

ALAGAPPA UNIVERSITY, KARAIKUDI
NEW SYLLABUS UNDER CBCS PATTERN (w.e.f.2017-18)

B.Sc. ZOOLOGY - PROGRAMME STRUCTURE

Sem.	Part	Course Code	Title of the Course	Cr.	Hrs./ Week	Max. Marks		
						Int.	Ext.	Total
I	I	711T	Tamil / Other Languages – I	3	6	25	75	100
	II	712E	English – I	3	6	25	75	100
	III	7BZO1C1	Core – I – Biodiversity of Invertebrates – I	4	5	25	75	100
		7BZO1C2	Core – II – Biodiversity of Invertebrates – II	4	5	25	75	100
		---	Core – III – Practical – I – Biodiversity of Invertebrates I&II and Biodiversity of Chordates	-	2*	--	--	---
			Allied – I (Theory only) (or) Allied – I (Theory cum Practical)	5	5	25	75	100
				4	3	15	60	75
			Allied Practical – I	-	2**	--	--	---
	IV	7NME1A / 7NME1B / 7NME1C	(1) Non-Major Elective –I – (A)jkpo;nkhopapd; mbg;gilfs; / (B) ,f;fhy ,yf;fpak; / (C) Communicative English	2	1	25	75	100
	Total (Allied Theory only)				21	30	--	--
Total (Allied Theory cum Practical)				20	575			
II	I	721T	Tamil / Other Languages – II	3	6	25	75	100
	II	722E	English – II	3	6	25	75	100
	III	7BZO2P1	Core – III – Practical – I – Biodiversity of Invertebrates I&II and Biodiversity of Chordates	4	2*	40	60	100
		7BZO2C1	Core – IV – Biodiversity of Chordates	4	4	25	75	100
		7BZO2C2	Core – V – Cell Biology	4	5	25	75	100
			Allied – II (Theory only) (or) Allied– II (Theory cum Practical)	5	5	25	75	100
				4	3	15	60	75
			Allied Practical – I	2	2	20	30	50
IV	7BES2	(3) Environmental Studies	2	2	25	75	100	
Total (Allied Theory only)				25	30	--	--	700
Total (Allied Theory cum Practical)				26				725
III	I	731T	Tamil /Other languages – III	3	6	25	75	100
	II	732E	English – III	3	6	25	75	100
	III	7BZO3C1	Core – VI – Developmental Biology and Evolution	4	6	25	75	100
		7BZO3P1	Core – VII – Practical – II – Cell Biology &Developmental Biology	4	4	40	60	100
			Allied – III (Theory only) (or) Allied–III (Theory cum Practical)	5	5	25	75	100
			4	3	15	60	75	
		Allied Practical – II	-	2**	--	--	---	

	IV	7NME3A/ 7NME3B/ 7NME3C	(1) Non-major Elective–II–(A) ,yf;fpaKk; nkhopg;gad;ghLk; / (B) goe;jkpo; ,yf;fpaq;fSk; ,yf;fpa tuyhWk;/ (C) Effective Employability Skills	2	1	25	75	100	
		7SBS3A1/ 7SBS3A2/ 7SBS3A3	(2) Skill Based Subjects – I	2	2	25	75	100	
	V	7BEA3	Extension activities	1	--	100	--	100	
Total (Allied Theory only)				24	30	--	--	800	
Total (Allied Theory cum Practical)				23				775	
IV	I	741T	Tamil /other language – IV	3	6	25	75	100	
	II	742E	English – IV	3	6	25	75	100	
	III	7BZO4C1	Core – VIII – Genetics & Molecular Biology	4	5	25	75	100	
		7BZO4P1	Core – IX – Practical – III – Evolution, Genetics and Molecular Biology	4	4	40	60	100	
			Allied – IV(Theory only) (or) Allied –IV(Theory cum Practical)	5	5	25	75	100	
			Allied Practical - II	4	3	15	60	75	
	IV	7SBS4B1/ 7SBS4B2/ 7SBS4B3	(2) Skill Based Subjects – II	2	2	25	75	100	
		7BVE4/ 7BMY4/ 7BWS4	(4) Value Education / Manavalakalai Yoga / Women’s Studies	2	2	25	75	100	
		Total (Allied Theory only)				23	30	--	--
	Total (Allied Theory cum Practical)				24	725			
V	III	7BZO5C1	Core – X – Animal Physiology	4	5	25	75	100	
		7BZO5C2	Core – XI - Biochemistry	4	5	25	75	100	
		7BZOE1A / 7BZOE1B/ 7BZOE1C	Elective–I- A) Fisheries Biology (or) B) Vermiculture (or) C) Mushroom Culture	5	5	25	75	100	
		7BZOE2A / 7BZOE2B/ 7BZOE2C	Elective – II – A) Microbiology and Immunology (or) B) Poultry Science (or) C) Sericulture	5	5	25	75	100	
		7BZO5P1	Core – XII– Practical – IV Animal Physiology , Biochemistry and Elective Course I & II	4	6	40	60	100	
	IV	7SBS5A4/ 7SBS5A5/ 7SBS5A6/ 7SBS5A7	(2) Skill Based Subjects – I	2	2	25	75	100	
			(2) Skill Based Subjects – I	2	2	25	75	100	
Total				26	30	--	--	700	
VI	III	7BZO6C1	Core – XIII – Fundamentals of Biotechnology	4	7	25	75	100	
		7BZO6C2	Core – XIV – Environmental Biology and Biostatistics	4	7	25	75	100	

	7BZOE3A / 7BZOE3B/ 7BZOE3C	Elective – III- A) Recombinant DNA Technology (or) B) Biology of cloning vectors(or) C) Fermentation Technology	5	5	25	75	100
	7BZO6P1	Core – XV – Practical – V – Fundamentals of Biotechnology, Environmental Biology & Biostatistics and Elective III	4	7	40	60	100
IV	7SBS6B4/ 7SBS6B5/ 7SBS6B6/ 7SBS6B7	(2) Skill Based Subjects – II	2	2	25	75	100
		(2) Skill Based Subjects – II	2	2	25	75	100
Total			21	30	--	--	600
Grand Total			140	180	--	--	4100

* **Core III – Practical I University Practical Examination at the end of Second semester.**

** **External practical exam for the allied subjects is scheduled at the end of the even semester of the said subject.**

B.Sc. ZOOLOGY

I YEAR – I SEMESTER COURSE CODE: 7BZO1C1

CORE COURSE- I – BIODIVERSITY OF INVERTEBRATES – I

Unit I Protozoa

Introduction to the principles of taxonomy – Protozoa and Metazoa, Radiata and Bilateria, Acoelomata, Pseudocoelomata and Coelomata

Classification upto classes and their characters with suitable examples

Type study: *Amoeba* and *Paramecium*

General topic: *Plasmodium*, and *Trypanosoma*.

Unit II Porifera

Classification upto classes and their characters with suitable examples

Type study - *Leucosolenia*

General topic: Canal system in sponges

Unit III Coelenterata

Classification upto classes and their characters with suitable examples

Type study – *Obelia* colony

General topic: Corals and Coral reefs

Unit IV Platyhelminthes

Classification upto classes and their characters with suitable examples

Type Study: *Taenia solium*

General topic: Life history of Liver fluke.

Unit V Aschelminthes

Classification upto classes and their characters with suitable examples

Type Study: *Ascaris lumbricoides*

General topic: Life history of *Enterobius vermicularis*, and *Wuchereria bancrofti*

Text books:

1. Ekambaranatha Ayyar & T.N.Ananthakrishnan (1992) Manual of Zoology Vol – I, part I & II S.Viswanathan Pvt. Ltd. Chennai.
2. Janakiraman.N. & PatchiRajan.G. “Biodiversity of Invertebrates”, Seetha Lakshmi Ganesan Publishers, Shri Shanmuga Lakshmi Nilayam, Annamalaiyar Street, Vivekanandhapuram North, Devakottai – 630 303
3. Jordan.E.L & Verma.P.S. “Invertebrate Zoology” S.Chand & Co. New Delhi.
4. Arumugam.N “Text book of Invertebrates” Saras Publication.

Books for Reference:

1. Barnes R.D (1982) “Invertebrate Zoology” IV Edn. Holt saunders International Edn.
2. Barrington E.J.W (1979) “Invertebrate structure and function” 2nd Edition ELBS & Nelson
3. Kotpal R.L, S.K.Agarwal, R.P.R.Khetarpal (1989) “Modern text book of Zoology” Rastogi Publications



**I YEAR – I SEMESTER
COURSE CODE: 7BZO1C2**

CORE COURSE - II – BIODIVERSITY OF INVERTEBRATES – II

Unit I Annelida

Classification upto classes and their characters with suitable examples

Type Study: *Megascolex marutii*

General topic: Metamerism in Annelida, Economic importance of Earthworm.

Unit II Arthropoda

Classification upto classes and their characters with suitable examples

Type study: Prawn

General topic: Crustacean larval forms,

Unit III Arthropoda

General topic: Social life in insects

Economic importance of insects:- **Beneficial** (Honey bee, Silkworm) and **Harmful** (*Tryporyza*, *Amsecta*)

Metamorphosis in insects, Evolutionary significance of Peripatus

Unit IV Mollusca

Classification upto classes and their characters with suitable examples

Type Study: *Pila*

General topic: Torsion in Gastropods,

Economic importance of Mollusca – Pearl oyster

Cephalopod as an advanced Mollusc.

Unit V Echinodermata

Classification upto classes and their characters with suitable examples

Type Study: Starfish

General topic: Larval forms and water vascular systems in Echinodermates.

Text books:

1. Ekambaranatha Ayyar & T.N.Ananthkrishnan (1992) Manual of Zoology Vol – I, part I & II S.Viswanathan Pvt. Ltd. Chennai.
2. Janakiraman.N. & PatchiRajan.G. “Biodiversity of Invertebrates”, Seetha Lakshmi Ganesan Publishers, Shri Shanmuga Lakshmi Nilayam, Annamalaiyar Street, Vivekanandhapuram North, Devakottai-630 303
3. Jordan.E.L & Verma.P.S. “Invertebrate Zoology” S.Chand & Co. New Delhi.
4. Arumugam.N “Text book of Invertebrates” Saras Publication.

Books for Reference:

1. Barnes R.D (1982) “Invertebrate Zoology” IV Edn. Holt saunders International Edn.
2. Barrington E.J.W (1979) “Invertebrate structure and function” 2nd Edition ELBS & Nelson
3. Kotpal R.L, S.K.Agarwal, R.P.R.Khetarpal (1989) “Modern text book of Zoology” Rastogi Publications



**I YEAR – I / II SEMESTER
COURSE CODE: 7BZO2P1**

**CORE COURSE - III – PRACTICAL - I
BIODIVERSITY OF INVERTEBRATES I & II AND BIODIVERSITY OF CHORDATES**

[Practical Examination at the end of the second Semester]

Institutional Animal Ethical Committee (IAEC) constitution

A) Dissection

1. Earth worm – Digestive system, Nervous system.
2. Frog – Anatomy, Digestive system, Circulatory system and Urino-genital system.
[Demonstration using Video clippings or CD / DVD].

Mountings

1. **Earth worm** – Body setae, Penial setae.
2. **Prawn** - appendages,
3. **Honey bee** -Sting apparatus
4. **Shark** – Placoid scales.

B) Museum specimens, slides, models and charts

Invertebrata

Ameoba, Paramecium, Noctiluca, Plasmodium, Leucosolenia, Obelia colony, *Madreporite, Fasciola, Ascaris* – male and female, Neries, Prawn, Nauplius, Zoea, Mysis larva, Pila, Octopus, Pearl oyster, Star fish, Bipinnaria larva.

Chordata

Balanoglossus Tornaria larva, Ascidian Amphioxus, Petromyzon, Shark, Narcine, Sucker fish, Hippocampus, Bufo, Rhacoporus, Chamaeleon, any two poisonous and non-poisonous snakes, Drago, Pigeon, Kingfisher, bat, Ant eater.

Osteology

Pigeon – Synsacrum, Rabbit skull, Girdles, Vertebrae (atlas, cervical and sacral), fore limb and hind limb skeleton.

Bonafide Record of the work done in laboratory must be submitted while attending the examination.

Scheme of Examination

- | | |
|---|------------|
| 1. Dissect and display the nervous system in Earthworm
[Or] digestive system in Earthworm | – 15 marks |
| 2. Mounting of Body setae [Or] Placoid scales (or)Sting apparatus
[Sketch and label the parts] | – 10 marks |
| 3. Comment on the Rabbit Skull / Girdles / Limb skeleton/
Bird synsacrum | – 05 marks |
| 4. Five spotters (Two from invertebrata and three from Chordata) | 15 marks |
| 5. Observation note book | – 15 marks |



**I YEAR – II SEMESTER
COURSE CODE: 7BZO2C1**

CORE COURSE - IV – BIODIVERSITY OF CHORDATES

Unit I Prochordata & Pisces

1. Chordate characters and outline classification of prochordata up to class level with examples and pisces upto order with examples.
2. Affinities of Balanoglossus, Ascidian, Amphioxus and petromyzon.
3. Type study – Shark.
4. General topic- Migration in Fishes, Accessory respiratory organs in fishes.

Unit II Amphibia

General characters and classification upto classes
Type study- Frog
General topic:-Parental care in amphibia

Unit III Reptilia

General characters and classification upto classes
Type study – Calotes
General topic- Identification of south Indian poisonous snakes, Poison apparatus of snake, Biting mechanism in snake, First aid to snake bite.

Unit IV Aves

General characters and classification upto classes
Type study – Pigeon
General topic- Flight adaptation in birds, Migration in birds, Ratitae.

Unit V Mammalia

General characters and classification upto classes
Type Study: Rabbit
General topic- Egg laying mammals, Marsupial mammals, Dentition in mammals

Text books:

1. Ekambaranatha Ayyar & T.N.Ananthakrishnan (1992) Manual of Zoology Vol – I, part I & II S.Viswanathan Pvt. Ltd. Chennai.
2. Janakiraman.N. & PatchiRajan.G. “Biodiversity of Chordates”, Seetha Lakshmi Ganesan Publishers, Shri Shanmuga Lakshmi Nilayam, Annamalaiyar Street, Vivekanandhapuram North, Devakottai – 630 303
3. Jordan.E.L & Verma.P.S. “Chordate Zoology” S.Chand & Co. New Delhi
4. Arumugam.N Text book of chordates Saras Publication.

Books for Reference:

1. Barnes R.D (1982) “Chordate Zoology” IV Edn. Holt saunders International Edn.
2. Kotpal R.L, S.K.Agarwal, R.P.R.Khetarpal (1989) “Modern text book of Zoology” Rastogi Publications



**I YEAR – II SEMESTER
COURSE CODE: 7BZO2C2**

CORE COURSE - V – CELL BIOLOGY

Unit I

Microscopy – Principle and Working mechanism of

1. Compound and
2. Electron microscopes – SEM,TEM

Cytological techniques

1. Fixatives and fixation techniques.
2. Stains and staining techniques.

Unit II

Comparison of Prokaryotic and eukaryotic cells.

Ultra structure and functions of

1. Mesosome
2. Plasma Membrane
3. Golgi complex and Endoplasmic Reticulum

Unit III

1. Mitochondria (glycolysis, kreb's cycle, electron transport system, energy generation summary)

Ultrastructure & functions of Ribosomes and Lysosomes

Unit IV

1. Ultra structure and functions of Nucleus and nucleolus.
2. Chromosomes: Structure & types and Giant Chromosomes.

Unit V

1. Cell division- Mitosis, Meiosis & their significance.
2. Cancer- Types, properties, causes, treatment and Oncogenes and tumour suppressor genes.

Text Books:

1. Verma and Agarwal 2010 "Cytology", S.Chand and Co.Ltd., Ramanagar, New Delhi.
2. Rastogi, V.B., 2010, "Introductory Cytology", IX Editison, Kedarnath Ramnath Publications, New Delhi
3. Gupta, P.K.,2010 "Cell and Molecular Biology", Rastogi Publications, Meerut
4. Arumugam.N 2013 "Cell biology" Saras publications.
5. Wilson.K and Walker J.M 2013 'Biomolecular techniques.' ELBS Publication,Londan

Books for Reference:

1. DeRobertis and DeRobertis, 1999. "Cell and Molecular Biology", W.B. Saunders Co., Philadelphia.
2. Giese, A.C: 1979. Cell physiology – V Edn. WB. Saunders Company, Philadelphia



**II YEAR – III SEMESTER
COURSE CODE: 7BZO3C1**

CORE COURSE - VI – DEVELOPMENTAL BIOLOGY AND EVOLUTION

Unit I

Gametogenesis – Spermatogenesis and Oogenesis.
Fertilization, cleavage and gastrulation

Unit II

Development of Eye, Ear, Brain and Heart in frog
Extra embryonic membranes in chick,
Placentation in mammals.

Unit III

Organizer concept
Amphibian metamorphosis – Biochemical changes and hormonal control
Regeneration – Types and regeneration in Salamander limbs
Test tube baby, Rh factors & incompatibility

Unit IV

Lamarckism, Neo Lamarckism, Darwinism, Neo Darwinism and Modern Synthetic Theory
Fossil and Fossilization, Living fossils, Dating of Fossils, Mesozoic reptiles.

Unit V

Species concept, Isolating mechanisms, Mimicry and colouration.
Hardy Weinberg Principle: Gene, Gene pool, Gene and genotypic frequencies and factors affecting H.W. Equilibrium. Evolution of man.

Text Books:

1. Arumugam.N 2013 “ Developmental zoology” Saras publications
2. Patchirajan, G., “Introduction to Developmental Biology” Seetha Lakshmi Ganesan Publishers, Shri Shanmuga Lakshmi Nilayam, Annamalaiyar Street, Vivekanandapuram North, Devakottai
3. P.S. Verma, V.K.Agarwal and B.S. Tyagi, "Chordate Embryology", S.Chand and Company Ltd., Ram Nagar, New Delhi – 110 055.
4. Janakiraman.N., ”Evolution”, Text Book Publishers, 11, Subramaniapuram First St., Karaikudi 630 001.

Books for Reference:

1. Balinsky, B. (1981) "An introduction to Embryology", Saunders, Philadelphia Weiss. PA 1988,
2. Muthukaruppan, VR. and Pichappan, RM.1975. "A Laboratory Guide – Animal development"
3. Deleta and verma, "Text book of chordate Embryology", Jai Praksh Math & Co., Meerut.



**II YEAR – III SEMESTER
COURSE CODE: 7BZO3P1**

**CORE COURSE - VII – PRACTICAL - II
CELL BIOLOGY & DEVELOPMENTAL BIOLOGY**
[Practical Examination at the end of the third Semester]

CELL BIOLOGY

1. Principle, working mechanism and care of compound microscope.
2. Mounting of Mitotic stages in the onion root tip
3. Mounting of Meiotic stages from the testis of grasshopper.
4. Mounting of Giant Chromosomes in Chironomous larva
5. Mounting of Squamous epithelial cells from the oral mucosa
6. Observation of blood cells in man
7. Ultra microscopic sketches of the following cell organelles:
 - a) Nucleus
 - b) Mitochondria
 - c) Endoplasmic Reticulum
 - d) Golgi Apparatus
 - e) Ribosomes

DEVELOPMENTAL BIOLOGY

1. Mounting of live sperms of a vertebrate
2. Observation of eggs – Chick
3. Slides – Cleavage, Blastula, Gastrula stages of Frog
4. Whole mounting of Chick blastoderm
5. Slides – 18, 24, 33, 48 & 72 hours chick embryo.
6. Placenta of Mammals – Pig, sheep, Man & Rabbit

Bonafide Record of the work done in laboratory must be submitted while attending the examination.

Scheme of Examination

- | | | |
|--|---|----------|
| 1. Mounting of Mitotic/Meiotic stage [or] Giant chromosomes
[or] Live Sperm of a vertebrate | – | 15 marks |
| 2. Mounting of Squamous epithelial cells [OR] Blood cells.
Sketch and label the parts | – | 10 marks |
| 3. Identify & comment on the chick embryo stage | – | 05 marks |
| 4. Five Spotters [2 from Cell Biology & 3 from Devt. Biology] | – | 15 marks |
| 5. Observation note book | – | 15 marks |



**II YEAR – IV SEMESTER
COURSE CODE: 7BZO4C1**

CORE COURSE - VIII – GENETICS & MOLECULAR BIOLOGY

GENETICS

Unit I CLASSICAL GENETICS

Mendelian Genetics: Monohybrid – laws of dominance & segregation; Dihybrid cross – law of independent assortment – simple mendelian traits in man.

Interaction of Genes: Complementary, Epistasis – Dominant & Recessive

Polygenic Inheritance - Skin colour in man

Unit II FUNCTIONAL GENETICS

Multiple Alleles - Blood groups in man Linkage & Crossing over in *Drosophila*, Chromosome mapping, Sex-linked inheritance in man – Colour blindness and Haemophilia. Sex Determination – Types, intersexes, Gynandromorph and sex-mosaics

Unit III APPLIED GENETICS

Inborn Errors of metabolism, Non-disjunction – Syndromes – Klinefelter, Turner, Down, Cri-du-chart. Pedigree analysis, Inbreeding and Out-breeding, Eugenics, Euthenics and Genetic Counselling.

MOLECULAR BIOLOGY

Unit IV NUCLEIC ACIDS

DNA – Watson and Crick model of DNA, Replication.

DNA as the Genetic material (Transformation, Transduction & Conjugation Experiments)

RNA – types and structure

Bacteriophage

Unit V GENE EXPRESSION

Genetic Code – Characters

Protein Synthesis – Central dogma, Transcription & Translation.

Gene regulation – Lac - Operon model, Types of regulation.

Text Books:

1. Patchirajan, G., "Genetics and Molecular Biology" Seetha Lakshmi Ganesan Publishers, Shri Shanmuga Lakshmi Nilayam, Annamalaiyar Street, Vivekanandhapuram North, Devakottai – 630 303.
2. Agarwal, V.K., "Genetics", S.Chand & Company Ltd., 7361 RamNagar, New Delhi– 55.
3. Meyyan R.P. 2013 "Genetics" Saras publications
4. Rastogi. V.B. 2013 Principles of Genetics Rastogi publications.

Books for Reference:

1. Gardner, Eeden J., "Principles of Genetics, Wiley Eastern Private Limited, New Delhi.
2. Sinnod, Edward W. Dunn, L.C., and dolzhansky, Theodosins, "Principles of Genetics", McGraw-Hill, New York.
3. Winchster, A.M. "Genetics", Oxford IBH Publishing Co., New Delhi.



**II YEAR – IV SEMESTER
COURSE CODE: 7BZO4P1**

**CORE COURSE - IX – PRACTICAL – III -
EVOLUTION, GENETICS AND MOLECULAR BIOLOGY
[Practical Examination at the end of the Fourth Semester]**

GENETICS & MOLECULAR BIOLOGY

1. Experiments to study Mendel's law using beads.
2. Observation of minimum 10 Mendelian characters for self & class students.
3. Observation of Blood group for self & class students
4. Preparation of Pedigree chart for any two known visible characters for self.
5. Study of phenotypic characters of Drosophila
6. Spotters :
 - a) Drosophila.
 - b) Cis-Trans linkage types
 - c) Gynandromorph
 - d) Syndromes –Down, Turner, Klinefelter & Cri-du-Chart
 - e) Bacteriophage
 - f) E.coli.
 - g) DNA
 - h) Base pairs
 - i) Replication
 - j) tRNA
 - k) Protein synthesis

EVOLUTION

1. Fossils: Trilobite, Nautilus
2. Animals of evolutionary importance: Peripatus, Limulus, Archaeopteryx.
3. Darwin's finches
4. Mimicry: Leaf insects, Stick insects, Monarch and Viceroy butterfly.
5. Adaptive colouration: Chamaeleon, Lycodon

Bonafide Record of the work done in laboratory must be submitted while attending the examination.

Scheme of Examination

- | | |
|---|----------|
| 1. Finding out the Blood group of unknown individuals or Monohybrid or Dihybrid experiments | 15 marks |
| 2. Finding out the trait type of the given Mendelian traits in man [For any two characters like eye colour, ear lobe, chin, widow's peak, hair colour, handedness, etc.](Reasons should be given) | 05 marks |
| 3. Identify & comment on the living fossil | 10 marks |
| 4. Five Spotters [3 from Evolution and 2 from Genetics] | 15 marks |
| 5. Observation note book | 15 marks |



**III YEAR – V SEMESTER
COURSE CODE: 7BZO5C1**

CORE COURSE - X – ANIMAL PHYSIOLOGY

Unit I

- Food : Composition, Classification, vitamins
Digestion : Types and mechanisms, Digestive enzymes, Absorption and assimilation

Unit II

- Respiration : Types, Respiratory organs in animals, Mechanism of respiration, -
Transportation of gases.
Circulation : Types, structure and functions of Human heart –Electrocardiograph
Blood : Composition, Functions and coagulation, Blood pressure.

Unit III

- Excretion : Types of nitrogenous wastes, Ammonotelism, Ureotelism and
Uricotelism Structure of nephron: Urine formation and
composition. Osmoregulation in fishes.

Unit IV

- Nervous System : Structure, types and functions of neurons and Synapses –
Mechanism and conduction of nerve impulses – Neuro –
Muscular junction – Reflex actions.
Muscle Physiology : Ultrastructure and properties of skeletal muscles, Mechanism
& theories of muscle contraction – Kymograph.

Unit – V

- Chemical co- ordination : 1. Endocrine systems of insects and their significance.
2. Endocrine physiology of man:– Pituitary, Thyroid,
Parathyroid, Adrenals, Islets of Langerhans and gonads.
Reproduction : Menstrual Cycle in man and contraceptive devices in man.

Text books:

1. Patchirajan, G., “Animal Physiology” Seetha Lakshmi Ganesan Publishers, Shri Shanmuga Lakshmi Nilayam, Annamalaiyar Street, Vivekanandapuram North, Devakottai 630303.
2. Ananthkrishnan T.N. Ananthasubramanian and Parameswaran, “Animal Physiology”, Viswanathan & Co. Chennai.
3. Verma & Agarwal, “Animal Physiology” S. Chand & Co, New Delhi.
4. Arumugam.N 2013 “Animal Physiology” Saras publication

Books for Reference:

1. Gurdon.H” Text book of Animal Physiology”
2. Hoar S. William, “General and comparative Physiology “, Prentice Hall of India Private Limited., New Delhi



**III YEAR - V SEMESTER
COURSE CODE: 7BZO5C2**

CORE COURSE - XI – BIOCHEMISTRY

Unit I

Bio - Macromolecules as an energy source – Handerson and Hasselbalch equation – Acid base maintenance and their significance. Chemical bonds and their significance. Thermodynamics – laws and their significance.

Unit II

Carbohydrates- classification, structure, properties and biological importance of Monosaccharides, Disaccharides and Polysaccharides

Unit III

Proteins- Classification and function of Proteins, structural levels of organization. Denaturation and isoelectric point of Proteins. Amino acids: Classification of amino acids, essential amino acids, reactions of amino and carboxyl groups of amino acids

Unit IV

Lipids- Classification and properties of lipids
Types of fatty acids – saturated, unsaturated and essential fatty acids.
Significance of lipoproteins and phospholipids
Structure, synthesis and biological significance of cholesterol, HDL and LDL.

Unit V

Instrumentation- Principle and working mechanism of pH meter, Centrifuge, Chromatography and Electrophoresis

Books for Reference:

1. Murray R.K., D.K. Granner and V.M Rodwell., 2006. **Harpers Illustrated Biochemistry**, 28th edition, The McGraw-Hill companies, Inc.
2. Thomas M. Devlin., 2006. **Textbook of Biochemistry with Clinical Correlations**, 6th edition, John Wiley & Sons Inc., Publications.
3. Lehninger., 2006. **Principles of Biochemistry**, 4th edition, D.L. Nelson and M.M. Cox, Macmillan worth Publishers.
4. Donald Voet and Judith G. Voet., 2004. **Biochemistry**, 3rd edition, John Wiley and Sons, USA.
5. Jeremy M.Berg, John L. Tymoczke and Lubert Stryer., 2007. **Biochemistry**, 5th edition, W.H. Freeman and Company, USA.
6. Trevor Palmer., 2004. **Enzymes- Biochemistry, Biotechnology and Clinical Chemistry**, by Affiliated East – West Press Pvt. Ltd, India.



**III YEAR – V SEMESTER
COURSE CODE: 7BZOE1A**

ELECTIVE COURSE - I (A) – FISHERIES BIOLOGY

Unit I Importance of Fisheries

Classification of fisheries – Marine fisheries (Coastal, Offshore and deep sea fisheries), inland fisheries, Crustacean fisheries (Prawn, shrimp, lobster and crab fisheries); Molluscan fisheries (Edible Oyster, pearl oyster, Cephalopod and lime fisheries).

Unit II South Indian fisheries and its management

Fishing craft and gear in India, Fisheries Management. Parasites and diseases of fishes –Fish in relation to public health.

Unit III Physiology and Ecology of fishes

Food and feeding habits –locomotion by fins and Body form – Respiration – Accessory respiratory organs – Airbladder – reproduction – Ecological factors influencing spawning in carps, parental care, Migration.

Unit IV Fish Culture

Types – Hybridization – Induced spawning of Indian carps – Paddy cum fish culture, Monoculture, Composite fish culture, sewage – fed fisheries, cage fish culture – culture of Prawn, pearl – Oyster and Catla – Catla (Common carp).

Unit V Fish processing and preservation

Drying, Salting Smoking, Canning, Frog legs and Prawns – Fishery by products .

Practical

1. Identification of commercially important fishes – Larvivorous and Air breathing. (Two insect) South Indian examples)
2. Determinations of fish age with scales otolith (frequency distribution method), Length and weight relationship in freshwater and marine fish.
3. Growing of fishes in aquaria under experimental conditions – abundance and shortage of food.
4. Identification of fish parasites and diseases
5. Study of scales of temporary mounting.
6. Oxygen consumption of fishes under different situations.
7. Practical knowledge of preservation and processing, preparation of shark liver oil, fish meal, fish flour.
8. Maintenance of aquaria to observe feeding, breeding and behaviour
9. Identification of commonly available ornamental fishes.
10. Visit of fish farms fisheries related institutions.

Books for Reference:

1. N. Chandy, “Fishes”, National Book Trust.
2. V.G.Jhingran, ‘Fish and Fisheries of India’, Hindustan Publishing Corp. Delhi.
3. J.R. Norman, ‘A History of Fishes’ Earnest Benn Limited, London.
4. N.B. Marshall, ‘The life of Fishes’ Weidnefeld & Nicholson, London.



**III YEAR – V SEMESTER
COURSE CODE: 7BZOE1B**

ELECTIVE COURSE - I (B) – VERMICULTURE

Unit I

Classification – different species of earth worms.
Morphology, anatomy and Physiology of earthworms.

Unit II

Types of Vermicomposting – Roll of earth worms in soil fertility – vermiculture – vermi-cast – vermi-technology and applications – Physical, chemical and biological properties of vermi-compost.

Unit III

Raw materials for composting – requirements of vermicomposting. Maintenance of composting – Collection of vermicompost – Efficiency of vermicomposting – General problems in production of vermi-composting.

Unit IV

Advantage of vermicomposting – Applications of vermicomposting – Vermicomposting of Agricultural and Urban Solid Wastes – Recycling of wastes through vermicomposting.

Unit V

Small Scale or Indoor vermicomposting – Large scale or outdoor vermicomposting. Effects of vermicompost on soil properties.
Vermicompost Quality & Economics. Prospects of vermi-culture as self employment venture.

Practical

1. Morphological features of composting earthworms *Lampito mauritii* and *Eudrilus lugenae*.
2. Identification of earthworm cocoons and vermi casts.
3. Dissection of earthworm digestive system.
4. Vermicomposting - Demonstration of preparation pit method, heap and window method.
5. Estimation of digestive enzymes – amylase
6. Visit to agricultural farms to identify earthworm burrows, vermicomposting units

Books for Reference:

1. R.K. Bhatnagar & R.K. Palta, “Earthworm Vermiculture and Vermicomposting”, Kalyani Publishers, No. 1, Mahalakshmi Street, T. Nagar, Chennai -600 017.
2. P.K. Gupta, “Vermi Composting for Sustainable Agriculture“, AGROBIOS (India), Agro House, Behind Nasrani Cinema, Chopasani Road, Jodhpur – 342 002.



**III YEAR – V SEMESTER
COURSE CODE: 7BZOE1C**

ELECTIVE COURSE I (C) – MUSHROOM CULTURE

Unit I

Introduction to mushroom – Importance of mushroom and nutritive value – Lifecycle of mushroom

Unit II

Identification of mushroom – Edible and poisonous mushrooms – Mushroom growth and Environment – Types of Mushrooms

Unit III

Mushroom cultivation techniques: Culture media preparation – Selection of mushrooms to be cultivated – Production of the culture or starter – Preparation of spawn – preparation of the compost – Spawning, harvesting, post harvesting technology.

Unit IV

Major pests: Insect Pests, Mite Pests, Viral, Bacterial, fungal.
Mushroom insects diseases – Prevention and Control measures.

Unit V

Preservation: Short term storage & Long term storage.
Marketing.
Economics of Mushroom culture.

Practical

1. Edible and poisonous mushrooms.
2. Culture media preparation.
3. Major pests.
4. Small scale mushroom production.

Books for Reference:

1. V.N.Pathak, Nagendra Yadav & Maneesha Gaur, "Mushroom Production and Processing Technology", Published by Agrobios (India), Chopasani Road, Jodhpur – 342 002.
2. Bahl N., (1984), "Handbook of Mushroom", Oxford IBH, New Delhi 123p.
3. Garcha H.S. (1984), "A manual of Mushroom Growing", PAU Publications, Ludhiana, 54p.
4. Marimuthu, T. Krishnamoorthy, A.S., and Jeyarajan, R. (1991), "Oyster Mushroom Production", Glimpses of Mushroom Research in Tamilnadu Agricultural University, TNAU Publishers, Coimbatore.
5. Kapoor, J.N. (1989), "Mushroom Cultivation", ICAR Publication, New Delhi



**III YEAR – V SEMESTER
COURSE CODE: 7BZOE2A**

ELECTIVE COURSE - II (A) –MICROBIOLOGY AND IMMUNOLOGY

Unit I

History and Scope of Microbiology, Contribution of Leuwenhoek, Louis Pasteur, Robert Koch, Edward Jenner, Joseph Lister. Methods of classifying and identifying microbes. Sterilization and Disinfection – Principles and methods of sterilization – Physical and chemical methods.

Unit II

Prokaryotic cell: Classification of Bacteria and Virus. Size, shape, arrangement, flagella, fimbriae, cell wall of Gram Positive and Gram Negative, Staining techniques cell membrane, nuclear material and spores. Eukaryote: Structural organization of yeasts and molds (fungi).

Unit III

Culture techniques – Media preparation – Solid and Liquid – Types of Media – Crude, Semi Synthetic, Synthetic, Enriched, Selective, Differential and Special Purpose Media (one eg for each type). Pure culture technique – Tube dilution, Pour, Spread, Streak and Micromanipulator.

IMMUNOLOGY

Unit IV

Immune cells and molecules, immunity –types (cell mediated and antibody mediated). Transplantation immunology, lymphoid organs- types, structure and lymphoid functions. Immune responses- primary and secondary.

Unit V

Stem cells – types and its roll, Monoclonal antibodies, Major Histocompatibility Complex, Hyper sensitivity – Types and prophylaxis

Practical

1. Laboratory safety and sterilization techniques
2. Preparation of culture media – nutrient broth and nutrient agar
3. Culturing of microorganisms – in broth and in plates (pour plates, streak plates, isolation and preservation of bacterial cultures)
4. Identification of immune cells
5. Study of lymphoid organs.

Books for Reference:

1. Prescott, L.M J.P. Harley & C.A. Klein 1995. Microbiology 2nd edn Wm, C. Brown publishers.
2. Salle A.J.: Fundamental Principles of Bacteriology 7th edition, Tata Mc Hill Publishing Company Ltd.,
3. William claus. G.W. 1989. Understanding Microbes – A Laboratory textbook for Microbiology, W.H. Freeman and Co., New York.
4. Wilson. K and Goulding. K.H. 1986. A Biologist's Guide to Principles and Techniques of Practical Biochemistry, ELBS, London. B.Sc., Microbiology (Colleges-revised) 2008-09 Annexure No. 33 A



**III YEAR – V SEMESTER
COURSE CODE: 7BZOE2B**

ELECTIVE COURSE - II (B) – POULTRY SCIENCE

Unit I General

- a) Poultry Industry in India, a survey – progress through I to VII five year plans.
- b) Choosing commercial laying stock: Pure lines, commercial chicks, sexing in day old chicks.
- c) Poultry housing – General principles of building poultry house.
- d) Economic Importance of Poultry.

Unit II Management

- a) Practical aspects of chick rearing: Brooding equipment, Brooder temperature, feeder and water space allowance, vaccination.
- b) Management of growers, layers and broilers (Cage House and deep litter syleing).
- c) Summer and Winter management.
- d) Lighting for chicks, growers and layers.
- e) Debeaking.

Unit III Poultry Nutrition

- a) Energy: Gross energy, digestible energy, metabolizable energy and net energy, Energy requirements for chicks, growers, layers and broilers.
- b) Proteins, amino acids, Vitamins and Inorganic elements: Requirements for chicks, growers and layers – fat soluble and water soluble vitamins – supplementation of vitamins and minerals in poultry feeds.

Unit IV Non Nutritive

- a) Non Nutritive food additive: Names and their allowances in the poultry feed, merits and demerits in the usage of feed additives.
- b) Feed formulation for chicks, growers, layers and Broilers. Make note on the overcoming of environmental temperature by changing feed formulate.

Unit V Diseases

Short account of Cause, symptoms, prevention, control and treatment of the following diseases:

- a) Virus diseases: New Castle disease, fowl plague, infectious bronchitis, Laryngotracheitis, fowl pox and Avian Leucosis complex & Gumboro disease.
- b) Bacterial Diseases: Pullorum, salmonellosis, fowl cholera, coryza, botulism, mycoplasmosis and spirochaetosis.
- c) Fungal Diseases: Aspergillosis & Afatoxicosis.
- d) Parastic Disease: Coccidiosis, Nematode infection, Tapeworm infections, ticks, mites and Lice.

Practical

- 1. Identification of Parasites.
- 2. Observation of feeding, debeaking, deworming and vaccination.
- 3. Diseases

Books for Reference:

- 1. David J.Lobo, (Editor) "Deejay Technical Bulletin", Deejay Hatcheries, Banglore – 77
- 2. P. Senevirratna, "Diseases of Poultry", Published by Bristol, John Wright & Sons Ltd.,



**III YEAR – V SEMESTER
COURSE CODE: 7BZOE2C**

ELECTIVE COURSE - II (C) – SERICULTURE

Unit I General

History in India, promoting organizations (CSB, NSSP, SSTC, CSTRI, NSP) future scope. Mulberry silkworm (*Bombyx mori*): Taxonomy, Morphological sex differences in larva and adult, silk gland. Non –Mulberry silkworm: Tasar, Muga & Eri – brief accounts only.

Unit II Moriculture

Cultivation: varieties, land preparation, planting system, propagation, irrigation, manuring, pruning, harvesting and storing. Diseases: Fungal, Bacterial and Viral. Pests: Leaf eating pests.

Unit III

Methods of industrial egg production. Rearing: House appliances, Operation-disinfection, feeding, cleaning, moulting, maintenance of temperature and humidity.

Unit IV

Diseases: Protozoan, bacterial, fungal & viral. Pests: Uzifly, beetles, mites, ants, nematodes, lizards, birds, squirrels & rats.

Unit V

Physical characters of marketable cocoons, defective cocoons, the markets, transport. Stifling, cooking, reeling – operations & appliances

Practical

1. Identification of Mulberry and Non-Mulberry Silk worms.
2. Collection of different types of Mulberry leaves.
3. Spotters on various parts of Mulberry.
4. Insects box preparation of the Life Cycle of *Bombyx mori*.
5. Identification of eggs, pupa, cocoon and adults.
6. Dissection of Silk gland.
7. Mounting of mouth parts of Silk worm.
8. Silk worm seeds collection.
9. Spotters – Defective cocoons, Byproducts of silk worm rearing and Reeling.
10. Field visit to Sericulture house, rearing house, Cocoon markets, reeling and weaving cent.

Text Books:

1. Ullal, SR., & Narasimhanna, Dr.M.N. "Handbook of practical Sericulture", published by the central silk board, 39, M.G. Road, Bangalore-560 001.
2. Ganga, G., & Sulochana chetty, J. "An Introduction to Sericulture", Oxford & IBH Publishing Co. Pvt., Ltd., 66, Janpath, New Delhi-110 001.



**III YEAR – V SEMESTER
COURSE CODE: 7BZO5P1**

**CORE COURSE - XII – PRACTICAL - IV
ANIMAL PHYSIOLOGY, BIOCHEMISTRY AND ELECTIVE COURSE I & II**

ANIMAL PHYSIOLOGY

1. Qualitative analysis of carbohydrates
2. Qualitative analysis of proteins
3. Qualitative analysis of lipids.
4. Action of salivary amylase of man in relation to the temperature.
5. Oxygen consumption by a fish.
6. Study of ciliary activity / heart beat of F W Mussel in relation to the temperature.
7. Observation of blood cells.
8. Preparation of haemin crystals.
9. Qualitative analysis of excretory products, blood sugar & cholesterol.
10. Osmoregulation – Salt loss & gain in Tilapia fish.
11. Determination of Rf values of amino acid – Paper Chromatography:
A] Haemoglobinometer B] Haemocytometer C] Sphygnomanometer D] Kymograph
E] pH meter F] Centrifuge G] Electrophoresis.

Practicals for Elective Course I & II may be designed on their own while deciding the subjects by the respective colleges themselves considering the source of availability in their department.

Bonafide Record of the work done in laboratory must be submitted while attending the examination.

Scheme of Examination

- | | |
|---|----------|
| 1. Estimation of oxygen consumption by a fish [or]
Rate of activity in salivary amylase action in man [or]
Estimation of Salt loss / salt gain in Tilapia fish. | 15 marks |
| 2. Mounting of Blood cells / Haemin crystals | 05 marks |
| 3. Find out the presence or absence of carbohydrates/
protein/lipid/nitrogenous waste products in the sample | 05 marks |
| 4. Comment on Haemoglobinometer/Haemocytometer/
Sphygnomanometer/Kymograph/ pH meter/Electrophoresis/
Elective Course | 05 marks |
| 5. Five Spotters [All from Elective Course] | 15marks |
| 6. Observation note book | 15marks |



**III YEAR – VI SEMESTER
COURSE CODE: 7BZO6C1**

CORE COURSE - XIII – FUNDAMENTALS OF BIOTECHNOLOGY

Unit I

Definitions and landmarks in the history of Biotechnology, major areas of Biotechnology. Gene transfer techniques and their applications.

Unit II

Gene cloning – Restriction Enzymes and its types – endonucleases & ligases. Vectors – Plasmids (pBR 322), Phagemid(M13 phage) Cosmids (pLFR5) and animal viral vector (SV 40 and Retro viruses).

Unit III

Recombinant DNA (rDNA) technology, methods of integration of DNA fragments into the vector – methods of introduction of rDNA into host cells. In vitro fertilization and embryo transfer

Unit IV

Principles and applications of DNA finger printing, DNA sequencing, and DNA micro array. Gene therapy. Blotting techniques – Southern, Western and Northern.

Unit V

Concepts of transgenic animal technology; strategies for the production of transgenic animals and their importance in biotechnology – Transgenic Fish, Sheep and Pig. RNA i – Technology and Biosensors and their applications.

Text books:

1. Smith 2012 Introduction to Biotechnology ELBS publication
2. Patchirajan, G., “Basics of Genetic Engineering and Fundamentals of Biotechnology” Seetha Lakshmi Ganesan Publishers, Shri Shanmuga Lakshmi Nilayam, Annamalaiyar Street, Vivekanandhapuram North, Devakottai 630303.
3. V.Kumaresan – “Biotechnology”, Saras Publication., Nagercoil.
4. Lohar.P.S – “Biotechnology”, MJP Publishers, Chennai – 5.
5. Brown T.A 2013 Basics of Gene Cloning University press USA

Books for Reference:

1. Watson JD, Hopkins WH, Roberts JW, Steitz JA, Weiner AM, “Molecular Biology of the Gene”.
2. Benjamin Lewin, “Gene VII”, Oxford University Press. 2000
3. “A Text Book of Biotechnology” – R.C.Dubey S.Chand & Co. New Delhi.
4. Brown.C.H., Campbell I and Priost.F.G (1987) “Introduction of Biotechnology” Blackwell Scientific Publications Oxford.



**III YEAR – VI SEMESTER
COURSE CODE: 7BZO6C2**

CORE COURSE - XIV – ENVIRONMENTAL BIOLOGY AND BIOSTATISTICS

ENVIRONMENTAL BIOLOGY

Unit I

Abiotic factors-Temperature, Light and biotic factors. Biogeochemical cycle – Carbon, Nitrogen and Phosphorus cycle. Animal associations – Inter and intra specific relationship

Unit II

Population Ecology: Types – Natality, Mortality, Growth pattern, Biotic potential – Dispersal and distribution – Population Explosion – Regulation of population. Community – Structure. Characteristics – Ecotone and Edge effect, Ecological Niche, Ecological succession.

Unit III

Ecosystem: Structure and its dynamics. Food chain and food web; Ecological pyramids – Energy flow. Habitat ecology - Fresh water, Marine, Terrestrial. Desert, and Cave. Pollution - Air, Water and Noise– sources, hazards and impact. Bio remediation.

BIOSTATISTICS

Unit IV

Collection of data, Classification, Tabulation, Diagrammatic & Graphic representation
Measures of Central Tendency – Mean, Median and Mode.

Unit V

Measures of Dispersion – Range, Standard Deviation, Standard error & Coefficient of variation. Probability and its types. Chi Square Test.

Text Books:

1. Verma & Agarwal – “Principles of Ecology” second edition 1985. S.Chand & Company Ltd., Ramnagar, New Delhi.
2. Janakiraman.N., ”Environmental Biology”, Text Book Publishers, 11, Subramaniapuram First St., Karaikudi 630 001.
3. Patchi Rajan, G. & Siva Rama Krishnan.G., ”Biostatistics and Computer applications”, Seetha Lakshmi Ganesan Publishers, Shri Shanmuga Lakshmi Nilayam, Annamalaiyar Street, Vivekanandhapuram North, Devakottai – 630 303.
4. Pranab Kumar Banerjee, 2004,”Introduction to Biostatistics”, S, Chand & Company Ltd., 7361, Ram Nagar New Delhi 110 055.
5. Veer Bala Rastogi & M.S. Jayaraj “Animal Ecology and Distribution of animals” 6th revised Edition., Kedar Nath & Ram Nath, Meerut Delhi.

Books for Reference:

1. Clarke “Ecology”
2. Saha, T.K., 1992, ”Biostatistics in theory and Practice” Emkay Publications, PB No.941 Delhi 110 051



**III YEAR – VI SEMESTER
COURSE CODE: 7BZOE3A**

ELECTIVE COURSE - III (A) – RECOMBINANT DNA TECHNOLOGY

Unit I

Restriction and Modification systems of Bacteria. Restriction enzyme: DNA Polymerases, DNA Ligase, methylase, Taq polymerase, polynucleotide kinase, alkaline phosphatase, reverse transcriptase, DNase, S1nuclease, RnaseH, terminal deoxynucleotidyl transferase, RNA polymerase.

Unit II

Types and methods in probe construction, methods of labeling gene probes, identification of recombinant DNA. Construction of DNA libraries and genomic libraries, protein engineering.

Unit III

Introduction of cloned genes into the host cells: Transformation, transduction, Particle gun, electroporation, liposome mediated and agro packed co-cultivation.

Unit IV

Recombinant DNA techniques: Anti sense technology, terminator gene technology, site directed mutagenesis, hybridization techniques – southern, Western and Northern blotting

Unit V

Human genome project.

Chromosome walking. PCR, RFLP, RAPD, DNA finger printing,

Micro array and sequencing, gene therapy, DNA sequencing.

Books for Reference:

1. Ernst.L.Winnacker, (2003) from genes to clones, 2nd edition, Panima publishing corporation, New Delhi.
2. James.D.Watson (2001) Recombinant DNA technology, 2nd edition, WH Freeman and company, New York.
3. Glick and Pasternak, (1996), Molecular biotechnology, Panima publishing corporation, New Delhi.
4. Brown T.A., (1998) Introduction to gene cloning, 3rd edition, Stanley Thomas Publishing Ltd, London.
5. Primrose S.B., (2003) Principles of gene manipulation,6th edition, Blackwell Science Ltd, Germany.
6. Cartagena Protocol on Biosafety, January 2000.
7. Biological Warfare in the 21st century, by M.R. Dano, Brassies London, 1994.
8. Safety Considerations for Biotechnology, Paris, OECD, 1992 and latest publications



**III YEAR – VI SEMESTER
COURSE CODE: 7BZOE3B**

ELECTIVE COURSE - III (B) – BIOLOGY OF CLONING VECTORS

Unit I

Introduction to cloning vectors: Plasmid Biology. *E.coli* vector; properties of plasmid (plasmids in gene transfer) plasmid compatibility, copy number control, PBR322, BAC and expression vectors in prokaryotes.

Unit II

Molecular biology of lambda, Lambda vectors; cosmid, phagemid. *in-vitro* packaging, M13 and other viral vectors of prokaryotes.

Laboratory and industrial applications of prokaryotes.

Unit III

Cloning in Yeast: genetics of *S.cerevisiae*, identification of Yeast genes, Yeast vectors, YAC.

Cloning in Bacillus. Plasmids and vectors, inducible promoters.

Cloning in Streptomyces.

Unit IV

Animal vectors; Selectable markers, SV40 Vectors, papilloma virus, Retero virus, Vaccinia virus. Bacculo virus

Ti plasmid as gene vector, Caulimo viruses, Gemini viruses, Transposable elements, RNA viruses, viroids

Unit V

m RNA isolation, cDNA synthesis.

Genomic and cDNA libraries.

Site – directed mutagenesis

Books for Reference:

1. Ernst.L.Winnacker, (2003) from genes to clones, 2nd edition, Panima publishing corporation, New Delhi.
2. Benjamin Lewin (2004) Genes VIII, Pearson Education corporation, New Jersey
3. Alberts B, (1994) molecular biology of the cell, Garland publishing Inc New York
4. Friedfielder.D, (2002), Molecular biology II Ed., Narosa publishing house, New Delhi.
5. J.d.Watson (2001) Recombinant DNA technology, 2nd Ed WH Freeman and Company, NY.
6. Brown T.A (1998) Introduction to gene cloning 3rd ED Stanley Thomas Pub Ltd, Germany
7. Primrose S.B (2003) Principles of gene manipulation 6th Ed Black well Sci Ltd, Germany.



**III YEAR – VI SEMESTER
COURSE CODE: 7BZOE3C**

ELECTIVE COURSE - III (C) – FERMENTATION TECHNOLOGY

Unit I

Industrially important strains – Screening methods – Strain development for Improved yield – Mutation, Recombination and protoplasmic fusion.

Unit II

Fermentation – submerged and solid state – component parts of a CSTR – types of Fermentors (Tower, cylindroconical & airlift) – batch fermentation – continuous Fermentation.

Unit III

Production of beverages – beer and wine – vitamin B12 and Riboflavin – Antibiotics – penicillin and streptomycin – production of enzymes – Amylases and Proteases – methods of immobilization.

Unit IV

Single cell protein – Bakers yeast, spirulina – Details of mushroom development – Oyster (Pleurotus) and Button (Agaricus) mushroom.

Unit V

Downstream process – Intercellular and extracellular – Centrifugation, filtration, Flootation – solvent extraction, precipitation – Breakage of cells – physical and chemical methods

Books for Reference:

1. Stanbury P T and Whitaker 1984, Principles of Fermentation Technology, Pergamon Press. NY
2. Casida, L E JR 1968 Industrial Microbiology. New Age International Publishers.
3. Prescott and Rehm 1979. Industrial Microbiology. Wiley and Sons.



**III YEAR – VI SEMESTER
COURSE CODE: 7BZO6P1**

**CORE COURSE - XV – PRACTICAL – V - FUNDAMENTALS OF
BIOTECHNOLOGY, ENVIRONMENTAL BIOLOGY & BIostatISTICS AND
ELECTIVE COURSE III**

FUNDAMENTALS OF BIOTECHNOLOGY

1. Techniques of sterilization using autoclave/pressure cooker
2. Blotting techniques – observation of photograph
3. Extraction of DNA from samples – Demonstration Only
4. Differentiation of haemolymph and blood
5. **Recommended** to visit a Biotech Industry / Biotech Laboratory – A report may be submitted along with Observation record
6. Spotters:
(1) Spirulina (2) Mushroom seed (3) Penicillin (4) Yeast (5) Autoclave (6) Pressure cooker (7) Media (8) Azolla (9) Air-filter

ENVIRONMENTAL BIOLOGY

1. Analysis of fresh water and marine plankton and mounting of plankton.
2. Detection of transparency of water by Secchi disc
3. Estimation of dissolved Oxygen of river, pond and sewage water
4. Estimation of Salinity
5. Estimation of Calcium.
6. Observation of animal associations- commensalism, symbiosis, parasitism and predation
7. Study of pond Ecosystem.
8. Field visit to expose the students to various ecological habitats, pollution affected areas and Study of Intertidal, rocky, sandy and muddy shore fauna. (**Compulsory**)

BIostatISTICS

1. Data collection and Diagrammatic representations – Construction of graphs, bar and pie diagram.
2. Calculation of mean, median, mode and standard deviation for different types of data.
3. Calculation of probability using coin toss method.

Practical for Elective Course III may be designed on their own while deciding the subjects by the respective colleges themselves considering the source of availability in their department.

Bonafide Record of the work done in laboratory must be submitted while attending the examination.

Scheme of Examination

1. Estimation of oxygen in the given sample
[Pond water / Ditch water / Tap water] /
Estimation of measures of central tendency/dispersion [or]
Probability experiment using coins to prove
Chi square method. Procedure needed. 15 marks
2. Mounting of any one plankton. Sketch and label the parts 05 marks
3. Comment on the Blotting technique [OR]
Sterilization apparatus [OR]Pie chart[OR]
Bar diagram [OR] from the elective subject 05 marks
4. Five Spotters [2 from Biotech., 1 from Env't.Biol.,
& 2 from Elective Course] 15 marks
5. Field visit report [**Compulsory**] 10 marks
6. Observation note book 10 marks

