E.M.G. YADAVA WOMEN'S COLLEGE, MADURAI – 625 014.

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Re-accredited **(3rd Cycle)** with Grade **A+** & **CGPA 3.51** by NAAC

DEPARTMENT OF ZOOLOGY

CBCS SYLLABUS

BACHELOR OF SCIENCE

PROGRAMME CODE - Z

COURSE STRUCTURE

(w.e.f. 2017 – 2018 onwards)

Annexure - 5

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CBCS
DEPARTMENT OF ZOOLOGY
COURSE STRUCTURE

(w.e.f. 2017 – 2018 Batch onwards)

S.No	Part	Sub Code	Title of the paper	Teaching hrs. (per week)	Duration of Exam (hrs.)	Marks allotted			Credits
						C · A	S.E	Total	
1	I	171T1	Tamil	6	3	25	75	100	3
	II	172E1	English	6	3	25	75	100	3
	III	**17Z11**	**Core – Invertebrata**	4	3	25	75	100	4
	III	**17Z1P**	**Core Lab - in – Inveretebrata**	2	-	-	-	-	-
	IV	**17SEZ11**	**Computer Application**	2	2	-	-	100	2
	IV	**17SEZ12**	**Aquaculture**	2	2	-	-	100	2
	IV	**17NMZ1**	**Medical microbiology**	2	2	-	-	100	2
	III	**17AK1**	Allied I - General Chemistry	4	3	25	75	100	4
	III	**17AK2P**	Allied I –Practical-1 Salt analysis	2	-	-	-	-	-
2	I	**171T2**	Tamil	6	3	25	75	100	3
	II	**172E2**	English	6	3	25	75	100	3
	III	**17Z21**	**Core – Chordata**	4	3	25	75	100	4
	III	**17Z2P**	**Core - Lab in Invertebrata & Chordata**	2	3	40	60	100	2
	IV	**17SEZ21**	**Vermi Technology**	2	2	-	-	100	2
	IV	**17SEZ22**	**Clinical microbiology**	2	2	-	-	100	2
	IV	**17NMZ2**	**Ornamental fish culture**	2	2	-	-	100	2
	III	**17AK2**	Allied I - General Chemistry-II	4	3	25	75	100	4

Annexure - 3

	III	**17AK2P**	Allied I –Practical-1 Salt analysis	2	3	40	60	100	1
3	I	**171T3**	Tamil	6	3	25	75	100	3
	II	**172E3**	English	6	3	25	75	100	3
	III	**17Z31**	**Core – Cell and Molecular Biology**	4	3	25	75	100	4
	III	17Z3P	Core - Lab in **Cell and Molecular Biology and Developmental Biology**	2	-	-	-	-	-
	III	17AK3	Allied I - General Chemistry -III	4	3	25	75	100	4
	III	**17AK4P**	Allied I –Practical-II Volumetric Analysis	2	-	-	-	-	-
	III	17AG3	Allied – II Botany Plant Diversity – Algae, Fungi, Bryophytes, Pteridophytes and Gymnosperms	4	3	25	75	100	4
	III	17AG4P	Plant Diversity - Algae, Fungi, and Bryophytes, Pteridophytes Gymnosperms,	2	-	-	-	-	-
4	I	171T4	Tamil	6	3	25	75	100	3
	II	172E4	English	6	3	25	75	100	3
	III	**17Z41**	**Core – Developmental Biology**	4	3	25	75	100	4
	III	**17Z4P**	**Core - Lab in Cell and Molecular Biology and Developmental Biology**	2	3	40	60	100	2
	III	17AK4	Allied I - General Chemistry -IV	4	3	25	75	100	4
	III	17AK4P	Allied I - Practical-II Volumetric Analysis	2	3	40	60	100	1
	III	17AG4	Allied -II – Cell Biology, Plant Anatomy, Genetics, Plant Breeding & Horticulture	4	3	25	75	100	4

Annexure - 3

	III	17AG4P	Plant Diversity - Algae, Fungi, and Bryophytes, Pteridophytes Gymnosperms, Cell Biology, Plant Anatomy, Genetics, Plant Breeding & Horticulture	2	3	40	60	100	1
5	III	**17Z51**	**Core – Genetics**	4	3	25	75	100	4
	III		**Elective - I**	4	3	25	75	100	4
	III		**Elective –II**	4	3	25	75	100	4 4
	III	17Z61P	**Core - Lab in Genetics, Ecology & Evolution and Biochemistry**.			-	-	-	-
	III	17Z62P	**Core - Lab in Physiology Microbiology &Immunology and Biotechnology**	4	-	-	-	-	-
	IV	**17SEZ51**	**Biostatistics**	2	-	-	-	100	2
	IV	**174EV5**	Environmental Studies	2	-	-	-	100	2
	III	17AG5	Morphology, Taxonomy of Angiosperms, Medicinal Botany & Economic Botany	4	3	25	75	100	4
	III	17AG6P	Morphology, Taxonomy of Angiosperms, Medicinal Botany & Economic Botany	2	-	-	-	-	-
6	III	**17Z61**	**Core –Physiology**	4	3	25	75	100	4
	III	**17Z62**	**Core - Microbiology & Immunology**	4	3	25	75	100	4
	III		**Core Elective – III**	4	3	25	75	100	4
	III	**17Z61P**	**Core - Lab in Biochemistry, Genetics, Ecology & Evolution**	4	3	40	60	100	7 -
	III	**17Z62P**	**Core – Lab in Physiology Microbiology &Immunology and Biotechnology**	4	3	40	60	100	8

Annexure - 3

	IV	**17SEZ61**	**Economic Zoology**	2	2	-	-	100	2
	III	**17AG6**	Allied - II - Botany Plant Physiology, Embryology, Tissue culture and Plant Pathology.	4	3	25	75	100	4
	III	**17AG6P**	Morphology, Taxonomy of Angiosperms, Medicinal Botany & Economic Botany, Plant Physiology, Embryology, Tissue Culture & Plant Pathology	2	3	40	60	100	1
	IV	**174VE6**	Value Education	2	2	-	-	100	2
	Part – V **175NS4/175PE4**		Extension Activities NSS/Physical Education	-	2	-	-	100	1
	Total			180					140

Electives :

Semester - V (Elective – I & II – Choose any two)

1. **Ecology & Evolution** - **17ZE5A** (Choosen Elective I)
2. **Biochemistry** - **17ZE5B** (Choosen Elective II)
3. Fisheries Biology - 17ZE5C

Semester- VI (Elective - III - Choose any one)

1. **Biotechnology** - **17ZE6A** (Choosen Elective III)
2. Poultry science - 17ZE6B

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CBCS

DEPARTMENT OF ZOOLOGY

(w.e.f. 2017 – 2018 onwards)

Title of the Paper : Invertebrata
Semester : I **Contact hours: 4**
Sub Code : 17Z11 **Credits 4**

Objective:

To have an overall understanding of the basic classification, organization, evolutionary relationship and social importance of the following Invertebrates.

Unit- I Principles of taxonomy and Binomial nomenclature - classification.

PROTOZOA -General characters and classification of Protozoa up to class level with one example. Type study: *Paramecium caudatum* - External morphology - Cyclosis - Contractile vacuole - Conjugation only. General topics: 1. Protozoan parasite: Life Cycle – Symptoms - Diagnosis - Prevention and treatment of *Plasmodium vivax.* 2. Nutrition in Protozoa.**PORIFERA**- General Characters and classification of Porifera upto class level with one example. Type study: Sycon Sponge – Structure - Histology - Spicules - Gemmules and Parenchymula larva. General topic: Canal system in sponge.

Unit- II COELENTERATA- General characters and classification of Coelenterata upto class level with one example. Type study: *Obelia* -Structure and Metagenesis only. General topics:1. Polymorphism in Coelenterates 2. Corals and Coral reefs - Theories of reef formation.

Unit- III HELMINTHES -General characters and classification of Helminthes upto class level with one example. Type study: *Fasciola hepatica* - External morphology –

Excretory System - Reproductive systems and Life history. General topics:

1. Structure - Pathology - control measures of *Ascaris lumbricoides* and *Wuchereria bancrofti.* 2. Parasitic adaptations of Helminthes.**ANNELIDA** -General characters and classification of Annelida upto class level with one example. Type study: *Megascolex mauritii* - External morphology - Setae - Nephridia - Nervous system - Reproductive system only. General topics:1. Metamerism in Annelida2. Affinities of *Peripatus.*

Unit-IV ARTHROPODA General characters and classification of Arthropoda upto class level with one example. Type study: palaemon - External morphology - Appendages - Excretory System - Reproductive system and development.General topics: Economic importance of Insects.

Unit-V MOLLUSCA General characters and classification of Mollusca upto class level with one example. Type study*: Pila globosa* - External morphology - Digestive system - Nervous system, Respiratory system and Osphradium only.General topic: Sepia as an advanced Mollusc. **ECHINODERMATA :**General characters and classification of Echinodermata upto class level with one example. Type study: *Asterias rubens* – External morphology - Pedicellaria –Water Vascular System - Reproductive System. General topic: Larval forms of Echinoderms.

Textbook:

Nair N.C, Leelavathy.S , Soundara Pandian.N Murugan.T and Arumugam.N., "*A text book of Invertebrata"* , Saras publication 2010 .

Reference books:

1. Barrington, E. J. W. Invertebrate Structure and functions. ELBS and Nelson. 1979
2. M. Ekambaranatha Ayyar & T. N. Ananthakrishnan "A Manual of Zoology S. Viswanathan Pvt. Limited, 1985.
3. Jordon E.L. and Verma P.S "*Invertebrate Zoology"* S. Chand & Company Ltd, 2014
4. Kotpal. R..L., "*Invertebrate Zoology"* 9th Edition Rastogi publication, 2005.

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CBCS

DEPARTMENT OF ZOOLOGY

(w.e.f. 2017 – 2018 onwards)

SKILL BASED ELECTIVE

Title of the Paper : Computer Application
Semester : I **Contact hours : 2**
Sub Code : 17SEZ11 **Credits 2**

Objective:

To educate the students about the basic knowledge of computer applications

Unit-I Introduction to Computer - Block diagram- Characteristics of computer- Generations of computer - Hardware components of computer.

Unit-II Computer and communication- types - needs - communication media- Network topologies.

Unit-III MS Word-Word basic – Starting Word – Creating document - Key board operation – Mouse operation – Menu – File Menu – Editing Menu – Tool Bars and their icons – Drawing tool bar – Closing and opening the document

.

Unit-IV MS Excel – Selecting the cells – Entering the formulae – Entering data – Alignment – Format tool bar – Data menu – Inserting rows and columns.

Unit-V M.S. Powerpoint – View menu – Slide show – Tool menu – Create a new slide – Close presentation – Internet and its applications – E.mail and its advantages.

Annexure - 5

Text Book:

1. Arumugam. *N.,Computer application, Bioinformatics and Biostatistics*, Saras Publications. 2012.
2. Lakshmanan. R. and R. Rajamani and Shanmuganantham. M .,*Basics of Computer Science*, R.L.Publication,Madurai**.** 2009.

Reference Books:

1. Balaguruswamy. E., "Fundamentals of Computers", Mc Graw –Hill Education - Europe Publication., 2009.
2. Mittal C , *Fundamentals of Information Technology* , Pragathi Prakasam, Meerut. 2003.
3. Rajaraman. V., *Fundamentals of computes*, fourth edition, Prentice Hall India Pvt.Ltd**.**, 2008.
4. Vasanthi Ramanathan., "*Computer application,*" 1st Edition, Meenakshi Pathippagam., 2007.

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DEPARTMENT OF ZOOLOGY

(w.e.f. 2017 – 2018 onwards)
SKILL BASED ELECTIVE

Title of the Paper : Aquaculture
Semester : I **Contact hours : 2**
Sub Code :17SEZ12 **Credits 2**

Objective:

To create an awareness on the rearing of aquatic organisms for human welfare.

Unit – I Introduction -Need and scope of aquaculture- Aquaculture potentials of India - Inland Fishery resources- cultivable fishes.

Unit – II Monoculture – poly culture- pen culture – cage culture – Raft culture – its problems – Integrated fish farming- paddy cum fish culture and salt cum shrimp culture.

Unit - III Predators – control measures – aquatic weeds and their control measures – types of fishing nets – marketing.

Unit – IV Pearl oyster culture – pearl formation. Mass culture of live feed Artemia, Algae, Spirulina and Daphnia.

Unit – V Prawn culture (fresh water) – hatchery stocking density – fresh water fish farming – selection of pond, construction, water quality management – conditioning the pond.

Annexure - 5

Text Books :

1. Arumugam ., "*Aquaculture*". , Saras Publication. 2012
2. Santhana Krishnan,G., "*Aquaculture"., J*.J Publications.1992.

Reference Books:

1. Bal.D.V and Rao K.V., "*Marine Fisheries"* .,Tata McGraw Hill Publishing Co- Ltd 1984.
2. Jhingran,V.G., *"Fish and Fisheries Of India"*., Hindustan.Publications 1982.
3. Marshall.N.B., "*The exploration in the Life history Of Fishes"., *Harvard University Press., Cambridge, MA.1971.
4. Santhana Kumar.G and Selvaraj .A.M., "*Concept of Aquaculture"., *Meenam Publication . 2005.

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DEPARTMENT OF ZOOLOGY

(w.e.f. 2017 – 2018 onwards)
NON MAJOR ELECTIVE

Title of the Paper : Medical Microbiology
Semester : I **Contact hours : 2**
Sub Code :17NMZ1 **Credits 2**

Objective:

To have a basic knowledge, treatment of protozoan, Fungal, Bacterial, Viral, Insect born diseases

Unit- I **Protozoan diseases**: Causative organisms, mode of transmission, pathogenicity, symptoms, treatment and prophylaxis 1. Malaria 2. Ameobiasis

Unit-II Fungal diseases: Causative organisms, mode of transmission, pathogenicity, symptoms, treatment and prophylaxis 1.Candidiasis 2.Actinomycosis (Actinomycitis bovis)

Unit-III Bacterial diseases: Causative organisms, mode of transmission, pathogenicity, symptoms, treatment and prophylaxis 1. Tuberculosis (air-borne) 2. Syphilis (contagious)

Unit-IV Viral diseases: Causative organisms, mode of transmission, pathogenicity, symptoms, treatment and prophylaxis1.Bird flu 2.polio

Unit-V **Insect –borne diseases:** Causative organisms, mode of transmission, pathogenicity, symptoms, treatment and prophylaxis 1.Chikungunya 2. Dengue fever

Annexure - 5

Text Book:

1. Dubey R.C. & Maheswari D.K., "*A text Book of Microbiology*". S.Chand & Company Pvt, Ltd.2010.

Reference Book :

1. William Irving.et.al., "*Medical microbiology".* Taylor and Francis Group 2005.

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DEPARTMENT OF ZOOLOGY

(w.e.f. 2017 – 2018 onwards)

Title of the Paper : Chordata
Semester : II **Contact hours : 4**
Sub Code : 17Z21 **Credits : 4**

Objective:

To impart the basic knowledge and information of the structure, function, organization, of organisms and classification of the following chordates.

Unit- I General characters of chordates - outline classification of chordates with one example. **Prochordates** General characters and classification of Prochordates upto class level with example. Type study: Prochordata – *Amphioxus lanceolatum* - External morphology Digestion - Respiration. General topics: Retrogressive metamorphosis in Ascidians - Affinities of Hemichordata.

Unit- II Pisces - Salient features and affinities of Petromyzon. Shark- External Morphology- Lateral Line Sensorgan - Urinogenital System **General topic:** Accessory respiratory organs in Fishes.

Unit – III Amphibia: External morphology of frog- respiratory system only **Reptiles :** External morphology of Calotes only **General Topics:**Parental care in Amphibia. Identification of poisonous and non- poisonous snakes –poison apparatus- Biting mechanism - First aid.

Unit – IV Aves - External morphology of Pigeon- structure and function of eye – respiratory system **General Topics:** Flight adaptation in Birds - flightless birds.

Unit – V Mammals - External morphology of Rabbit- structure & function of heart **General Topics:** Dentition in mammals , monotremes (egg laying mammals).

Annexure - 5

Textbook:

1. Nair N.C.*et.al*., "*A text book of Chordata"* Saras Publications. 2012.
2. Jordon, E.L & Verma, P.S. (2000) Chordate Zoology, S.Chand & Co., New Delhi.

Reference books:

1. Alexander R.M.C.N., "*The Chordata"* Cambridge University Press., New York, 1981
2. Kotpal. R.L., *"Modern Text Book of Zoology Vertebrates"* Rastogi Publications., 3rd Edition., 2009.
3. Romer A.S. & Parson, T.S "*A vertebrate body",* W.B Saunders, Philadelphia 1986.
4. Young J.Z., "*Life of Vertebrates"*., ELBS, 1988.

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DEPARTMENT OF ZOOLOGY

(w.e.f. 2017 – 2018 onwards)

Title of the Paper : Lab in Invertebrata & Chordata
Semester : II **Contact hours : 2**
Sub Code :17Z2P **Credits 2**

Anatomical observation and comments on the following systems(Models / visual aids/ charts and transparency.

1. Cockroach - Digestive System & Reproductive System
2. Earthworm - Nervous system
3. Calotes - Arterial system
4. Rabbit - Reproductive System

Mountings:

1. Earthworm - Body Setae
2. House Fly - Mouth Parts
3. Shark - Placoid scales

Spotters:

Protozoa : Paramecium conjugation, Entamoeba
Porifera : Spicules and gemmules,
Coelenterata : Physalia and Aurelia
Platyhelminthes : Taenia solium, Liver fluke entire
Annelida : Chaetopterus and Heteroneries.
Arthropoda : Peripatus and Sacculina.
Mollusca : Nautilus and Chiton.
Echinodermata : Star Fish& Sea- urchin

Annexure - 5

Prochordata	:	Amphioxus, Balanoglossus and Ascidian
Agnatha	:	Petromyzon
Pisces	:	Echeneis and Hippocampus
Amphibia	:	Rhacophorus , Salamander and Bufo.
Reptilia	:	Naja naja, Draco and Chaemeleon
Aves	:	Duck and Kite
		(beak and claw adaptations)
Mammallia	:	Bat and Echidna
Osteology	:	Fore and hind limbs of rabbit
	:	Synsacrum of Bird, Skull of Calotes.
		Field trip compulsory

Annexure - 5

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DEPARTMENT OF ZOOLOGY

(w.e.f. 2017 – 2018 onwards)

SKILL BASED ELECTIVE

Title of the Paper	**: Vermitechnology**		
Semester	**: II**	**Contact hours**	**: 2**
Sub Code	**: 17SEZ21**	**Credits**	**: 2**

Objective:

To impart the basic knowledge and information of Scope of Vermicomposting, Vermiculture technique, Recycling of Wastes through Vermicomposting.

Unit-I Introduction-Scope & Importance of Vermitechnology- Classification of earthworms – External morphology of earthworm.

Unit – II Selection of earthworm species for composting - Collection and preservation of earthworms for Vermicomposting - Vermiculture techniques.

Unit – III Raw materials for Vermicomposting-Maintanence of composting- Methods of Vermicomposting –Collection of Vermicompost- vermiwash.

Unit – IV Role of Earthworms in organic forming -Use of Vermicompost for crop production, Land improvement and Reclamation –Recycling of Wastes through Vermicomposting.

Unit – V Large scale manufacture of Vermicompost,Packaging of Vermicompost and its Marketing-Financial supporting- from Government and NGOs for vermiculture works.

Annexure - 5

Text book:

1.M. Seethalekshmy & R.Santhi , "*Vermitechnology",* Saras Publications 2012

Reference Book:

1. Edwards,C.A., Bohlen.P.J, Lindon, D.R and Subler.S "*Earthworms in Agroecosystems*. In: Earthworm Ecology and Biogeography in North America" Lewis Publisher, Boca Raton., FL, PP:185-213.1995.

2. Edwards, C.A & Bohlen, P.J,., "*Biology and Ecology of Earthworms"* 3rd Edition., Springer Science & Business Media, 1996.

3. Mary Violet Christy , A., "*Vermitechnology",* MJP Publishers. 2008.

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DEPARTMENT OF ZOOLOGY

(w.e.f. 2017 – 2018 onwards)

SKILL BASED ELECTIVE

Title of the Paper : Clinical Microbiology
Semester : II **Contact hours : 2**
Sub Code : 17SEZ22 **Credits 2**

Objective:

To have a basic knowledge, treatment of protozoan, Fungal, Bacterial, Viral, Insect born diseases.

Unit- I Protozoan diseases: Causative organisms, mode of transmission, pathogenicity, symptoms, treatment and prophylaxis 1. Amoebiasis 2. Balantidiasis 3. Vaginitis.

Unit-II Fungal diseases: Causative organisms, mode of transmission, pathogenicity, symptoms, treatment and prophylaxis 1.Phycomycoses 2.Candidiasis 3.Actinomycosis (Actinomycitis bovis)

Unit-III Bacterial diseases: Causative organisms, mode of transmission, pathogenicity, symptoms, treatment and prophylaxis 1. Tuberculosis (air-borne) 2. Syphilis (contagious) 3. Cholera (water-borne).

Unit-IV Viral diseases: Causative organisms, mode of transmission, pathogenicity, symptoms, treatment and prophylaxis 1.Influenza (Bird flu) 2.Polio.

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Unit-V Insect – borne diseases: Causative organisms, mode of transmission, pathogenicity, symptoms, treatment and prophylaxis 1. Chikungunya 2. Dengue fever 3.Sleeping sickness.

Text Book:

1. Dubey R.C. & Maheswari D.K., "*A text Book of Microbiology*"., S.Chand & Company Pvt, Ltd.2010.

Reference Book :

1. William Irving.et.al., "*Medical microbiology"*., Taylor and Francis Group 2005.

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DEPARTMENT OF ZOOLOGY

(w.e.f. 2017 –2018 onwards)

NON MAJOR ELECTIVE

Title of the Paper : Ornamental fish culture

Semester	**: II**	**Contact hours :**	**2**
Sub Code	**: 17NMZ2**	**Credits**	**2**

Objective: To create an interest among the non major students about the culturing techniques of Ornamental fishes.

Unit-I Scope and importance of Ornamental fishes. Identification and salient featutes- Siamese fighting fish, Gold fish, Rosy barb, tiger barb, Angel fish, Black molly, Guppy and Swordtail.

Unit – II Construction of aquarium : Size and Shape of fish tank, bottom settings , stocking of fish ,Accessories of fish Tank – aerators types of filters , nets, lights and hood.

Unit - III Transport of fishes**:** Oxygen packing Food and feeding: Culture of live food organisms – Chironomous larva tubifex ,Artificial feed – Pellet feed.

Unit – IV Breeding methods: Siamese fighting fish, Gold fish , Black molly , Guppy and sword tail.

Unit – V Common diseases and treatment of ornamental fishes : Protozoan diseases (White spot diseases), Fungal disease (Ichthyosporidium), Bacterial diseases (Dropsy diseases and ectoparasites).

Text books :

1. Arumugam et.al., "*Ornamental Fishes"*, Saras Publications. 2012
2. Jameson J. D and R. Santhanam , **"***Manual of ornamental fishes and farming Technologies"* **,** Fisheries college & Research Institute **,** Tamilnadu. 1996,

Annexure - 5

Reference Books :

1. Ramanathan . N and Francis,T., "*Manual of Breeding & Larval rearing of cultivable fishes"*, Tamilnadu Veterinary & Animal Sciences University, Chennai 1996.
2. Santhanam R., Sukumaran .N and Natarajan "*Manual of fresh water Aquaculture",* P. Oxford and IBH Publishing.Co Pvt . Ltd, New Delhi.1990.
3. Sundaraj. S, and Thilakar .S., "*Manual of tropical fish diseases and diagnosis,* Tamilnadu Veterinary & Animal sciences University – Chennai, 1999.

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DEPARTMENT OF ZOOLOGY

B.Sc. ZOOLOGY
(w.e.f. 2017 – 2018 Batch onwards)

Title of the Paper : Cell and Molecular Biology
Semester : III **Contact hours : 4**
Sub Code : 17Z31 **Credits : 4**

Objective:

To impart more knowledge on the structure and function of cell organelles and understand the basic knowledge of molecular biology.

Unit – I - Microscopy – Study of Compound and Electron Microscope -Ultra structure of Prokaryotic and Eukaryotic cells- Protoplasm : Physical & Biological properties-Plasma membrane - ultra structure and functions.

Unit – II - Ultra structure and functions of Mitochondria - Endoplasmic reticulum – Lysosome-Golgi body- Nucleus – Nucleolus.

Unit – III - Chromosomes - Structure- types and functions,-Cell division - Cell cycle-Mitosis and Meiosis, Significance of Meiosis - Mitotic apparatus and Synaptonemal complex.Cancer cells-Characteristics of cancer cells, Aging and Stem cells.

Unit – IV- Structure of nucleic acids-DNA-RNA-Replication ,Repair of DNA, photo re-activation- incision repair-Modern concept of genes: Cistron-Recon -Muton - Genetic code-mutation at molecular level- Frame shift mutation- base analogues - Control of gene expression-Lac operon.

Unit -V – Ribosomes-Structure -Central dogma of Protein synthesis- Transcription – Translation – Post translational processes.

Annexure --5

Text Books :

1. Arumugam.N., *Cell Biology*, Saras Publication, 2009 .
2. Arumugam.N., *Cell and Molecular biology*, Saras Publication, 2009.

Reference Books :

1. Adams. R.L.P.et al., *The Biochemistry of the Nucleic Acids.* Chapman and Hall .1986.

2. Albert .B.D., Bray. J, Lewis. M, Raff. K, Robertis and J.D. Watson. *Molecular Biology of the Cell,* 2nd edn. Garland Publishing, New York. 1989.

3. Ambrose E,J.,and Dorothy M.E., *Cell Biology* –ELBS,1970.

4. D.E Robertis, E.D.P., and E.M.F.DE Roberties, Jr.. *Cell and Molecular Biology*, Saunders College/Holt, Rine-hart and Winston, Philadelphia. 1980.

5. Singh,S.P. and Tomar,B.S. *Cell Biology*,Rastogi Publications.1996

6. Gelard, K. *Cell and Molecular Biology*, John Wiley and Sons. Inc., New York1996.

7. Prakash S. Lohar, *Cell and Molecular Biology* **,** MJP Publishers.

Annexure - 5

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CBCS

DEPARTMENT OF ZOOLOGY

B.Sc. ZOOLOGY
(w.e.f. 2017 – 2018 Batch onwards)

Title of the Paper : Developmental Biology
Semester : IV **Contact hours : 4**
Sub Code : 17Z41 **Credits : 4**

Objective:

To enrich the students with the basic knowledge of Developmental Biology,Experimental Embryology and Applied Embryology.

Unit - I Theories - Preformation theory- Epigenesis- Biogenetic law and Von Baer's Law- Types of Sperm and Ovum- Gametogenesis-Spermatogenesis and Oogenesis.

Unit - II Fertilization: Chaemotaxis, fertilizin & anti-fertilizin reaction-acrosomal reaction-cortical reaction-physiological and biochemical changes in fertilization.

Unit – III Cleavage: Types, patterns and Laws of cleavage factors that influences the cleavage-Morula –Blastula and Gastrula-Gastrulaion in Frog: Fate Map – construction of fate map(Frog only)- Morphogenetic movements.

Unit – IV Formation of primitive streak and endoderm in chick-Extra embryonic membranes of Chick-Organogenesis: Development of Heart in mammal-Placentation in Mammals .

Unit- V Experimental embryology : Organizer concept- Fields and Gradients -Amphibian metamorphosis – Biochemical changes and hormonal control-Regeneration - Types and Regeneration in Salamander limbs-Applied embryology : IVF, Birth control methods.

Annexure - 5

Textbooks:

1. Arumugam.N.-*Developmental Biology* - Saras Publication 2010.
2. Verma P.S. & Agarwal, V.K., *Chordate Embryology* , S.Chand & Co. Ramnagar New Delhi.1981.

Reference books:

1. Balinsky W.B. Saunders -*An introduction to Embryology* –Philadelphia
2. Charles W. Bodermer Holt Rinehart & WinstonInc., *Modern embryology*
3. Nelson, *Comparative Embryology of Vertebrates* - Mc Graw Hill Company Inc., New york.
4. Pattern S.M., MC. Graw. *Human Embryology* - Hill Co.1953.
5. Vander, Sherman, *Human Physiology* -, Luciana MC. Graw.Hill Co.1990. 6.

Verma P.S., & V.K.Agarwal, *Chordate Embryology* - S.Chand & Co1981.

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DEPARTMENT OF ZOOLOGY

B.Sc. ZOOLOGY

(w.e.f. 2017 – 2018 Batch onwards)

Title of the Paper : Lab in Cell and Molecular Biology, Developmental Biology.
Semester : IV **Contact hours : 2**
Sub Code : 17Z4P **Credits : 2**

Cell Biology:

1. Mitosis in Onion Root tip cells
2. Giant chromosome in Chironomous larva
3. Preparation of Squamous Epithelium and Human Blood Smear.
4. Sketch of organelles Electron Micrograph of
   Nucleus - Mitochondria -Endoplasmic Reticulum - DNA and tRNA models.
5. Transverse section of Bone Tissue and Cardiac Tissue.

Molecular Biology:

1. Preparation and Identification of Barr body in Squamous Epithelial cells from Buccal cavity
2. Isolation of Genomic DNA from Bacteria.

Developmental Biology:

1. Structure of Egg and Sperm.
2. Blastula and Gastrula of Frog.
3. Whole mounts of 48hrs and72hrs Chick Embryo.
4. Mammalian Placenta. (Pig and Sheep)
5. Teratology-Abnormal embryos.

Annexure – 3a

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DEPARTMENT OF ZOOLOGY

CERTIFICATE COURSE

HUMAN SYSTEMS AND CLINICAL CHEMISTRY

Course structure

(w.e.f. 2018-2019 Batch onwards)

Duration: 90 hrs

S.NO.	SUBJECT CODE	TITLE OF THE PAPER	EXAM DURATION (Hrs)	MAXIMUM MARKS
1.	19ZC1	THEORY: **Human Systems and Clinical Chemistry**	3	100
2.	19ZCP	PRACTICAL: **Lab in Human Systems And Clinical Chemistry**	3	100

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(w.e.f 2018-2019 Batch onwards)

Title of the Paper : Human Systems and Clinical Chemistry
Semester : III & IV **Contact hours :90hrs**
Sub-code : 19ZC1

Objectives:

1. To familiarize the students about the detailed structure and physiological functions of various systems
2. To familiarize the students about the Normal chemical constituents of the Human body.

Unit- I Introduction to Human Anatomy: Cutaneous , Digestive system and Respiratory system.

Unit- II Structure and Functions : Circulatory system, Excretory system, Endocrine system (Thyroid and Pancreas) and Reproductive systems.

Unit – III Reproductive cycle:-Menstrual cycle, Birth control methods, IUO.

Unit – IV Blood Analysis – collection and preservation of blood, Estimation of Blood Sugar, Blood urea, Lipid profile.

Unit – V Urine Analysis: –urine colour,odour.pH, sugar, Albumin, Ketone bodies, bilesalts, and bile pigments.

Annexure – 3a

Text Books:

1. Arumugam, N. *Animal Physiology* , Saras Publications, 2012.
2. Ambiga Shanmugam, *Biochemistry,* Lippincott Williams & Wilkins, 2013 .

Reference Books:

1. Balwin Ernest - *An Introduction to Comparative Bio - Chemistry* , Cambridge University Press,1964.
2. Philip.H.Mitchel- *A Text book of General Physiology*, McGraw hill Company inc. Newyork ,Toronto. London. Cat.log.No.55-9548, 1957.
3. Rastogi. S.C., *Essentials of Animal Physiology* –Wiley Eastern Ltd, 2007
4. Robert,K.Murray Daryl.K.Granner. Harper's *Biochemistry,* PeterA.Mayes & Victor W.Rodwell prentice –Hall International, 2003.
5. Hoar, S.William , *General Comparative Physiology* - Printice Hall of India Pvt. Ltd. New Delhi, ISBN-0-87692-337-6.1975.

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DEPARTMENT OF ZOOLOGY

(w.e.f 2018 -2019 Batch onwards)

Title of the Paper : Lab in Human Systems and Clinical Chemistry
Semester : III & IV Contact hours: 90hrs
Sub-code : 19ZCP

List of Experiments

1. Human Organ Models– Heart, Kidney,Liver,Lungs, Mammary gland, Ovary and Uterus.
2. Human Parasites- *Ascaris lumbricoides, Taenia solium*, *Enterobius vermicularis, Wucheria brancroftii.*
3. Qualitative determination of Blood Sugar (Benedict's test & Fehling'test)
4. Estimation of Blood Pressure
5. Estimation of Haemoglobin
6. Blood Grouping
7. Analysis of Urine sugar
8. Qualitative analysis of Ketone bodies
9. Estimation of Erythrocyte Sedimentation Coefficient.
10. Haemocytometer-Demonstration only (RBC and WBC counting).

Annexure - 3

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(w.e.f. 2017 – 2018 Batch onwards)

Elective - I

Title of the Paper : Genetics

Semester	**: V**	**Contact hours**	**: 4**
Sub Code	**: 17Z51**	**Credits**	**: 4**

Objective:

To enable students to understand the organization, function of genes and genetic components which are the basis of life continuum.

Unit - I Introduction to Genetics History of Genetics, General areas of Genetics (Classical, Molecular & Evolutionary) ,Basis of Mendelian Inheritance and Mendelian laws, Interaction of Gene - Complementary Factors, Supplementary Factor, Simple mendelian traits in man

Unit- II Linkage and Crossing over - Drosophila-Morgan's experiments - Complete and Incomplete linkage, Linkage groups, Crossing over types, Mechanisms - Cytological evidence for Crossing over- Blood Groups and their inheritance in Human

Unit- III Sex Determination and Sex Linked Inheritance: Sex Determination in Man, Sex influenced and Sex limited genes - Non Disjunction and Gynandromorphs - Cytoplasmic inheritance - Maternal effect on *Limnaea* (Shell Coiling), Kappa Particles in *Paramecium*, Sex Linked Inheritance- Colour Blindness and Haemophilia in Man.

Unit- IV Chromosomal aberrations **:**Mutation- Molecular Basis of Mutation, Types of Mutation, Mutagens, Mutable and Mutator genes, Chromosomal Aberrations- Autoploidy and Aneuploidy, In born errors of metabolism – phenylketoneuria- Parkinson's disease

Unit- V Microbial and Population genetics **:** Microbial genetics- Recombination in bacteria: Transformation- Griffith experiment, Conjugation- F Factor, H Factor,

Sexduction, Transduction- Hershey and Chase experiment- Plasmids and episomes. Population genetics - Hardy Weinberg law, Gene pool and gene frequency, significance and applications

Text Book:

1. Dr. R. Meyyan .,Genetics , Saras Publication ,3rd Edition , Kanyakumari 2009

Reference Books:

1. Verma, P.S. and P.K. Agarwal, Genetics, 10th edition , S.Chand and Co., New Delhi 2009.
2. James .D. Watson, Molecular Biology of the Gene, W. A. Benjamin Publishers, California 2008.
3. William.S. Klug, Essentials of Genetics, 7th edition, Benjamin Cummings Publisher, New York 2009.
4. Gardner, Simmond and Snustad , Principles of Genetics, John Wiley & Sons, 8th edition, New York 2006.
5. Strickberger, Genetics, 3rd edition, Macmillan Publications, New York 1985.

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CBCS

DEPARTMENT OF ZOOLOGY

(w.e.f. 2017 – 2018 Batch onwards)

Title of the Paper : Ecology & Evolution
Semester : V **Contact hours: 4**
Sub Code : 17ZE5A **Credits 4**

Objective:

To make the students understand the ecosystems and behaviour of organism under various conditions.

Unit – I Ecosystem: Pond as an ecosystem - food chain and its types. Food web - ecological pyramids Light as a limiting factor – Effects of light on metabolism and reproduction. Temperature as a limiting factor .Effects of light on metabolism and morphology.

Unit – II Terrestrial habitat- grass land, fresh water & marine habitat : Characteristics, stratification, deep sea adaptations.

Unit – III Characteristics of Community Ecology. Ecotone and edge effect. Ecological niche, equivalence, ecotypes and ecological succession.

Unit – IV Evidences of Evolution : Brief account on morphological , comparative anatomy Embryological.physiological and Biochemical evidences. Homology & Analogy(example-forelimbs),Vestigial organ-(Vermiform appendix, Plica semilunaris), Fossil evidence –Archaeopteryx .Lamarkism , Darwinism,Neo-Darwinism - Mimicry - Batesian and Mullerian Mimicry.

Unit- V Hardy Weinberg law & its Significance- . Factors affecting gene equilibrium- Natural selection - Isolating mechanisms- Speciation – Allopatric & Sympatric speciation - Human evolution - Physical and cultural Evolution.

Annexure - 3

Text Book :

1. Arumugam ,N., *Concepts of Ecology* , Saras Publication, Kottar, Nagarkovil 2010.

Reference Books :

1. Dash, M.C., *Fundamentals of Ecology*, Tata Mc.Graw Hill Publishing Co.Ltd., New Delhi . ISBN: O – 07 -460103 – 2. 1996.
2. Gnanamuthu, C.P. *Introduction to Animal Ecology* – Higginbothms, Mount road, Chennai .1901
3. Kumar H.D., *Modern Concepts of zoology,* Vikas publishing House(P) Ltd. New Delhi.1995
4. Sambasivaya, Kamalakara Rao,& Augustine Chellapa-*Animal Ecology* S.Chand & Co.,Ram Nagar New Delhi 110055.1985
5. Odum, E.P. *Basic Ecology,* Saunders College Publishing, New York.1971
6. Odum, E.P. *Fundamentals of Ecology*, Saunders Toppan, London. 1983

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DEPARTMENT OF ZOOLOGY

(w.e.f. 2017– 2018 Batch onwards)
Elective- II

Title of the Paper	**: Biochemistry**		
Semester	**: V**	**Contact hours**	**: 4**
Sub Code	**: 17ZE5B**	**Credits**	**: 4**

Objective:

To familiarize the basic principles, and techniques of bio-chemistry.

Unit - I Carbohydrates: classification and biological importance - carbohydrate metabolism – Glycogenesis , Glycolysis , Citric acid cycle and Hexose Monophosphate Shunt .

Unit –II Amino acid structure and classification , Protein – structure, classification and biological importance-Transamination , Decarboxylation, Transdeamination, Transmethylation, Urea cycle.

Unit - III Lipids: Classification and structure of cholesterol- β-oxidation of fatty acids - Biological importance of lipids–biosynthesis of fattyacids.

Unit - IV Enzymes: classification, physico-chemical nature and mechanism of enzyme action, factors affecting enzyme activity-role of coenzymes and enzymes.

Unit-V Bio -chemical techniques, Principle and biological application of Paper chromatography and Electrophoresis (PAGE only), pH meter, Spectro photometry

Annexure -3

Textbook:

1. Satyanarayana. U *Bio - chemistry*, 5th Edition, Elsevier Health Sciences, India.2017.

Reference Books:

1. Ambiga Shanmugam, *Biochemistry,* 1996.
2. Lehninger, Nelson& Cox ,*Principles of Biochemistry,*CBS Publishers & Distributers, Delhi, CBS ISBN 81-239-0295-6 , 2004.
3. .Lubert stryer, *Biochemistry* ,W.H.Freeman and company,New York.2015
4. Power.C.B & Chatwal G.R , *Biochemistry* , 5th edition, Himalaya Publishing House. 2017
5. Robert,K.Murray Daryl.K.Granner. Harper's *Biochemistry,* PeterA.Mayes & Victor W.Rodwell pRetice –Hall International.1988

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DEPARTMENT OF ZOOLOGY

(w.e.f. 2017 – 2018 Batch onwards)
Elective – I & II (Optional)

Title of the Paper : Fisheries Biology
Semester : V **Contact hours : 4**
Sub Code : 17ZE5C **Credits : 4**

Objective:

To make the students understand the importance of fishes and its role in the economy of mankind.

Unit – I Introduction – Importance of fisheries – Economic value of common South Indian fishes – catla , Tilapia -Nutrition and feeding habits and feeding adaptations.- Native & Invasive fish species.

Unit – II Tagging of fishes.- Reproduction in fishes-Induced breeding - hypophysation Ecological factors influencing spawning in carps.

Unit – III Edible molluscan fisheries - Pearl fishery in India.Fisheries management – prawn fisherey , Constrains for fisheries -Sewage fed fisheries.

Unit – IV Marine Fisheries & Inland fisheries. Protozoan disease white spot disease-, worm disease -ligulosis, crustacean disease-argulosis and non parasitic disease-soft shell syndrome.

Unit – V Home Aquaria, Ornamental fishes – gold fish & black molly , By products of fishes-body oil , liver oil, fish glue, Isinglass & fish manure- Fish preservation and processing – Fish in relation to Public Health.

Annexure - 3

Text Book:

1. R. Santhanam **,** Fisheries Science, Daya Publishing House 2013

Reference Books:

1. Chandy, M. *Fishes*– National book trust, India 1970
2. Norman, J.R.*A history of Fishes*– Earnest Benn Ltd, London.1975.
3. Marhall, N.B.The life of Fishes– Weidnefeld & Nicholson, London.1965
4. S.R.Munro., *Marine and Fresh water fishes of Ceylo*, 2017.
5. Jhingran V.G., *Fish and Fisheries of India*– Hindustan Publishing Corp. Delhi.1991

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DEPARTMENT OF ZOOLOGY

(w.e.f. 2017 – 2018 Batch onwards)

SKILL BASED ELECTIVE

Title of the Paper	**: Biostatistics**		
Semester	**: V**	**Contact hours**	**: 2**
Sub Code	**: 17SEZ51**	**Credits**	**2**

Objective:

To familiarize the students about the basic concepts of Biostatistics and its applications in biology.

Unit - I: Basic concepts in Biostatistics - Collection of Data-Editing, presentation, Analysis and interpretations of data collection – sampling.

Unit- II Classification and Tabulation of data. - Diagrammatic presentation of data - Graphic presentation of data.

Unit -III Measures of Central tendency – Mean, Median, and Mode (Discrete series and continuous series) – Related Problems.

Unit-IV Measures of Dispersion – Range, Standard Deviation, Variance, Standard Error-Related Problems.

Unit-V Correlation & Regression , Basic concepts of probability – Measures and Theorems. Theoretical distributions -Binomial distribution and Chi-square Test, T-test .

Annexure - 3

Text Book:

1.Ramakrishnan,P., *Biostatistics*, Saras publications,2010.

Reference Books.

1. Arumugam N, *Biostatistics and Computer application*, Saras publications, 2005.
2. Baskararao T, *Methods o Biostatistics,* PARAS Publications, Hyderabad.2001.
3 . Gupta S.P, *Statistical methods*, Sulthan chand & Sons.New Delhi, 2006.
4. Khan A.S, & Khanum A., *Fundamental of Biostatistics,* Ukaas publishers, Hyderabad. 2004.
5. Prasad.S., *Elements of Biostatistics*, Rastogi publications, Meerut, ISBN 81 : 7133-885-2. 2009.

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DEPARTMENT OF ZOOLOGY

(w.e.f. 2017 – 2018 Batch onwards)

Title of the Paper : Physiology
Semester : VI **Contact hours : 4**
Sub Code : 17Z61 **Credits : 4**

Objective:

To familiarize the students about the detailed structure and physiological functions of various systems.

Unit – I Nutrition, Types of Nutrition-Balanced Diet- Malnutrition (Marasmus & kwashiorkor) Physiological role of carbohydrates, proteins, fats, vitamins and minerals. Digestion -Function of digestive glands – role of enzymes in digestion – hormonal control of digestion**.**

Unit – II Respiration -Types and mechanism of respiration- respiratory pigments- Oxygen transport - CO_2 transport – Respiratory Quotient (RQ). Circulation - Structure and function of human heart – coronary circulation-ischemic heart diseases- origin and conduction of heart beat-Electrocardiogram(ECG) Blood pressure (BP)- – blood sugar, blood cholesterol, blood urea level in man – blood coagulation.

Unit – III Osmoregulation - Mechanisms of osmoregulation – Poikilosmotic and Homeoosmotic animals. Euryhaline, Stenohaline – Osmoconfirmers, Osmoregulators, Osmoregulations in crustaceans, fishes and birds .Excretion -Ultra structure and function of kidney and nephron – mechanism of urine formation – hormonal control -Diabetes insipidus .

Unit – IV Muscles - Ultra structure of skeletal muscle — Physico chemical properties and mechanism of muscle contraction. Sense organs: Physiology of vision and hearing .Chronobiology - Biological clock, Lunar Rhythm and Circadian Rhythm.

Unit – V Nervous system: Structure and types of neuron — conduction of nerve impulse through Axon, Synapse and Neuromuscular junctions – Reflex arc. Endocrine system- Hormones of Pituitary, Thyroid, Parathyroid, Adrenal and Sex glands.

Textbook:

1.Arumugam, N. *Animal Physiology* , Saras Publications, 2012.

Reference Books:

1. Ernest Baldwin - *An Introduction to Comparative Bio - Chemistry* , Cambridge University Press.1966
2. Hoar, S.William , *General Comparative Physiology* - Printice Hall of India Pvt. Ltd. New Delhi, ISBN-0-87692-337-6.1966
3. Rastogi. S.C., *Essentials of Animal Physiology* –Wiley Eastern Ltd, 1977
4. Byron A. Schottelius & Dorothy D. Schottelius -*Text Book of Physiology*, the C. V. Mosby Company; 17th Revised edition edition (July 13, 1973).
5. Philip H MitchellTextbook of General Physiology, 4th Edition, Mc Graw-Hill Company ,Fourth Edition Newyor, Toronto. London. Cat.log.No.55-9548. (1948).

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DEPARTMENT OF ZOOLOGY

(w.e.f. 2017 – 2018 Batch onwards)

Title of the Paper	**: Microbiology & Immunology**		
Semester	**: VI**	**Contact hours**	**: 4**
Sub Code	**: 17Z62**	**Credits**	**4**

Objective:

To educate the students about the biology of micro organism, their impact on human welfare and defense mechanism of our body.

Unit – I Introduction to Microbiology -The historical development and scope of Microbiology -Sterilization and disinfections - Physical methods (UV Radiation, Autoclave & Incineration) – Chemical methods (antibiotics & other chemicals) Preparation of nutrient agar and selective agar media – pure culture.– Principles of bacterial staining. Bacterial growth curve.

Unit – II Food Microbiology- Perishable & non – perishable food – Spoilage of meat, Vegetables, fish, sea foods, Milk & dairy products and cereals - Food preservation – principle and methods. Removal of Microorganisms-maintenance of anaerobic condition -preservation by high & low temperatures–by drying and use of chemical-Food storage.

Unit – III Biogeochemical cycles – Nitrogen Cycle and Phosphorus Cycle - Microbes for alternate source of energy – Hydrogen producing bacteria - *Halobacterium halobium*

Unit – IV Ontogeny of Lymphoid organs – Myeloid Lineage and Lymphoid Lineage . Primary and secondary organs – Thymus, Bone marrow,Spleen, lymph node- Specific and non specific immunity – B cells, T cells and sub cells - Immune response- cell mediated immune response & humoral immune response.

Unit – V Structure and properties of antigen. Antigen – antibody reaction(precipitation & agglutination).Transplantation- MHC, HLA typing, Hypersensitivity reactions – Type

I- anaphylactic reactions, Type II – cytotoxic reactions, Type III – immune complex reactions, Type IV – delayed type hypersensitivity reactions- Vaccine programme.

Text books :

1. Anantha Narayanan. ,*Text Book of Microbiology,* Longman, Chennai, 1986.
2. Dulsy Fatima, *Immunology,* Saras publication, 2009.

Reference Books:

1. Anna K. Joshua, *Microbiology* Popular Book Depot, Madras. 2000
2. Alice Lorraine Smit - *Principles of Microbiology***.** Sixth Edition The C.V. Mosby Company, Saint Louis1973
3. Chakravarthy, A.K., Immunology, Tata McGraw Hill Publishing Company, New Delhi. 1993
4. Danial lim, -*Microbiology ,* M.C.Graw Hill Pvt. 1998
5. Dubey R.C. -*Microbiology* S, Chand &Co. Ltd, 1993.
6. Frobisher Martni -*Fundamentals of Microbiology* **,**. W.B. Saunders and Co, London.1946.
7. John W.Kimball , *Introduction to Immunology*, Macmillan Publishing Company 1986.
8. David Male,.Jonathan Brostoff ,David Roth & Ivan Roitt, *Immunology,* Harcourt Brace & Company 2012.

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DEPARTMENT OF ZOOLOGY

(w.e.f. 2017 – 2018 Batch onwards)
Elective - III

Title of the Paper : Biotechnology
Semester : VI **Contact hours : 4**
Sub Code : 17ZE6A **Credits : 4**

Objective :

To educate the students about the basic knowledge, recent developments and applications of Biotechnology.

Unit –I Recombinant DNA Technology - Conventional vs Modern Biotechnology . Biotechnology tree-Tools of genecloning : Restriction Endonucleases , DNA ligase. Cloning vectors: Plasmid, cosmid, & expression vectors. Major steps in gene cloning- Cloning of human insulin gene.

Unit – II Industrial Biotechnology**:**Microbial products – Production of Cyanocobalamine (primary) and Pencillin (Secondary) - Bio Gas Production - stages of methanogenesis – uses. Industrial production and application of ethanol (green fuel)

Unit- III Environmental Biotechnology-Biopesticides – biological control of crop pest (bacterial pesticides only) – plant extracts – bt toxin production – biofertilizers – types – definition –phosphate solubilizers & nitrogen fixers – application – super bug – treatment of oil spills in marine environment.

Unit- IV Animal Biotechnology - Animal tissue culture – Basic requirements – Culture media and its composition – Transgenesis – Transgenic mice, Transgenic cattle – transgenic plants. Monoclonal Antibody (mAb) - production & its application.

Annexure - 3

Unit – V Applied Biotechnology : r-DNA Proteins and their uses – Interferon, IL-2,Factor VIII , Urokinase , TPA , FMD Vaccine in Cattle- Composting, Bioleaching and Bioremediation - Biosafety and Ethics . -GMO & constraints.

Text Book:

1. Kumaresan V. *Book of Biotechnology* ,Saras Publications, 2012.

Reference Books:

1. Alcamo. LD ., *DNA Technology* – The Awesome Skill. WCB Dubuque IA. ISBN 0-697- 21248-3 , 1996.
2. Dharmalingam. K., *Biotechnology: principles, Practices and Prospects,* Biology Education. 7(3): 152-156. ISBN 0970-5961.1990.
3. Dubey. R.C.,-*Text Book Biotechnology*. S.Chand & Co.Ltd. 2004.
4. Gupta. P.K.., *Elements of Biotechnology*, Rastogi publication, Meeurt, ISBN 81-7133-412-1 Nuzhat Ahmed, Fouad M. Qureshi Obaid Y.Khan1999.
5. Nuzhat Ahmed, et al. *Industrial and Environmenal Biotechnology*, 2004.
6. Singh,B.D., *Biotechnology,* Kalyani publishers, New Delhi, ISBN 81 - 7096-735. 1998.

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DEPARTMENT OF ZOOLOGY

(w.e.f. 2017 – 2018 Batch onwards)
(Elective III – Optional)

Title of the Paper	**: Poultry Science**		
Semester	**: VI**	**Contact hours**	**: 4**
Sub Code	**: 17ZE6B**	**Credits**	**: 2**

Objective:

To educate the students about the basic knowledge of poultry keeping and maintenance of chicks in a controlled conditions.

Unit –I Poultry industries in India-survey choosing the commercial layers and broilers. Poultry housing- deep litter system, cage rearing., feeders & waterers. Poultry manure Importance of egg .

Unit –II Chick rearing - management of chicks-management of layers-management of broilers. Lighting in poultry

Unit –III Summer management, winter management, debeaking, debeaking apparatus and its significance.

Unit –IV Feeding of chicks, growers and layers. symptoms of excess and deficiency of amino acids, vitamins and minerals, feed formulation and Non – Nutritive Feed additives.

Unit –V Poultry diseases- viral disease, bacterial disease, fungal disease and parasitic diseases .Vaccination programme.

Annexure - 3

Text Book:

1. Gnanamani ,M.R., *Modern aspects of commercial Poultry Keeping* , GIRI Publications, Madurai. 1988.

Reference Books :

1. Biester,H.E. and Schwarte., *Diseases of Poultry* , Oxford and IBH Publishing Company.1978
2. Naidu,P.M.N., *Poultry Keeping In India,* Indian Council of Agricultural Research, New Delhi.1973
3. Singh, R.A., *Poultry Production*, Kalyani Publishers, New Delhi.1981
4. Scott,M.L., *Nutrition of Chickens*. M. L. Scott & Assocates., Second Printing edition. 1971

Annexure - 3

E.M.G. YADAVA WOMEN'S COLLEGE, MADURAI -14.

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DEPARTMENT OF ZOOLOGY

(w.e.f. 2017 – 2018 Batch onwards)

Title of the Paper	**: Lab in Genetics, Ecology & Evolution and Biochemistry**		
Semester	**: V& VI**	**Contact hours**	**: 4**
Sub Code	**: 17Z61P**	**Credits**	**: 2**

Genetics:

1. Observation of simple Mendelian Traits in Man.
2. Study of probability with two coins using tossing experiments.
3. Multiple Allelic Inheritance-Rh factor
4. Observation on the study of Polygenetic inheritance of quantitative traits to be interpreted(Neem leaf serration).

Ecology:

1. Detection of Transparency of water by Secchi disc.
2. Analysis of dissolved oxygen in water sample.
3. Observation of Animal association, symbiosis parasitism, predation and commensalism.

Evolution:

1. Variations – finger prints.
2. Homologous & Analogous organs.
3. Vestigial organs.
4. Connecting link- Archaeopteryx
5. Examples of evolutionary importances - Peripatus , Limulus & Archaeopteryx.

Annexure - 3

Bio Chemistry:

1. Principle and pH Measurements of various samples using pH meter.
2. Principle and Amino acids separations using Paper Chromatography- demonstration.
3. Qualitative tests for protein, carbohydrates & fats.
4. Principle and Electrophoresis- demonstration (PAGE).

Annexure - 3

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DEPARTMENT OF ZOOLOGY

(w.e.f. 2017 – 2018 Batch onwards)

Title of the Paper	**: Lab in Physiology, Microbiology & Immunology and Biotechnology**		
Semester	**: V &VI**	**Contact hours**	**: 4**
Sub Code	**: 17Z62P**	**Credits**	**: 4**

Animal Physiology:

1. Estimation of oxygen consumption by fish

2. Haemoglobinometer

3. Qualitative analysis of ammonia, urea and uric acid.

4. Demonstration of blood pressure using Sphygmomanometer.

Microbiology:

1. Simple staining.

2. Gram staining.

3. Media preparation – Agar plate method.

4. Structure of Bacteria, HIV, TMV and Algae.

Immunology:

1. Histology of Bone marrow, Bursa fabricus, Spleen, Thymus

2. ABO blood groups & Rh factor

3. HLA & MHC

Biotechnology:

1. Transgenic fish & mice

2. Super bug – Pseudomonas putida

3. pBR 322

4. Ti plasmid

5. Humulin

Annexure - 3

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DEPARTMENT OF ZOOLOGY

(w.e.f. 2017 – 2018 Batch onwards)

SKILL BASED ELECTIVE

Title of the Paper : Economic Zoology
Semester : VI **Contact hours : 4**
Sub Code : 17SEZ61 **Credits : 2**

Objective:

To make the students skillful and to become self employed entrepreneur

Unit –I Sericulture - Introduction to Sericulture – Types of silk worms – culture of Mulberry silkworms-Diseases and enemies of silkworms – uses of silk-ahimsa silk

Unit –II Apiculture - Introduction to Apiculture – Types of Honey Bee – Bee Keeping – Precautions – Products of Bee keeping – Economic Products of Bee Keeping – Economic importance of honey – enemies and diseases of bees – Bee Keeping industry

Unit -III Aquaculture - Qualities of culturable fishes – Types of Fish farming .Fish culture – Breeding ponds – nursery ponds – rearing ponds – stocking ponds – Harvesting – Preservation of fishes-fish feed

Unit – IV Poultry -Commercial layers and broilers. Poultry housing- deep litter system, cage rearing., feeders & waterers. Summer management, winter management in brief. Debeaking Poultry diseases- viral disease, bacterial disease, fungal disease and parasitic diseases (one each) Vaccination programme.

Unit- V women entrepreneur – marketing -Management - Dairy farming - Breeds of cattles- dairy products-management. Diseases and mode of prevention- self help groups.

Annexure - 3

Text Book:

Arumugam ,N., *Applied Zoology* , Saras Publications. 2012.

Reference Books:

1. Gnanamani. M.R., *Modern aspects of commercial Poultry Science* , GIRI Publications .1988.
2. Oxford and IBH Publishing Company Pvt.Ltd .2008 .
3. Jhingran. V.G., *Fish and fisheries of India*, Hindustan Publishing Corporation, Delhi.
4. Krishnan. N.T., *Economic Entomology*, J.J. Publications ,2008.
5. Khanka.S.S., *Entrepreneurial Development*, S. Chand &Company Ltd. 2012.

Annexure - 3

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DEPARTMENT OF ZOOLOGY

(w.e.f. 2017 – 2018 Batch onwards)

Title of the Paper : Lab in Genetics, Ecology and Evolution and Biochemistry,
Semester : V& VI
Sub Code : 17Z61P

Model Question

1. Analysis of dissolved oxygen in water sample.- 15
2. Qualitative test for protein/carbohydrates/fats - 10
3. Comment on the given Experimental set up - 10
4. Spotters ; (5x3) - 15
   - Evolution - 2
   - Ecology - 2
   - Genetics - 1
5. Record Note Book - 10

Total - 60

Annexure - 3

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DEPARTMENT OF ZOOLOGY

(w.e.f. 2017 – 2018 Batch onwards)

Title of the Paper : **Lab in Physiology, Microbiology & Immunology and Biotechnology**
Semester : **V&VI**
Sub Code : **17 Z62P**

Model Question

1. Estimation of oxygen consumption by fish - 15
2. Qualitative test for ammonia/ Urea /Uric acid - 10
3. Comment on the Experimental set up - 10
4. Spotters ; (5x3) - 15
   - Microbiology - 1
   - Biotechnology - 2
   - Immunology - 2
5. Record Note Book - 10

Total - 60

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ALLIED CHEMISTRY

(For B.Sc. Zoology & Mathematics Majors)

COURSE STRUCTURE

(w.e.f. 2017 – 2018 onwards)

Annexure – 5a

E.M.G. YADAVA WOMEN'S COLLEGE, MADURAI -14.

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CBCS

ALLIED CHEMISTRY

(For B.Sc. Zoology & Mathematics Majors)

COURSE STRUCTURE – SEMESTER WISE

(w.e.f. 2017 – 2018 Batch onwards)

Sem	Part	Sub Code	Title of the Paper	Teaching hrs. (per week)	Duration of Exam (hrs)	Marks allotted			Credits
						C.A	S.E	Total	
I	III	17AK1	General Chemistry – I	4	3	25	75	100	4
II	III	17AK2	General Chemistry – II	4	3	25	75	100	4
		17AK2P	Practical – I	2	3	40	60	100	1
III	III	17AK3	General Chemistry – III	4	3	25	75	100	4
IV	III	17AK4	General Chemistry – IV	4	3	25	75	100	4
		17AK4P	Practical – II	2	3	40	60	100	1

Annexure – 5a

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ALLIED CHEMISTRY

(For B.Sc. Zoology & Mathematics Majors)
(w.e.f. 2017 – 2018 onwards)

Title of the Paper	**: General Chemistry**	**Contact Hours: 4**	
Semester	**: I**	**Credits**	**4**
Sub code	**: 17AK1**		

Objectives:

- To learn the basic principles of metallurgy.
- To understand the meaning of colloids and to learn the preparation and properties of colloids.
- To become familiar with catalysis and photo chemical reactions.
- To understand the theory, preparation and classification of dyes
- To acquire knowledge in elements and periodic variations in properties.

Unit- I Metallurgy: 1) Minerals and Ores – definition, example and difference – Various terms used in Metallurgy: Flux, Gangue, Slag – **2) Various steps involved in metal extraction: i)** Grinding **ii)** Pulverising **iii)** Ore dressing **iv)** Calcination **v)** Roasting **vi)** Smelting – **3) Refining Methods**: **i)** Van Arkel Method **ii)** Zone refining – **4) Platinum**: **i)** Extraction **ii)** Various forms of Platinum **iii)** Their preparation and uses.

Unit : II Colloids: Definition, Size of Colloidal particles, Classification, Differences between lyophilic Sols and lyophobic Sols - Preparation of Sols: **i)** Dispersion Method **ii)** Condensation Method – *Physical method* – Vapour Condensation, *Chemical method* – Double decomposition – Properties: **i)** Tyndall Effect **ii)** Brownian movement.

Unit : III Catalysis: Definition, Types of Catalysts – i) Positive Catalyst ii) Negative Catalyst iii) Auto catalyst – T ypes of Catalysis – i) Homogenous/Acid Base Catalysis ii) Heterogenous catalysis, Important terms involved in – Promoter, Catalytic poison. **Photo Chemistry:** Definition, Comparison of Thermal and Photo Chemical reaction – Laws of Photo Chemistry – i) Grotthus Draper Law ii) Einstein's Law, Quantum efficiency, (problems are not expected).

Unit : IV Dyes: Definition, Theory of colour and constitution: Chromophore – Auxochrome theory, Classification **i)** based on chemical structure **ii**) based on their mode of application – Preparation of the following dyes: **i)** Methyl orange **ii**) Bismark brown **iii)** Malachite green

Unit : V Periodic Table : Mendeleef's Periodic table, Characteristic of Mendeleef's periodic table, Merits and demerits of M.P.Table, Modern periodic law, Periodic variations in properties – i) Atomic radius ii) Ionisation potential iii) Metallic and Non Metallic Characters.

Annexure – 5a

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ALLIED CHEMISTRY

(For B.Sc. Zoology & Mathematics Majors)
(w.e.f. 2017 – 2018 onwards)

Title of the Paper : General Chemistry

Semester : II **Contact hours : 4**

Sub Code : 17AK2 **Credits : 4**

Objectives :

- To become familiar with atomic structure
- To make on in depth study of Hydrogen and Heavy hydrogen
- To become familiar with condensed systems and Heterocyclic compounds.
- To understand the concepts of bond formation and bond fission
- To learn the chemistry of carbohydrates.

Unit : I Atomic Structure: 1. Determination of e/m ratio for cathode rays – Thomson's experiment 2**.** Determination of charge of an electron – Millikan's oil drop method **3.** Rutherford Scattering Experiment **4.** Rutherford atom model **5.** Defects of Rutherford model **6.** Postulates of Bohr Atom model **7.** Defects of Bohr model **8.** Sommerfeld modifications **9.** Differences between Orbit and Orbital

Unit : II 1. Hydrogen - Position of hydrogen in the periodic table. Isotopes of hydrogen, Separation of isotopes of hydrogen by i**)** Gaseous diffusion method **ii)** Electrolysis method. **2. Heavy Hydrogen -** Preparation, Chemical properties and uses. 3. **Hydrides -** Definition, Classification, Preparation and uses of **i)** Covalent hydride **ii)** Polymeric hydride.

Unit: III Fundamental Concepts: 1. Tetra valency of Carbon **2.** Brief explanation of Hybridisation: **i)** Sp3 Hybridisation **ii)** Sp2 Hybridisation **iii)** Sp Hybridisation with one example for each **3.** Bond fission: i) Homolytic fission **ii)** Heterolytic fission – one example for each. **4.** Definition and Formation of the following reaction intermediates **– i)** Free radical **ii)** Carbonium ion **iii)** Carbanion.

Unit – IV 1. Condensed System: i) Definition **ii)** Preparation, Synthesis, Properties and Structure (No elucidation) of **Naphthalene 2. Heterocylic compounds:** Preparation and properties of Furan and Pyridine.

Unit : V Carbohydrates: Definition, Classification – **1.** Mono Saccharide – Glucose Preparation, Properties and uses of glucose. **2.** Straight chain Structure, Cyclic Structure and Haworth's Structure of glucose **3.** Conversion of glucose into fructose and vice- Versa **4.** Disaccharide – Sucrose Manufacture, Properties and Structure (No Structural elucidation) **5.** Distinction between glucose, fructose and Sucrose.

Annexure – 5a

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ALLIED CHEMISTRY

(For B.Sc. Zoology & Mathematics Majors)
(w.e.f. 2017 – 2018 onwards)

Practical : I **Contact hours : 2**

Semester : I and II **Credits : 1**

Sub Code : 17AK2P

Salt Analysis - (Model Question)

To analyse systematically the given simple salt containing one anion (acid radical) and one cation (basic radical). Record your observations as and when you make them.

The following simple salts are given for analysis:

1. Copper Carbonate 2. Lead Nitrate 3. Cadmium Phosphate 4. Nickel Sulphate 5. Copper Phosphate 6. Ammonium Oxalate 7. Ammonium Chloride 8. Ferrous Sulphate 9. Barium Chloride 10. Nickel Chloride 11. Aluminium Sulphate

Allotment of Marks for Salt analysis:

Internal Maximum Marks = 40	
Acid radical	= 20
Basic radical	= 20
Total	40

External Maximum Marks = 60	
Record	= 10
Acid radical	= 20
Basic radical	= 20
Viva Voce	= 10
Total	60

Reference books :

Bahl B.S & Arun Bahl, "*Advanced Organic Chemistry*", S. Chand & Company. New Delhi 2008.

Bajbai D.N., "*Advanced Physical Chemistry*", S.Chand & Co, New Delhi, 2008.
Bhupindu Mehta Manjal Mehta, "*Organic Chemistry*", PHI Learning Private Limited, New Delhi, 2012.

Madan R.D, "*Modern Inorganic Chemistry*", S. Chand and company Ltd. New Delhi, 2008.

Puri B.R. Sharma L.R. Kalia K.C., "*Principles of Inorganic Chemistry*", Milestone Publishers, Delhi, 2008.

Puri, Sharma, Pathania, "*Principles of Physical Chemistry*," Vishal Publishing Co, Vishal Publishing Co, Jalandhar, 2004.

Dr. Ratinamuthu M.Sc., M.Phil., Ph.D., *B.Sc* "*Ancillary chemistry*" R. Arun & Co, educational publishers, Madurai.

Soni P.L. & Chawla H.M., "*Text Book of Organic Chemistry*", Sultan & Sons, Sultan Chand & Sons, New Delhi, 2004.

Soni P.L. & Dharmarha O.P., "*Text Book of Physical Chemistry*", Sultan Chand & Sons, New Delhi, 2001.

Annexure – 5a

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ALLIED CHEMISTRY

(For B.Sc. Zoology & Mathematics Majors)
(w.e.f. 2017 – 2018 Batch onwards)

Title of the Paper	**:**	**General Chemistry-III**	
Semester	**:**	**Three**	**Contact Hours: 4**
Subject code	**:**	**17AK3**	**Credits 4**

Objectives:

1. To get an insight into the Nature of Chemical bonding
2. To understand the basic concept of Oxidation and Reduction, Acids & Bases
3. To acquire knowledge on Halogen compounds
4. To learn the Chemistry of Polymers
5. To understand the Ionic equilibrium and the Hydrolysis of salts

Unit: I Chemical Bonding a)Valence Bond Theory-Postulates of VB Theory -Application to the formation of simple molecules like Hydrogen and Oxygen -Explanation of the following with suitable example -s –s Overlapping -s- p Overlapping –p – p Overlapping -Sigma bond, pi bond and their differences. b) Molecular Orbital Theory -Formation of molecular orbital (combination of s – s Orbital only) -Differences between bonding and anti bonding molecular orbitals-Molecular orbital diagram for the following homonuclear diatomic molecules –Hydrogen, Helium ,Oxygen -Bond Order and Magnetic Properties.

Unit: II Oxidation and Reduction, Acids & Bases

a) Oxidation and Reduction-Electronic concept of Oxidation and Reduction- oxidation number-differences between oxidation number and valency- rules for calculating oxidation number-solved examples-oxidation number concept of oxidation and reduction-oxidising agents and reducing agents-redox reactions.

b) Modern concepts of Acids and Bases-Arrhenius concept, bronsted-lowry concept, LuX-Flood concept, Lewis concept and Usanovich concept- relative strengths of acids and bases – amphoteric solvents-Levelling effects.

Unit: III Halogen Compounds-Aliphatic halogen compounds -Preparation, Properties and uses of Chloroform -Aromatic halogen compounds -Preparation, Properties and uses of Chlorobenzene and Benzy1 Chloride -Differences between Chloro benzene and benzy1 chloride-Mechanism of aliphatic nucleophilic substitution -SN_1 – Explanation with Example -SN_2 – Explanation with Example.

Unit: IV Polymers a) Polymers-Definition-Explain the following with suitable Example-Addition-Polymerization-Condensation Polymerization. b) fibres-Definition-Manufacture and uses of important fibres -Polyamide fibre-Polyester fibre. c) Resins – Definition -Manufacture and uses of Amino resin, Unsaturated Polyester resin. d) Plastics -Definition -Classification of Plastic -Thermoplastics -Thermo setting plastics- Manufacture and uses of Polythene and PolyVinyl Chloride.

Unit: V Ionic Equilibria-Ionic Product of Water -Hydrolysis – definition – Nature of Salts solution undergoing Hydrolysis, degree of Hydrolysis and Hydrolysis constant of the following-Salts of strong acid and strong base -Salts of weak acid and strong base- Salts of strong acid and weak base -Salts of weak acid and weak base.

Text Books

1. Bahl B.S. & Arun Bahl, "*A Text Book of Organic Chemistry*", S.Chand & Company New Delhi, 2012.

2. Puri B.R, Sharma L.R. and Kalia K.C.,"*Principles of Inorganic Chemistry*", Vishal Publishing Co, Delhi, 2017.

3. Ratinamuthu . K, "*B.Sc Ancillary chemistry"* R. Arunn & Co, Educational Publishers, Madurai.

Reference Books

Annexure – 5a

1. Jain P. C and Monika Jain, "*Engineering Chemistry*" Fifteenth Edition, Dhanpat Rai Publishing Company (P) Ltd, New Delhi, 2011.

2. Madan R. D, "Modern Inorganic Chemistry", S. Chand and Company Ltd, New Delhi, 2011.

3. Puri, Sharma and Pathania, "*Principles of Physical Chemistry*," Vishal Publishing Co, Jalandhar, 2011.

4. Jain.M.K and Sharma.S.C,"Modern Organic Chemistry", Vishal Publishing Co, Delhi, 2018.

Annexure – 5a

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ALLIED CHEMISTRY

(For B.Sc. Zoology & Mathematics Majors)
(w.e.f. 2017 – 2018 Batch onwards)

Title of the Paper : General Chemistry-IV
Semester : Four **Contact Hours : 4**
Subject code : 17AK4 **Credits 4**

Objectives:

1. To understand the terminology and theories of Double Salts, Alums and Coordination compounds.
2. To learn the chemistry of some Natural products – Alkaloids and Terpenoids.
3. To learn the preparation and uses of some important Organic Compounds and Industrial Organic Compounds.
4. To acquire knowledge on Chemotherapy.
5. To become familiar with Fertilizers, Insecticides, Pesticides and Fungicides.

Unit: I Double Salts, Alums and Coordination compounds a) Double Salts And Alums -Definition -Double Salts –Alum-Distinction between Double salts and alums -Preparation and uses of ferrous ammonium sulphate -Preparation and uses of ferric Alum b) Coordination compounds -Definition -Definition of various terms involved in Coordination Chemistry – Werner's Theory – illustrate with example -Effective Atomic Number rule with examples -Valence Bond Theory –postulates, formation of $[Co(NH_3)_6]^{3+}$ complex.

Unit: II Alkaloids and Terpenoids:- a) Alkaloids -Definition -Occurrence- Classification of alkaloids- Extraction of alkaloids- General Properties of alkaloids -Structure of Cocaine, Piperine and Nicotine. b) Terpenoids -Definition -Isoprene rule – special isoprene rule -Classification -Isolation of Terpenoids (Steam distillation method) -General properties-Structure of Citral, Geraniol, Menthol and α – Terpineol(no structural elucidation).

Annexure – 5a

Unit: III Organic Compounds and Industrial Organic Compounds:- a) Preparation and uses of some Important Organic Compounds –Saccharin, Salicylic acid, Aspirin, Salol and Picric acid. b) Manufacture and uses of some Industrial organic compounds -Alcoholic beverages (Beer and wine), Absolute alcohol, n-butyl alcohol, vinegar and lactic acid.

Unit : IV Chemotherapy: Introduction-characteristics of a drug- Antibacterials-Definition-preparation and uses of sulphadiazine-Antimalarials –definition-preparation and uses of chloroquine-Antibiotics-definition-classification-based on the specificity of their action, based on gram staining method-structure and uses of Penicillin-Arsenical drugs-definition- preparation and uses of Salvarsan.

Unit: V Fertilizers, Insecticides, Pesticides and Fungicides a) Fertilizers –Definition-role of various elements in plant growth -Manufacture and uses of Nitrogenous fertilizers-Calcium Ammonium Nitrate-Urea-Phosphatic fertilizers -Calcium Super Phosphate -Triple Super Phosphate -Potash fertilizers-Potassium Chloride -Potassium Sulphate b) Insecticides, Pesticides and Fungicides -Definition -Classification according to the mode of action -Preparation and uses of DDT and BHC.

Text Books

1. Bahl B.S. & Arun Bahl, "*Advanced Organic Chemistry*", S.Chand & Company New Delhi, 2004.
2. Puri P.R, Sharma L.R. & Kalia K.C., "*Principles of Inorganic Chemistry*", Vishal Publishing Company, Delhi, 2017.
3. Ratinamuthu .K, "*B.Sc Ancillary chemistry",* R. Arunn & Co, Educational Publishers, Madurai.

Reference Books

Annexure – 5a

1. Jain.M.K and Sharma.S.C,"Modern Organic Chemistry", Vishal Publishing Co, Delhi, 2018.

2. Finar I. L., "*Organic Chemistry*", Volume II, Pearson Education Pvt. Ltd, Indian Branch, Delhi, 2011.
3. Madan R. D, "*Modern Inorganic Chemistry*", S. Chand & Co., New Delhi, 2011.
4. Sharma B. K., "*Industrial Chemistry*", Sixteenth Edition, Krishna Prakashan Media Pvt. Ltd., Meerut, 2011.

Annexure – 5a

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ALLIED CHEMISTRY

(For B.Sc. Zoology & Mathematics Majors)
(w.e.f. 2017 – 2018 Batch onwards)

PRACTICAL –II

Title of the Paper : Volumetric Analysis
Semester : Third and Fourth **Contact Hours : 2**
Subject Code : 17AK4P **Credit 1**

Volumetric analysis (Question model)

You are given a solution containing Sodium carbonate. To estimate volumetrically the weight of Sodium carbonate present in the whole of the given solution. You are provided with approximately decinormal solution of hydrochloric acid and a standard solution of Sodium hydroxide Containing..... g / L.

S.No.	Standard	Link	Solution to be estimated
1.	Na OH	HCI	Na_2CO_3
2.	$FeSO_4$	$KMnO_4$	Mohr's salt
3.	NaOH	$C_2H_2O_4$	$KMnO_4$
4.	Na_2CO_3	HCI	NaOH
5.	Mohr's salt	$KMnO_4$	$FeSO_4$
6.	HCI	NaOH	$C_2H_2O_4$

Allotment of Marks for Volumetric Analysis

Annexure – 5a

Maximum Marks-100

Internal Maximum Marks – 40		External Maximum Marks - 60	
Procedure	- 10	Record	- 10
Experiment	- 30	Procedure	- 10
Total	- 40	Experiment	- 40
		Total	- 60

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ALLIED BOTANY

(For B.Sc. ZOOLOGY)

COURSE STRUCTURE

(w.e.f. 2017 - 2018 onwards)

Annexure -5b

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ALLIED BOTANY
(For B.Sc. ZOOLOGY)

COURSE STRUCTURE

(w.e.f. 2017 – 2018 Batch onwards)

Sem.	Subject Code	Title of the paper	Teaching *hrs.* (Per week)	Duration of Exam (*hrs.*)	Marks allotted			
					C.A	S.E	Total	Credits
III	17AG3	Plant Diversity - Algae, Fungi, Bryophytes, Pteridophytes and Gymnosperms	4+2	3	25	75	100	4
IV	17AG4	Cell Biology, Plant Anatomy, Genetics, Plant Breeding and Horticulture	4+2	3	25	75	100	4
	17AG4P Practical - I	Plant Diversity - Algae, Fungi, Bryophytes, Pteridophytes and Gymnosperms/ Cell Biology, Plant Anatomy, Genetics, Plant Breeding and Horticulture		3	40	60	100	1
V	17AG5	Morphology, Taxonomy of Angiosperms, Medicinal Botany & Economic Botony	4+2	3	25	75	100	4
VI	17AG6	Plant Physiology, Embryology, Tissue culture and Plant Pathology	4+2	3	25	75	100	4
	17AG6P Practical - II	Morphology, Taxonomy of Angiosperms,Medicinal Botony & Economic Botony/ Plant Physiology, Embryology Tissue Culture & Plant Pathology		3	4 0	60	100	1
							Total	**18**

Annexure -5b

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ALLIED BOTANY
(For B.Sc. ZOOLOGY)

(w.e.f. 2017 – 2018 Batch onwards)

Title of the Paper	**:**	**Plant diversity**			
Semester	**:**	**III**	**Contacthours**	**:**	**4hrs**
SubCode	**:**	**17AG3**	**Credits**	**:**	**4**

Objectives:

To know the classification of plant kingdom and basic structural variations among cryptogams and Gymnosperms.

Unit : I Introduction to Plant Diversity

Plant diversity – Concept, Plant kingdom-Position of plants in five kingdom system (Robert Wittaker) and Classification of plant kingdom Oswald Tippo1942.

ALGAE Occurrence, cell structure and Life Cycle Patterns of:-

a. Cyanophyceae - *Oscillatoria* b. Chlorophyceae - *Oedogonium*

c. Phaeophyceae - *Sargassum* d. Rhodophyceae - *Polysiphonia*

Unit : II FUNGI Occurrence, cell structure and life cycle patterns of:-

a. Phycomycetes – *Mucor* b. Ascomycetes – *Aspergillus*

c. Basidiomycetes – *Puccinia* d. Lichens – *Usnea*

Unit : III BRYOPHYTES

Structure and life cycle of *Marchantia.*

Unit : IV PTERIDOPHYTES

Structure and life history of *Selaginella.*

Unit : V GYMNOSPERMS

Structure and reproduction of *Cycas.*

Annexure -5b

Text Books:

1. Arumugam, N. and Annie Ragland. Algae, Fungi, Bryophytes, Plant Pathology, Saras Publication, Nagercoil, (2014).
2. Pandey, S.N., Misra, S.P. and Trivedi, P.S. *A text Book of Botany*. Vikas Publishing House Pvt. Ltd. New Delhi, (2009).

Reference Book:

1. Reddy, S.M. University Botany I: *Algae Fungi, Bryophyta and Pteridophyta*. New Age International Pvt. Ltd. New Delhi, (2001).
2. Sambamurthy, A.V.S.S. *A text Book of Algae*. I.K. International Pvt. Ltd. New Delhi, (2005).
3. Sharma, O.P. *Text Book of Algae*. Tata Mc.Graw-Hill Publishing Company Ltd. (2011).
4. Soni, N.K. and Soni, V. *Fundamentals of Botany Vol. I*. Tata McGraw-Hill. Education Pvt. Ltd. New Delhi, (2010).
5. Vashishta, P.C., Sinha, A.K., and Anil Kumar. *Botany for Degree Students*. S.Chand and Company Ltd. New Delhi, (2010).

e-Books for all Unit

1. www.vedambook.com
2. www.ebook3000.com/Science
3. www.freebook centre.net/Biology/Botany-Books.html

Annexure -5b

E.M.G. YADAVA WOMEN'S COLLEGE, MADURAI -14.

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CBCS

ALLIED BOTANY
(For B.Sc. ZOOLOGY)

(w.e.f. 2017 – 2018 Batch onwards)

Title of the Paper	**: Cell Biology, Plant Anatomy, Genetics, Plant Breeding and Horticulture**		
Semester	**: IV**	**Contact hours**	**: 4hrs.**
Sub Code	**: 17AG4**	**Credits**	**: 4**

Objectives:

1. To know knowledge about plant cell, tissue and its function.
2. To be familiar with basic genetics.
3. To acquire knowledge on applied botany like plant breeding and Horticultural techniques.

Unit : I CYTOLOGY

Overall structure of a typical plant cell, Prokaryotic & Eukaryotic cell difference (table form) – Structural organization and functions of intracellular organelles – Mitochondria and Chloroplast. Structure of Plasma-membrane (Unit membrane concept – Robertson; Fluid mosaic model – Singer and Nicolson)

UNIT : II PLANT ANATOMY

Tissues – Meristematic and Permanent tissue –

Simple permanent tissue – **a**) Parenchyma **b)** Collenchyma **c)** Sclerenchyma, Complex permanent tissue – **a)** Xylem **b)** Phloem (Meristematic theories need not be discussed). Primary structure and Secondary thickening in dicot stem and dicot root. Differentiate Dicot & Monocot stem and Root (Table form).

Unit : III GENETICS

Mendelian Principles – Explain law of Dominance, Segregation and Independent assortment. Mendel's Experiment on P ea plant – Monohybrid Cross, Dihybrid Cross, Back Cross, Test Cross and Incomplete Dominance.

Unit : IV PLANT BREEDING

Objectives of plant breeding and methods of crop improvement – Introduction, Selection (Mass selection and Clonal selection), Hybridization –Types and

Techniques of Hybridization. Mutation and Polyploidy in plant breeding (Achievements only).

Unit : V HORTICULTURE

Introduction, Branches and Importance of horticulture.

Methods of propagation:-

Vegetative: – **a**) Natural – Rhizome, bulb, corm and sucker.

b) Artificial – Stem Cutting (Herbaceous, Softwood, Semi – Hardwood and Hardwood cutting) – Layering (Simple, Compound and Air layering) – Grafting (Approach, Whip, Cleft and Top). Kitchen Garden (Home Garden) – aim, layout, choices of vegetable plants and Advantages.

Greenhouse structure – **a**) Site selection and orientation **b**) Structure materials **c)** Covering materials **d**) Temperature and humidity control. Advantages of greenhouse in growing ornamental, vegetable, fruit and medicinal plants.

Text Books:-

1. Annie Ragland. Plant Anatomy and Microtechniques. Saras Pulication, Nagercoil, (2010).
2. Aggarwal, V.K. and Verma, P.S. *Cell Biology, Genetics, Molecular Biology, Evolution and Ecology*. S. Chand Group, New Delhi, (2006).
3. Gupta, P.K. *Genetics: A Text Book for University Students*. Rastogi Publication, Meerut, (1990).
4. Jatinder Singh K. *Basic Horticulture*. Kalyani publishers, Ludhiana, Punjab, 2014.
5. Manibhusan Rao, K. *Text Book of Horticulture II Edition*. Macmillan, Ltd. New Delhi. (2005).
6. Mohan, K.V. *Essentials of Plant Breeding*. PHI learning Pvt. Ltd. New Delhi, (2010).
7. Phundan Singh M. genetics and Plant Breeding, ed. 2017.

Reference Books:

1. Adames, C.R. and Early, M.P. *Principles of Horticulture*. 4th Ed., Butterworth – Heinemann Publishers, Burlington, (2004).
2. Chadha, K.L. and Choudhury, B.*Ornamental Horticulture in India*. Indian Council of Agricultural Research, New Delhi, (2004).
3. Dey, S.C. *Complete Home Gardening*. Agrobios, Jodhpur, India, (2001).

4. Monroe Strickberger, W. *Genetics III Edition*, PHI Learning Pvt. Ltd. New Delhi, (2008).
5. Pandey, S.N. and Chandha, A. *Plant Anatomy and Embryology*. Vikas Publishing House, (1996).
6. Singh B.D. *Plant Breeding: Principles and Methods*. Kalayani, Publishers, (2012).
7. Singh.V, *Plant Anatomy and Embryology of Angiosperms*. Global Media, India, (2009).
8. Tayal, M.S. *Plant Anatomy*. Rastogi Publication, Meerut, (1996).

e-Books for all Unit

1. www.vedambook.com
2. www.ebook3000.com/Science
3. www.freebook centre.net/Biology/Botany-Books.html

Annexure -5b

E.M.G. YADAVA WOMEN'S COLLEGE, MADURAI -14.

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CBCS

ALLIED BOTANY
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(w.e.f. 2017 – 2018 Batch onwards)

PRACTICAL PAPER - I

Title of the Paper	**:**	**Plant Diversity, Cell Biology, Plant Anatomy, Genetics, Plant Breeding and Horticulture.**		
Semester	**:**	**IV**	**Contact Hours**	**: 2**
Sub Code	**:**	**17AG4P**	**Credit**	**: 1**

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1. Micro preparation of Algal/Fungal specimens.
2. Sectioning, Mounting and Identifying internal structure of Bryophytes/Gymnosperm.
3. Sectioning, Mounting and Identifying internal structure of Dicot: Stem, Root and Leaf.
4. Identification of permanent slides of Cell Biology.
5. Monohybrid Cross, Test Cross and Incomplete Dominance.
6. Demonstrate the method of vegetative propagation with the help of suitable materials. (Layering, Grafting, Greenhouse construction structure).
7. Observation of note book.

Annexure -5b

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(w.e.f. 2017 – 2018 Batch onwards)

PRACTICAL PAPER – I

Model Question

Title of the Paper : Plant Diversity, Cell Biology, Plant Anatomy, Genetics, Plant breeding and Horticulture

Semester : IV **Time : 3 hrs.**

Subject Code : 17AG4P **Max : 60 marks**

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1. Make suitable micro Preparations of '**A**'. Stain and mount it in glycerin. Draw labeled sketches and ide ntify giving reasons. Submit the slides for valuation. (**Algae/Fungi**) **1x10 =10**

2. Take T.S. of '**B**' Stain and mount it in glycerin, Draw labeled sketches and identify giving reasons. Submit the slide for valuation. (**Bryophyte/Pteridophyte/Gymnosperm**) **1x10 =10**

3. Take T.S. of '**C**' Stain and mount it in glycerin, Draw labeled sketches and identify giving reasons. Submit the slide for valuation. (**Plant Anatomy**) **1x10 =10**

4. Identify draw sketches and write notes on **D** & **E** (**Cell Biology**) **2x5 =10**

5. Indentify and comment on Crossing Over **F** (**Genetics**) **1x5 = 5**

6. Using the given material perform a Horticultural technique. (**Horticulture**) and Green house structures. **1x5 = 5**

7. Observation of Record note book. **10**

Total Marks **60**

Annexure- 3b

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CBCS

ALLIED BOTANY
(For B.Sc. ZOOLOGY)

(w.e.f. 2017 – 2018 Batch onwards)

Title of the Paper : Morphology, Taxonomy of Angiosperms, Medicinal Botany and Economic Botany

Semester : V **Contact Hours : 4 hrs.**

Sub Code : 17AG5 **Credits : 4**

Objectives:

To understand the relationship and nomenclature of plants.

To know the economical values of plants in each family.

To bring awareness on the enhanced use of traditional medicine.

Unit I: Plant Morphology

Root –Fusiform, Napiform and Conical, **Stem** – **Aerial** – Tendril, Thorn, Bulbils and Cladode, **UndergroundStem** –Bulb, Corm, Sucker and Stolen modifications, **Leaf** – **Phyllotaxy** – Alternate, Opposite, Ternate and Whorled – Modifications of leaf – Phyllode.

Unit II: Plant Morphology

Inflorescence – Definition, Types –**a**)**Racemose** – Raceme, Spike, Spadix, Umbel and Capitulum **b**) **Cymose** – Solitary Cyme, Monochasial Cyme and Dichasial Cyme and Polychasial Cyme.

Flower – Parts of a typical flower, floral whorls **a**) **Calyx** –Modifications and Types of aestivation **b**) **Corolla** – Forms – Cruciform, Papilionaceous, Infundibuliform and Bilabiate and types of aestivation **c**) **Androecium** –Parts of stamen – Monadelphous, Diadelphous and Polyadelphous. **d)Gynoecium** – Parts of carpel, apocarpus and syncarpus, types of placentation in ovules.

Fruit – Classification Types **a)Simple** – Fleshy and Dry (Dehiscent and Indehiscent) **b)Aggregate** – Eaterio of Berries and Follicles **c)Multiple** – Sorosis and Syconus.

Unit III: Taxonomy of Angiosperms

General outline of Bentham and Hooker's classification, its merits and demerits.

Study the salient features of the following families and their Economic Importance: -

Caesalpiniaceae, Asclepiadaceae, Lamiaceae, Euphorbiaceae and Poaceae

Unit IV : Medicinal Botany

Description of the individual plant, Common name, Botanical name, Family, Morphology of the useful part, Chemical constituents and Medicinal uses of the following plants:-

- Insulin leaf – *Costus igneus* – Zingiberaceae
- Turmaric (*Manjal*)– *Curcuma longa* –Zingiberaceae
- Nelavembu – *Andrographis paniculata* – Acanthaceae
- Thudhuvalai – Solanum *trilobatum*– Solanaceae
- Thulsi – *Ocimum sanctum* – Lamiaceae
- Vallarai –*Centella asiatica*– Apiaceae
- Sotrukatrallai– *Aloe vera* – Liliaceae
- Keelanelli – *Phyllanthus amara* – Euphorbiaceae
- Perunelli – *Phyllanthus emblica* – Euphorbiaceae
- Arukampul – *Cyanodon dactylon* – Poaceae

Unit V: Economic Botany

Cereals – 1. Paddy (*Oryza sativa***)** Poaceae **2. Millets – Ragi (***Eleusine coracana***)**Poaceae **3. Pulses – Cowpea (***Vigna unguiculata***)** Fabaceae **4. Fruits - Banana- (***Musa paradisiaca***)** *Musaceae* -Ripe Fruit, Inflorescence, Pseudostem **5. Nuts- Cashew nut- (***Anacardium occidentale***)**Anacardiaceae.

Text Books:

1.Annie Ragland. *Fundamentals of Botany*. Saras Publication, New Delhi, (2002).

2.Singh, V and Jain D. K. *Taxonomy of Angiosperm*. Rastogi Publication, Meerut, (1997).

3.Pandey, B.P. *A Textbook of Botany: Angiosperms - Taxonomy, Anatomy, Embryology and Economic Botany*. S. Chand Ltd. New Delhi, (2001).

4.Singh, V. Pande, P.C. Jain,D.K. *Economic Botany*. Rastogi Publications, (2016).

5.Pullaiah, T. *Medicinal plants in India, Vol. I and Vol. II*. R egency Publications, New Delhi, (2002).

Reference Books:

1.Sammbamurty & Subrahmanyam, N.S.A text Book of Modern Economic Botany. CBS Publishers & Distributers Pvt. Ltd. (2008).

2.Singh, V, Pande P.C. Jain, D.K. *A Text Book of Botany Angiosperms.* Rastogi Publication, Meerut, (2019).

3.Guptha, P. *Indian Medicinal Plants*. *Vol. I*. Indian Council of Medicinal Research, (2003).

4.Kochhar, S.L. *Economic Botany*, Cambridge A Comprehensive University press pvt. Ltd (2016).

5.Pandey, S.N. and Misra, S.P. *Taxonomy of Angiosperm*. Ane Book Private Ltd. New Delhi, (2008).

6.Sharma, O.P. *Plant Taxonomy II edition*. MacGraw Hill Company, Ltd. New Delhi, (2009).

7.Sharma, R. *Medicinal Plants of India – An Encyclopaedia*. Daya Publishing House, Delhi, (2003).

8.Soni, N.K. and Vandana Soni, *Indian Medicinal Plants*. Tata McGraw Hill Education Private Ltd. New Delhi (2010).

9.Thirugnanam, S., Akbarsha, M.A. & Krishnamurthy, K.V. *Indian Medicinal Plants and Home Remedies*. Selvi Pathippaham, Trichy, (2010).

10.Kochhar, S. L. Economic Botany*: A Comprehensive Study*, Cambridge University Press, (2018).

Annexure- 3b

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CBCS

ALLIED BOTANY
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(w.e.f. 2017 – 2018 Batch onwards)

Title of the Paper : Plant Physiology, Embryology, Tissue Culture and Plant Pathology

Semester	**: VI**	**Contact Hours**	**: 4 hrs.**
Sub Code	**: 17AG6**	**Credits**	**: 4**

Objectives:

- To understand the structure, growth, development and functional aspects of plant tissues systems.
- To study the plant tissue culture techniques and its importance in agriculture.
- To study important plant diseases.

Unit I : Plant Physiology

Photosynthesis - Light harvesting complexes, Hill's Light Reaction -Noncyclic Photophosphorylation (Z Scheme), Calvin's - Dark reaction (C_3 cycle) in the chloroplast.

Unit II: Plant Physiology

Absorption of water (Active and Passive absorption) in roots. Transpiration – Types S tomatal Movement and Guttation in leaves - Ascent of sap through xylem (Vital theories – Physical theory (**Dixon and Jolly**) –Transpiration pull. Respiration (Glycolysis, Kerb's Cycle and Electron Transport Chain (ETC) in Mitochondria.

Plant hormones – Role of phytohormones in plants- Auxins, Cytokinins and Gibberellins (chemical structure need not be discussed).

Unit III : Embryology

Structure a nd development of anther, male gametophyte. Structure of mature megasporangium (ovule) – development of female gametophyte (Embryosac) (e.g. *Polygonum* type of embryosac), Double fertilization. Endosperm – Different types (Nuclear, Cellular and Helobial).

Unit IV: Tissue Culture

Tissue culture – laboratory requirements for plant tissue culture – Tissue culture techniques (Steps) – Applications of tissue culture – Production and uses of haploid plants.

Annexure- 3b

Unit V: Plant Pathology

General account about Bacterial and Viral diseases – Symptoms, Causative organism and control measures of the following diseases: **Viral disease** – Bunchy top of Banana; **Bacterial disease** – Canker of Citrus; **Fungal disease** – Tikka disease of ground nut.

Text Book:

1. Annie Ragland, Kumaresan, V. Arumugam,N. *Taxonomy Embryology & Horticulture* Saras Publication, Nagercoil, (2016).
2. Annie Ragland, Kumaresan, V. Rajakumar, K. *Plant Physiology & Environmental Biology*, Vol 4: Saras Publication, (2015).
3. Kumaresan, V.*Techniques in Biotechnology*. Saras Publication, Nagercoil, (2014).
4. Pandey, B. P. *Plant Pathology Pathogen and Plant Disease*. Sultan Chand & Company, NewDelhi, (2018).
5. Pandey, S. N. and Chadha, A. *Plant Anatomy and Embryology,*Vikas Publishing House Pvt. Ltd. New Delhi, (2017).

Reference books:

1. Batygin, T .B. *Embryology of Flowering Plants: Terminology and Concepts*. Vol. 3: Reproductive Systems, Taylor & Francis Group, India, (2009).
2. Bojwani, S.S. *Plant Tissue Culture*: *Applications and Limitations* (HB). Elsevier Science Publisher, Netherland, (2013).
3. Chawla, H.S. *Introduction to Plant Biotechnology*. Oxford and IBH Publishing Company, Pvt, Ltd. New Delhi, (2010).
4. Hariday S. Chaube, Ramji Singh. *Introductory Plant Pathology*, CBS Publishers, New Delhi, (2015).
5. Mehrotra, R.S. and Aggarwal. *Plant Pathology*. Tata McGraw-Hill, (2003).
6. Reddy, S. M. University Botany: *Angiosperms, Plant Embryology, Plant Physiology.* III New Age International Pvt Ltd, Chennai, (2004).
7. Singh V, Pande P.C. Jain, D.K. *Embryology of Angiosperms*, Rastogi Publication. Meerut, (2019).
8. Sinha, R.K. *Modern Plant Physiology*. Narosa Publishing House, New Delhi, (2004).

Annexure- 3b

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(w.e.f. 2017 – 2018 Batch onwards)

Title of the Paper : Morphology, Taxonomy of Angiosperms, Medicinal, Botany, Economic Botany/ Plant Physiology, Embryology, Tissue Culture and Plant Pathology

Semester	**: VI**	**Contact Hours**	**: 4 hrs.**
Sub Code	**: 17AG6P**	**Credit**	**: 2**

1. To make dissections of the floral parts of the given plants and technically describe the salient features. (Floral diagram is also expected). Mount the L.S. of flower parts on a given slide
2. To identify morphological modification of the given specimens specified in the syllabus.
3. To identify the medicinal plant specified in the syllabus and point out the botanical name, family, morphology of the useful part and their uses.
4. Identification of sections of anther and ovule types.
5. Describe Tissue Culture technique.
6. Comment on simple experimental setups in Plant Physiology.
7. Identification of economically important products.
8. Observation of record note book.