



**GOVERNMENT ARTS COLLEGE (AUTONOMOUS),  
KARUR – 639 005.**

(Reaccredited with A Grade status by NAAC)  
(Affiliated to Bharathidasan University, Tiruchirappalli.)

**PG & RESEARCH DEPARTMENT OF ZOOLOGY  
B.Sc. Zoology**

**PROGRAMME OUTCOMES**

<b>PO.NO.</b>	<b>On successful completion of B.Sc. Zoology programme in our institution, the graduates will be capable of</b>
<b>PO – 1</b>	Comparing and contrasting various fauna that belong to different phyla and knowing their classification
<b>PO - 2</b>	understanding the distribution and relationship of different fauna among themselves and with their environment
<b>PO – 3</b>	gaining knowledge of ultra-structure of cell, its functions related to various metabolic activities
<b>PO - 4</b>	understanding the evolutionary processes and their complexity in various living organisms
<b>PO – 5</b>	Analyzing the physiology of organs in various animals and correlating the structure and functions of organs
<b>PO - 6</b>	Understanding the concepts of genetics and its significance in various animals and human beings
<b>PO - 7</b>	Developing entrepreneurial skills in sericulture, aquaculture, vermiculture and poultry science

**PROGRAM SPECIFIC OUTCOMES**

1. Ability to identify various animals and know their significance
2. Capacity to explain various physical principles linking the cell biological phenomena.
3. Intelligence on genetic and molecular aspects of heredity
4. Decoding knowledge on human genetics and significance of endocrine glands
5. Analyzing skill using various tools of statistics and informatics
6. Treasure of knowledge on physiology and biochemical reactions
7. Respecting and protecting the nature with different ecological conservation programmes
8. Capacity to understand and magnify the microbiological phenomena and to utilise the applications of biotechnology and genetic engineering
9. Competence in identifying live entomological species that are beneficial and harmful to humans beings
10. Hands on practical experience for doing various tests on urine and blood samples using medical lab technologies
11. Potential of perceiving the concepts of origin and evolution of different organisms
12. Capability of understanding the developmental stages of organisms and significance of immune organs.

**GOVERNMENT ARTS COLLEGE (AUTONOMOUS), KARUR – 639 005**

**B.Sc., ZOOLOGY COURSE STRUCTURE UNDER CBCS SYSTEM**

(For the candidates admitted from the year 2016-17 onwards)

SEMESTER	COURSE	SUBJECT TITLE	SUBJECT CODE	INSTR. HOURS WEEK	CREDIT	EXAM HOURS	MARKS		TOTAL
							INT	ESE	
I	Tamil - I	Tamil – I	U16L1T1	6	3	3	25	75	100
	English - I	English – I	U16L1E1	6	3	3	25	75	100
	Core Course – I	Biology of Invertebrates	U16ZO1C1	6	5	3	25	75	100
	Core Course – II	Practical – I (For CCI & III)	-	3	-	-	-	-	-
	First Allied Course-I	Allied Chemistry - I	U16CH1A1	5	3	3	25	75	100
	First Allied Course – II	Allied Chemistry – II (Practical)	-	2	-	-	-	-	-
	Value Education	Value Education	U16VE1	2	2	3	25	75	100
			<b>30</b>	<b>16</b>				<b>500</b>	
II	Tamil – II	Tamil – II	U16L2T2	6	3	3	25	75	100
	English – II	English – II	U16L2E2	6	3	3	25	75	100
	Core Course – II	Practical – I (For CC I & III)	U16ZO2C2P	3	4	3	25	75	100
	Core Course – III	Biology of Chordates	U16ZO2C3	6	5	3	25	75	100
	Allied Course - II	Allied Chemistry – II (Practical)	U16CH2A2P	2	4	3	25	75	100
	Allied Course – III	Allied Chemistry - III	U16CH2A3	5	3	3	25	75	100
	Environmental Studies	Environmental Studies	U16ES2	2	2	3	25	75	100
			<b>30</b>	<b>24</b>				<b>700</b>	
III	Tamil - III	Tamil- III	U16L3T3	6	3	3	25	75	100
	English – III	English -III	U16L3E3	6	3	3	25	75	100
	Core Course – IV	Cell biology and Biophysics	U16ZO3C4	6	5	3	25	75	100
	Core Course V	Practical – II ( For CC IV & VI)	-	3	-	-	-	-	-
	Second Allied Course-I	Allied Botany – I	U16BO3A1	5	3	3	25	75	100
	Second Allied Course II	Allied Botany II – (Practical)	-	2	-	-	-	-	-
	Non-Core Elective I	Medicinal Botany	U16BO3N1	2	2	3	25	75	100
			<b>30</b>	<b>16</b>				<b>500</b>	
IV	Tamil – IV	Tamil- IV	U16L4T4	6	3	3	25	75	100
	English – IV	English -IV	U16L4E4	6	3	3	25	75	100
	Core Course – V	Practical – II (For CC IV & VI)	U16ZO4C5P	5	5	3	25	75	100
	Core Course VI	Genetics and Molecular biology	U16ZO4C6	2	4	3	25	75	100
	Second Allied Course II	Allied Botany – II (practical)	U16BO4A2P	2	4	3	25	75	100
	Second Allied Course III	Allied Botany – III	U16BO4A3	5	3	3	25	75	100
	Skill Based Elective I	Human Genetics and Endocrinology	U16ZO4S1	2	4	3	25	75	100
Non-Core Elective II	Economic Botany	U16BO4N2	2	2	3	25	75	100	
			<b>30</b>	<b>28</b>				<b>800</b>	
V	Core Course – VII	Physiology and Biochemistry	U16ZO5C7	5	5	3	25	75	100
	Core Course – VIII	Biotechnology and Microbiology	U16ZO5C8	5	4	3	25	75	100
	Core Course – IX	Biostatistics and Bioinformatics	U16ZO5C9	4	3	3	25	75	100
	Core Course - X	Practical III ( For CC VII to IX)	-	3	-	-	-	-	-
	Core Course - XI	Practical IV (For CC XII to XIII)	-	3	-	-	-	-	-
	Elective Course I	Poultry Science	U16ZO5E1	4	4	3	25	75	100
	Skill Based Elective II	Medical Laboratory Technology	U16ZO5S2	2	4	3	25	75	100
	Skill Based Elective III	Vermitechnology	U16ZO5S3	2	4	3	25	75	100
Soft Skill Development	Soft Skill Development	U16SSD3	2	2	3	25	75	100	
			<b>30</b>	<b>26</b>				<b>700</b>	
VI	Core Course - X	Practical III (For CC VII to IX)	U16ZO6C10P	3	4	3	25	75	100
	Core Course – XI	Practical IV (For CC XII to XIII)	U16ZO6C11P	3	5	3	25	75	100
	Core Course – XII	Ecology, Evolution and Toxicology	U16ZO6C12	6	5	3	25	75	100
	Core Course – XIII	Developmental biology and immunology	U16ZO6C13	6	5	3	25	75	100
	Elective Course II	Aquaculture	U16ZO6E2	5	5	3	25	75	100
	Elective Course III	Entomology	U16ZO6E3	6	4	3	25	75	100
	Extension Activities	Extension Activities	-		1				
	Gender Education	U16EA4	1	1	3	25	75	100	
			<b>30</b>	<b>30</b>				<b>700</b>	
<b>TOTAL</b>				<b>180</b>	<b>140</b>				<b>3900</b>

CHAIRMAN  
BOARD OF STUDIES IN ZOOLOGY

CONTROLLER OF EXAMINATIONS

Sl. No.:

Subject Code:

U16ZO1C1

**GOVERNMENT ARTS COLLEGE (AUTONOMOUS), KARUR-5**  
**B.Sc. ZOOLOGY – I SEMESTER – CORE COURSE - I**  
(For the candidates admitted from 2016-17 onwards)

**BIOLOGY OF INVERTEBRATES**

**Course Outcomes**

On the completion of this course the students will be able to

1. Become familiar with the invertebrate world that surrounds us and their importance.
2. Understand the process of evolution (unicellular cells to complex, multicellular organisms).
3. Identify the invertebrates and classify them up to the class level with the basis of systematics
4. Understand the basis of life processes in the invertebrates and recognize the economically important invertebrate fauna.

**UNIT- I     Phylum protozoa:** General characteristics and classification up to class level giving examples. Detailed Study: *Paramoecium*, General Topics: Protozoan parasites – *Plasmodium* & *Entamoeba* – Life History, Pathogenesis and Control Measures.

**UNIT- II     Phylum Porifera:** General characters and classification up to class level giving examples. Detailed Study: *Ascon* sponge, General topics: Canal System in Sponges **Phylum Coelenterata:** General characters and Classification up to class level giving examples. Detailed study: *Obelia*. General Topics: Polymorphism in Hydrozoa, Corals & Coral Reef.

**UNIT-III     Phylum Platyhelminthes:** General characters and Classification up to class level giving examples. Detailed study: *Fasciola hepatica*, General topics: Parasitic adaptations. **Phylum Nemathelminthes;** General characters and classification up to class level giving examples. Detailed study: *Ascaris lumbricoides*. General Topics: Nematode parasites.

**UNIT-IV     Phylum Annelida:** General Characters and classification up to class level giving examples Detailed Study: Earthworm. General topics: Excretion in Annelids. **Phylum Arthropoda:** General characters and classification up to class level giving examples. Detailed study: Cockroach. General topics: Crustacean Larvae and their significance, Mouth Parts of Insects.

**UNIT-V     Pylum Mollusca:** General Characters and Classification up to class level giving examples. Detailed study: *Pila*. General topics: Torsion in Molluscs. **Phylum Echinodermata:** General Characters and Classification up to class level giving examples. Detailed Study: *Asterias*. General topics: Larval forms in Echinoderms.

**Text Books:**

1. Arumugam *et al*, 2013, A Text Book of Invertebrates, by Saras Publications.Nagercoil
2. E.L.Jordan. & Verma.P.S.2006, Chordate Zoology, S.Chand & Company Ltd, New Delhi.

**Reference Books:**

1. Ekambaranatha Iyer and Ananthkrishnan. T. N., A Manual of Zoology Vol.I & II
2. Barrington. E.J.W. Invertebrates Structure and Function.
3. Barnes, R.D., 1974, Invertebrate Zoology, 4th Ed., Holt Saunders International Edition
4. Kotpal, R.L., A Text Book of Invertebrates, Rastogi Publishers, Meerut.

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U16ZO2C2P

**GOVERNMENT ARTS COLLEGE (AUTONOMOUS), KARUR-5**

**B.Sc. ZOOLOGY – I SEMESTER – CORE COURSE –II PRACTICAL I**

(For the candidates admitted from 2016-17 onwards)

**BIOLOGY OF INVERTEBRATES AND BIOLOGY OF CHORDATES**

**Course Outcomes**

On the completion of this course the students will be able to

1. Get familiar with Scientific method of identifying the organisms and
2. Recognize the importance of conservation
3. Understand the importance of taxonomy of organisms for other studies

**DISSECTIONS** : Earthworm - Nervous System  
Cockroach – Digestive System, Nervous System  
Fish – General Anatomy & Digestive System  
**VIRTUAL DISSECTION**  
Frog – Digestive, Arterial and Venous System

**MOUNTINGS** : Earthworm – Body & Penial setae.  
Cockroach - Mouth Parts  
Honey Bee – Mouth Parts  
Fish – Placoid, Cycloid & Ctenoid scales.

**SPOTTERS :**

**INVERTEBRATES** : *Amoeba, Euglena, Paramecium, Ascon, Euplectella, Sponge – gemmule, Obelia-colony, Physalia, Ephyra larva, Metridium, Fasciola hepatica, Cercaria and Redia larvae. Taenia solium, Taenia – scolex, Planaria, Ascaris – male & female). Microfilaria, Megascolex, Nereis, Nereis-parapodium, Nereis – T.S. Lecch – Entire and T.S. Trochophore larva, Penaeus, Scorpion, Peripatus, Lamellidens, Pila, Sepia, Chiton, Octopus, Astraeas, Echinus, Pedicellaria and Holothuria, Ophiopluteus larva, Bipinnaria larva*

**PROCHORDATES** : *Amphioxus, Ascidia, Balanglossus, Tornaria larva.*

**CYCLOSTOMES** : *Petromyzon*

**PISCES** : *Scoliodon, Trygon, Narcine, Clarias, Gambusia, Echineis, Hippocampus (Male), Synapta, Exocoetus, Anabas, Protopterus, Neoceratodus, Lepidosiren,*

**AMPHIBIA** : *Rana, Alytes, Hyla, Salamander, Ichthyophis, Axolotal larva*

**REPTILIA** : *Calotes, Draco, Varanus, Naja naja, Vipera russellii, Enhydrina, Chelone*

**AVES** : *King fisher, Psittacula, Columba, Quil feather*

**MAMMALIA** : *Ornithorhynchus, Rattus, Pteropus, Oryctolagus, Loris.*

**DENTITION** : Rabbit, Dog & Man

**OSTEOLOGY** : **Pigeon**-Synsacrum, **Rabbit**-Pectoral and Pelvic girdles, Bones of Fore limb & Hind limb.

**A record of laboratory work is to be submitted at the time of Practical Examination**

**Mark distribution for the Practical Examination:**

1. Major Practical (Invertebrata / Chordata) : 25

2. Mounting : 15

3. Spotters: (Invertebrata -2 Chordata – 2  
Dentition/Osteology-1) : 25

4. Record : 10

**Total : 75**

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U16CH1A1

## **GOVERNMENT ARTS COLLEGE (AUTONOMOUS), KARUR-5**

### **B.Sc. ZOOLOGY - I SEMESTER- FIRST ALLIED COURSE-I**

(For the candidates admitted from the year 2016-17 Onwards)

#### **ALLIED CHEMISTRY – I**

##### **Course Outcomes:**

##### **On the completion of this course the students will be able**

1. To estimate the chemical elements by using volumetric analysis.
2. To practice laboratory hygiene, first aid procedures and to identify water hardness.
3. To learn the various kinds of atomic models.
4. To follow the IUPAC nomenclature of Organic Compound, Polymer and Nuclear Chemistry.

##### **UNIT - I (15 hours)**

1.1 Volumetric Analysis : Standard Solution – Primary and Secondary

1.2 Standards – Types of titrimetric reactions – reactions – redox- precipitation – EDTA titrations.

1.3 Laboratory Hygiene and Safety: Storage and handling of corrosive, flammable, explosive, toxic, carcinogenic and poisonous Chemicals.

1.4 Simple first aid procedure for Accidents: Acid in eye, alkali in eye, acid burns, alkali burns, poisoning, inhalation of gases, cut by glasses and heat burns.

##### **UNIT –II (15 hours)**

2.1 Water: Soft water – Temporary and permanent hardness of water - Treatment of water for municipal purpose – Softening of water - Definition – Softening by Zeolite Process.

2.2 Atomic Structure: Rutherford's Nuclear Atom –Bohr's Model of the atom- Bohr Sommerfeld theory - Distribution of electrons –Pauli's Exclusion Principle-Hund's Rule of maximum Multiplicity – Aufbau Principle.

##### **UNIT-III (15 hours)**

3.1 Radioactivity – Definition – types of radioactive rays – Nuclear energy – mass defect – binding energy – magic Numbers – Nuclear fission – Nuclear fusion – difference between Nuclear fission and fusion – Nuclear power plant

3.2 Isotopes, Isobars and Isotones.

##### **UNIT – IV (15 hours)**

4.1 Classification and Nomenclature of organic of Compounds classification of organic compounds – functional groups – homologous series.

4.2 IUPAC System of nomenclature of simple and complex aliphatic compounds.

##### **UNIT- V (15 hours)**

5.1 Polymerisation – Introduction –Preparation of Polymers – addition polymers (Polyethylene, PVC and Teflon) – Condensation polymers (nylon – 6,6 and terylene)

5.2 Synthetic rubbers(BUNA, Butyl rubber and SBR) Thermoplastic and thermosetting plastics.

##### **Books Recommended:**

1. R.Gopalan, P.S.Subramanian, K.Rengarajan – Elements of Analytical Chemistry Sultan Chand & Sons New Delhi -2
2. B.K.Sharma “Industrial Chemistry” GOEL Publishing House Meerut.
3. P.L.Soni and Mohan Katyal “Text Book of inorganic Chemistry 20th Received Edition, Sultan Chand 1992.
4. U.N.Dash-Nuclear Chemistry Sultan Chand & Sons New Delhi-2.
5. I.L.Finar-Organic Chemistry. The fundamental Principles ELBS English Lan.
6. P.L.Soni H.M.Chawla “Text Book of organic chemistry Sultan Chand and sons New Delhi-2.
7. B.S.Bahl and Arun Bahl ‘Advanced Organice chemistry S.Chand and Co New Delhi.

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U16CH2A2P

## **GOVERNMENT ARTS COLLEGE (AUTONOMOUS), KARUR-5**

### **B.Sc. ZOOLOGY - II SEMESTER- FIRST ALLIED COURSE-II**

(For the candidates admitted from the year 2016-17 Onwards)

#### **ALLIED CHEMISTRY – II –PRACTICAL**

##### **Course Outcomes:**

**On the completion of this course the students will be able**

1. To estimate the chemical elements by using volumetric analysis.
2. To practice laboratory hygiene, first aid procedures and to identify water hardness.
3. To analyse the importance of reactions of organic compounds.

##### **1. Acidimetry and alkalimetry**

- a) Strong acid Versus Strong Base
- b) Weak acid Versus Strong base.
- c) Determination of hardness of water

##### **2. Permangnometry**

- a) Estimation of ferrous sulphate using  $\text{KMnO}_4$
- b) Estimation of oxalic acid using  $\text{KMnO}_4$

##### **3. Iodometry**

- a) Estimation of copper using thiosulphate
- b) Estimation of  $\text{K}_2\text{Cr}_2\text{O}_7$
- c) Estimation of  $\text{KMnO}_4$  using thiosulphate

#### **II ORGANIC ANALYSIS**

A study of reactions of the following organic compounds:

1. Carbohydrate
2. Amide
3. Aldehyde
4. Acid
5. Amine
6. Phenol

The students may be trained to perform the specific reactions like Test for element (nitrogen only)

Aliphatic or aromatic,

Saturated or unsaturated and functional group present and record their observation.

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**GOVERNMENT ARTS COLLEGE (AUTONOMOUS), KARUR-5**

**B.Sc. ZOOLOGY – II SEMESTER – CORE COURSE -III**

(For the candidates admitted from 2016-17 onwards)

**BIOLOGY OF CHORDATES**

**Course Outcomes**

On the completion of this course the students will be able to

1. Describe the diversity in form, organization and habits of vertebrates
2. Explain general characteristics and classification of different classes of vertebrates

- UNIT- I** General characters of Prochordata and its outline classification up to class level.  
Detailed study : Prochordata – *Balanoglossus* and *Amphioxus*  
General Topics : 1. Origin of chordates.  
2. Retrogressive Metamorphosis in Ascidian
- UNIT- II** General characters and classification of Cyclostomes and Pisces up to order level.  
Detailed study : *Petromyzon* and *Scoliodon*. (Excluding endoskeleton)  
General Topics : 1. Accessory Respiratory organs in Fishes,  
2. Migration of fishes
- UNIT-III** General characters and classification of Amphibia and Reptilia up to order level.  
Detailed study : *Rana* and *Calotes*. (Excluding endoskeleton)  
General Topics : 1. Parental care in Amphibia.  
2. Identification of Poisonous and non poisonous snakes of India – Biting mechanism – Poison apparatus.  
3. *Sphenodon* as living fossil
- UNIT-IV** General characters and classification of Aves up to order level  
Detailed study : *Columba* (Excluding endoskeleton)  
General Topics : 1. Origin of birds  
2. Flightless birds and their distribution  
3. Flight adaptations in birds
- UNIT-V** General characters and classification of Mammalia up to order level.  
Detailed study : *Oryctolagus* (Excluding endoskeleton)  
General Topics : 1. Aquatic mammals and their adaptations  
2. Prototheria and Metatheria  
3. Dentition in Mammals

**Text Books:**

1. A. Thangamani, A Text book of Chordates –Saras Publications, Nagercoil
2. Ekambarathanatha Iyar and Ananthakrishnan. T. N., A Manual of Zoology Vol.I & II

**REFERENCES**

1. Chordate Zoology – L.Jordan. and Verma.P.S.,S.Chand & Company Ltd
2. Kotpal, R.L.A, Modern Text Book of Zoology-Vertebrates. Rastogi Publication,2009.

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## **GOVERNMENT ARTS COLLEGE (AUTONOMOUS), KARUR-5**

### **B.Sc. ZOOLOGY - II SEMESTER- ALLIED COURSE-III**

(For the candidates admitted from the year 2016-17 Onwards)

#### **ALLIED CHEMISTRY – III**

##### **Course Outcomes:**

**On the completion of this course the students will be able to**

1. Analyse the theory of molecular orbital and sulphur compounds and the theory of coordination compounds can be understood.
2. Review the optical properties of organic compounds and to analyse the aromaticity of hydrocarbons. Understand the chemistry of pesticides and chromatography principles.
3. Understand the various forms of catalysis and to predict knowledge of surface chemistry.

##### **UNIT- I (15 Hours)**

- 1.1 Molecular Orbital theory: Basic concepts of M.O. theory – Bonding and antibonding orbitals – Bond order – Application of M.O. theory to H<sub>2</sub>, He<sub>2</sub>, N<sub>2</sub>, O<sub>2</sub> and F<sub>2</sub> molecules.
- 1.2 Compounds of Sulphur: Preparation, Properties, uses and structures of per acids of sulphur and sodium thio sulphate.

##### **UNIT –II (15 hours)**

Co-Ordination Chemistry: Nomenclature of Mononuclear complexes – Werner, Sidgwick theories Chelation – Application and structure of EDTA – Biological role of haemoglobin and chlorophyll (Elementary idea)

##### **UNIT –III (15 hours)**

- 3.1 Electron displacement Effect: Inductive Effect – Definition – Relative strengths of aliphatic mono carboxylic acids and aliphatic amines
- 3.2 Stereoisomerism: Optical isomerism – Optical activity – Chirality – Lactic and tartaric acids- racemic mixture- resolution. Geometrical isomerism – Maleic and fumaric acids.

##### **UNIT –IV (15 hours)**

- 4.1 Aromatic Hydrocarbons: Structure, Stability, Resonance and aromaticity of benzene. Electrophilic substitution reactions in benzene with mechanism – nitration, sulphonation, halogenation. Naphthalene – isolation, synthesis and properties
- 4.2 Organic halogen Compounds: Chemistry of Chloroform, Carbon tetra chloride, DDT, BHC and Freon -1,2

##### **UNIT –V (15 hours)**

- 5.1 Surface Chemistry: Emulsions, Gels – Definition, Preparation, Properties and applications.
- 5.2 Chromatography – Column, paper and thin layer chromatography.
- 5.3 Catalysis-types, Mechanisms and industrial applications.

##### **Books Recommended:**

1. P.L. Soni and Mohan kalyal “Text Book of Inorganic Chemistry” 20th Revised Edition, Sultan Chand 1992.
2. R.B. Puri and L.R. Sharma “Principles of Inorganic Chemistry” Sultan Chand 1989.
3. R.D. Madan “Modern inorganic Chemistry” S. Chand and Co.Pvt. Ltd., 1987 New Delhi. 4. P.L. Soni “Text Book of Inorganic Chemistry” ,Sultan Chand and Co., New Delhi.
5. B.S. Bahl and Arun Bahl ‘Advanced Organic Chemistry’ S.Chand and New Delhi.
6. B.R. Puri, L.R.Sharma amd madan S.Pathania ‘Principles of Physical Chemistry’ Shoban Lal Nagin Chand and Co., Delhi.
7. P.L Soni “Text Book of Physical Chemistry” Sultan Chand and Co., New Delhi.



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U16ZO3C4

**GOVERNMENT ARTS COLLEGE (AUTONOMOUS), KARUR-5**

**B.Sc. ZOOLOGY - III SEMESTER – CORE COURSE IV**

(For the candidates admitted from 2016-17 onwards)

**CELL BIOLOGY AND BIOPHYSICS**

**Course Outcomes**

On the completion of this course the students will be able to

1. Develop deeper understanding of what life is and how it functions at cellular level.
2. Know the structure and function of cell and cell organelles.
3. Perform a variety of molecular and cellular level and biophysical techniques
4. Understand the basic principles underlying the instruments that are used in biological studies.

**CELL BIOLOGY**

**UNIT- I** Cell types –prokaryotic and eukaryotic cells – Ultra structural organization of Plasma membrane– Unit membrane model – fluid mosaic model and functions – Permeability, passive transport, active transport, endocytosis, exocytosis; Modifications of plasma membrane. Cytoplasm – Physico - Chemical and biological properties.

**UNIT-II** Endoplasmic Reticulum -Ultra structure types and functions. Golgi complex – Morphology, structure, role in secretion and other functions. Ribosomes, Lysosome and Centrosome – Morphology, chemistry and functions. Mitochondria – Ultrastructure and functions.

**UNIT-III** Ultra Structure of inter-phase nucleus and nucleolus: Organization of chromosome – Giant chromosomes- Microtubules and microfilaments- Cell cycle-Cell division – mitosis and meiosis. Cancer Biology.

**BIOPHYSICS**

**UNIT- IV** Scope of biophysics: Colloids – types, properties – Electro-kinetic properties, Donnan equilibrium, Tyndall effect, Surface tension, Brownian movement, Filtration, Osmosis, Dialysis, Adsorption, Components of light: Beer-Lambert's law of absorption of light – colorimetry and spectrophotometry- X-ray diffraction

**UNIT- V** Laws of thermodynamics Entropy and Enthalpy; Bioelectricity-Radioactivity – Types, measurement of radioactivity – Geiger – Muller counter. Microscopy – Principles construction and application of light and electron microscopes (SEM and TEM), Phase contrast and fluorescent microscopes. Centrifugation –Differential and Density gradient centrifuges: Principles, types and application.

**Text Books:**

1. Arumugam, 2011, Cell Biology, Saras Publications, Nagercoil.
2. Thiraviaraj, S., 1998, Biophysics, . Saras Publications, Nagercoil.

**Reference Books:**

1. DeRobertis, E.D.P and E.M.F. DeRobertis, 1987, Cell and Molecular Biology. VIII Ed. Lea and Febger, Philadelphia.
2. Powar, C.B. 1989, Essentials of Cytology, Himalaya Publishing House, Mumbai.
3. Subramanian M.A. 2008, Biophysics Principles and Techniques, MJP Publishers.
4. Upadhyay, A., Upadhyay, K., and Nath, N., 2004, Biophysical Chemistry, Himalayas Publishing House, Mumbai.

Sl. No.:

Subject Code:

**GOVERNMENT ARTS COLLEGE (AUTONOMOUS), KARUR-5**

**B.Sc. ZOOLOGY –CORE COURSE PRACTICAL – II**

(For the candidates admitted from 2016-17 onwards)

**CELLBIOLOGY AND BIOPHYSICS & GENETICS AND MOLECULAR BIOLOGY**

**Course Outcomes**

On the completion of this course the students will be able to

1. Demonstrate the mitotic and meiotic cell division, human karyotypes and isolation of genetic material.
2. Understand the principle and operate instruments like pH meter, spectrophotometer, electrophoretic unit etc.,
3. Develop skill in simple biochemical laboratory procedures

**1. CELL BIOLOGY**

1. Onion Root Tip - squash preparation to study different stages of Mitosis
2. Grasshopper Testis/  
*Tradescantia* sp. - Squash preparation to study different stages of Meiosis
3. Chironomus Larva - Mounting of Salivary glands and study of Giant Chromosomes.
4. Buccal smear preparation - Showing the Squamous epithelial cells

**Spotters:**

- |                          |                        |                        |
|--------------------------|------------------------|------------------------|
| 1. Columnar epithelium   | 2. Ciliated epithelium | 3. Squamous epithelium |
| 4. Glandular epithelium  | 5. Cardiac Muscle      | 6. Striated Muscle     |
| 7. Non – Striated Muscle | 8. Bone Tissue         | 9. Blood of Man        |
| 10. Blood of Frog        | 11. Micrometer         | 12. Camera lucida      |

**2. BIOPHYSICS**

1. Verification of Beer-Lambert law using photoelectric colorimeter

**Spotters:**

- |             |                |                      |                              |
|-------------|----------------|----------------------|------------------------------|
| 1. pH meter | 2. Colorimeter | 3. Spectrophotometer | 4. Electrophoretic apparatus |
|-------------|----------------|----------------------|------------------------------|

**3. GENETICS:**

1. Recording of Mendelian Traits in Man.
2. *Drosophila* - Male and Female Identification
3. Human Karyotypes : Normal Male, Down Syndrome, Klinefelter's and Turner's Syndrome
4. Pedigree Analysis.

**4. MOLECULAR BIOLOGY**

1. DNA isolation in Eukaryotes / Prokaryotes : Demonstration only
2. Electrophoretic separation of Proteins : Demonstration only

**Spotters:**

- |                 |                      |              |  |
|-----------------|----------------------|--------------|--|
| 1. PCR- Machine | 2. DNA-Model         | 3. RNA Model | 4. Wire frame and ball & stick model for Myosin and cytochrome |
| 5. ATP Model    | 6. Phylogenetic tree |              |  |

**A record of Laboratory Work shall be submitted at the time of Practical Examination.**

**Mark distribution for the Practical Examination:**

- |   |             |
|---|-------------|
| 1. Major Practical (Cell Biology/Biophysics)  | : 25        |
| 2. Minor Practical (Cell Biology/Biophysics)  | : 10        |
| 3. Spotters (Cell Biology – 1, Genetics – 1, Molecular biology 2- Biophysics - 2) (6x5) | : 30        |
| 3. Record   | : 10        |
| <b>Total</b>  | <b>: 75</b> |

Sl. No.:

Subject Code:

U16BO3A1

## **GOVERNMENT ARTS COLLEGE (AUTONOMOUS), KARUR-5**

### **B.Sc. ZOOLOGY - III SEMESTER- SECOND ALLIED COURSE-I**

(For the candidates admitted from the year 2016-17 Onwards)

#### **ALLIED BOTANY – I**

(ALGAE, FUNGI, BRYOPHYTES, PTERIDOPHYTES, ECOLOGY AND EVOLUTION)

#### **Course Outcomes:**

**On the completion of this course the students will be able to**

1. Differentiate the algae, fungi and bryophytes
2. Understand the economic importance of algae, fungi and bryophytes
3. Understand the stages in the Origin of life
4. Know the adaptations of plants to different habitats

#### **Unit - I:**

General characters of Algae. Classification of Algae by Fritsch. Structure and Life history of the following. Chlamydomonas, Volvox, Oscillatoria, Sargassum and Polysiphonia.

#### **Unit - II:**

General characters of Fungi. Classification of fungi by Alexopoulos. Structure and Life history of the following Penicillium, Agaricus, Fusarium.

#### **Unit - III:**

General characters of Bryophytes, Pteridophytes and Gymnosperms. Structure and Life history of Riccia, Selaginella and Cycas.

#### **Unit - IV:**

Geological era, Types of Fossilization- Structure and reproduction of the following Rhynia, Lepidodendron and Lepidocarpon.

#### **Unit - V:**

Ecology and Evolution : Ecological factors - Climatic, Edaphic and Biotic factors. Plant adaptation - Hydrophytes, Xerophytes and Halophytes. Origin of Life, Theories of Lamarck and Darwin.

#### **Reference Books:**

1. Fuller, H.J. and Tippo, 1990 - Collage Botany - Henry, Holt & Co. New Delhi.
2. Ganguly, A.K. -General Botany, The New Book Stall, Calcutta, Vol.I, 7th Edt.(1970), Vol.II,6th Edition (1975). New Delhi.
3. K.N. Rao, K. Krishnamurthy and G.S. Rao. 1979. Ancillary Botany, S. Viswanathan.
4. Nathawat, G.S.P.D. Sharma and R.K. Shani 1977. - A Text Book of Botany, Ramesh Book Depo., Jaipur.
5. Sambamurthy A.V. S.S. 2005. A Textbook of Algae. I.K. International Pvt.Ltd, New Delhi.
6. Vashishta, Sinha A.K, Adarsh Kumar. (2011). Bryophytes, S.Chand &Company ltd., New Delhi.

**CHAIRMAN – BOS**

**COE**

Sl. No.:

Subject Code:

**GOVERNMENT ARTS COLLEGE (AUTONOMOUS), KARUR-5**

**B.Sc. Zoology– IV SEMESTER – SECOND ALLIED COURSE II**

(For the candidates admitted from 2016-17 onwards)

**ALLIED BOTANY II -PRACTICAL (COVERING SAC-I & SAC-III)**

**Course Outcomes**

On the completion of this course the students will be able to

1. Identify the algae, fungi, bryophytes and pteridophytes
  2. Make sections and study the anatomical characters
  3. Dissect the parts of plants and study the anatomical characters
  4. Understand the adaptations of plants
- 
1. Micropreparation and Identification of types included in Algae, Fungi, Bryophytes, Pteridophytes and Gymnosperms.
  2. Micropreparation of Stem, Root and Leaf of Dicot
  3. To make dissection using dissection microscope and study the following families as per the syllabus.
  4. Demonstrations: Osmosis, Ganong's photometer, Anaerobic respiration, Auxanometer and Clinostat.
  5. To study the Ecological adaptations - Eichhornia, Opuntia, Avicennia.

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**COE**

Sl. No.:

Subject Code:

U16BO3N1

**GOVERNMENT ARTS COLLEGE (AUTONOMOUS), KARUR-5**

**B.Sc., ZOOLOGY – NON-CORE ELECTIVE - I**

(For the candidates admitted from 2016-17 onwards)

**MEDICINAL BOTANY**

**Course Outcomes:**

On the completion of this course the students will be able to

1. Understand the history of various alternative medicine systems
2. Know the pharmaceutical importance of plants
3. Follow the methods of cultivation of medicinal plants

**UNIT - I:**

Brief history of medicinal plants. Indian system of medicines - Siddha, Ayurvedha, and Unani systems. Classification of crude drugs and drug adulteration.

**UNIT - II:**

Cultivation and utilization of the selected medicinal plants Adathoda, Aloe, Allium, Ocimum and Vinca - Role of National Medicinal Plants Board of India.

**UNIT - III:**

Drugs from Leaves - Atropa, Eucalyptus, Datura and Cassia. Flower - Eugenia. Roots - Rauwolfia. Bark - Cinchona. Stem of wood - Ephedra. Fruits and Seeds - Wood apple and Coriander. Underground stem : Ginger.

**Unit - IV:**

A brief account of drugs acting on the central nervous system, Drugs used in disorders of gastrointestinal tract and cardio vascular drugs used in different treatment methods.

**Unit - V:**

Cultivation of medicinal plants in India. Breeding, Methods applied to medicinal herbs, Plant tissue culture as source of biomedicine.

**Reference Books:**

1. Dhavan, B.N. (1986), Ayurvedic Research on medicinal plants in India INSA, New Delhi.
2. Trivedi, P.C. (2010) - Ethnic Tribes & Medicinal Plants, Pointer Publishers, Jaipur.
3. Amruth, The medicinal plants magazine (All volumes) Medicinal Plants Conservatory society, Bangalore.
4. Baruah, A. (2011) - Aromatic & Spices Plants : Utilization and Conservation - Pointer Publishers, Jaipur.
5. Prajapathi, Purohit, Sharma and Kumar (2003) - A hand Book of Medicinal Plants. Agrobios Publications, Jodhpur.
6. Sood, S.K. (2015) - Herbal medicine, Pointer Publishers, Jaipur.

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**COE**

Sl. No.:

Subject Code:

U16ZO4C6

**GOVERNMENT ARTS COLLEGE (AUTONOMOUS), KARUR-5**

**B.Sc. ZOOLOGY – IV SEMESTER - CORE COURSE - VI**

(For the candidates admitted from 2016-17 onwards)

**GENETICS AND MOLECULAR BIOLOGY**

**Course Outcomes**

On the completion of this course the students will be able to

1. Prepare squash and observe chromosomal arrangements during cell division
2. Distinguish different chromosomal syndromes in man
3. Develop skills to perform routine blood analysis.
4. Understand the contribution of great Geneticists
5. Carry out the practical applications of the Classical and Molecular Genetics

**GENETICS**

**UNIT- I** Mendel's laws of inheritance – Gene interaction-Allelic and Non allelic interaction; Linkage, Crossing over-Definition– Mechanism with *Drosophila* as example; Multiple alleles: Blood groups and their inheritance. Sex determination – Chromosomal, Environmental and hormonal basis of sex determination.

**UNIT- II** Chromosome – Structure and Function – DNA as genetic material – Transformation –Conjugation-Transduction- Molecular Genetics: Fine structure of gene-cistron, recon and muton – gene expression and regulation in prokaryotes – Operon model.

**UNIT-III** Genetic code - Transcription and Translation - Protein biosynthesis; Initiation-Elongation-Termination-Post translational modifications-Gene bank and libraries.

**MOLECULAR BIOLOGY**

**UNIT-IV** Central dogma of Molecular Biology- Structure and types of DNA: DNA replication and repair mechanism; Types of RNA – Processing of RNA molecules. Mutation-types & induced mutation - Molecular basis of mutation

**UNIT-V** Molecular techniques- Southern, Northern and Western blotting; DNA fingerprinting –PCR- Isolation of DNA and RNA -Sanger's DNA Sequencing method – Plasmid extraction. Centrifugation and precipitation; dialysis, chromatography, electrophoresis.

**Text Books:**

1. Meyyan, R.P., 2005. Genetics, Saras Publications, Nagercoil.
2. Verma, P.S. and V.K. Agarwal, 2002, Genetics, S.Chand & Co. New Delhi.
3. Arumugam, N, 2005. Molecular biology, Saras Publications, Nagercoil
4. Jeyanthi, G.P, Molecular biology,2009,MJP Publishers, Chennai.

**References:**

1. Gardner, E.J., 2007, Principles of Genetics , 8<sup>th</sup> edition, Willey India Publishers
2. Miglani, G.S.,2007, Advanced Genetics –2<sup>nd</sup> edition, Narosa Publishing, New Delhi
3. Friefelder, D., 2003, Essential of Molecular Biology; Narosa Publishing, New Delhi
4. Lewin, B. 2008, Genes IX, Jones and Barlett Publishers, Boston.
5. Strickberger, M.W., 2005 Genetics, Prentice Hall of India, New Delhi.

Sl. No.:

Subject Code:

U16BO4A3

**GOVERNMENT ARTS COLLEGE (AUTONOMOUS), KARUR-5**

**B.Sc. Zoology– IV SEMESTER –ALLIED COURSE III**

(For the candidates admitted from 2016-17 onwards)

**ALLIED BOTANY- III**

**(Morphology, Taxonomy, Cytology, Anatomy, Embryology and Plant Physiology)**

**Course Outcomes**

On the completion of this course the students will be able to

1. Have an in-depth knowledge on leaf and inflorescence
2. Distinguish and identify the plants up to family level
3. Understand the ultra-structure of cell organelles
4. Know the concept of pollination and fertilization
5. Understand the mechanism of absorption, transpiration and photosynthesis

**Unit - I:** Plant Morphology: Leaf types and leaf shapes. Types of inflorescence Racemose, cymose. Floral parts.

**Unit - II:** Taxonomy: Naming of plants - Binomial system. Classification by Bentham and Hooker. Distinguishing features and economic importance of following families, Annonaceae, Rutaceae, Ceasalpinaceae, Asclepiadaceae, Lamiaceae, Euphorbiaceae, Arecaceae, Poaceae.

**Unit - III:** Cytology: Ultra structure of cell and cell organelles - Endoplasmic reticulum, Golgi complex, Mitochondria, Chloroplast, Nucleus. Mitosis and Meiosis. Genetics: Mendel's law of inheritance- Monohybrid and Di hybrid ratios.

**Unit - IV:** Anatomy and Embryology: Meristematic tissues. Primary structure of stem, root and leaf in Dicot. Embryology: Structure and types of Anther, Female gametophyte. Pollination, Fertilization. Endosperm types- nuclear and cellular.

**Unit - V:** Plant Physiology: Absorption of water- transpiration and ascent of sap. Absorption of minerals and their role in plant nutrients. Photosynthesis - mechanism- light and dark reaction - C3 cycle only, Growth hormones.

**Reference Books:**

1. Singh, V.D.K 1983. Taxonomy of Angiosperms. Rastogi publication Meerut. India
2. Pandey B.P 1997. Taxonomy of Angiosperms. Chand & Co P Ltd, New Delhi.
3. Vasishta P.C 1977. A text book of Plant anatomy. S. Nagin & Company. Jallunder, New Delhi.
4. Singh, V., Pande, P.C. and Jain, D.K. - 4th Revised Edition (2013-14) -A Text Book Of Botany, Angiosperms- Rastogi Publications, Meerut.
5. S.S. Bhojwani and S.P. Bhatnagar - 2009 ( Revised Edition) The Embryology of Angiosperms. - Vikas Publishing House, Pvt. Ltd., New Delhi.
6. Jain V.K. Fundamentals of Plant physiology.

**CHAIRMAN – BOS**

**COE**

Sl. No.:

Subject Code:

U16ZO4S1

**GOVERNMENT ARTS COLLEGE (AUTONOMOUS), KARUR-5**

**B.Sc., ZOOLOGY – SKILL BASED ELECTIVE - I**

(For the candidates admitted from 2016-17 onwards)

**HUMAN GENETICS AND ENDOCRINOLOGY**

**Course Outcomes**

On the completion of this course the students will be able to

1. Induct the fundamentals of classical and modern genetics
2. Understand the structure, functions and disorder of endocrine glands
3. Understand the structure of chromosome, chromosomal aberrations, metabolic disorder and eugenics

**HUMAN GENETICS**

**UNIT –I Introduction** to Human genetics- Simple Mendelian traits in man –Twins- Amniocentesis- Human karyotyping-Human cytogenetics- Chromosome banding Techniques

**UNIT-II** Human chromosomes-chromosomal non-disjunction-chromosomal Aberration (Structural and Numerical)- Human genetic disorders- inborn errors of Metabolism: Phenylalanine metabolism-sickle cell anaemia- colour blindness- Thalassaemia- Haemophilia.

**UNIT-III** Eugenics- Euthenics-Euphenics; Inbreeding and Outbreeding, Heterosis, Pedigree analysis- Gene therapy and Genetic counseling.

**ENDOCRINOLOGY**

**UNIT-IV** Endocrine glands in Man- Hypothalamus, Pituitary, Thyroid, Parathyroid- Structure, secretion and disorders - Mechanism of hormone action (Steroid & Peptide).

**UNIT- V** Adrenal, Endocrine pancreas, Testis and Ovary, Pineal body - Structure, Secretion and disorders - Gastrointestinal hormones.

**Text Books:**

1. Mandal, S., 2010, Fundamentals of human genetics, New central book Agency (P) Ltd
2. Kotpal, R.L., 1978, Concepts of genetics, Rastogi publication
3. Meyyan, R.P. 2010, Genetics, Saras Publication.
4. Prakash Lohar, 2007, Endocrinology Hormones and Human Health- M JP Publications
5. Berry, 2000, A.K, Text Book of Endocrinology, Emkay Publication-

**Reference Books:**

1. Verma P.S. and V.K.Agarwal,1998, Concepts of genetics, Human genetics and Eugenics. S. Chand & Company Ltd.
2. Rothwell. N.V. 1989. Human Genetics. Prentice Hall of India New Delhi.
3. Berry, A.K., 2000. Text Book of Endocrinology, Emkay Publication.
4. Guyton & Hall 2013, Text book of Medical Physiology, Elsevier Publication.
5. Turner , 1976. General Endocrinology , VI Ed., Topper Company Ltd, Japan.

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Sl. No.:

Subject Code:

**GOVERNMENT ARTS COLLEGE (AUTONOMOUS), KARUR-5**

**B.Sc., ZOOLOGY – NON-CORE ELECTIVE - II**

(For the candidates admitted from 2016-17 onwards)

**ECONOMIC BOTANY**

**Course Outcomes:**

On the completion of this course the students will be able to

1. Understand the utilization of Cereals and Millets and fibre crops
2. Know the pharmaceutical importance of plants
3. Follow the methods of cultivation of economic tuber crops and oil seeds

**UNIT - I:** A Study of occurrence, morphology of useful parts and utilization of the following – Cereals and Millets, *Pennisetum*, *Sorghum*, Rice, Fibre crops: Coir, *Agave*, *Hibiscus cannabinus* and Sun hemp ( Structure properties and production of the concerned fibres to be studied).

**UNIT – II:** Medicinal plants: *Vinca*, *Zingiber*, *Dioscorea*, *Allivium sativum*, *Eclipta*, *Centella and Withania*. Wood and Timber plants: Teak, Magerstermoees, Terminalia, Neem, Bamboos and Seeds General account.

**UNIT- III:** Tuber Crops: Tapioca, Sweet potato, *Amorphophallus*. Pulses: *Cajanus*, Cow pea, Black gram, Green gram. Fruits and Nuts: Cashew, Mango, Plantain, Jack, Papaya and Orange.

**UNIT- IV:** Oil Seeds: *Cocos*, *Arachis*, *Helianthus*, *Ricinus* and Sesamum. Foe Wood: *Prosopis*, *Tamarindus*, Eucalyptus, and *Casuarina*.

**UNIT- V:** Condiments and Spices: Chillies, Cardamom, Cinnamon, Curcuma, Onion, Coriander and Pimpenella.

**Reference Books:**

1. Hill, A., 1962, Economic Botany, Mc Graw Hill Book Company.
2. Gupta S.K., 1978, Introductory Botany, Volume IV, Taxonomy, Embryology and Economic Botany, Kedar Nath Ram Nath, Meerut.
3. Sambamurthy, AVSS, and Subramaniam, N.S., 1989, A Text book of Economic Importance, Wiley Eastern Ltd.New Delhi.
4. Sharma O.P., 1996, Economic Botany, Tata Mc Graw Hill Company Ltd, New Delhi.
5. Verma V. 1998, A Text Book of Economic Botany, M.K.Publications, New Delhi.
6. Maiti and Singh 2006, Modern Economic Botany, Agrow Bios (India) Jodhpur.
7. Singh V. Pandae, P.C., and D.K.Jain, 2012, Economic Botany 2<sup>nd</sup> Edition, Rastigi Publications, Meerut

**CHAIRMAN – BOS**

**COE**

Sl. No.:

Subject Code:

U16ZO5C7

## **GOVERNMENT ARTS COLLEGE (AUTONOMOUS), KARUR-5**

### **B.Sc., ZOOLOGY – V SEMESTER CORE COURSE - VII**

(For the candidates admitted from 2016-17 onwards)

### **PHYSIOLOGY AND BIOCHEMISTRY**

#### **Course Outcomes**

On the completion of this course the students will be able to

1. Understand the structure and functioning of various systems
2. Apply the knowledge of Physiology and Biochemistry to lead a healthy life
3. Understand the importance of Bio molecules and the metabolic reactions
4. Get familiarized with various biochemical pathways and energy production.

**UNIT- I** Nutrition – types; calorific values; balanced diet, Digestion in man; malnutrition; peptic ulcer; appendicitis; liver cirrhosis -Respiration: transport of oxygen and carbon dioxide in man, control, pneumonia and bronchitis - Circulation: blood Composition; types of heart; origin and conduction of heart beat; blood pressure; coronary blood vessels; myocardial infarction; ECG, angiogram, angioplasty and bye-pass surgery.

**UNIT- II** Excretion: types of nitrogenous waste; structure of mammalian kidney and urine formation; renal failure, kidney stone and kidney transplantation - Osmo-ionic regulation in fresh water, marine and terrestrial organisms. (one example for each) - Muscle physiology: types of muscle, ultra structure of skeletal muscle, Chemistry and mechanism of muscle contraction.

**UNIT-III** Coordinating system: Nerve physiology, types of neuron, impulse transmission, synapse, synaptic transmission, reflex action - Receptors- Optic, Olfactory and Auditory receptors in man – Reproductive Physiology-Anatomy of Male and Female reproductive system of human – Hormonal control of reproduction.

### **BIOCHEMISTRY**

**UNIT-IV** Classification, Structure and functions of carbohydrates proteins and lipids;– source, functions, and deficiency diseases of vitamins and minerals (Ca, P, K, Mg, Na, Fe and Cu)

**UNIT-V** Metabolism of carbohydrates, proteins and lipids; energy kinetics, structure of ATP and hormonal control. Enzymes – Major Types and characteristics, mode of action – theories, factors affecting enzyme action, Enzyme inhibition and types.

#### **Text Books:**

1. Mariakuttikan, 2005, Animal Physiology, Saras Publications, Nagercoil.
2. Arumugam, 2007, Biochemistry, Saras Publications, Nagercoil.
3. P.S Verma and V.K. Agarwal S.1980, Animal Physiology, S. Chand & Co. Ltd. New Delhi.
4. Ambika shanmugam,2009, Fundamentals of Biochemistry for medical students, Karthik Printers Chennai.

#### **Reference Books:**

1. Leninger, L. 1990, Biochemistry, W.H. Freeman & co.
2. Hoar, W.S., 1983, General and comparative physiology, Prentice Hall of India.
3. Harper, H.A., 193, Review of Physiological chemistry, Muruen Ascian Ed.
4. Nagabushanam, R., 1991, Animal Physiology, S. Chand & Co.

Sl. No.:

Subject Code:

U16ZO5C8

**GOVERNMENT ARTS COLLEGE (AUTONOMOUS), KARUR-5**  
**B.Sc., ZOOLOGY – CORE COURSE - VIII**  
(For the candidates admitted from 2016-17 onwards)  
**BIO TECHNOLOGY AND MICROBIOLOGY**

**Course Outcomes**

On the completion of this course the students will be able to

1. Understand the applications of Biotechnology
2. Get familiarized with the tools and techniques of Biotechnology
3. Operate and perform practical with the tools and techniques used in microbiology and pathogenic microbes

**BIOTECHNOLOGY**

**UNIT- I** Scope and importance of biotechnology. Genetic Engineering: Tools of genetic Engineering – Enzymes and vectors; Gene cloning - isolation of desired DNA, insertion of DNA into vector, introducing rDNA into host, identification, selection and expression of cloned DNA. Gene manipulation in Eukaryotes – *Agrobacterium* as natural genetic engineer; Transgenic animals.

**UNIT- II** Fermentation – fermenter construction, types, process of fermentation – upstream and downstream; types of fermenters – solid state, submerged, and semi solid, uses of fermentation; Ethanol production, Applications of biotechnology in industries. Hybridoma technology and uses; Applications of biotechnology in medicine – production of vaccines - gene therapy, forensic medicine.

**UNIT-III** Bio-fertilizers-microbes as bio-fertilizers, culture methods, Single Cell Protein, bio-pesticides; Environmental Biotechnology: Biodiversity and its conservation, Applications of biotechnology in agriculture and environment. Sources, uses and applications of enzymes; Immobilization of enzymes-need, methods, types and uses.

**MICROBIOLOGY**

**UNIT-IV** Introduction, history and scope of microbiology – General structure of bacteria and virus – Outline classification of each group and identification – Sterilization techniques- Bacterial growth, culture media, continuous and batch culture techniques, bacterial growth curve. Food Microbiology: food poisoning, food spoilage, food preservation.

**UNIT-V** Industrial microbiology: Production of antibiotics with reference to penicillin. Soil microbiology: role of soil microbes in Nitrogen fixation. Medical microbiology: Bacterial Diseases: cholera, tuberculosis, leprosy, tetanus – Viral Diseases: jaundice, small pox, AIDS, Poliomyelitis, causative organism, symptoms, impact on the host and control measures.

**Text Books:**

1. Kumaresan, 2009, Biotechnology, Saras Publications, Nagercoil.
2. Ananda Narayanan, T. and Jayram Paniker, C.K., 2000, Textbook of Microbiology, 6<sup>th</sup> Ed. Orient Longman Ltd., Chennai.

**Reference Books:**

1. Balasubramanian, D., 1996, Concepts in Biotechnology, University Press (India) Ltd., Hyderabad.
2. Dubey, R.C. 1995, Text book of Biotechnology, S. Chand & Co. New Delhi.
3. Trevan, M.D.1993, Biotechnology, the Biological Principles, Tata McGraw Hill Publishing Co., New Delhi.
4. Pelczar, M.J., Reid, R.D. and Chan. E.C.S, 2002, Microbiology, 5<sup>th</sup> Ed. Tata McGraw Hill Publishing Co. Ltd., New Delhi.
5. Dubey, R.C. and Maheswari, D.K., 2005, Text book of Microbiology, S. Chand & Co. New Delhi.
6. Powar, C.B.and Daginawala. H.F., 1982, General Microbiology Volume I &II, Himalayas Publishing House, Mumbai.

Sl. No.:

Subject Code:

U16ZO5C9

**GOVERNMENT ARTS COLLEGE (AUTONOMOUS), KARUR-5**

**B.Sc., ZOOLOGY – CORE COURSE - IX**

(For the candidates admitted from 2016-17 onwards)

**BIostatistics, COMPUTER APPLICATIONS & BIOINFORMATICS**

**Course Outcomes**

On the completion of this course the students will be able to

1. Get familiarized with Digital knowledge
2. Apply the knowledge to collect various Biological data
3. Analyze the importance of Bio molecules
4. Practice various Applications of Bioinformatics
5. Bring awareness about nature of the emerging digital knowledge in society

**BIostatistics**

**UNIT- I** Data collection – primary and secondary data; Processing the data – classification and tabulation; Organization of data – Individual, Discrete and Continuous series; Diagrammatic and Graphical presentation of data – Bar diagram, Pie diagram, Frequency polygon, Frequency curve – Histogram.

**UNIT- II** Measures of central tendency – Mean, Median and Mode; Measures of dispersion – Range, Standard deviation and Variance and Standard error. Co-relation-Regression.

**COMPUTER APPLICATIONS**

**UNIT-III** Definition of Computer, computer generations – basic components of computer – input and output devices, CPU, Memory and types. Number systems in brief. Introduction to basic Softwares and Packages-MS-Word, MS-Excel and MS-PowerPoint. Basic ideas about internet, Search engines, browsing, website, E-mail, other uses of internet. An introduction to Medical Transcription.

**BIOINFORMATICS**

**UNIT-IV** Introduction, Biological databases – Primary, Secondary and Composite databases. Structural databases – PDB (Protein Data Bank), SWISPROT, CATH (Class Architecture Topology Homology), SCOP (Structural Classifications of proteins).

**UNIT-V** DNA databases- NCBI, EMBL, DDBJ, Pub Med and Genbank. Human Genome Project. Bioinformatics Tools- BLAST, FASTA, RASMOL, PHYLIP. Sequence Alignment Tool-PAM and BLOSUM.

**Text Books:**

1. Palanivel *et al.*, 2002, Biophysics, Biostatistics and Computer Applications, Saras Publications, Nagercoil.
2. Thomas.C. Bartee, 2005, Digital Computer Fundamentals Tata McGraw Hill & Co., New Delhi.
3. Sundaralingam.R, 2008, Bioinformatics, Saras Publications, Nagercoil.

**Reference Books:**

1. Gurumani, 2006, Biostatistics, MJP Publishers, Chennai.
2. Zar, J.H., 1974, Biostatistical analysis, Prentice Hall Inc., New Jersey, USA.
3. Balagurusamy, E., 1984, Programming in BASIC, Prentice Hall of India.
4. Rajaraman, V., 1985, Fundamentals of computers, Prentice Hall of India.
5. KaviKishore, Chavali, L.N., 2013, Principles of Biological Databases, Himalayas Publishing House Pvt. Ltd. Mumbai.
6. Baxevanis, A. and Ouellette, B.F.F., 2006, Bioinformatics, A Practical Guide to the Analysis of Genes and Proteins, John Wiley and Sons, New delhi.

**CHAIRMAN – BOS**

**COE**

Sl. No.:

Subject Code:

U16ZO6C10P

**GOVERNMENT ARTS COLLEGE (AUTONOMOUS), KARUR-5**

**B.Sc. ZOOLOGY – CORE COURSE – X- PRACTICAL – III**

(For the candidates admitted from 2016-17 onwards)

**(Physiology & Biochemistry, Biotechnology and Microbiology, Biostatistics & Computer Applications & Bioinformatics)**

**Course Outcomes**

On the completion of this course the students will be able to

1. Demonstrate basic principles in physiology Objectives of the course
2. Operate clinical procedures for blood & urine analysis
3. Develop skill in simple biochemical laboratory procedures
4. Know the importance of various biomolecule databases and it's applications
5. Develop skill in retrieving and analyzing various Biological Data

**I. Physiology and Biochemistry**

1. Human salivary Amylase activity in relation to temperature and calculation of Q<sub>10</sub>
2. Enumeration of RBC and WBC
3. Differential count of WBC
4. Qualitative tests for Protein, Carbohydrate and Lipid
5. Qualitative tests for nitrogenous wastes.

**Spotters**

- A) Kymograph, B) Haemoglobinometer C) Sphygmomanometer
- D) Haemoglobin model

**II Biotechnology and Microbiology**

1. Isolation of DNA – Demonstration only
2. Serial Dilution Technique
3. Observation of Bacterial mobility by hanging drop method
4. Simple and Gram staining of Bacteria

**Spotters**

1. Transgenic animals: Sheep, Cow & Mouse
2. Model of Vectors: PBR<sup>322</sup>, SV40 & Ti Plasmid. 3. PCR
4. Bacterial Colony Counter 5. Micropipette 6. Autoclave 7. Petri dish
8. Inoculation loop.

**II. Biostatistics, Computer application and Bioinformatics**

1. Calculation of Mean, Median, Mode and Standard deviation using Molluscan shells.

**Spotters**

1. Bar diagram, 2. Histogram, 3. Pie diagram, 4. Mouse, 5. Keyboard, 6. CPU, 7. Monitor, 8. Printer, 9. Wire frame model and Ball & Stick Model of Myosin
10. Wire frame model and Ball & Stick Model of Cytochrome

**A record of laboratory work shall be submitted at the time of practical examination.**

**Mark distribution:**

- |  |                   |
|--|-------------------|
| 1. <b>Major practical</b> (Physiology and Biochemistry)  | : 20 Marks        |
| 2. <b>Minor Practical</b> (Biochemistry/Biostatistics)   | : 15 Marks        |
| 3. <b>Spotters (6x5)</b> Physiology and biochemistry –1, Biotechnology– 1, Microbiology-1, Biostatistics–1, Computer Application–1, Bioinformatics-1 | : 30 Marks        |
| 4. <b>Record</b>   | : 10 Marks        |
| <b>Total</b>   | : <b>75 Marks</b> |

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U16ZO6C11P

**GOVERNMENT ARTS COLLEGE (AUTONOMOUS), KARUR-5**

**B.Sc., ZOOLOGY – CORE COURSE – XI - PRACTICAL – IV**

(For the candidates admitted from 2016-17 onwards)

(Ecology, Evolution and Toxicology, Developmental biology and Immunology)

**Course Outcomes**

On the completion of this course the students will be able to

1. Demonstrate various types of Eggs
2. Develop skill in observing the various stages of egg development and sperm motility
3. Estimate the Turbidity, dissolved oxygen and BOD.
4. Get familiarized with ecological adaptations of fauna in different habitats
5. Measure pH of different water samples using pH meter and pH paper
6. Estimate the salinity and other chemical characters of water samples.
7. Create an opportunity to explore the live invertebrate and vertebrate organisms through field visit.

**Ecology**

1. Estimation of Salinity in water samples
2. Estimation of dissolved oxygen in water samples
3. Estimation of Carbonate and bicarbonates water samples
4. Mounting of Zoo Plankton
5. Animal Association: Mutualism, Commensalism & Parasitism.
6. Study of Intertidal (Sandy, Muddy & Rocky) fauna.
7. Visit to different habitats for studying the adaptations of animals (Educational Tour may be arranged).
8. Spotters: (a) Secchi disc, (b) Wet and Dry hygrometer, (c) Rain gauge, (d) Six's Maximum- Minimum thermometer, (e) Plankton net, (f) pH meter and (g) Fortin's Barometer.

**Evolution**

1. Animals of Evolutionary Significance: *Peripatus*, *Archaeopteryx*.
2. Colouration - *Chameleon*, *Lycodon* & *Krait*.
3. Mimicry - *Phyllium*, Stick insect
4. Fossils - Ammonoid, Nautiloid and Echinoid

**Toxicology**

1. Evaluation of Toxicity of textile/Paper mill effluent through LC50 96 hr value in Fishes.
2. Determination of pH using pH paper and pH meter.

**Developmental biology & Immunology**

1. Chick Blastoderm mounting – Demonstration only.
2. Examination of prepared microslides: (a) To study Blastula, gastrula & yolk plug stages in frog (b) 24 hours, 48 hours, 72 hours & 96 hours developmental stages in chick
3. ABO blood grouping in human.
4. Rh typing in human
5. Lymphoid organs of mouse – demo

**A record of laboratory work and field visit report shall be submitted at the time of practical Examination.**

**Mark distribution:**

1. **Major practical** (Environmental biology & Evolution) : 20 Marks
2. **Minor Practical** (Developmental biology & Immunology) : 1 Marks
3. **Spotters (4x5)** (Environmental biology – 1, Evolution-1 : 20 Marks  
Developmental biology – 1, Immunology – 1)
4. **Field visit report & Record** (10 + 10 = 15) : 20 Marks

**Total : 75 Marks**

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**GOVERNMENT ARTS COLLEGE (AUTONOMOUS), KARUR-5**  
**B.Sc., ZOOLOGY – ELECTIVE COURSE - I**  
(For the candidates admitted from 2016-17 onwards)

**POULTRY SCIENCE**

**Course Outcomes**

On the completion of this course the students will be able to

1. Knowledge on different breeds of hen
2. Formulate feed for hens and cocks
3. Design the poultry shed and the equipment needed for rearing.
4. Have an in-depth knowledge on the diseases of poultry and the ways to control them
5. Run their own poultry farm.

**UNIT- I** Introduction to poultry science – Historical review. Nomenclature of breeds of fowl, classification of fowls, selection of breed – natural and artificial brooding. Housing and equipment – General principles of building poultry sheds, deep litter system, laying cages.

**UNIT- II** Brooding and rearing – Methods of brooding, brooder temperature, space and duration; feed, water and space allowance, debeaking – vaccination. Management of growers, layers, broilers – lighting of chicks, growers, and layers; Summer and winter management.

**UNIT-III** Feed additives – names, allowance and usage of food additives – Food stuffs for poultry in relation to protein, amino acids, minerals (Ca and P), vitamins and fiber content. Feed formulations for chicks, growers, Phase I to Phase III layers and broilers.

**UNIT-IV** Short account on cause, symptoms, prevention, control and treatment of viral, bacterial, fungal and parasitical diseases.

**UNIT-V** Nutritive value of egg, factors affecting egg size, storage and preservation of egg, marketing, incubation and hatching of eggs.

**Text Books:**

1. Banerjee, G.C., 1992, A textbook of animal husbandry, Oxford and IBM Publishing Co., New Delhi.
2. Gnanamani, M.R., 2010, Modern Aspects of Commercial Poultry Keeping, Deepam Publications, Madurai.

**Reference Books:**

1. Sunil Kumar Das, 1994, Poultry production, CBC Publishers and Distribution, Delhi.
2. Shukula, G.S. and Upadhyay, V.B., 1997, Economic Zoology, Rakesh Rastogi Publication, Meerut.
3. Indian Poultry Industry year book 1975-76. By Sakuntlak B. Gupta, C-35, New Bactak Road, New Delhi.

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U16ZO5S2

**GOVERNMENT ARTS COLLEGE (AUTONOMOUS), KARUR-5**  
**B.Sc., ZOOLOGY – SKILL BASED ELECTIVE - II**  
(For the candidates admitted from 2016-17 onwards)  
**MEDICAL LABORATORY TECHNOLOGY**

**Course Outcomes**

On the completion of this course the students will be able to

1. Identify and count the different cells of blood
2. Perform the protocol of different diagnostic tests or procedures
3. Understand the principle and the techniques involved in various medical tests.
4. Get confidence to start their own laboratories

**Unit-I- CLINICAL LAB MAINTANANCE**

Scope –Hygiene and Safety measures for Technicians- lab safety - Cleaning and maintenance of lab equipments and glass wares- First Aid and Introduction to Clinical research.

**Unit-II- CLINICAL BIOCHEMISTRY**

Blood chemistry- Preservation of blood- Anticoagulants- Analysis of Blood- separation of serum- platelet count and coagulation test- glucose estimation – Lipid profile-(TGL, HDL, LDL)- hemoglobin-Urea, Urine Sugar, Albumin and Creatine analysis

**Unit-III-CLINICAL MICROBIOLOGY**

Disinfection and sterilization of lab, Culture media preparation- Serial dilution- Isolation of pure culture- antibiotic sensitive test-Types of Staining procedure for microbes- Antimicrobial agent, Common viral diseases and viral vaccines-Common bacterial diseases- common fungal diseases

**Unit-IV- CLINICAL DIAGNOSTICS**

Diagnostic pathological techniques- Entamoeba- Trypanasoma-Plasmodium- Ascaris- Tapeworm- Schistosoma- Wucheraria. Liver and renal function test- Thyroid test- semen analysis- stool, sputum analysis

**Unit-V - CLINICAL IMMUNOLOGY**

Separation of antibodies- Ag- Ab reactions- Immuno electrophoresis- ELISA- RIA- Widal test- Pregnancy test- Allergy test (Montox test)- VDRL test.

**Text Books:**

- 1.Sood Ramnik ., Edition:1/e ,2006, Textbook of Medical Laboratory Technology, Jaypee Brothers Medical Publishers Pvt. Ltd
- 2.Gupte Satish ., Edition:2/e .,2014,The Short Textbook of Medical Laboratory for Technicians, Jaypee Brothers Medical Publishers Pvt. Ltd
- 3.Sood Ramnik, Edition:1/e ,2009,Concise Book of Medical Laboratory Technology: Methods and Interpretations, Jaypee Brothers Medical Publishers Pvt. Ltd
- 4.Barbara H. Estridge, Anna P. Reynolds, Norma J. Walters., 1999, Basic Medical Laboratory Techniques ,Edition 4, Publisher: Cengage Learning, New Delhi.
5. R Pramila., Edition:1/e,2008 Pocket Book on Laboratory Tests for Nurses, Jaypee Brothers Medical Publishers Pvt. Ltd

**Reference books**

1. Ramakrishnan S, Sulochana KN., Edition:1/e, 2012, Manual of Medical Laboratory Techniques, Jaypee Brothers Medical Publishers Pvt. Ltd
2. Rashid Najat, Sood Ramnik., Edition:1/e.,2013, Manual of Laboratory Safety, Jaypee Brothers Medical Publishers Pvt. Ltd
3. Barbara H. Estridge & Anna P. Reynolds Edition: 1,2008, Laboratory Techniques in Hematology, Jaypee Brothers Medical Publishers Pvt. Ltd.



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**GOVERNMENT ARTS COLLEGE (AUTONOMOUS), KARUR-5**

**B.Sc. ZOOLOGY - V SEMESTER – SKILL BASED ELECTIVE - III**

(For the candidates admitted from 2016-17 onwards)

**VERMITECHNOLOGY**

**Course Outcomes**

On the completion of this course the students will be able to

1. Identify the different types of earthworm
2. Understand the significance of earthworm for increasing the fertility
3. Get familiarized with the process of making vermin-compost
4. Start large scale vermin-compost production unit

**UNIT- I** Introduction, Earthworms – Ecological types – Trophic classification of earthworm, Physical and chemical effects of earth worms on soils.

**UNIT- II** Earthworms: Structure – External features – Internal features – Earthworms: Lifecycle.

**UNIT-III** Earthworms for culture – worms used in vermiculture – Earthworm breeding – Vermicompost.

**UNIT-IV** Vermiculture and vermitech – Preparations for starting vermiculture – Vermibeds. Vermi wash unit.

**UNIT-V** Applications of vermiculture – Effect of earthworms on plant growth – applications in organic agriculture – Earthworms in medicine, as feed and other uses.

**Text Book:**

1. Thiagarajan, S., 2002, Commercial Zoology Tee Jay Publications
2. Vermitechnology,
3. Ramalingam.R., 2007, Manbulu Valarppu, Tamil Nadu Higher Education Council, Chennai.

**Reference Book:**

1. Seethalakshmi.M, and Shanthi.R., 2014, Vermitechnology, Saras Publications, Nagercoil.
2. Sultan A. Ismail, 1977, Vermicology, The biology of earthworms, Orient Longman Ltd., Hyderabad.
3. Sathe Tukaram Vithatran, 2004, Vermiculture and Organic Farming,
4. NIIR Board, 2004, The Complete Technology Book on Vermiculture and Vermicompost

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## **GOVERNMENT ARTS COLLEGE (AUTONOMOUS), KARUR-5**

### **B.Sc. ZOOLOGY – VI SEMESTER- CORE COURSE - XII**

(For the candidates admitted from 2016-17 onwards)

### **ECOLOGY, EVOLUTION AND TOXICOLOGY**

#### **Course Outcomes**

On the completion of this course the students will be able to

1. Understand the concept of ecosystem
2. Understand the inter-relationships among all the organisms
3. Get familiarized with the bio-geo chemical cycles
4. Understand the causes, effects and solutions for pollution
5. Explore the adaptations of fauna of different habitats
6. Analyze the impacts of toxicants in the field of ecology

**UNIT- I** Ecology and Environmental science – definition, scope, branches; abiotic factors– water, soil, temperature and light. Biotic factors – animal relationship – symbiosis, commensalism, mutualism, antagonism, antibiosis, parasitism, predation, competition. Ecosystem – definition, structure, pond ecosystem, primary production, secondary production, food-chain, food-web, trophic levels, energy flow, pyramid of biomass, pyramid of energy.

**UNIT- II** Community ecology-types, characteristics, stratification of community, community interdependence, Ecotone and Edge effect, Ecological niche, Ecological succession. Population Ecology – definition of population, density, natality, mortality, age distribution, age pyramids, population growth, population equilibrium, biotic potential, regulation of population growth.

**UNIT-III** Origin of life, Lamarckism, Darwinism, De Vries theory of mutation, Modern synthetic theory of evolution. Evidences for evolution – Embryological and Biochemical evidences.

**UNIT-IV** Colouration and Mimicry. Hardy-Weinberg principle. Speciation, Isolating mechanism. Evolution of Man – Cultural and future.

**UNIT-V** Toxicology-Introduction, Scope and importance-Definition of toxicants-Types-Air Water and Food-Evaluation of toxicity-LC<sub>50</sub>, LD<sub>50</sub>, ED<sub>50</sub>-Biomagnification, biotransformation and bioaccumulation-Effect of toxic metal, pesticide and carcinogen.

#### **Text Book:**

1. Arumugam, 2002, Ecology, Saras Publications, Nagercoil.
2. Arumugam, 2002, Evolution, Saras Publications, Nagercoil.
3. Subramanian.M.A.2004, Toxicology principles and methods.MJP Publishers.

#### **Reference Books:**

1. Odum, E.P., 1971, Fundamentals of Ecology, W.B. Saunders Company, Philadelphia.
2. Clarke, G.L., 1954, Elements of Ecology, John Wiley & Sons, New York.
3. Rastogi, V.B. and M.S. Jayaraj, 1989, Animal Ecology and Distribution of animals, Kedarnath Ramnath.
4. Stansfield, W.D., 1977, The Science of Evolution, Collier Macmillan, London.
5. Dobzhansky, T., et al, 1977 Evolution, W.H. Freeman and Co., San Francisco.
6. Subramanian.M.A.2004, Toxicology principles and methods.MJP Publishers.
7. Bhattacharya, S., 2011, Environmental Toxicology, Books and Allied Pvt. Ltd., Kokatta.

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## **GOVERNMENT ARTS COLLEGE (AUTONOMOUS), KARUR-5**

### **B.Sc., ZOOLOGY – VI SEMESTER - CORE COURSE - XIII**

(For the candidates admitted from 2016-17 onwards)

### **DEVELOPMENTAL BIOLOGY AND IMMUNOLOGY**

#### **Course Outcomes**

On the completion of this course the students will be able to

1. Get familiarized with various stages involved in the developing embryo
2. Understand the initial developmental processes in *Amphioxus*, frog and chick
3. Analyze the types of placenta and Prenatal Diagnosis
4. Get familiarized with the principle, Techniques and tools of developmental biology
5. Appreciating the contribution of great immunologists
6. Know the significance of Innate immunity, Acquired Immunity and vaccination
7. Understand the structure and function of antibody and antigen
8. Understand the importance of Immune system, the causes, symptoms and prevention of immune deficiency diseases.

#### **DEVELOPMENTAL BIOLOGY:**

**UNIT- I** Gametes and gametogenesis: Structure and types of sperm and egg; Spermatogenesis and spermiogenesis; Oogenesis; growth of Oocyte, Vitellogenesis, organization of egg cytoplasm, polarity and symmetry, maturation of egg and egg envelopes. Fertilization – External and internal, sperm – egg interaction, physiological changes in the organization of egg cytoplasm, theories of fertilization.

**UNIT- II** Cleavage – Patterns and types of cleavage, Factors affecting cleavage; Blastulation – types of blastula – Presumptive organ forming areas in frog and chick-fate maps; Gastrulation in frog and chick, Morphogenetic movements – epiboly and emboly.

**UNIT-III** Organogenesis – Development of eye; Organiser concept; Embryonic induction; Foetal membranes in chick, Placentation in mammals; Concept of test tube baby; Nuclear transplantation.

#### **IMMUNOLOGY:**

**UNIT-IV** History and scope of immunology, Immunity and its types; Lymphoid organs- primary and secondary (thymus, bone marrow, Bursa fabricius, spleen, tonsil, lymph node and Peyer's patches.

**UNIT-V** Immunoglobulins – structure and functions; Antigen – antibody reaction, Immunology of infectious diseases, AIDS; Humoral and Cell mediated immune response.

#### **Text Books:**

1. Arumugam, 2002, Embryology, Saras Publications, Nagercoil.
2. Arumugam, 2002, Immunology, Saras Publications, Nagercoil.

#### **Reference Books:**

1. Balinsky, B.I., 1981, An introduction to embryology, W.B. Saunders Company, Philadelphia.
2. Verma, P.S. and V.K. Agarwal, 2005, Chordate Embryology, S.Chand & Co., New Delhi.
3. Nandhini, S. 1994, Immunology Introductory text book, New Age Int (P) Ltd. Publications, New Delhi.
4. Chakravarthy, A.K. 1996, Immunology, Tata McGraw Hill Publishing Co. Ltd., New Delhi.

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**GOVERNMENT ARTS COLLEGE (AUTONOMOUS), KARUR-5**

**B.Sc. ZOOLOGY– V SEMESTER- ELECTIVE COURSE- II**

(For the candidates admitted from 2016-17 onwards)

**AQUACULTURE**

**Course Outcomes**

On the completion of this course the students will be able to

1. Analyze the applications of different cultivable fish
2. Design and develop the infrastructure required for aquaculture
3. Manage the water quality of the pond.
4. Develop skills of rearing of fish disease management in an aqua-farm

**UNIT- I** Aquaculture – History and present status in India, Cultivable species of fishes  
Culture of Live feed organisms – Rotifers and *Artemia*.

**UNIT- II** Composite fish culture – Carps in inland waters, Site selection, Pond construction, pond preparation.

**UNIT-III** Water Quality Management, Control of predatory organisms, Seed transport and Stocking, Pathology – Parasitic infection, Diseases of fishes and prawns and their control measures.

**UNIT-IV** Hypophysation or Induced breeding in carps, Hybrid fish, Transgenic fish, Techniques for hatching and spawning. Transport of fry and fingerlings.

**UNIT-V** Methods of Harvesting, Freezing techniques, Canning, Smoking, Fish products – fish meal, fish oil and fish pickle. Marketing – Export and Import countries, Quality control.

**Text Book:**

1. Arumugam, 2008, Aquaculture, Saras Publications, Nagercoil.

**References:**

1. Barton Lias, Estuarine Chemistry
2. Kennedy, Estuarine perspective.
3. Quereshi, T.A. and Quereshi, N.A., Indian Fishes.
4. Pillay, T.V.R., Aquaculture – Principles and Practices, Fishing News Books.
5. CMFRI, Coastal aquaculture – Marine Prawn culture.

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## **GOVERNMENT ARTS COLLEGE (AUTONOMOUS), KARUR-5**

### **B.Sc. ZOOLOGY – VI SEMESTER - ELECTIVE COURSE - III**

(For the candidates admitted from 2016-17 onwards)

#### **ENTOMOLOGY**

##### **Course Outcomes**

On the completion of this course the students will be able to

1. Understand the unique characteristics of insects and identify the insects up to order level
2. Analyze the basic pattern of organization and different physiological systems of insects.
3. Interpret the application of beneficial insects and the control methods of harmful insects.
4. Analyze the damages caused by the pest and how to control them
5. Estimate the diversity of insects and understand the significance.

**UNIT- I** Taxonomy – Basics of insect classification, Classification up to super family level, Key characteristics with South Indian examples, External Anatomy of a typical insect – Exoskeleton, Head, Throat and Abdomen, Metamorphosis of insects, Mouth parts in insects, Types of larvae and pupae.

**UNIT- II** Physiology of insects – Digestive system, Excretory system, Respiratory system, Circulatory system, Nervous system and sense organs, Reproductive system, Endocrine system and pheromones.

**UNIT-III** Classification based on Economic Importance of Insects. Insects relation to Public Health – Mosquito and Housefly; Household insect pests – Ant, Termite and Cockroach – Beneficial Insects – Economic Importance of Honeybee, Silkworm and Lac insect; Insect pollinators, Parasites, Predators and Scavengers.

**UNIT-IV** Pest – Definition, Insect pests of Paddy, Sugarcane, Cotton, Groundnut and Brinjal- damages caused and control measures; Common pests of stored products and control measures

**UNIT-V** Methods and Principles of pest Control – Natural, Mechanical, Physical, Chemical and Biological control methods, Integrated Pest Management, Causes for assuming pest status. Pest surveillance & forecasting pest outbreak, Estimation of damage caused by insect pest to crops.

##### **Text Books:**

1. Vasantharaj David, B., 2005, Elements of Economic Entomology, Popular Book Depot, Chennai.
2. Nayar, K.K., T.N. Anathkrishnan and B. Vasantharaj David, General and Applied Entomology

##### **Reference Books:**

1. Ambrose Dunston, P. Insects: Structure, Function and Biodiversity
2. Chapman, R.F., The Insects: Structure and Function
3. Wigglesworth, V.B., Principles of Insect Physiology.
4. Krishnan, N.T., 1993, Economic Entomology, J.J. Publications, Madurai.
5. Ramkrishnan Ayyar, T.V., 1984, Hand Book of Economic Entomology for South India, International Books and Periodicals Supply Service, New Delhi.