completion of the course students will be able

CO1: To describe the process of nutrition and digestion

CO2: To understand the process of respiration and circulation.

CO3: To recognize excretory system and osmo-ionoregulation in fishes and mammals.

CO4: To describe nervous system and muscular system

CO5: To understand receptors and structure, secretions and functions of endocrine glands

SEMESTER V	COURSE CODE:					ANIMAL PHYSIOLOGY										HOURS: 5	CREDITS: 5
COURSE OUTCOMES	PROGRAMME OUTCOMES(PO)					PROGRAMME SPECIFIC OUTCOMES(PSO)										MEAN SCORE OF CO'S	
	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8	PSO 9	PSO 10		
CO1	5	5	4	4	4	5	5	4	4	5	4	1	5	1	5	4.1	
CO2	5	5	4	4	4	5	5	4	4	5	4	3	5	1	5	4.2	
CO3	5	5	4	4	4	5	5	4	4	5	4	1	5	1	5	4.1	
CO4	5	5	4	4	4	5	5	4	4	5	4	1	5	1	5	4.1	
CO5	5	5	4	4	4	5	5	4	4	5	4	2	5	1	5	4.1	
Mean Overall Score																4.1	

This Course is having **VERY HIGH** association with Programme Outcome and Programme Specific Outcome

Association	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%
Scale	1	2	3	4	5
Interval	0<=rating<=1	1.1<=rating<=2	2.1<=rating<=3	3.1<=rating<=4	4.1<=rating<=5
Rating	Very Poor	Poor	Moderate	High	Very High

UNIT – I

Nutrition and Digestion

Introduction– Food requirements – Carbohydrates, proteins, fats, minerals, and vitamins. Digestive enzymes and their role in digestion – absorption and assimilation.

UNIT – II

Respiration and Circulation

Introduction – Respiratory Pigments and functions. Transport of gases [Co₂ and O₂] – Respiratory quotient. Circulation Types, Composition, Properties and Function of Blood – Human – Cardiac Cycle – Cardiac Rhythm – Origin of heart Beat – Regulation of heart Beat – ECG – Blood Pressure – Factors Contributing to heart Problems – coronary circulation.

UNIT – III

Excretion and Osmoionoregulation

Introduction – kinds of excretory products – Kidney - structure and Mechanism of urine formation in mammals, hormonal regulation of excretion. Kidney failure and Transplantation. Osmoionoregulation in fishes and mammals.

UNIT – IV

Neuromuscular Co-ordination

Nervous tissue – Neuron – Structure, types of neurons. Nerve impulse – Synapse – Synaptic transmission of impulses – Neurotransmitters. Muscles – Types of muscles – Muscle Proteins – Mechanism of contraction – Cori cycle – Theories of muscle contraction.

UNIT – V

Receptors and Endocrine system

Receptors – Photoreceptor – mammalian eye –structure of retina – visual pigments – physiology of vision – phonoreceptors – mammalian ear- Organ of Corti – working mechanism – phonoreception in bat. Endocrine glands – structure, secretions and functions of endocrine glands of vertebrates – Pituitary, Hypothalamus, Thyroid, Parathyroid, Adrenal, Thymus, Islets of langerhans, Testis and Ovary.

Reference Books:

Sambasivaiah, Kamalakara rao and Augustine chellappa 1990. A Text book of Animal physiology and ecology, S. Chand & co., Ltd., New Delhi – 110 055.

Parameswaran, Anantkrishnan and Ananta Subramanyam, 1975. Outlines of Animal Physiology, S. Viswanathan [printers & Publishers] Pvt. Ltd.

William S. Hoar, 1976. General and comparative physiology, prentice Hall of India Pvt. Ltd., New Delhi. 110 001.

Wood.D.W, 1983, Principles of Animal Physiology 3rd Ed.,

Prosser,C.L. and Brown, 1985, Comparative Animal Physiology, Satish Book Enterprise, Agra – 282 003.

QUESTION PATTERN

Written paper Max Marks: 75 Marks

Time: 3 Hours

A Question paper consists of three parts

Part-A

10 very short answer question without choice .Each question is to be answered in about 50 words. Each answer is to be valued out of 2 marks.

Part-B

5 questions are to be answered out of 8 given .Each question is to be answered in about 300 words . Each answer is to be valued out of 5 marks.

Part-C

Essay questions, containing internal choice to be answered in about 1200 words. Each answer is to be valued out of 15 marks.

Part-A

Very Short Answers (50 words) 10 questions each 2 marks.

Part-B

Short Answers (300 words) 5 question each 5 marks.

Part-C

Essay questions (1200 words) 2 questions each 15 marks.

III B.Sc (Zoo)	ELECTIVE-I APPLIED ENTOMOLOGY	
SEMESTER - V		HRS/WK - 5
ELECTIVE-I (Compulsory)		CREDIT - 5

Objective:

- To provide extensive knowledge in the field of Entomology.
- The familiarity between insect and environment was highlighted to the entomological research in many directions which have immense value in the control measures various disease causing insects.

Course Outcome

On completion of the course students will be able

CO1: To describe the economic classification of insects

CO2: To understand the types of insect development

CO3: To know pests of stored products and their control

CO4: To describe pest control methods and application

CO5: To understand the production and marketing of pesticides

SEMESTER V	COURSE CODE:					ELECTIVE-I APPLIED ENTOMOLOGY										HOURS:5	CRE DITS :5
COURSE OUTCOMES	PROGRAMME OUTCOMES(PO)					PROGRAMME SPECIFIC OUTCOMES(PSO)										MEAN SCORE OF CO'S	
	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8	PSO 9	PSO 10		
CO1	5	5	4	5	4	4	4	5	2	2	3	2	5	4	5	4.0	
CO2	5	5	4	5	3	4	4	4	3	2	3	2	5	3	5	3.8	
CO3	5	5	4	5	4	4	4	3	2	2	3	2	5	5	5	3.9	
CO4	5	5	4	5	5	4	4	3	1	3	3	2	5	5	5	4.0	
CO5	5	5	5	5	5	4	4	2	1	3	3	2	5	5	5	4.0	
Mean Overall Score															3.9		

This Course is having **HIGH** association with Programme Outcome and Programme Specific Outcome

Association	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%
Scale	1	2	3	4	5
Interval	0<=rating<=1	1.1<=rating<=2	2.1<=rating<=3	3.1<=rating<=4	4.1<=rating<=5
Rating	Very Poor	Poor	Moderate	High	Very High

UNIT – I

Introduction – economic classification of insects - Types of pests – types of damage caused by pests in crops – causes for insects assuming pest status – outbreak of pests.

UNIT – II

Types of insect development – ametabola and metabola (hemi metabola, holometabola, paurometabola and hypermetabola) - Pests of agricultural importance, their bionomics, life cycle and control measures of paddy, ground nut, cotton, tomato, coffee & Banana.

UNIT – III

Pests of stored products and their control – Household pests – cockroach and termites – and their control – pest in relation to public health – rodents and their control. Mosquitoe borne diseases and their control measures.

UNIT- IV

Pest control methods and application: cultural, mechanical, biological and chemical methods – classification of pesticides – LC 50 and LD 50 values – First Aid & precautions in handling pesticides – pesticide spraying appliances. Residual effects of pesticides on non target organisms.

UNIT – V

Pesticide industry - production and marketing – recent trends in pest control – pheromones, attractants, repellants and chemosterilants Integrated pest management, its importance & applications.

Reference Books:

Vasantharaj David and T. Kumaraswami 1988. Elements of Economic Entomology Popular Book Depot, Chennai.

Nayar, K.K., Ananthkrishnan, T.N. and B.V. David 1992 General and Applied Entomology Tata McGraw, New Delhi.

P.G. Fenemore and Alka Prakash 1997 Allied Entomology, Wiley Eastern Ltd., New York.

Wigglesworth J.B., 1994. Insect Physiology, Chapman and Hall, London.

Temphare D.B., 1984 A. Text Book of Insects Morphology, Physiology and Endocrinology. S. Chand and Co., New Delhi.

A.Upadhyaya, K.Upathyaya and N.Nath, 2003 Biophysical chemistry, Principles and Techniques,3rd Ed, Himamalaya publishing house.

H.B.Bull, F.H.Davis, 1971. An introduction to physical Biochemistry 2nd Ed, Philadelphia Gurumani.N 2006. Research methodology for biological sciences MJP publ. Chennai.

QUESTION PATTERN

Written paper Max Marks: 75 Marks

Time: 3 Hours

A Question paper consists of three parts

Part-A

10 very short answer question without choice .Each question is to be answered in about 50 words. Each answer is to be valued out of 2 marks.

Part-B

5 questions are to be answered out of 8 given .Each question is to be answered in about 300 words . Each answer is to be valued out of 5 marks.

Part-C

Essay questions, containing internal choice to be answered in about 1200 words. Each answer is to be valued out of 15 marks.

Part-A

Very Short Answers (50 words) 10 questions each 2 marks.

Part-B

Short Answers (300 words) 5 question each 5 marks.

Part-C

Essay questions (1200 words) 2 questions each 15 marks.

III B.Sc (Zoo)	ENVIRONMENTAL BIOLOGY	
SEMESTER - VI		HRS/WK - 5
CORE - VIII		CREDIT - 5

Objective:

- To learn the scope of environmental biology, importance of protection and conservation of wild life to maintain the ecosystem balance.
- To create awareness about the environmental problems and motivate the students to participate in environment protection and sustainable utilization of natural resources.

Course Outcome

On completion of the course students will be able

CO1: To realize the scope and concept of environmental biology

CO2: To describe structure and functions of ecosystem.

CO3: To understand biogeochemical cycles and animal association

CO4: To describe population and community of an ecosystem and management of natural resources

CO5: To get knowledge on environmental degradation and their effects and remedy measures

SEMESTER VI	COURSE CODE:					ENVIRONMENTAL BIOLOGY										HOURS: 5	CREDITS: 5
COURSE OUTCOMES	PROGRAMME OUTCOMES(PO)					PROGRAMME SPECIFIC OUTCOMES(PSO)										MEAN SCORE OF CO'S	
	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8	PSO 9	PSO 10		
CO1	5	5	5	5	4	5	5	3	1	4	3	1	5	5	5	4.1	
CO2	5	5	5	5	4	5	5	3	1	4	3	1	5	5	5	4.1	
CO3	5	5	4	5	4	5	5	5	1	4	3	1	5	5	5	4.1	
CO4	5	5	4	5	4	5	5	4	1	4	3	1	5	5	5	4.1	
CO5	5	5	4	5	4	5	5	3	1	4	3	1	5	5	5	4	
Mean Overall Score															4.1		

This Course is having **VERY HIGH** association with Programme Outcome and Programme Specific Outcome

Association	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%
Scale	1	2	3	4	5
Interval	0<=rating<=1	1.1<=rating<=2	2.1<=rating<=3	3.1<=rating<=4	4.1<=rating<=5
Rating	Very Poor	Poor	Moderate	High	Very High

UNIT – I

Scope – concept – Branches in ecology – Autecology, synecology - types of media and substratum and their influences on animals – **Water:** Properties, Forms of water, Soft and hard water. **Air** composition – properties. **Substratum:** Soil -Types, soil formation, soil group of India, soil profile.

UNIT – II

Biosphere – Hydrosphere – Lithosphere – Atmosphere – temperature: Distribution of temperature, thermal stratification – Temperature as a limiting factor, thermal adaptations. Light as a limiting factor. Ecosystem-concept, components, types, structure and functions.

UNIT – III

Biogeochemical cycles – gaseous cycle [C,N₂ & S] sedimentary cycle, [phosphates]. **Animal association** - Intra specific and inter specific - colony formation, social organization, predation, parasitism, commensalisms, mutualism, inter specific competition – competitive principle or Gause's principle.

UNIT – IV

Population: Definition – characteristics – Natality, Mortality, age distribution of Population growth forms, population fluctuation. Community Ecotone and edge effects – ecological succession. Conservation - **Wild life management**, Preservation – laws enforced – sanctuaries, National parks. **Natural resources management:** renewable and non-renewable.

UNIT – V

Environmental degradation – deforestation, urbanization, population explosion and other environmental hazards – Environmental ethics and laws – Earth summits – role of governmental agencies for environmental monitoring.

Reference Books:

Kotpal. R.L, and N.P. Bali, 1986. Concepts of Ecology, Vishal Publications, New Delhi – 7
Rastogi V.B, and M.S. Jayaraji, 1988 – 1989 Animal Ecology and Distribution of animals, Kedar nath, Ram Nath Meerut – 250 001.

Clark, G.L. 1954, Elements of Eology, John wiley & Sons Inc., New York, London.

Ananthakrishnan, T.N, and S. Viswanathan, Principles of Animal Ecology.

Eugene P. Odum, 1971. Fundamentals of ecology, Saunders International Student Edition, W.B. Saunders Company, Philadelphia London, Toronto.

Verma, P.S and Agarwal 1986, Environmental Biology, S. Chand & Co Ltd. New Delhi.

QUESTION PATTERN

Written paper Max Marks: 75 Marks

Time: 3 Hours

A Question paper consists of three parts

Part-A

10 very short answer question without choice .Each question is to be answered in about 50 words. Each answer is to be valued out of 2 marks.

Part-B

5 questions are to be answered out of 8 given .Each question is to be answered in about 300 words . Each answer is to be valued out of 5 marks.

Part-C

Essay questions, containing internal choice to be answered in about 1200 words. Each answer is to be valued out of 15 marks.

Part-A

Very Short Answers (50 words) 10 questions each 2 marks.

Part-B

Short Answers (300 words) 5 question each 5 marks.

Part-C

Essay questions (1200 words) 2 questions each 15 marks.

III B.Sc (Zoo)	ECONOMIC ZOOLOGY	
SEMESTER - VI		HRS/WK - 5
CORE - IX		CREDIT - 5

Objective:

- To impart the importance of valuable animals like earth worms, silk worms, honey bees, fishes, prawns, oysters and cattle.
- To study the rearing methods of these organisms with an economic point of view.

Course Outcome

On completion of the course students will be able

CO1: To acquire knowledge on vermiculture, apiculture and sericulture

CO2: To describe prawn culture, pearl culture and pisciculture

CO3: To acquire knowledge on poultry

CO4: To describe dairy farm and sheep farm

CO5: To understand future strategies for livestock development

SEMESTER VI	COURSE CODE:					ECONOMIC ZOOLOGY										HOURS: 5	CREDITS: 5
	PROGRAMME OUTCOMES(PO)					PROGRAMME SPECIFIC OUTCOMES(PSO)											
COURSE OUTCOMES	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8	PSO 9	PSO 10		
CO1	5	5	5	5	5	5	4	4	3	5	5	2	5	4	5	4.5	
CO2	5	5	5	5	5	5	4	4	3	5	5	2	5	4	5	4.5	
CO3	5	5	5	5	5	5	4	4	3	5	5	2	5	4	5	4.5	
CO4	5	5	5	5	5	5	4	4	3	5	5	2	5	4	5	4.5	
CO5	5	5	5	5	5	5	4	4	3	5	5	2	5	4	5	4.5	
Mean Overall Score																4.5	

This Course is having **VERY HIGH** association with Programme Outcome and Programme Specific Outcome

Association	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%
Scale	1	2	3	4	5
Interval	0<=rating<=1	1.1<=rating<=2	2.1<=rating<=3	3.1<=rating<=4	4.1<=rating<=5
Rating	Very Poor	Poor	Moderate	High	Very High

UNIT – I

Vermiculture: Composting of Earthworms-Methods of composting.

Apiculture - Species of Honeybees –Construction of Apiary-Honey extraction – Economics of Apiculture and management.

Sericulture – Nature and economic importance of sericulture in India.

UNIT –II

Prawn culture – Culture techniques of fresh water [*Macrobrachium rosenbergii*] & Marine water (*Penaeus monodon*)

Pearl culture: Formation and nature of Pearls – Commercial importance of Pearl Culture in India.

Pisciculture– Techniques of induced breeding, commercial culture of catla & catfish, By-products of fishing and its commercial values.

UNIT – III

Poultry- Morphology of different breeds of Chicken – Brooding and Rearing of Chicks – Processing of Egg, Meat and By-Products of Poultry.

UNIT – IV

Dairy farm - management, Milch breeds. Draught Breeds, Dual Purpose breeds and New cross Breeds of Cows and Buffaloes in India.

Sheep farm: Indigenous and Exotic breeds of sheep

UNIT – V

Future strategies for Livestock Development – Transgenic animal Technology – Genetic Improvement for best Breeds – Economic importance of Dairy, Leather, Wool, Fur and Pharmaceutical Industries in India.

Reference Books:

Sukla, G.S. and Upadhyay, V.B., 2000 Economic Zoology – ISBN – 81- 7133 -137 -8 Rastogi Publication, Meerut, India

Jawaid Ahsan and Subhas Prasad sinha – 2000 A Handbook on Economic Zoolgy - Chand & co., Ltd., New Delhi.

Ashok Kumar and Prem Mohan Nigam, 1991 Economic and Applied Entomology Emkay Publication, New Delhi.

Shammi,Q.J. and Bhatnagar, S., 2002 Applied Fisheries Agrobios [India],Jodhpur - India Major Hall, C.B. 2005 Ponds and Fish culture.

Agrobios [India], Jodhpur - India

Keith Wilson, N.D.P., 2005 A Handbook of Poultry Practice

Agrobios [India], Jodhpur - India

Banerjee, G. C. 1992 Poultry – III – Edition

Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.

Banerjee, 1988

A Text book of Animal Husbandry – VIII- Edition xford & IBH Publishing co. Pvt. Ltd., New Delhi.

Kaushish, S.K., 2001 Trends in livestock Research

Agrobios [India], Jodhpur - India

Ismail, S.A1997. Vermicology the Biology of Earth worm orient Longman, India.

Mary Violet chrishty .A 2008 Vermi techonology MJP Publ. Chennai.

QUESTION PATTERN

Written paper Max Marks: 75 Marks

Time: 3 Hours

A Question paper consists of three parts

Part-A

10 very short answer question without choice .Each question is to be answered in about 50 words. Each answer is to be valued out of 2 marks.

Part-B

5 questions are to be answered out of 8 given .Each question is to be answered in about 300 words . Each answer is to be valued out of 5 marks.

Part-C

Essay questions, containing internal choice to be answered in about 1200 words. Each answer is to be valued out of 15 marks.

Part-A

Very Short Answers (50 words) 10 questions each 2 marks.

Part-B

Short Answers (300 words) 5 question each 5 marks.

Part-C

Essay questions (1200 words) 2 questions each 15 marks.

III B.Sc (Zoo)	EVOLUTION	
SEMESTER - VI		HRS/WK - 5
CORE - X		CREDIT - 5

Objective:

- To learn the outline of major transitions in evolution from origin of life, process of evolution and biological diversity.
- To gain knowledge on natural selection, behavior and distribution of animals

Course Outcome

On completion of the course students will be able

CO1: To describe the evidences of evolution

CO2: To realize the theories of evolution like Lamarckism and Darwinism,

CO3: To recognize natural selection and types of variation.

CO4: To describe mimicry behavior and distribution of animals

CO5: To understand isolation and evolution of man

SEMESTER VI	COURSE CODE:					EVOLUTION										HOURS:5	CREDITS:5
COURSE OUTCOMES	PROGRAMME OUTCOMES(PO)					PROGRAMME SPECIFIC OUTCOMES(PSO)										MEAN SCORE OF CO'S	
	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8	PSO 9	PSO 10		
CO1	5	5	2	3	3	5	5	3	2	4	2	3	5	3	5	3.7	
CO2	5	5	2	3	3	5	5	3	2	4	2	3	5	3	5	3.7	
CO3	5	5	4	3	3	5	5	3	2	4	2	3	5	3	5	3.8	
CO4	5	5	4	3	3	5	5	3	2	4	2	3	5	3	5	3.8	
CO5	5	5	4	3	3	5	5	3	2	4	2	3	5	3	5	3.8	
Mean Overall Score															3.8		

This Course is having **HIGH** association with Programme Outcome and Programme Specific Outcome

Association	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%
Scale	1	2	3	4	5
Interval	0<=rating<=1	1.1<=rating<=2	2.1<=rating<=3	3.1<=rating<=4	4.1<=rating<=5
Rating	Very Poor	Poor	Moderate	High	Very High

UNIT – I

Evidences: The need of evidences for the fact of evolution – Morphological, anatomical, Embryological, Physiological and Biochemical evidences.

UNIT – II

Theories: Lamarckism, Neolamarckism, Darwinism, NeoDarwinism, Devries concept of Mutation. Modern version of Mutation theory.

UNIT – III

Natural selection: Types, stabilizing and diversifying directional selection. **Variation:** Types of variation.

UNIT-IV

Mimicry – Batesian and mullerian mimicry and evolution, living fossils. Distribution of animals.

UNIT – V

Isolation – Premating and post mating isolating mechanism, speciation. **Evolution of man** – Biological and cultural.

Reference Books:

Agarwal, V.K and Usha Gupta –1990. Evolution and animal distribution, Chand and Co.,

Dodson, E.O.. Evolution, Reinhold, Newyork.

Francisco, J. Ayla – Evolution, Surject publication.

Gopalakrishnan, T.S. Itta Sambasivaiah and A.P. Kamalakara Rao. Principles of organic Evolution,

Himalaya publishing house.

Ranganathan T.K., Evolution. 1994 Rainbow Printers, Palayankottai.

Veer Bala Rastogi. Organic Evolution, Meerut Publications.

Arumugam, N. Organic Evolution, 2009 Saras. Publ. Nagarcoil.

QUESTION PATTERN

Written paper Max Marks: 75 Marks

Time: 3 Hours

A Question paper consists of three parts

Part-A

10 very short answer question without choice .Each question is to be answered in about 50 words. Each answer is to be valued out of 2 marks.

Part-B

5 questions are to be answered out of 8 given .Each question is to be answered in about 300 words . Each answer is to be valued out of 5 marks.

Part-C

Essay questions, containing internal choice to be answered in about 1200 words. Each answer is to be valued out of 15 marks.

Part-A

Very Short Answers (50 words) 10 questions each 2 marks.

Part-B

Short Answers (300 words) 5 question each 5 marks.

Part-C

Essay questions (1200 words) 2 questions each 15 marks.

III B.Sc (Zoo)	ELECTIVE-II AQUACULTURE	
SEMESTER - VI		HRS/WK - 4
ELECTIVE-II (Compulsory)		CREDIT - 5

Objective:

- To provide basic information on production of low cost, protein rich, nutritive, edible and easily digestible human food by aquaculture.
- To introduce new species and technique to strengthen the stocks of existing fish from natural resources by artificial recruitment.

Course Outcome

On completion of the course students will be able

CO1: To understand the principles of site selection for aquaculture.

CO2: To describe different types of aquaculture practices.

CO3: To know the criteria for aquaculture species selection and water quality management.

CO4: To describe nutritional requirements and feed formulation for aquaculture organisms

CO5: To acquire knowledge in Mari culture

SEMESTER VI	COURSE CODE:					ELECTIVE-II AQUACULTURE										HOURS: 4	CREDITS :5
	PROGRAMME OUTCOMES(PO)					PROGRAMME SPECIFIC OUTCOMES(PSO)											
COURSE OUTCOMES	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8	PSO 9	PSO 10		
CO1	5	5	5	5	4	4	5	1	1	2	4	1	5	4	5	3.7	
CO2	5	5	5	5	4	4	5	1	1	2	4	1	5	4	5	3.7	
CO3	5	5	5	5	4	4	5	4	1	2	4	2	5	4	5	4.0	
CO4	5	5	5	5	4	4	5	3	1	2	4	2	5	4	5	4.0	
CO5	5	5	5	5	4	4	5	1	1	2	4	1	5	4	5	3.7	
Mean Overall Score																3.8	

This Course is having **HIGH** association with Programme Outcome and Programme Specific Outcome

Association	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%
Scale	1	2	3	4	5
Interval	0<=rating<=1	1.1<=rating<=2	2.1<=rating<=3	3.1<=rating<=4	4.1<=rating<=5
Rating	Very Poor	Poor	Moderate	High	Very High

UNIT I

Definition of aquaculture – Principles of site selection for fish farms, water, soil, types and other parameters.

UNIT II

Types of aquaculture - Monoculture, Poly culture, Integrated farming, Pond culture, Pen and Cage culture, Raft culture, Race way culture, Warm and cold water fish culture .

UNIT III

Criteria for selection of variety – Seed procurement and stocking management. Water quality management.

UNIT IV

Nutritional requirements and formulation of artificial diets. Breeding and culture of fresh water fishes – Catla, *Mrigala*, Rohu and Tilapia.

UNIT V

Mari culture – Culture of edible oyster, pearl oyster, mussels, clams, sea urchins, sea cucumbers

REFERENCES:

1. Fish and Fisheries in India, Jhingran, V.G., 1982, Hindustan Publishing Corporation, New Delhi
Principles and practices of Pond Aquaculture, Annan, J.F, R.O. Smitherman and G. Tehebenoglous (Eds), 1983, Oregon State University, U.S.A.
2. Home Aquarium: aquatic gema and tropical fish, 1970, Makinos Japan Publications

QUESTION PATTERN

Written paper Max Marks: 75 Marks

Time: 3 Hours

A Question paper consists of three parts

Part-A

10 very short answer question without choice .Each question is to be answered in about 50 words. Each answer is to be valued out of 2 marks.

Part-B

5 questions are to be answered out of 8 given .Each question is to be answered in about 300 words . Each answer is to be valued out of 5 marks.

Part-C

Essay questions, containing internal choice to be answered in about 1200 words. Each answer is to be valued out of 15 marks.

Part-A

Very Short Answers (50 words) 10 questions each 2 marks.

Part-B

Short Answers (300 words) 5 question each 5 marks.

Part-C

Essay questions (1200 words) 2 questions each 15 marks.

III B.Sc (Zoo)	Skill Based Subject SERICULTURE	
SEMESTER - VI		HRS/WK – 5
Skill Based Subject		CREDIT – 4

Objective:

- To acquire knowledge on economic importance of sericulture.
- To understand the species of silk moth and techniques in sericulture.

Course Outcome

On completion of the course students will be able

CO1: To gain knowledge on introduction and importance of sericulture

CO2: To understand classification and biology of silk moth

CO3: To describe the tools of sericulture

CO4: To get knowledge on harvesting methods in sericulture

CO5: To realize the economic status of sericulture

SEMESTER VI	COURSE CODE:					Skill Based Subject SERICULTURE										HOURS: 5	CREDITS: 4
	PROGRAMME OUTCOMES(PO)					PROGRAMME SPECIFIC OUTCOMES(PSO)											
COURSE OUTCOMES	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8	PSO 9	PSO 10		
CO1	5	5	4	5	4	4	4	3	1	2	3	1	5	2	5	3.5	
CO2	5	5	4	5	4	4	4	5	3	2	3	1	5	2	5	3.8	
CO3	5	5	5	5	4	4	4	4	2	2	3	1	5	2	5	3.7	
CO4	5	5	5	5	4	4	4	3	2	2	3	1	5	2	5	3.7	
CO5	5	5	5	5	4	4	4	3	1	2	3	1	5	2	5	3.6	
Mean Overall Score																3.7	

This Course is having **HIGH** association with Programme Outcome and Programme Specific Outcome

Association	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%
Scale	1	2	3	4	5
Interval	0<=rating<=1	1.1<=rating<=2	2.1<=rating<=3	3.1<=rating<=4	4.1<=rating<=5
Rating	Very Poor	Poor	Moderate	High	Very High

UNIT – I

Introduction – Importance of sericulture– Mulberry plant - Classification of commercial varieties of mulberry. Mulberry plant cultivation practices.

UNIT – II

Classification and Biology of silk moth – familiar and economically important types of silkworms – life cycle study of *Bombyx mori*. Diseases of silk worms – fungal, bacterial, viral and nematode diseases, deficiency diseases and their remedial measures.

UNIT – III

Tools of sericulture– cultural methods and management of mulberry silk worms - Silkworm rearing operations – Chawki rearing and late age rearing techniques.

UNIT – IV

Harvesting methods- Physical and commercial characters of cocoons. Reeling operations, importance of by – products of Sericulture.

UNIT – V

Economics of Sericulture – Future and progress of sericulture in India. Role of State and central silk board – employment opportunities - Prospects of sericulture as self Employment as cottage industry.

Reference Books:

Ganga, G. 2003: comprehensive sericulture Vol-1, Mariculture – Oxford –IBH Publ. Co. India.

Ganga, G. 2003: comprehensive sericulture Vol –II Silkworm rearing – Oxford – IBH Publ. Co. India.

Ganga, G. and Sculochana Chetty, J. 1997: An Introduction to sericulture Oxford – IBH Publ. Co. India.

QUESTION PATTERN

Written paper Max Marks: 75 Marks

Time: 3 Hours

A Question paper consists of three parts

Part-A

10 very short answer question without choice .Each question is to be answered in about 50 words. Each answer is to be valued out of 2 marks.

Part-B

5 questions are to be answered out of 8 given .Each question is to be answered in about 300 words . Each answer is to be valued out of 5 marks.

Part-C

Essay questions, containing internal choice to be answered in about 1200 words. Each answer is to be valued out of 15 marks.

Part-A

Very Short Answers (50 words) 10 questions each 2 marks.

Part-B

Short Answers (300 words) 5 question each 5 marks.

Part-C

Essay questions (1200 words) 2 questions each 15 marks.

III B.Sc (Zoo)	CORE PRACTICAL – III BIostatISTICS, ANIMAL PHYSIOLOGY, DEVELOPMENTAL BIOLOGY AND IMMUNOLOGY	
SEMESTER - VI		HRS/WK - 3
CORE PRACTICAL – III		CREDIT - 5

BIostatISTICS:

Biological data – calculation of mean, median, mode, Mean and standard deviation.

Graphical representation – Bar, Pie, frequency distribution.

Demonstration of MS- word, MS-Excel and MS-PPT.

ANIMAL PHYSIOLOGY:

Activity of human salivary amylase in relation to PH, Enzyme concentration and Temperature.

Estimation of Oxygen consumption in a fish with reference to body weight.

Detection of nitrogenous waste products in fish tank water, frog tank water, bird excreta and mammalian urine.

Use of Kymograph Unit, B.P. apparatus, stethoscope.

DEVELOPMENT BIOLOGY:

Study of the following prepared slides / museum specimens.

Section of testis and Ovary [Mammalian].

Slides of Mammalian sperm and ovum.

Study of Egg types – Frog’s Egg, Hen’s Egg.

Study of cleavage stages 2 Cell, 4Cell, 8Cell – Blastula and gastrula of Frog.

Slides of different stages of chick embryo –24 hours, 33 hours,48 hours 72 hours and 96 hours.

Placenta of Sheep, Pig and Man.

IMMUNOLOGY:

Study of Antigen – Antibody reaction – Human Blood grouping [ABO and Rh].

Study of prepared slides of histology: Thymus, Spleen, Bone marrow, Lymph node.

III B.Sc (Zoo)	CORE PRACTICAL - IV ENVIRONMENTAL BIOLOGY, ECONOMIC ZOOLOGY AND EVOLUTION ENVIRONMENTAL BIOLOGY	
SEMESTER - VI		HRS/WK - 3
CORE PRACTICAL - IV		CREDIT - 5

Estimation of Dissolved oxygen, salinity, pH, Free CO₂, Carbonate and Bicarbonates in water samples.

Use of rain gauge, Maximum and Minimum thermometer, Hygrometer and Anemometer.

Plankton study – fresh water and Marine plankton.

Study of natural ecosystem and field report.

ECONOMIC ZOOLOGY:

Study of the following prepared slides / specimens.

Earthworm types [any two] – [vermiculture].

Megacolex mauritii – south Indian species – surface crawlers.

Drawida modesta – Redsoil with calciferous gland.

Pheretima posthuma – North Indian – Large specimen.

Eudrilus eugenia – Redworm, Exotic.

Fish parasites [Lernea, Argulus].

Larvivorous fishes :

Poecelia reticulate – Guppy.

Gambusia Affinis – Gambusi.

Colisa labia – Dwarf gowrami.

Different stage of **Silk worm**.

Types of Honey **Bees**.

Common **Pests**.

EVOLUTION

Fossils – ammonite.

Living fossils – Limulus, sphenodon.

Conneting link – peripatus, archaeopteryx.

Evolutionary significance – exocoetus, draco, hippocampus.

Mimicry – monarch butterfly.

Camouflage – chameleon.

DEPARTMENT OF ZOOLOGY
ALLIED ZOOLOGY
&
ENVIRONMENTAL STUDIES (SKILL- BASED)
COURSE PATTERN

SEMESTER	PART	CODE	SUBJECT TITLE	HOURS	CREDITS
III	III	AZCMB301	Classical Genetics & (II Year Micro Biology)	8	6
IV	III	AZMB402	Solid waste Management (II Year Micro Biology)	8	6
IV	III	AZBC401T	Advanced Zoology-Theory (II Year Bio – Chemistry)	8	6
IV	III	AZBP401	Advanced Zoology-Practical (II Year Bio – Chemistry)	3	3
III & IV	IV	EVS301S & EVS401S	Environmental Studies(All UG B.Sc/B.A/B.COM/B.C.A	3	2

II B.Sc (MB)	CLASSICAL GENETICS & BIO-STATISTICS	AZCMB301
SEMESTER - III		HRS/WK - 8
ALLIED		CREDIT - 6

(For II Year B.Sc., Micro-Biology)

Objective:

- To provide basic knowledge in the field of genetics and applications of biostatistics for data analysis.

Course Outcome

On completion of the course students will be able

CO1: To understand the history of genetics and Mendel's laws

CO2: To understand recombination in Eukaryotes

CO3: To describe molecular, human and and cytogenetics

CO4: To obtain knowledge on introduction, scope, importance and functions of biostatistics

CO5: To analyze correlation, regression and test of significance

SEMESTER III	COURSE CODE:					CLASSICAL GENETICS & BIO-STATISTICS										HOURS: 8	CREDITS: 6
COURSE OUTCOMES	PROGRAMME OUTCOMES(PO)					PROGRAMME SPECIFIC OUTCOMES(PSO)										MEAN SCORE OF CO'S	
	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8	PSO 9	PSO 10		
CO1	5	5	3	5	4	5	4	2	2	4	4	3	5	2	5	3.9	
CO2	5	5	4	5	4	4	4	2	3	4	4	3	5	2	5	4.0	
CO3	5	5	4	5	4	4	4	2	4	4	4	3	5	2	5	4.0	
CO4	5	5	4	5	4	4	4	2	2	4	4	4	5	2	5	4.0	
CO5	5	5	4	5	4	4	4	2	1	4	4	4	5	2	5	3.9	
Mean Overall Score																4.0	

This Course is having **HIGH** association with Programme Outcome and Programme Specific Outcome

Association	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%
Scale	1	2	3	4	5
Interval	0<=rating<=1	1.1<=rating<=2	2.1<=rating<=3	3.1<=rating<=4	4.1<=rating<=5
Rating	Very Poor	Poor	Moderate	High	Very High

Unit – I : Genetics and Mendel's laws :

History of genetics – Mendel's experiments: monohybrid, dihybrid and polyhybrid cross - Mendel's laws of inheritance - hybrid vigour – gene expressivity - pleiotropism – incomplete dominance – complementary genes - epistasis - supplementary genes – duplicate genes – lethal genes – atavism – multiple genes – polygenic inheritance – continuous and discontinuous characters. Multiple Alleles and linkage - Characters and theories of multiple alleles – sub alleles and iso alleles - ABO Blood Group inheritance - Rh factor – linkage and linkage group – history - linked genes – complete and incomplete linkage – significance of linkage.

Unit – II : Recombination in Eukaryotes :

Mechanism – stage specificity - cytological evidence – frequency of crossing over – factors controlling crossing over – mitotic and meiotic crossing over – somatic and germinal crossing over – significance of crossing over - construction of chromosome maps – history of chromosomes – size, shape, structure, types and physiology of chromosomes- gene concept - gene function.

Unit – III: Molecular, Human and and cytogenetics

DNA as the genetic material – nucleic acids – structure of DNA , gene – enzyme relationship - euploidy - aneuploidy – chromosomal aberrations - Pedigree analysis – human chromosomes – eugenics and euphenics – inbreeding, outbreeding and hybrid vigour - population genetics.

BIO-STATISTICS

Unit – IV:

Introduction – Scope – Definition – Importance – Functions – Data – Data collection – Methods of data collection – Classification of Data – Tabulation of Data – Diagrammatic, Graphical presentation of Data – Histogram – Frequency polygon – Oogive curves. Measures of central tendency _ Arithmetic mean – Median – Mode - Measures of dispersion – range – quartile deviation – standard deviation and coefficient of variation – mean deviation – skewness – kurtosis.

Unit –V:

Correlation – simple correlation – Rank correlation – Regression – Probability – Addition theorem – Multiplication theorem – Permutation and combinations - Test of significance – Hypothesis testing – Null hypothesis – alternative hypothesis – Large sample test – small sample test (Students 't' test) – chi-square test – standard error – ANOVA (Analysis of variance) – one way ANOVA.

Text Books:

1. Verma, P.S and Agarwal, V.K 2005 ‘ Cell Biology, Genetics, Molecular Biology, Evolution & Ecology’, S. Chand and Co., New Delhi.
2. Biostatistics P. Ramakrishnan Saras Publications 1996 A.R.P. Camp Road, Kottar, Nagarkoil, Kanyakumari District.
3. Elements of Biostatistics by Gurumani Nithi Publishers.

Reference books:

1. Veer Bala Rastogi. 1992 .A textbook of Genetics, 9th edition, Keda Nath Ram Nath, New Delhi.
2. Karvita B. Aluwalia , 1991. ‘Genetics’ Wiley Eastern Ltd, New Delhi .
3. Sarin, C.1990. ‘ Genetics’ Tata Mcgraw – Hill Publishing Co ., Ltd., New Delhi.
4. Burns. G.W .and Boltsmo, P.J. 1989. The Science of Genetics’ Macmillan publishing Co ., New York.

QUESTION PATTERN

Written paper Max Marks: 75 Marks

Time :3 Hours

A Question paper consists of three parts

Part-A

10 very short answer question without choice .Each question is to be answered in about 50 words . Each answer is to be valued out of 2 marks.

Part-B

5 questions are to be answered out of 8 given .Each question is to be answered in about 300 words . Each answer is to be valued out of 5 marks.

Part-C

Essay questions, containing internal choice to be answered in about 1200 words. Each answer is to be valued out of 15 marks.

Part-A

Very Short Answers(50 words) 10 questions each 2 marks.

Part-B

Short Answers(300 words) 5 questions each 5 marks.

Part-C

Essay questions (1200 words) 2 questions each 15 marks.

II B.Sc (MB)	SOLID WASTE MANAGEMENT	AZMB402
SEMESTER - IV		HRS/WK - 8
ALLIED		CREDIT - 6

(For II Year B.Sc., Micro-Biology)

Objective:

- To provide basic knowledge solid waste management and their handling rules as well as vermicomposting technology

Course Outcome

On completion of the course students will be able

CO1: To describe the types, sources and generation of solid waste and their handling rules

CO2: To identify the types of industrial waste and their treatment and disposal methods

CO3: To describe biomedical waste and hazardous waste and their handling rules

CO4: To understand various species of earthworm, vermiculture and vermicomposting

CO5: To gain information regarding composting technology and economics of vermicomposting

SEMESTER IV	COURSE CODE:					SOLID WASTE MANAGEMENT										HOURS: 8	CREDITS :6
	PROGRAMME OUTCOMES(PO)					PROGRAMME SPECIFIC OUTCOMES(PSO)											
COURSE OUTCOMES	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8	PSO 9	PSO 10		
CO1	5	5	5	5	4	3	4	1	1	3	3	2	5	5	5	3.7	
CO2	5	5	5	5	4	3	4	1	1	3	3	2	5	5	5	3.7	
CO3	5	5	5	4	4	3	4	1	1	3	3	2	5	5	5	3.7	
CO4	5	5	4	4	4	3	4	1	1	4	5	2	5	5	5	3.8	
CO5	5	5	4	4	4	3	4	1	1	4	5	2	5	5	5	3.8	
Mean Overall Score																3.7	

This Course is having **HIGH** association with Programme Outcome and Programme Specific Outcome

Association	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%
Scale	1	2	3	4	5
Interval	0<=rating<=1	1.1<=rating<=2	2.1<=rating<=3	3.1<=rating<=4	4.1<=rating<=5
Rating	Very Poor	Poor	Moderate	High	Very High

Unit I : Introduction**(20 Hrs)**

Waste – classification, quantification, solid waste management and disposal, source and generation of solid wastes – characterization, composition and classification, physico-chemical properties - Municipal solid wastes: Collection, storage and transportation – disposal methods – sanitary land fills, shredding and pulverizing, baling, incineration, composting, vermicomposting, recycling – energy recovery from wastes – municipal wastes management and handling rules (1999)

Unit II: Industrial wastes:**(20 Hrs)**

Industrial solid wastes and description – health hazards – collection and storage – treatment and disposal - liquid wastes – primary, secondary and tertiary treatments – water pollution and their effects on animals and plants – water quality standards – gaseous pollution – types and sources – air pollution control.

Unit III: Bio-medical wastes:**(20 Hrs)**

Generation – legal aspects and environmental concern – Bio-medical waste management and handling rules, 1998 – storage, handling and transportation of bio-medical wastes – disposal technologies - Hazardous wastes: Definition – characteristics – sources and transportation – radioactive wastes – half life, mode of decay, effect on plants, animals and man – treatment methods; physical, chemical and biological methods – site remediation – waste minimization – hazardous waste rules, 1989.

Unit IV : Earthworms:**(20 Hrs)**

Characteristics, types – Indian species – suitable species for vermicomposting – digestion, decomposition and humification – role of microorganisms - Earthworm culture: Steps involved in the culture of indigenous and exotic species of earthworms – physical, chemical and biological requirements – protection of worms from predators – enemies of earthworms - Organic wastes: Definition – types and sources of various organic wastes – utilization of organic wastes in vermiculture and vermicomposting.

Unit V: Composting technology:**(20 Hrs)**

Definition – types of vermicomposting – requirements – advantages – precautionary measures - nutrients enhancement of vermicompost – effect of vermicomposting in the soil fertility - Economics of vermicomposting: Small scale and large scale applications of vermicomposting – loan facilities – marketing strategies.

Field Work:**(20 Hrs)**

Methods of vermicomposting – preparation of vermi bed – monitoring – bio-manure production – application of compost for culture operations – minor project reports.

Text Books:

Study materials given

Reference Books:

1. K.C.Agarwal, 2001. Environmental pollution: Causes, Effects and Control, Nidhi Publisher (India), Bikaner.

2. Verma, P.S., and VK. Agarwal. 2003. Environmental Biology, S. Chand and Company. Ram Nagar, New Delhi.
3. Pradyot Patnik, 1977. Hand book of Environmental Analysis. Chemical Pollutants in Air, Water, Soil and Solid wastes, Lewis Publishers, CRC Press. U.S.A.
4. S.A. Abbasi, 1998. Water Quality, Sampling and Analysis. Discovery Publishing House, New Delhi.
5. P.K. Gupta, 2000. Methods in Environmental Analysis. Water Soil and Air, Agrobios (India) Jodhpur.
6. Bhatnager and R.K. Patra (1996); Earthworm, Vermiculture and Vermicompositing, Kalyani Publishers, New Delhi.
7. C.A. Edwards and B.J. Bohlen (1996); Biology and Ecology of Earthworms, Chapman and Hall, London.
8. S. Ismail (1997); Vermicology, Orient Long man Limited, Chennai.
9. K.E. Lee (1985) 'Earthworms; Their Ecology and Relationship with Soils and Land Use', Academic Press, Sydney.
10. J.E. Satchell (Ed) (1983) - Earthworm Ecology: From Darwin to vermi culture. Chapman and Hall, "London.

QUESTION PATTERN

Written paper Max Marks: 75 Marks

Time :3 Hours

A Question paper consists of three parts

Part-A

10 very short answer question without choice .Each question is to be answered in about 50 words. Each answer is to be valued out of 2 marks.

Part-B

5 questions are to be answered out of 8 given .Each question is to be answered in about 300 words . Each answer is to be valued out of 5 marks.

Part-C

Essay questions, containing internal choice to be answered in about 1200 words. Each answer is to be valued out of 15 marks.

Part-A

Very Short Answers (50 words) 10 questions each 2 marks.

Part-B

Short Answers (300 words) 5 question each 5 marks.

Part-C

Essay questions (1200 words) 2 questions each 15 marks.

II B.Sc (BC)	ADVANCED ZOOLOGY For the students admitted in the year 2015	AZBC401T
SEMESTER - IV		HRS/WK – 5
ALLIED		CREDIT - 3

Objective:

- To understand the basic concepts of animal kingdom, Invertebrates, Chordates, human physiology, cytological techniques, human genetics, developmental biology, ecology and evolution.

Course Outcome

On completion of the course students will be able

CO1: To describe structure and functions of some Invertebrate and Chordate species

CO2: To describe physiology of human organ systems

CO3: To analyze cytological techniques and human genetics

CO4: To understand developmental biology

CO5: To understand the basic concepts of ecology and evolution

SEMESTER IV	COURSE CODE:					ADVANCED ZOOLOGY										HOURS: 5	CREDITS :3
COURSE OUTCOMES	PROGRAMME OUTCOMES(PO)					PROGRAMME SPECIFIC OUTCOMES(PSO)										MEAN SCORE OF CO'S	
	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8	PSO 9	PSO 10		
CO1	5	5	4	5	4	5	5	5	5	5	5	2	5	3	5	4.5	
CO2	5	5	4	5	4	5	5	5	5	5	5	2	5	3	5	4.5	
CO3	5	5	4	5	4	5	5	5	5	5	5	5	5	3	5	4.7	
CO4	5	5	4	5	4	5	5	5	5	5	5	3	5	3	5	4.6	
CO5	5	5	4	5	4	5	5	5	4	5	5	3	5	3	5	4.5	
Mean Overall Score																4.6	

This Course is having **VERY HIGH** association with Programme Outcome and Programme Specific Outcome

Association	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%
Scale	1	2	3	4	5
Interval	0<=rating<=1	1.1<=rating<=2	2.1<=rating<=3	3.1<=rating<=4	4.1<=rating<=5
Rating	Very Poor	Poor	Moderate	High	Very High

Unit: 1

INVERTEBRATES AND CHORDATES- Structural and functional details of phylum– Protozoa-*Plasmodium vivox*, Helminthes-*Taenia solium*, Annelida-Earthworm- Digestive system, Prochordata – amphioxus- Morphological details of chordates- Pisces-shark, Amphibia -Frog, Reptiles- Calotes, Aves- pigeon, Mammalia- Rat.

Unit: 2

PHYSIOLOGY- Digestion and absorption of carbohydrates proteins and lipids. **Respiration** –exchange and transport of Gases (CO₂ & O₂) Bohr's effect. **Circulation**:- Structure and functions of human heart, **Excretion** – ornithine cycle Osmo regulation in fresh water and marine animals. **Nerve Physiology**: Structure of Neuron, Conduction of Nerve impulse. **Muscle Physiology**: Types of Muscle, Theories of Muscle contraction. **Endocrinology**: Structure, secretions and functions of Pituitary, Thyroid, adrenal, islets of langerhans, Gonads –Pheromones.

Unit: 3

MOLECULAR BIOLOGY AND HUMAN GENETICS – Histological techniques – Fixation- selective fixatives- Embedding- Sectioning and Staining Principles. Mendals experiments, Fine structure of Gene, Mutation, Linkage and crossing over, Eugenics, Human chromosome, Chromosome number, Idiogram. Population genetics- Hardy Weinberg principle and its application in human population. Genetic engineering and its applications in human being. Pedigree chart and its uses.

Unit: 4

DEVELOPMENTAL BIOLOGY- Gametogenesis in mammals – Spermatogenesis, Oogenesis, Fertilization. Types of Eggs, Pattern of cleavage & Blastulataion in chick, Gastrulation. Human Reproduction- puberty, Menstrual cycle, Menopause, Pregnancy and related problems-parturition and lactation- Human cloning- Ethics.

Unit: 5

ECOLOGY AND EVOLUTION- Principles and Applications of Environmental biology. ecological succession, ecological niche, Animal relationships, Interspecific- Antagonism, symbiosis, Parasitism, Mutualism, commensalisms. Fossil and Fossilization, Dating of Fossils, Geological timescale.

Books for reference:

BIODIVERSITY OF INVERTEBRATES AND CHORDATES:

1. Ekambaranatha Ayyar & T.N.Ananthakrishnan (1992) Manual of Zoology Vol – I, part I & II S.Viswanathan Pvt. Ltd. Chennai.
2. Jordan.E.L & P.S.Verma (2000) 'Chordate Zoology' S.Chand & Co New Delhi.

ANIMAL PHYSIOLOGY AND ENDOCRINOLOGY:

3. Parameswaran.R.S.Viswanathan – Animal Physiology Printers & Publishers Pvt. Ltd.
4. Verma.P.S and Agarwal.V.K Animal Physiology S.Chand & Co NewDelhi.

MOLECULAR BIOLOGY AND HUMAN GENETICS:

5. Verma.P.S and Agarwal.V.K (2004) Genetics, S.Chand & Co., New Delhi
6. Dalela.R.C and Verma.S.R (1970) A Textbook of Genetics, Jaiprakash Nath and Company., Meerut.

7. Max Levitan Text Book of Human Genetics - Oxford University Press.

DEVELOPMENTAL BIOLOGY

8. Verma.S and Agarwal V.K(2000) Chordate Embryology S.Chand & Co. New Delhi.
9. Balinsky.B.I (1981) An Introduction to Embryology S.Chand & Co. New Delhi.
10. Saunders.J.W (1982) Developmental Biology – Pattern and Principles, Macmillan New York.

ECOLOGY AND EVOLUTION

11. Text book of Ecology & Animal Distribution by P.S.Verma V.K.Agarwal S.Chand & Co. New Delhi.
12. Odum E.P.Basic Ecology (1983) Saunders College Publishing's New York.
13. Arumugam.N (2002) Organic Evaluation, Saras Publication., Nagercoil.

QUESTION PATTERN

Written paper Max Marks: 75 Marks

Time :3 Hours

A Question paper consists of three parts

Part-A

10 very short answer question without choice .Equal representation to be given to both the papers. Each question is to be answered in about 50 words . Each answer is to be valued out of 2 marks.

Part-B

5 questions are to be answered out of 8 given . Equal representation to be given to both the papers. Each question is to be answered in about 300 words . Each answer is to be valued out of 5 marks.

Part-C

Essay questions containing internal choice to be answered in about 1200 words. Equal representation to be given to both the papers. Each answer is to be valued out of 15 marks.

Part-A

Very Short Answers (50 words) 10 questions each 2 marks.

Part-B

Short Answers (300 words) 5 questions each 5 marks.

Part-C

Essay questions (1200 words) 2 questions each 15 marks.

II B.Sc (BC)	ADVANCED ZOOLOGY- PRACTICAL	AZBP401
SEMESTER - IV		HRS/WK – 3
ALLIED		CREDIT -2

MAJOR PRACTICALS

1. Dissection of digestive system and body setae in earthworm.
2. Prawn- Appendages
3. Estimation of Unit metabolism of fish.

MINOR PRACTICALS

- a. Squash preparation of onion root tip for mitosis.
- b. Human pedigree construction for a family data.
- c. Mouth parts- Honey bee and Mosquito.

SPOTTERS

T.S. of Chick embryo- 24hrs, 48hrs, 72hrs and 96hrs, *Taenia solium*, Plasmodium, T.S. of Pituitary gland, Adrenal gland, Thyroid gland, Testis and Ovary.

II YEAR	ENVIRONMENTAL STUDIES	EVS301S/ EVS401S
SEMESTER – III		HRS/WK - 3
Skill based subject		CREDIT - 2

(For All UG II Year Students Any One Semester)

Objective:

- The need for sustainable development is a key to the future of mankind.

Course Outcome:

On completion of the course students will be able

CO1: To understand the natural environment and its relationships with human activities.

CO2: To demonstrate an awareness and knowledge of the intrinsic values of ecological system.

CO3: To characterize and analyze human impacts on biodiversity and its conservation.

CO4: To demonstrate an ability to integrate the many disciplines and fields that intersect with environmental concerns

CO5: To integrate knowledge and to analyze, evaluate and manage the different public health aspects of disaster events at local and global levels.

SEMESTER III	COURSE CODE:					ENVIRONMENTAL STUDIES										HOURS: 3	CREDITS :2
	PROGRAMME OUTCOMES(PO)					PROGRAMME SPECIFIC OUTCOMES(PSO)											
COURSE OUTCOMES	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8	PSO 9	PSO 10		
CO1	5	5	3	4	4	5	5	5	2	3	5	1	5	5	5	4.1	
CO2	5	5	3	4	4	5	5	5	2	3	5	1	5	5	4	4.1	
CO3	5	5	3	4	4	5	5	5	2	4	5	1	5	5	3	4.1	
CO4	5	5	3	4	4	4	5	4	2	4	5	1	5	5	3	4.0	
CO5	5	5	3	4	4	4	5	4	2	4	5	1	5	5	5	4.1	
Mean Overall Score															4.1		

This Course is having **VERY HIGH** association with Programme Outcome and Programme Specific Outcome

Association	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%
Scale	1	2	3	4	5
Interval	0<=rating<=1	1.1<=rating<=2	2.1<=rating<=3	3.1<=rating<=4	4.1<=rating<=5
Rating	Very Poor	Poor	Moderate	High	Very High

Unit I : Environmental studies and Natural resources (20 Hrs)

Definition, scope and importance of environmental studies – forest resources: deforestation, mining, dams – water resources: over – utilization, floods, drought – mineral resources: exploitation, extraction and usage – food resources: food problems, overgrazing, pesticide problems, water logging, salinity – energy resources: energy needs, renewable and non renewable energy – land resources: land degradation, landslides, soil erosion and desertification – conserving natural resources.

Unit II: Ecosystems : (20 Hrs)

Concept, structure and function of an ecosystem – producers, consumers and decomposers – energy flow – ecological succession – food chains, food webs and ecological pyramids – types, characteristics, structure and function of forest ecosystem, grassland ecosystem, desert ecosystem and aquatic ecosystem –

Unit III: Biodiversity: (20 Hrs)

Definition of biodiversity – genetic, species and ecosystem diversity – value of biodiversity – India as a mega diversity nation – hot spots – threats to biodiversity – endangered and endemic species of India – In-situ and Ex-situ conservation of biodiversity.

Unit IV: Environmental Pollution: (20 Hrs)

Cause, effects and control measures of air pollution, water pollution, soil pollution, marine pollution, noise pollution, thermal pollution and nuclear hazards – solid waste management: causes, effects, control measures and disposal of wastes – disaster management: floods, earthquakes, cyclone, land slides and tsunami.

Unit V: Social Issues, Human population and the Environment: (20 Hrs)

Water conservation, rain water harvesting, watershed management – environmental ethics: issues and possible solution – climate change, global warming, acid rain, ozone depletion, nuclear accidents and holocaust – wasteland reclamation – Environment protection Act – Wildlife protection Act – Forest Conservation Act – public awareness – Population explosion – Environment and human health – Role of Information Technology in Environment and human health.

Field work: (20 Hrs)

1. Visit to a local area to document environmental assets – river / forest / grassland/mangrove.
2. Visit to a local polluted site – urban / rural / industrial / agricultural.
3. Study of common plants, insects, birds.
4. Study of simple ecosystems – pond, river, forest, etc.,
5. Practical work

Reference Books:

1. Joseph C.Daniel,2004. Principles of Environmental Science. Brightson's Publications,Chennai.
2. Agarwal, K.C. 2001 Environmental Biology, Nidi Publ. Ltd. Bikaner.
3. Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad - 380 013, India, Email:mapin@icenet.net
4. Jadhav, H & Bhosale, V.M. 1995. Environmental Protection and Laws. Himalaya Pub. House, Delhi
5. Miller T.G. Jr. Environmental Science, Wadsworth Publishing Co.

6. Odum, E.P. 1971. Fundamentals of Ecology. W.B. Saunders Co. USA,
7. Sharma B.K., 2001. Environmental Chemistry. Geol Publ. House, Meerut
8. Trivedi R.K., Hand book of Environmental Laws, Rules Guidelines, Compliances and Standards. Vol I and II, Enviro Media9.Wanger K.D., 1998. Environmental Management. W.B. Saunders Co. Philadelphia, USA

QUESTION PATTERN

Written paper Max Marks: 75 Marks

Time :3 Hours

A Question paper consists of three parts

Part-A

20 choose the answer question. Equal representation to be given to both the papers. Each answer is to be valued out of 1 marks.

Part-B

5 questions are to be answered out of 8 given. Equal representation to be given to both the papers .Each question is to be answered in about 300 words . Each answer is to be valued out of 5 marks.

Part-C

Essay questions containing internal choice to be answered in about 1200 words. Equal representation to be given to both the papers. Each answer is to be valued out of 15 marks.

Part-A

Choose the answer 20 questions each 1 mark.

Part-B

Short Answers (300 words) 5 question each 5 marks.

Part-C

Essay questions (1200 words) 3 questions each 10 marks.

Field work

Rw;Wr; NHy; fy;tp

Unit-myF/ 1Rw;Wr; NHapay; kw;Wk; ,aw;if ts';fs;

Rw;Wr;NHy; ,aypd; ,yf;fzk;. neh;fk;. Kf;fpaj;Jtk;? fhLk; mjd; ts';fSk;. fhLfs; mHpg;g[. Ru';fk;. ePh; njf;f miz?
ePh; Mjhu';fs; : gad;ghLfs;. bts;sk;. twl;rp/ fdpk ts';fs;? Ruz;ly;. msthf vLj;jy; (k) gad;ghL: czt[ts';fs;? czt[k; mjd; epiw FiwfSk;. mjp jPtpu nka;r;ry;. g{r;rpbfhy;yp (k) caph;bfhy;ypapd; Fiwfs;. ePh; nj';Fjy;. cg;g[j;jd;ik/ rf;jp ts';fs; ? rf;jpapd; njitfs;. g[Jg;gpf;f Toa (k) g[Jg;gpf;f ,ayhj rf;jpfs; epy ts';fs; ? wpytsf;Fiwt[. epyr;rhpt[. kz;rhpt[/ kw;Wk; ghiytdkhFjy;. ,aw;if ts';fspd; ghJfhg;g[ed;ikfSk;/

Unit-myF II) NHy;epiy kz;ly';fs;

nfh;ghL. mikg;g[kw;Wk; bray;ghL: cw;gj;jpahsh;fs;. Efh;nthh;fs;. kw;Wk; rpjig;gth;fs; ? NH;epiy kz;ly;jpd; Mw;wy; xl;lk; NHpay; tHpKiw tsh;r;rp. czt[r;r';fpy. czt[tis. NH;epiy kz;ly';fs; tiffs;. jd;ikfs;. mikg;g[kw;Wk; bray;gh:L? fh;L NH;epiy kz;lyk;. g[y;btsp NH;epiy kz;lyk;. ghiytdk; kw;Wk; ePh;r;NH;epiy kz;lyk;/

Unit-myF III) caphpag; gy;tifik

tiuaw. tiffs;. caphpag; gy;tifikapd; gad;fs;. ,e;jpah Xh; caphpakpif gy;tifik kz;lyk;. caphpa kpif gy;tifik ,l';fs;. caphpay; gy;tifik;F mr;RWj;jy;. caphpa gy;tifikapd; ghJfhg;g[

Unit-myF IV) Rw;Wr;NHy; khRghL

fhw;WkhRghL. ePh; khRghL. kz; khRghL/ fly; khRghL/ ,iur;ry; khRghL/. mdy; khRghL/ kw;Wk; fjphpaf;f khRghL/. jplfHpt[nkshd;ik. fhuzpfs;. tpist[fs;. jLf;Fk;Kiw kw;Wk; ghJfhg;ghd mg;g[wg;gLj;Jk; Kiw nghplh; nkyhz;ik. bts;sk;. epyLf;fk;. g[ay;. epyr;rhpt[kw;W MHpg;nguiyfs;/

Unit-myF V).rK:f rpf;fy;fSk; kf;fs; bgUf;fKk; Rw;WNHYk;

ePh;ts ghJfhg;g[. kiHePh; nrfhpg;g[. ePh;ts nkyhz;ik ? Rw;Wr;NHy; tiuKiw rpf;fy;fSk; mjd; ePh;f;Fk; fhuzpfSk;. thdpiy khw;w';fs;. cyfbtg;gkakhjy;. mkpykiH. Xnrhd; rpj[. fjphpaf;f tpgj;Jfs; kw;Wk; nghplh;fs; ePh;gphpif KfL rPuikg;g[. Rw;Wr;NHy; ghJfhg;g[rl;lk;. td caphpdg; ghJfhg;g[rl;lk;. tdg;ghJfhg;g[rl;lk;. Rw;Wr;NHy; tpHpg;g[zh;t[. kf;fs; bjhifg; bgUf;fk;. Rw;Wr;NHy; (k) kdpj eyd;. kdpj eydpYk;. Rw;Wr; NHypYk; jfty; bjhHpy; El;gjj;jpd; g';F/

II B.Sc (MB)	GENETICS	AZBC402
SEMESTER - III		HRS/WK - 6
ALLIED		CREDIT - 5

(For II Year B.Sc., Micro-Biology)

Objective:

- To provide basic knowledge in the field of genetics, mutation, human genetics and population genetics.

Course Outcome

On completion of the course students will be able

CO1: To acquire basic information on genetics and Mendelian laws

CO2: To understand chromosomal and gene mutation.

CO3: To define sex linked inheritance.

CO4: To describe human genetics

CO5: To acquire knowledge on population genetics

SEMESTER IV	COURSE CODE:					GENETICS										HOURS: 6	CREDITS: 5
	PROGRAMME OUTCOMES(PO)					PROGRAMME SPECIFIC OUTCOMES(PSO)											
COURSE OUTCOMES	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8	PSO 9	PSO 10		
CO1	5	5	5	5	4	4	5	3	3	5	5	2	5	2	4	4.1	
CO2	5	5	5	5	4	4	5	3	3	5	5	3	5	2	4	4.2	
CO3	5	5	5	4	4	4	5	3	3	5	5	2	5	2	4	4.1	
CO4	4	5	4	4	4	4	5	3	3	5	5	2	5	2	4	4.0	
CO5	5	5	4	5	4	4	5	3	3	5	5	3	5	2	4	4.1	
Mean Overall Score																4.1	

This Course is having **VERY HIGH** association with Programme Outcome and Programme Specific Outcome

Association	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%
Scale	1	2	3	4	5
Interval	0<=rating<=1	1.1<=rating<=2	2.1<=rating<=3	3.1<=rating<=4	4.1<=rating<=5
Rating	Very Poor	Poor	Moderate	High	Very High

Unit-I: Genetics and Mendel's laws

Basics of Mendelian inheritance – Interaction of genes – complementary factors, supplementary factors, inhibitory and lethal factors – atavism. Blood groups and their inheritance. Chromosomes - the vehicle of inheritance – Chemical basis of inheritance. Molecular basis of genetic material - genetic code – gene function – operon concept. Inborn errors of metabolism.

Unit-II: Gene Mutations

Linkage and Crossing over – Chromosome maps – Chromosomal mutation and gene or point mutation – mutagens. Chromosomal aberrations – numerical and structural – examples from humans.

Unit-III: Sex Inheritance

Sex determination - sex linked inheritance – extra chromosomal inheritance – kappa particles in paramecium, milk factor in mice.

Unit-IV: Human Genetics

Pedigree analysis – Human karyotype – sex determination, barr body and drumstick chromosome – anomalies in sex chromosomes and autosomes – Congenital malformation – Genetic disorders in man – Eugenics and Euphenics – Euthenics – Bioethics.

Unit-V: Population Genetics

Population – Gene pool – Gene frequency and genotypic frequency – Genetic equilibrium and Hardy Weinberg Law – Factors affecting gene frequency – Evolutionary forces of factors. Applied Genetics: Animal breeding – heterosis, inbreeding, out breeding. Out crossing and hybrid vigour.

Text Books:

Verma, P.S and Agarwal, V.K 2005 ‘ Cell Biology, Genetics, Molecular Biology, Evolution & Ecology’, S. Chand and Co., New Delhi

Reference books:

5. Veer Bala Rastogi. 1992 .A textbook of Genetics, 9th edition, Keda Nath Ram Nath, New Delhi.
6. Karvita B. Aluwalia , 1991. ‘Genetics’ Wiley Eastern Ltd, New Delhi .
7. Sarin, C.1990. ‘ Genetics’ Tata Mcgraw – Hill Publishing Co ., Ltd., New Delhi.
8. Burns. G.W .and Boltsmo, P.J. 1989. The Science of Genetics’ Macmillan publishing Co ., New York.

QUESTION PATTERN

Written paper Max Marks: 75 Marks

Time :3 Hours

A Question paper consists of three parts

Part-A

10 very short answer question without choice .Equal representation to be given to both the papers. Each question is to be answered in about 50 words . Each answer is to be valued out of 2 marks.

Part-B

5 questions are to be answered out of 8 given . Equal representation to be given to both the papers .Each question is to be answered in about 300 words . Each answer is to be valued out of 5 marks.

Part-C

Essay questions containing internal choice to be answered in about 1200 words. Equal representation to be given to both the papers. Each answer is to be valued out of 15 marks.

Part-A

Very Short Answers(50 words) 10 questions each 2 marks.

Part-B

Short Answers(300 words) 5 questions each 5 marks.

Part-C

Essay questions (1200 words) 2 questions each 15 marks.

II B.Sc (MB)	ENDOCRINOLOGY	AZMB402
SEMESTER - IV		HRS/WK - 6
ALLIED		CREDIT - 5

Objective:

- To make the students to learn the objectives and scope of comparative endocrinology, anatomy, morphology and histology of endocrine tissues of vertebrates, crustacean and insect endocrine organs and their functions.

Course Outcome

On completion of the course students will be able

CO1: To describe the morphology of pituitary gland and its hormones

CO2: To understand the structure of thyroid and thyroid hormones

CO3: To describe the structure and functions of pancreas and adrenal glands

CO4: To understand the vertebrate reproductive endocrinology

CO5: To understand the insects and crustacean endocrinology

SEMESTER V	COURSE CODE:					ENDOCRINOLOGY										HOURS:6	CREDITS:5
COURSE OUTCOMES	PROGRAMME OUTCOMES(PO)					PROGRAMME SPECIFIC OUTCOMES(PSO)										MEAN SCORE OF CO'S	
	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8	PSO 9	PSO 10		
CO1	5	5	4	5	4	4	4	5	2	2	3	2	5	4	5	4.0	
CO2	5	5	4	5	3	4	4	4	3	2	3	2	5	3	5	3.8	
CO3	5	5	4	5	4	4	4	3	2	2	3	2	5	5	5	3.9	
CO4	5	5	4	5	5	4	4	3	1	3	3	2	5	5	5	4.0	
CO5	5	5	5	5	5	4	4	2	1	3	3	2	5	5	5	4.0	
Mean Overall Score															3.9		

This Course is having **HIGH** association with Programme Outcome and Programme Specific Outcome

Association	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%
Scale	1	2	3	4	5
Interval	0<=rating<=1	1.1<=rating<=2	2.1<=rating<=3	3.1<=rating<=4	4.1<=rating<=5
Rating	Very Poor	Poor	Moderate	High	Very High

Unit–I: Pituitary Gland

General characteristics of hormones-Pituitary gland-structural organization-Pituitary hormones functions - hypothalamic control.

Unit–II: Thyroid Gland

Thyroid gland-structural organisation- metabolic effects of thyroid hormone- effects of thyroid on reproduction – Parathyroid – structure – function of parathyroid hormone.

Unit–III: Pancreas and Adrenal Glands

Structure of pancreas- function of Insulin and glucagon- Adrenals – structural organization, functions of cortical and medullary hormones.

Unit–IV: Vertebrate Reproductive Endocrinology

Structure of mammalian testis and ovary-male and female sex accessory organs- hormones of testis and ovary – estrus and menstrual cycle –hormones of pregnancy – parturition – hormonal control of lactation.

Unit–V: Insect and Crustacean Endocrinology

The concepts of neurosecretion – Endocrine system in crustacea – endocrine control of moulting and metamorphosis – Neuroendocrine system in insects- endocrine control of moulting and metamorphosis.

Text Books

1. Turner C.D, 1966, General Endocrinology. 4th Ed, W.B.Saunders Co., London.
2. Bentley P.J., 1985. Comparative Vertebrate Endocrinology. S.Chand and Co.,
3. Barrington E.J.W., 1968. An Introduction to General and Comparative endocrinology. Academic press, London.

Reference Books

1. Harris.G.W. and B.T.Donovan (Ed) 1968. The Pituitary Gland. Vol.3
2. Williams.R.M, 1974, Text Book of Endocrinology 5th Ed.
3. BentleyP.J. 1982. Comparative Vertebrate Endocrinology Cambridge University Press.
4. Michael .P. 1968. Endocrinology and Human Behaviour. Oxford University Press, New York.

QUESTION PATTERN

Written paper Max Marks: 75 Marks

Time :3 Hours

A Question paper consists of three parts

Part-A

10 very short answer question without choice .Equal representation to be given to both the papers. Each question is to be answered in about 50 words . Each answer is to be valued out of 2 marks.

Part-B

5 questions are to be answered out of 8 given . Equal representation to be given to both the papers .Each question is to be answered in about 300 words . Each answer is to be valued out of 5 marks.

Part-C

Essay questions containing internal choice to be answered in about 1200 words. Equal representation to be given to both the papers. Each answer is to be valued out of 15 marks.

Part-A

Very Short Answers(50 words) 10 questions each 2 marks.

Part-B

Short Answers(300 words) 5 questions each 5 marks.

Part-C

Essay questions (1200 words) 2 questions each 15 marks.

II B.Sc (MB)	ENDOCRINOLOGY-PRACTICAL	AZBCP401S
SEMESTER - IV		HRS/WK – 3
ALLIED		CREDIT -

MAJOR PRACTICAL

1. Demonstration of Male and Female reproductive systems in cockroach
2. Demonstration of nervous system of Prawn

MINOR PRACTICAL

1. Prawn - Appendages
2. Mouth Parts - Honey Bee and Mosquito

SPOTTERS

1. Histology of ovary, accessory glands, corpus allatum and brain in insects
2. Histological study of pituitary, adrenal, testis, ovary, corpus luteum, pancreas and thyroid gland
3. Demonstration of Ovariectomy in cockroach.
4. Vaginal smear showing various stages of estrus cycles.

II B.Sc (MB)	ENTOMOLOGY	AZMB402
SEMESTER - IV		HRS/WK - 6
ALLIED		CREDIT - 5

Objective:

- To provide extensive knowledge in the field of Entomology.
- The familiarity between insect and environment was highlighted to the entomological research in many directions which have immense value in the control measures various disease causing insects.

Course Outcome

On completion of the course students will be able

CO1: To describe the morphology of insects

CO2: To understand the physiology of insects

CO3: To know pests of agriculture

CO4: To describe pest control methods and managements

CO5: To understand the beneficial and vector insects

SEMESTER V	COURSE CODE:					ENTOMOLOGY										HOURS:6	CREDITS:5
	PROGRAMME OUTCOMES(PO)					PROGRAMME SPECIFIC OUTCOMES(PSO)											
COURSE OUTCOMES	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8	PSO 9	PSO 10		
CO1	5	5	4	5	4	4	4	5	2	2	3	2	5	4	5	4.0	
CO2	5	5	4	5	3	4	4	4	3	2	3	2	5	3	5	3.8	
CO3	5	5	4	5	4	4	4	3	2	2	3	2	5	5	5	3.9	
CO4	5	5	4	5	5	4	4	3	1	3	3	2	5	5	5	4.0	
CO5	5	5	5	5	5	4	4	2	1	3	3	2	5	5	5	4.0	
Mean Overall Score																3.9	

This Course is having **HIGH** association with Programme Outcome and Programme Specific Outcome

Association	1%-20%	21%-40%	41%-60%	61%-80%	81%-100%
Scale	1	2	3	4	5
Interval	0<=rating<=1	1.1<=rating<=2	2.1<=rating<=3	3.1<=rating<=4	4.1<=rating<=5
Rating	Very Poor	Poor	Moderate	High	Very High

Unit–I: Insect Morphology

Insect taxonomy upto orders – Salient features with suitable examples of the insect orders – Thysanura, Odonata, Isoptera, Orthoptera, Hemiptera, Coleoptera, Lepidoptera, Hymenoptera and Diptera - Insects collection – Preservation – Identification – insect head – types of antennae – mouth parts and wing venation.

Unit–II: Insect Physiology

Structure and physiology of integumentary, digestive, excretory, circulatory, respiratory, endocrine, reproductive and nervous system.

Unit–III: Agricultural Entomology

Insect – pests outbreak – assessment of insect population – Identification, seasonal history, biology, nature of damage and control measures of major pests of paddy, sugarcane, vegetables (Brinjal).

Unit–IV: Principles and methods of Pest Management

Principles of Insect control – Prophylactic measures – cultural, mechanical, physical methods– Genetic control and quarantine. Biological control : parasites, Predators and Microbial agents. Chemical methods: Pesticides- general classification – classification based on mode of action, mode of entry and Biopesticides: Integrated Pest Management (IPM) – definition, Integration of methods – potential components – need for IPM and uses.

Unit–V: Beneficial insects and Vector insects

Sericulture: biology of silk worm, silk gland, cultivation of mulberry plants, rearing silkworm and uses of silk – Apiculture: types of bees, bee colony, life history, Beekeeping accessories and byproducts of bees and its uses. Useful insects – Biology and control measures of important insect vectors – mosquitoes and houseflies.

Text Books

1. Temphare D.B. 1984. A Text Book of Insect Morphology, Physiology and Endocrinology. S.Chand and Co., New Delhi.
2. Chapman R.F. 1982. The Insect Structure and Functions. English Language Book society, Hoober Strongton.

Reference Books

1. Vasantharaj David.B. and V.V. Ramamurthy (2011). Elements of Economic Entomology, Namrutha publications, Chennai 600 116.
2. Temphare, D.B. (2009). Modern Entomology, Himalaya publishing Mumbai.
3. Ambrose, Dunston P., (2004). The Insects: Structure, function and Biodiversity. Kalyani publishers, Ludhiana – New Delhi – Chennai.
4. Chapman, R.F. (2002) The Insect structure and functions. English Languages Book Society, Hoober Strongton.
5. Mike, W., Service (1999). Medical Entomology for Student, Cambridge Press.
6. Nayer, K.K., Ananthkrishnan T.N. and David B.V. General and Applied Entomology. Mc.Grow Hill Publications, New Delhi.
7. Rathanswamy, G. K. (1986). A Handbook of Medical Entomology and Elementary Parasitology. S. Viswanathas Printers & Publishers Pvt. Ltd.
8. Srivastava, K.P. (1993). A Text Book of Applied Entomology. Vol I & II Kalyani Publishers, New Delhi.
9. P.G. Fenimore, Allaparakash, (1992). Applied Entomology : Wiley Eastern Ltd., Delhi.

10. Ullal., S.R. and M.N. Narasimhanna (1987). Hand book of practical sericulture, Central silk board (Ministry of textiles – Government of India), United Mansion, 39, Mahatma Gandhi road, Bangalore.

QUESTION PATTERN

Written paper Max Marks: 75 Marks
Time :3 Hours

A Question paper consists of three parts

Part-A

10 very short answer question without choice .Equal representation to be given to both the papers. Each question is to be answered in about 50 words . Each answer is to be valued out of 2 marks.

Part-B

5 questions are to be answered out of 8 given . Equal representation to be given to both the papers .Each question is to be answered in about 300 words . Each answer is to be valued out of 5 marks.

Part-C

Essay questions containing internal choice to be answered in about 1200 words. Equal representation to be given to both the papers. Each answer is to be valued out of 15 marks.

Part-A

Very Short Answers(50 words) 10 questions each 2 marks.

Part-B

Short Answers(300 words) 5 questions each 5 marks.

Part-C

Essay questions (1200 words) 2 questions each 15 marks.

II B.Sc (MB)	ENTOMOLOGY-PRACTICAL	AZBCP401S
SEMESTER - IV		HRS/WK – 3
ALLIED		CREDIT -

Major Practical

1. Methods of harmful insect collection, preservation and submission of insect box.
2. Identification of at least 10 insects belonging to different orders.
3. Mounting of salivary gland of cockroach, mouth parts of cockroach, housefly, and mosquito.
4. Mounting of different types of antennae and legs of insects, wings and their venation.
5. Demonstration of digestive, reproductive (male and female) and nervous system of insects (Cockroach and Odontopus).

Spotters

1. Histological slides – T.S. of foregut, midgut and hindgut, T.S of testis, L.S. of ovary and types, T.S. of carpus cardiacum and T.S. of carpus allatum.
2. Life history of silkworm (egg, larva, cocoon and adult).
3. Collection and Identification of medically important arthropods (Moquitoes, house flies, lice and mites).