

*Placed at the meeting of
Academic Council
held on 26.03.2018*

APPENDIX – CE
MADURAI KAMARAJ UNIVERSITY
(University with Potential for Excellence)

B.Sc. Ancillary Biology (Semester)
(for Biochemistry, Microbiology and Biotechnology Majors)

CBCS

(With effect from 2018-19 onwards)

Paper I

GENERAL BIOLOGY

Unit I

Basics of classification: species, genus, family-Nomenclature-binomial system. Systems of classification-artificial, natural and phylogenetic; Bentham and Hooker system of classification of plants (Cohort level only). General classification of animals up to class level with examples as mentioned in practical syllabus-description for example is not required.

Unit II

General characters and classification up to class level for the plant groups algae, fungi and Bryophytes. Type study (Development of sex organs need not be discussed).

Algae: *Sargassum*, Fungi: Yeast, Bryophytes: *Funaria*

Unit III

General characters and classification up to class level for the plant groups Pteridophytes and Gymnosperms. Type study (Development of sex organs and anatomical aspects need not be discussed). Pteridophytes: *Selaginella*, Gymnosperms: *Pinus* – economic importance of gymnosperms. Angiosperms: description of a typical monocot and dicot flowers.

Unit IV

Digestive, respiratory, excretory and reproductive systems in cockroach and frog.

Unit V

Digestive, respiratory, excretory and reproductive systems in pigeon and man.

References:

1. A.C. Dutta: **Botany for Degree Students**, Oxford University Press.
2. G.M. Smith: **Cryptogamic Botany, Vol. I & II**, Tata McGraw Hill.
3. W.T. Tailor and R.J. Wehe: **General Biology**, East West Press Pvt. Ltd.

4. E.L. Jordon and P.S. Verma (1995) **Invertebrate Zoology**, S. Chandra & Co., New Delhi
5. E.L. Jordon and P.S. Verma (1995) **Chordate Zoology**, S. Chandra & Co., New Delhi

**Practical
Botany -1**

1. Vegetative structure and reproductive structure in Sargassum, Yeast, Funaria, Seleginella and Pinus (section cutting of Sargassum and Sleginella, Pinus stem and needles)
2. Dissection and study of any available Monocot flower
3. Dissection and study of any available of Dicot flower

Zoology

1. Cockroach – external and digestive system and reproductive system
2. Frog – external, digestive system, and urogenital system
- a. Morphology of the following (spotters only) – amoeba, Euglena, Hydra, Planaria, Liver Fluke, Tania, Ascaris, earthworm, Prawn, Pila Starfish, Shark, Calotes, Pigeon and rat
3. A. Blood cells of man
4. B. Different types of muscles

Paper II Basic and Applied Ecology

UNIT – I

Ecosystem concept and flow of energy and nutrients:

Ecosystem concept – Biosphere and different ecosystems components of ecosystems- biotic and abiotic factors – Productivity – Primary and secondary – food chain and food web – Trophic relations within and between ecosystems – Ecological pyramids – energy flow through ecosystems – Biogeochemical cycles – Nitrogen and Carbon cycle. Water cycle in the biosphere.

UNIT – II

Resource conservation:

Renewable and non-renewable energy resources solar and wind energy and their utilization. Aquatic resources: Fresh water and marine fish resources and their conservation. Terrestrial resources: forests and agriculture. Wildlife conservation: role of Sanctuaries and National parks. Resources and rural development: Science and Technology for human welfare.

UNIT – III

Environmental pollution and management:

Causes and consequences of air, water, noise and radiation pollution. Pollution indicators – environmental pollution management - legislation – environmental education.

UNIT – IV

Population Biology

Population parameters and their estimation – reproductive effort – Population growth models – species interaction and competition – population – regulation – density dependent and independent.

UNIT V

Environmental Biology and its relevance to human civilization – Population explosion of man and its consequences – Man's interference with nature and its impacts – Deforestation and consequences – silent Valley project and Narmada projects as examples

References:

1. Dasamann, R., Environmental Conservation – III ed
2. Kormondy, J. 1976. Concepts of Ecology – III ed. Prentice – Hall, Engelwood cliffs.
3. Odum, E.P. 1971. Fundamentals of Ecology, W.B. Sanders, Toppan Co.Ltd, Tokyo, Japan.
4. Ehrlich, P.R., J.P Holdreh and R.W. Holm, Man and the Ecosphere, 1989
5. Southwick, C.H. 1976. Ecology and Quality of our Environment, D.Van Nostrand Co. New York.
6. Verma. P.S., and V.K. Agarwal., 1995. Environmental Biology, s. Chand & Co., New Delhi.
7. Sharma, P.D. 2005. Environmental Sciences and Toxicology, Rastogi Publications Meerut.

Practicals:

1. Study of vegetation by quadrat method
2. Estimation of dissolved oxygen in different examples
3. Estimation of salinity oxygen in different examples
4. Estimation of alkalinity oxygen in different examples
5. Soil testing for pH, alkalinity, nitrates and phosphates
6. Study of plant and animal adaptations Plants – Hydrophytic adaptations and xerophytic adaptations Animals – Camouflage in animals (Chameleon, Stick insect, leaf insect, industrial melanism in moths etc.)

Paper III – Biodiversity and Conservation

UNIT I

Biodiversity – introduction concept and scope of Biodiversity. Organization of Biodiversity research in India and in world.

UNIT II

Levels of Biodiversity, Genetic, species and Ecosystem biodiversity Alpha, Beta and Gamma Biodiversity.

UNIT III

Threats to Biodiversity; Loss of Biodiversity – causes and consequences: Hot spots; Mega diversity centers. Role of CITES and ICUN. Red data book categories.

UNIT IV

Measures of Biodiversity – Diversity indices. Dominance and Evenness. Methods of studying Biodiversity (Brief account).

UNIT V

Conservation of Biodiversity – Need for conservation – Methods of conservation in situ and Ex situ conservation. Cryopreservation and germ plasm conservation. Biosphere reserves National parks, Sanctuaries and sacred grooves.

References:

1. An advanced book on Biodiversity – Principles and Practice by K.V. Kirshnamurthy, 2003 – Oxford SIBH publishing co, pvt. Ltd., New Delhi
2. Biodiversity – CPR – Environmental Education center 2003, Chennai.

Practical:

1. By using world and Indian map mark Biodiversity important regions countries and centers.
2. Measuring Biodiversity – Quadrat method using various indices and calculate dominance and evenness.
3. Collection of endemic plants and animals photos with information by using websites, journals, newspapers etc.

Paper IV – Cell Biology

UNIT I :

Cell structure prokaryotic and eukaryotic plant and animal cells – structural features – a brief comparative account. Plasma membrane – Chemistry and ultra structure – Fluid Mosaic model: functions (Brief account only). Protoplasm – Chemistry and organization – microtubules and microfilaments.

UNIT II:

Organelles in Eukaryotes:

Lysosomes – Ultrastructure and functions, types – lysosomal enzymes, Ribosomes – ultrastructure and functions, chloroplast, ultra structure and chemistry, function mechanism of photosynthesis and generation of ATP to be explained briefly.

Mitochondria – ultra structure and functions (brief account) semiautonomy of cell organelles.

UNIT III:

Membrane systems in eukaryotes:

Endoplasmic reticulum and Golgi complex – structure, chemistry, origin and functions to be dealt with briefly. Nucleus – Nuclear envelope-structure chromatin Eu and Hetero chromatin, nucleosomes, chromosomes –Kinds, structure polytene chromosomes – Nucleolus structure and functions.

UNIT IV:

Cell cycle mitosis and meiosis – stages and significance. Cell growth normal and cancerous.

UNIT V

Microscopy:

Light and Electron microscope – a brief account, Subcellular fractionations, ultra centrifugation, differential and density and density centrifugation.Histochemical staining. Protein –mercuric bromophenol blue method (Maziaetal 1953, Ruthmann 1970). Lipid and lipoproteins – Sudan black B method Ruthmann 1970)

References:

1. B. Albert, D. Bray, J. Lewis, M. Raff, K. Roberts and J.D. Watson (1983) Molecular biology of the cell. New York. Garland.
2. E.E.P De Robertis F.A Saez and E.M.P De Robertis (1990) Cell and Biology.
3. K.V, Krishnamuthy (1988) Methods in plant histochemistry S. Viswanathan printers and publishers
4. P.S. Verma and V.K Agarwal (1995) Text book of Cytology. S chand & Co. New Delhi.
5. P.S Verma and V.K. Agarwal (1995) Text book of cell Biology Genetics, Evolution and Ecology, S. Chand & Co., New Delhi.

Practicals:

1. Parts and functions of compound microscope
2. Study of cell inclusions: Starch grains – Smear of potato, banana and rice, *Cystolites* – sections of *Fucus jeaves*, *Sclereids* – Sections of pothos leaves, petioles of *Aracase plants*
3. Study of cell organelles by photomicrographs
4. Study of mitosis by smear technique using *Allium cepa* roots
5. Study of mitosis by using *Rhoco* flower buds
6. Histochemical staining methods – techniques as given in the theory syllabus.