ST.JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS), VISAKHAPATNAM

I SEMESTER **BOTANY** TIME: 4 Hrs/Week

B 1101 (3) **PLANT DIVERSITY - I** Max. Marks: 100

w.e.f:2017-2020('17AE') **(MICROBIAL DIVERSITY, ALGAE, FUNGI & PLANT PATHOLOGY)**

SYLLABUS

OBJECTIVES: To enable the students to –

- Understand the position, classification and structure of prokaryotes
- Understand the position of Thallophyta in the plant kingdom and know the classification of the different groups namely Viruses, Bacteria, Algae, Fungi & Lichens.
- Identify the morphological and reproductive features of different algae and fungi through the study of representative types of various classes.
- Realize the economic importance of Algae and fungi and Bacteria.
- Understand the symbiotic association of Algae & fungi by study of lichens and their economic importance.
- Identify and understand disease cycle of some of the important plant disease and their control measures.

COURSE:

UNIT – I: MICROBIAL DIVERSITY – INTRODUCTION & VIRUSES

1. Introduction to microorganisms-Occurrence and distribution
2. Classification of microorganisms – R.H. Whittaker's five kingdom concept, Carl Woese's- Domain system.
3. Viruses: General characters of Viruses, Classification, Structure and Replication of TMV, Bacteriophage

UNIT – II: Bacteria & Cyanobacteria

1. General characters, Classification, Types, Ultra structure, Nutritional types, Reproduction- Asexual, Sexual- Transformation, Conjugation, Transduction
2. Economic importance of Bacteria
3. **Bacteria** : Brief account of special groups of bacteria- Archaebacteria, Mycoplasma, Chlamydia, Actinomycetes, Rickettsias
4. **Cynobacteria:** General characters (Brief account), Structure and Life history of Nostoc, Scytonema.

UNIT – III: ALGAE:

1. General characters, Thallus organization, Reproduction of Algae.
2. Classification of Algae according to Fritsch system.
3. Structure, reproduction and Life History of following types :
   Chlorophyceae : Oedogonium
   Phaeophyceae : Ectocarpus
   Rhodophyceae : Polysiphonia
4. Economic importance of Algae

UNIT – IV: FUNGI:

1. General characters.
2. Classification of Fungi (Ainsworth system)
3. Structure, Reproduction, Life History and Systematic position of the following types :
   Zygomycotina : Rhizopus
   Ascomycotina : Penicillium
   Basidiomycetes : Puccinia
5. Economic importance of Fungi.

UNIT – V: LICHENS & PLANT PATHOLOGY

1. **Lichens:** Structure, Reproduction, Economic & Ecological importance.
2. **Plant Pathology:** Major symptoms of Fungal, Bacterial and Viral plant diseases. Transmission of plant viruses
3. General Control Measures of Plant diseases.
4. Symptoms, Propagation and Control measures of following diseases.
   Fungal : Green ear of Bajra, Tikka disease of Ground nut, Red rot of Sugar cane.
   Bacterial : Leaf Blight of Rice, Citrus canker
   Viral : Bendi vein clearing, Leaf curl of Papaya.

TEXT BOOKS:

Common Core Botany – Vol. I – I K. Ramakrishna – Sri Vikas Publications, Guntur, 2008.

REFERENCES:

1. Pelczar, M.J. (2001) Microbiology, 5th edition, Tata Mc Graw-Hill Co, New Delhi.
2. The Structure and Reproduction of the Algae – by F.E.Fritsch (1945): Cambridge University Press Cambridge, U.K. Vol. I, Vol.II.
3. Introductory Botany –Vol.I – Srivastava H.N, - Pradeep Publications, JALANDAR 1993.
4. University Botany – Vol-I– Edited by Prof. S. M. Reddy – New Age International Publishing (P) Ltd. DELHI
5. Cryptogamic Botany – Vol – I- G.M.Smith – Tata Mc Graw HILL Publishing co. DELHI.
6. Botany for Degree students-Algae -Vasishta B.R.-S.Chanda & Co. Delhi, 1992.
7. Alexopoulos,C.J.., Mims, C.W. & Blackwell, M. (1996): Introductory Mycology John Wiley& Sons., Inc., N.Y., Chicester, Berisbane, Toronto, Singapore.
8. Botany for Degree students-Fungi -Vasishta B.R.-S.Chanda & Co. Delhi, 1992.
9. Diversity of Microbes & Cryptogams: Singh, V., Pandey PC, Jain D.K – 2006 Rastogi Publications – MEERUT.

** ** **

ST.JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS), VISAKHAPATNAM

I SEMESTER **BOTANY** TIME: 3 Hrs/Week

B 1151 (2) **PLANT DIVERSITY- I** Max. Marks: 50

w.e.f:2017-2020 ('17AE') **(MICROBIAL DIVERSITY, ALGAE, FUNGI & PLANT PATHOLOGY)**

PRACTICAL SYLLABUS – I A

OBJECTIVES: To enable the students to –

- Acquire the laboratory techniques of preparation of slides for study of algal and fungal forms.
- Identify and distinguish between the different algal types, fungal types & prokaryotes included in the syllabus.
- Identify some importance plant diseases through the symptoms.

COURSE:

1. Study of Bacteria, Virus using electron micro Photographs / slides.
2. A. **Cynobacteria** – Oscillatoria, Nostoc and Scytonema

   B. Vegetative and reproductive structure of the following with the help of micro preparation by students, Specimens & Permanent slides.

   Algae: Oedogonium, Ectocarpus & Polysiphonia.

   Fungi: Rhizopus, Pencillium, Puccinia.
3. Section cutting of diseased material infected by Fungi and identification of Pathogens per theory syllabus.
4. **Lichens:** Different types of thalli, Anatomy, and Reproductive structure.
5. **Plant Pathology:** Drawings and identification of Pathological Specimens.

   Fungal: Green ear of Bajra, Tikka disease of Ground nut, Red rot of Sugar cane.

   Bacterial: Leaf Blight of Rice, Citrus Canker

   Viral: Bendi vein clearing, Leaf curl of Papaya.

REFERENCES:

1. Practical Botany- Vol.I H.N.Srivastava (1991) – Pradeep Publications, Jalandhar.
2. A Text Book of Practical Botany – Vol.I (227) – Bendre & Kumar – Rastogi Publications, Delhi.

** ** **

ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM

IV SEMESTER **BOTANY** TIME: 4 Hrs/week

B 4101(3) **PLANT PHYSIOLOGY & METABOLISM** Max. Marks: 100

W.e.f. 2016 – 2019 ('16AD') **SYLLABUS**

OBJECTIVES: To enable the students to

1. Understand the physical aspects of plant physiology.
2. Understand the metabolic processes in plants.
3. Get an insight into growth and developmental aspects of plants.

COURSE:

UNIT – I: PLANT WATER RELATIONS

1. Water relations : Importance of water to plant life; Physical properties of water
2. Diffusion, imbibition and osmosis; concept of water potential - osmotic and pressure Potentials
3. Water absorption and transport of water; Ascent of sap: Mechanism; cohesion-tension theory.
4. Transpiration – Types, Stomata Structure; movements.

UNIT – II: MINERAL NUTRITION & ENZYMES

1. Mineral Nutrition – Essential macro and micro nutrients and their role
2. Symptoms of mineral deficiency
3. Mineral Absorption – Passive and active processes.
4. Enzymes: nomenclature, characteristics, brief outline of IUB classification of enzymes ; Mechanism and regulation of enzyme action, factors effecting enzyme action.

UNIT – III: PHOTOSYNTHESIS

1. Photosynthesis: Photosynthetic pigments; Absorption and Action spectra; Red drop and Emerson Enhancement effect;
2. Concept of two Photosystems, Mechanism of Photosynthetic electron transport and evolution of oxygen; Photophosphorylation .
3. Carbon assimilation pathways, Caivin cycle (C_3), C_4 pathway, CAM Cycle.
4. Photorespiration
5. Translocation of organic substances: Mechanism of Phloem transport; Source-Sink relationship

UNIT – IV: PLANT METABOLISM

1. Respiration : Aerobic & Anaerobic –Glycolysis, Kreb's cycle; Electron transport System ; Oxidative Phosphorylation-Mechanism
   Pentose Phosphate Pathway
2. Nitrogen metabolism: Biological Nitrogen fixation; Nitrate reduction; Ammonium assimilation – Amino acid synthesis .
   Protein synthesis
3. Lipid metabolism : Structure & functions of lipids, Fatty acid oxidation; β -oxidaiton ; Conversion of lipids to carbohydrates – Glyoxylate Cycle

UNIT – V: GROWTH AND DEVELOPMENT

1. Growth – Definitions, Phases and Kinetics of growth.
2. Phytohormones – Physiological effects of Auxins, Gibberillins, Cytokinins, ABA, Ethylene and Brassinosteroids.
3. Development: Physiology of flowering – Photoperiodism; Role of phytochrome in flowering, Vernalization.
4. Stress Physiology: Concept and Plant responses to water, salt and temperature stress.
5. Physiology of Scenescence and Ageing, Seed Dormancy, Methods to break Seed Dormancy

TEXT BOOK:

K. Ramakrishna & B.R.C Murthy 2006 – A Text Book of Common Core Botany – Vol.IV – Sri Vikas Publications, Guntur.

REFERENCE BOOKS:

1. Nogg;e G.R. & Fritz G.A.- 1996 – Introductory Plant Physiology – Prentice Hall of India Pvt Ltd., New Delhi.
2. Salisbury, F.B.& Ross C.W. – 1992 – Plant Physiology CBS Publishers & Distributors, Delhi.
3. Delvin, R.M.(2000) Plant Physiology. CBS Publishers & Distributors, New Delhi.
4. Srivastava, H.N. – 2004 – Plant Physiology – Pradeep Publications, Jalandhar.
5. Mayer, Anderson & Bonning(1965): Introduction to Plant Physiology D.Van Nostrand . Publishing Co., N.Y.
6. Mukherjee, S. A.K. Ghosh(1998) Plant Physiology ,Tata McGraw Hill Publishers(P) Ltd., New Delhi.

** ** **

ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM

IVSEMESTER **BOTANY** TIME: 3 Hrs/week

B 4151 (2) **PLANT PHYSIOLOGY & METABOLISM** Max. Marks: 50

W.e.f. 2016 – 2019("16AD") **PRACTICAL SYLLABUS – II B**

OBJECTIVES: To enable the student to

1. Perform experiments, record observations, analyse the results and draw conclusions of different physiological processes.
2. Understand the principle of experiments related to plant metabolism, growth & development.

COURSE:

MAJOR EXPERIMENTS

1. Determination of osmotic potential of cell sap of Rhoeo leaves by Plasmolytic method.
2. Determination of Relative rates of transpiration by Cobalt Chloride paper method
3. Determination of Stomatal frequency using epidermal peelings/impressions
4. Effect of Temperature on membrane permeability by colorimetric method.
5. Photosynthesis –
   a. Measurement of photosynthesis by Hydrilla – funnel experiment
   b. Study of the effect of different factors (Co_2, Light and temperature) on photosynthesis
6. Separation of Chloroplast pigments using Paper chromatography
7. Determination of Respiratory Quotient
8. Determination of Catalase Enzyme activity.
9. Estimation of protein.

MINOR EXPERIMENTS

1. Demonstration of osmosis using egg membrane/ Potato osmoscope.
2. Measurement of transpiration by simple potometer.
3. Hydroponics (Solution Culture)
4. Demonstration of ascent of sap/Transpiration pull.
5. Study of mineral deficiency symptoms using plant material/photographs.
6. Demonstration of oxygen evolution in photosynthesis using Wilmott' bubbler.
7. Measurement of growth by Arc Auxanometer.
8. Effect of Biofertilizer on plant growth

REFERENCE BOOK

Bender, A & Kumar 2005 – Practical Botany – Vol.II – Rastogi Publications, Jalandhar.

** ** **

ST.JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS), VISAKHAPATNAM

II SEMESTER **BOTANY** TIME: 4Hrs/Week

B 2101 (3) **PLANT DIVERSITY – II** Max.Marks: 100

(DIVERSITY OF ARCHIGONIATES & PLANT ANATOMY)

w.e.f 2017-2020 ("17AE") **SYLLABUS**

OBJECTIVES: To enable the students to –

- Know the systematic position of the two Cryptogamic group namely Bryophyta & Pteridophyta and their classification.
- Understand the life history of Bryophyta & Pteridophyta through the study of representative types.
- Assess the phylogenetic aspects of the two groups.
- Get an insight into geological past, extinct plants
- Understand the systematic position of the Spermatophyta group 'Gymnosperms' and the structural and reproductive features of the representative types.
- Understand the tissues, tissue system in plant body and the anatomy.
- Know the wood structure and the features of some local timber yielding plants

COURSE:

UNIT I: BRYOPHYTA:

1. Geological Time Scale
2. General characters, classification and alternation of generations of Bryophyta.
3. Structure, reproduction, life history and systematic position of following types :
   i. Marchantia ii. Funaria
4. Evolution of sporophyte in Bryophyta

UNIT II: PTERIDOPHYTA:

1. General characters, Classification
2. Structure, reproduction, life history and systematic position of following types :
   i. Lycopodium ii. Marsilea
3. Stelar evolution in Pteridophyta,
4. Heterospory and Seed habit.

UNIT III: GYMNOSPERMS:

1. Bennettitales : General Account
2. General characters, classification and economic importance of gymnosperms.
3. Morphology, anatomy, reproduction and life history of
   i) *Pinus* *ii) Gnetum*

UNIT IV: Tissues and Tissue systems

1. Meristems - Root and Shoot apical meristems and their histological organization.
2. Tissues – Meristematic and permanent tissues (simple, complex, secretory)
3. Tissue systems–Epidermal, ground and vascular.

UNIT V: Secondary growth

1. Anomalous secondary growth in *Achyranthes, Boerhaavia* and *Dracaena*.
2. Study of local timbers of economic importance-Teak, Rosewood, Red sanders and Arjun (Tella maddi).

TEXT BOOKS:

Common Core Botany – Vol.I & Vol. II– K.Ramakrishna & B.R.C.Murthy – Sri Vikas Publications, Guntur, 2008.

REFERENCES:

1. Introductory Botany – Vol. I & II – Srivastava, H.N. – Pradeep Publications, Jalandhar.1993
2. College Botany – Vol.I – Gangulee & Kar – Central Book Depot, Calcutta.
3. Botany for degree students – Bryophyta – B.R.Vasishta – S.Chand & Co. 1992
4. Botany for degree students – Pteridophyta – P.C.Vasishta – S.Chand & Co. 1992
5. Botany for degree students – Gymnospersm – P.C.Vasishta – S.Chand & Co. 1992
6. Morphology of Pteridophytes – K.R.Sporne – Hutchinson Univeristy Library, London.
7. Morphology of Gymnosperms – K.R.Sporne – Hutchinson University Library, London.
8. Diversity of Microbes & Cryptogams – Singh, V.Pande P.C., Jain D.K.2006. Rastogi Publications. - Meerut.
9. Smith, G.M. (1955): Cryptogamic Botany Vol. II. (2nd Edition) (Bryophytes & Pteridophytes) Tata McGraw Hill Publishing Co., New Delhi.
10. Eames, A.J., & Mc Daniels, L.H.(1979) : An Introduction to Plant anatomy Tata-McGraw-Hill Publishing Co., (P) Ltd. Bombay, New Delhi.
11. Esau. K.(1980) : Plant Anatomy, (2nd Edition) Wiley Eastern Ltd., New Delhi.

** ** **

ST.JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) , VISAKHAPATNAM

II SEMESTER **BOTANY** TIME: 3 Hrs/Week

B 2151 (2) **PLANT DIVERSITY – II** Max. Marks : 50

(DIVERSITY OF ARCHIGONIATES & PLANT ANATOMY)

w.e.f 2017-2020 ("17AE") **PRACTICAL SYLLABUS – I B**

OBJECTIVES : To enable the students to –

- Acquire and practice the laboratory techniques of section cutting, slide preparation etc. for the study of Bryophyta, Pteridophyta & Gymnosperms.
- Understand the aspects of structure and reproduction of representative forms and
- Identify the specimens and slides related to structure and reproduction of representative forms.
- To enable the students to make suitable preparations / handmade slides in the laboratory for the study of the anatomy of the plant organs.

COURSE:

BRYOPHYTA

Study of external and internal morphology; reproductive structures of following types :

1. Marchantia
2. Funaria

PTERIDOPHYTA

Study of external and internal morphology; reproductive structures of following types:

1. Lycopodium
2. Marsilea

GYMNOSPERMS

Study of morphology of vegetative and reproductive parts of following types :

1. Pinus
2. Gnetum

ANATOMY

1. Shoot apex organization.
2. Tissues
3. Stomatal types
4. Secondary structure of Stem : Pongamia
5. Demonstration of double staining technique
6. Study of anomalous secondary growth by double stained slides of Achyranthus, Boerhavia, Bignonia, Dracaena; Important timber plants

REFERENCES:

1. Practical Botany – Vol. I & II – Srivastava H.N. – Pradeep Publications, Jalandhar., 1991
2. Text Book of Practical Botany – Vol.I & II– Ashok Bendre & Ashok Kumar – Rastogi Publications, Meerut., 2006

** ** **

ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM

V SEMESTER **BOTANY** TIME: 3Hrs/week

B 5102(3) **ECOLOGY & PHYTOGEOGRAPHY** Max. Marks: 100

W.e.f. (2017 – 2018) '15AC' Batch **SYLLABUS**

OBJECTIVES: To enable the students to

1. understand basic concepts of Ecology and environment.
2. understand the morphological, anatomical and physiological responses of plants to the environmental factors.
3. understand the importance of community ecology and ecological succession.
4. know the significance of Phytogeography and understand the phtogeographical regions of India

COURSE:

UNIT – I: Concepts and Ecosystem Ecology

1. Introduction to Ecology: definition, branches and significance of ecology.
2. Ecosystem Ecology
   a. Concepts and components (Abiotic and biotic)
   b. Food chains, Food webs, Ecological pyramids, Energy flow
   c. Bio-geo-chemical cycles of carbon, nitrogen and phosphorus.
3. Productivity of ecosystem-Primary, Secondary and Net productivity.
4. Methods to estimate Primary productivity

UNIT – II: Elements of Ecology

1. Climatic Factors: Light, Temperature, precipitation.
2. Edaphic Factor: Origin, formation, composition and soil profile.
3. Biotic Factor: Interactions between plants and animals.
4. Ecological Adaptations of Plants
   a) Hydrophytes
   b) Xerophytes

UNIT – III: Population & Community Ecology

1. Population – Definition, Population Characteristics-Natality, Mortality, Growth curves, ecotypes, ecads
2. Plant Communities – characteristics of a community – Frequency, Density, Cover, and basal area, dominance, life forms, Biological spectrum, Important Value Index (IVI), competition
3. Methods to Study Plant Communities.

UNIT – IV: PHYTOGEOGRPHY:

1. Principles of Phytogeography, Distribution (wides, endemic, discontinuous species)
2. Phytogeographic regions of India.
3. Phytogeographic regions of World.
4. Endemism – types and causes

UNIT – V: PLANT BIODIVERSITY AND ITS IMPORTANCE

1. Definition, levels of biodiversity-genetic, species and ecosystem.
2. Biodiversity hotspots- Criteria, Biodiversity hotspots of India.
3. Loss of biodiversity – causes and conservation (*In-situ* and *ex-situ* methods).
4. Seed banks - conservation of genetic resources and their importance
5. Role of Organizations in the conservation of biodiversity – IUCN, UNEP, WWF, NBPGR, NBD.

SUGGESTED ACTIVITY: Collection of different soils, studying their texture, observing polluted water bodies, student study projects, debates on man's activity on ecosystem and biodiversity conservation methods, visiting a nearest natural vegetation area. Visit to NGO, working in the field of biodiversity and report writing; to study Honey Bees and plants yielding honey.

TEXT BOOK:

*K. Ramakrishna & B.R.C Murthy (2011) Text Book of Common Core Botany – Vol.II – Vikas Publications. Guntur. (*Subject to revision in 2017)

REFERENCE BOOKS:

1. Plant Ecology – R.S. Ambast – Students friends & Co., Varanasi, India – 1988.
2. Ecology & Environment – P.D. Sharma – Rastogi Publications, Meerut – 2001.
3. A. Treatise on Plant Ecology – K.N. Bhatia & Sharma K.K. – Pradeep Publications, Jalandhar – 1991.
4. Textbook of Environmental Studies of Undergraduate Courses. Bharucha, E.Universities Press (I) Pvt.Ltd., Hyderabad 2005
5. Concepts of Ecology, Kormondy, E.Prentice Hall of India, New Delhi 1989
6. Ecology, Michael S. Oxford University Press, London 1996.
7. Basics of Ecology Odum, E.P. Saunders Intenational Students Edition, Philadephia 1983
8. Elements of Ecology, Sharma P.D. Rastogi Publications, Meerut 1989
9. Environmental Biology Singh H.R, .S.Chand & Co. Ltd. New Delhi 2005
10. Kochhar, P.L. (1975): Plant Ecology. (9th Edn.,) New Delhi, Bombay, Calcutta-226pp.,
11. Kumar, H.D. (1992): Modern Concepts of Ecology (7th Edn.,) Vikas Publishing Co., New Delhi.
12. Kumar H.D. (2000): Biodiversity & Sustainable Conservation Oxford & IBH Publishing 10. Co Ltd. New Delhi.
13. Chapman, J.L&M.J. Reiss (1992): ecology (Principles & Applications). Cambridge University Press, U.K.

** ** **

ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM

V SEMESTER **BOTANY** TIME: 3Hrs/week

B 5152 (2) **ECOLOGY & PHYTOGEOGRAPHY** Max. Marks: 50

w.e.f. (2017 – 2018) '15AC' Batch **PRACTICAL- III B**

OBJECTIVES: To enable the students

- learn the quantitative aspects of a plant community by quadrat method
- study various aspects of plant communities.
- Acquire knowledge of the Phytogeography and biodiversity of the region

COURSE:

1. Study of instruments used to measure microclimatic variables; soil thermometer, Maximum and Minimum thermometer, Anemometer, Psychrometer, Rain gauze, and Lux meter.
2. Permeability (percolation; total capacity as well as rate of movement) of different soil samples.
3. Determination of soil pH
4. Study of morphological and anatomical characteristics of hydrophytes and xerophytes

   Hydrophytes - Hydrilla, Eichhornia, Pistia, Nympaea, Utricularia,Vallisnaria

   Xerophytes - Cocoloba, Opuntia, Euphorbia, Asparagus, Ruscus, Acacia melanoxylon, Casuarina
5. Quantitative Analysis of Herbaceous Vegetation: Study of frequency, density, abundance and biomass.
6. Study of Phytoplankton and macrophytes from water bodies.
7. Study of species diversity index of vegetation.
8. Estimation of Primary Productivity of an ecosystem
9. To study field vegetation with respect to stratification, canopy cover and composition.
10. To locate the hotspots, phyto geographical regions and distribution of endemic plants in the map of India.
11. The following practical should be conducted in the Field/lab with the help of photo-graphs, herbarium, Floras, Red data book- Study of endangered plants species, critically endangered plants species, vulnerable plant species and monotypic endemic genera of India.
12. Minimum of two field visits to local areas of ecological / conservation of biodiversity importance (Sacred grove / reserved forest / botanical garden / zoo park / lake etc.)

REFERENCES:

1. Text book of Practical Botany (Vol .II) – Ashok Bendra & Kumar, Rastogi Publications, Meerut – 2001-2002
2. Practical Botany (Vol.II) – H.N. Srivastava, Pradeep Publications, Jallandhar – 200.
3. Modern Practical Botany – B.P.Pandey – S.Chand & Co., New Delhi – 1988.

** ** **

ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM

VI SEMESTER **BOTANY** TIME:4Hrs/week

B-A3-6102(3) **MEDICINAL BOTANY & PHARMACOGNOCY** Marks:100

w.e.f.(2018 – 2019) '16AD' Batch **SYLLABUS**

OBJECTIVES: To enable the students to

1. Understand the importance of Medicinal plants in primary health care
2. Understand the role of medicinal plants in modern medicine
3. Learn different systems of traditional medicine
4. Get an insight into identify drug adultration and methods of drug evaluation
5. Gain knowledge about the production and applications of secondary metabolites

COURSE

UNIT – I: Importance of Medicinal Plants.

1. History, Scope and Importance of Medicinal Plants.
2. Significance of the following plants in primary health care practices along with their habitat and morphology

a) *Azadirachta indica*, b) *Ocimum sanctum*, c) *Vitex negundo*,
d) *Tribulus terrestris,* e) *Phyllanthus niruri ,* f) *Aloe vera*
g) *Senna auriculata* h) *Curcuma longa,* *i) Andrographis paniculata*

UNIT – II: Role of Medicinal Plants in modern Medicine

Role of Medicinal plants in modern medicine with special examples of

a) Rauvolfia sepentina, *b) Trichopus zeylanicus*, c) *Artemisia annua,*
d) Withania somnifera, *e) Catharanthus roseus,* *f) Gymnima sylverstris*

UNIT-III: Traditional Medicinal Systems

1. **Ayurveda** : Definition and Scope, History, origin. panchamahabhutas, saptadhatu and tridosha concepts, Rasayana, plants used in ayurvedic treatments.
2. **Unani**: History, Basic concepts: treatments/ therapy, polyherbal formulations (in brief).
3. **Homeopathy**: History, Basic concepts, Treatment/ Therapy, Drugs & dosage

UNIT – IV: Pharmacognosy:

1. Pharmacognocy-Definition, Importance,
2. Classification of drugs - Chemical and Pharmacological,
3. Drug Adulteration,
4. Drug evaluation methods

UNIT– V: Organoleptic studies and Secondary metabolites

1. Organoleptic and microscopic studies with reference to nature of active principles and common adulterants of
   a) Alstonia scholaris(bark), b) *Adhatoda vasica*(leaf), c) *Strychnos nuxvomica*(seed), and *d) Zinziber officinalis*
2. Secondary Metabolites: Definition of primary and secondary metabolites and their differences, major types - terpenes, phenolics, alkaloids, terpenoids, steroids.
3. A brief idea about extraction of alkaloids.
4. Origin of secondary metabolites – detailed account of mevalonate pathway.

Suggested Activities: Isolation techniques of active principles from various parts of popular medicinal plants, debates on the efficacy of plant medicines and palliative cure, volatile oils from plants-extraction methods, project work on crude drugs

BOOKS FOR REFERENCE:

1) S.K. Jain, Manual of Ethnobotany, Scientific Publishers, Jodhpur, 1995.
2) Glimpses of Indian. Ethnobotny, Oxford and I B H, New Delhi – 1981.
3) S.K. Jain (ed.) 1989. Methods and approaches in ethnobotany. Society of ethnobotanists, Lucknow, India.
4) Trivedi P C, 2006. Medicinal Plants: Ethnobotanical Approach, Agrobios, India
5) Purohit and Vyas, 2008. Medicinal Plant Cultivation: A Scientific Approach, 2nd edn. Agrobios, India.
6) Wallis, T. E. 1946. Text book of Pharmacognosy, J & A Churchill Ltd. 2. Roseline, A. 2011. Pharmacognosy. MJP Publishers, Chennai.
7) Gurdeep Chatwal, 1980. Organic chemistry of natural productis. Vol.I.Himalaya Publishing house.
8) Kalsi, P. S. and Jagtap, S., 2012. Pharmaceutical medicinal and natural product chemistry N.K. Mehra . Narosa Publishing House Pvt. Ltd. New Delhi.
9) Agarwal, O. P. 2002. Organic chemistry–Chemistry of organic natural products. Vol. II. Goel publishing house , Meerut.
10) Harborne, J. B. 1998. Phytochemical methods –a guide to modern techniques of plant analysis 3 rd edition, Chapman and Hall.
11) Datta & Mukerji, 1952. Pharmacognosy of Indian roots of Rhizome drugs. Bulletin No.1 Ministry of Health, Govt. of India.

** ** **

ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNA

VI SEMESTER **BOTANY** TIME:2Hrs/week

B-A3-6152 (2) **MEDICINAL BOTANY & PHARMACOGNOCY** Marks: 50

w.e.f. (2018 – 2019) '16AD' Batch **PRACTICAL SYLLABUS –** A3

OBJECTIVES: To enable the students to-

- Identify various locally available medicinal plants
- Test unorganised drugs
- Identification of plant drugs of different sources
- Gain hands on experience in using instruments used in drug extraction

1. Identification of plants in Primary health care
2. Identification of plants used in modern medicine
3. Physical and chemical tests for evaluation of unorganized drugs- Asaphoetida. Honey, Castor oil. Acacia
4. Identification of bark drugs – cinchona, cinnamom
5. Identification of fruit drugs – Cardamom, Coriander
6. Identification of root and rhizome drugs- Ginger, Garlic, Turmeric
7. Identification of whole plant – Aloes, Punarnava catharanthus
8. Instruments used in plant drug extraction
9. Herbarium of medicinal plants (minimum of 20 platns)
10. Collection of locally available crude drugs from local venders (minimum of 20)

Domain skills expected to achieve: Identification of various plant parts used as medicines, extraction of active principles from them, isolation by chromatographic techniques, learning callus culture techniques for secondary metabolite enrichment and understanding ethno-pharmacological principles

** ** **

ST.JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS), VISAKHAPATNAM

III SEMESTER **BOTANY** 4 Hrs/Week

B 3101 (3) **PLANT DIVERSITY – III** Max. Marks: 100

w.e.f 2016-2019("16AD") **(ANGIOSPERMS – TAXONOMY & EMBRYOLOGY)**

OBJECTIVES: To enable students to

1. Understand the principles of taxonomy and the modern trends in Plant taxonomy
2. Realize the diversity of families of angiosperms
3. Understand various aspects of embryology of Plants

COURSE: PLANT TAXONOMY

UNIT – I: INTRODUCTION TO PLANT TAXONOMY

1. Fundamental components of taxonomy - identification, nomenclature, classification
2. Taxonomic resources: Herbarium- technique, functions & important herbaria, Botanical gardens, Flora, Keys- single access and multi-access.
3. Botanical Nomenclature- Principles and rules of ICBN - ranks and names; principle of priority, binomial system; type method, author citation, valid-publication.
4. Modern trends in Taxonomy – Chemotaxonomy, Cytotaxonomy and Numerical taxonomy

UNIT – II: TAXONOMIC CLASSIFICATION

1. Types of classification- Artificial, Natural and Phylogenetic.
2. Bentham & Hooker's system of classification- merits and demerits.
3. Engler & Prantle's system of classification- merits and demerits
4. Phylogeny – origin and evolution of Angiosperms, APG System (Brief account)

UNIT – III: DIVERSITY OF ANGIOSPERMS – I

Systematic study and economic importance of plants belonging to the following families: Annonaceae, Brassicaceae, Rutaceae, Fabaceae, Caesalpiniaceae, Cucurbitaceae, Apiaceae

UNIT – IV: DIVERSITY OF ANGIOSPERMS – II

Asteraceae, Apocynaceae, Lamiaceae, Amaranthaceae, Euphorbiaceae, Orchidaceae, Arecaceae & Poaceae.

UNIT – IV: EMBRYOLOGY: History & Importance of Embryology

1. Anther: Structure and development of anther; Microsporogenesis, Development of male gametophyte.
2. Ovule: Structure, Types of ovules, Megasporogenesis, Female gametophyte – Structure, Types, development of Monosporic, Bisporic and Tetrasporic types of embryo sacs..
3. Pollination & Fertilization : Types of Pollination, A brief account of self-incompatability; Fertilization
4. Endosperm : Types : Nuclear, Cellular and Helobial
5. Embryo : Embryogenesis; Development of Dicot and Monocot embryo; Polyembryony, Apomixis, Parthenocarpy

TEXT BOOK: A Text Book of Common Core Botany – Vol. II & III (2011) – Sri Vikas Publications – Guntur.

REFERENCE BOOKS:

1. Lawrence, G.H.M. (1953): Taxonomy of Vascular Plants, Oxford & IBH Publishers, New Delhi, Calcutta.
2. Jefferey, C.(1968) : An Introduction to Plant Taxonomy J.A. Churchill, London.
3. Mathur, R.C.(1970) : Systematic Botany (Angiosperms) Agra Book Stores- Lucknow, Ajmer, Allahabad, Delhi.
4. Maheswari,P(1963) :Recent Advances in the Embryology of Angiosperms(Ed.,) International Society of Plant Morphologists- University of Delhi.
5. Swamy. B.G.L. & Krishnamoorthy. K.V.(1980):From flower to fruit Tata McGraw Hill Publishing Co., Ltd., New Delhi.
6. Maheswari, P.(1985):An Introduction to the Embryology of Angiosperms Tata McGraw Hill Publishing Co.,Ltd., New Delhi.
8. Bhojwani, S.S. & Bhatnagar, S.P. (2000) : The Embryology of Angiosperms (4th Edition) Vikas Publishing House(P)Ltd., UBS Publisher's Distributors, New Delhi.

** ** **

ST.JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS), VISAKHAPATNAM

III SEMESTER **BOTANY** 3 Hrs/Week

B 3151 (2) **PLANT DIVERSITY – III** Max. Marks: 50

w.e.f 2016-2019("16AD") **(Angiosperms – Taxonomy & Embryology)**

PRACTICAL SYLLABUS – II A

OBJECTIVES:

1. Understand the angiospermic plant diversity and identify the members of the representative families through taxonomic observations.

2. To make the students understand and identify the different stages in reproduction leading to seed formation in angiosperms.

I. SYSTEMATICS OF ANGIOSPERMS:

1. Demonstration of herbarium techniques.
2. Study of Angiospermic plant diversity through taxonomic observations of locally available plant specimens belonging to the following families.

Dicotyledonae

3. **Polypetalae :** Annonaceae, Brassicacae, Rutaceae, Fabaceae Caesalpiniaceae, Cucurbitaceae, Apiaceae
4. **Gamopetalae :** Asteraceae, Apocynaceae, Lamiaceae.
5. **Monochlamydeae :** Amaranthaceae, Euphorbiaceae

Monocotyledonae :

6. Orchidaceae, Arecaceae, Poaceae.

II. ANGIOSPERMS - EMBRYOLOGY

Study of embryological stages through permanent slides or hand made preparations.

1. Stages in Microsporogenesis
2. Structure of pollen grains using whole mounts (*Catharanthus, Hibiscus, Acacia*, Grass and Calotropis).
3. Pollen viability test *in- vitro* germination (*Catharanthus*).
4. Ovule types and developmental stages of embryo sac using permanent slides /Photographs.
5. Embryo Sac
6. Pollen germination on stigma
7. Endosperm – Types: nuclear and cellular
8. Embryo Development – Dicot, Monocot using permanent slides / Photographs
9. Isolation and mounting of embryo (using *Symopsis / Senna* / *Crotalaria*)

III. FIELD WORK:

1. Field visits.
2. Study of local flora and submission of Field Note Book.

REFERENCES:

1. Practical Botany – Vol.II (2008). Bendre & Kumar Rastogi publications, Meerut.
2. Modern Practical Botany – Vol.II (2007). B.P.Pande S. Chand & Co., New Delhi.

** ** **

ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM

VI SEMESTER **BOTANY** TIME:3 Hrs/week

B-A2-6102(3) **PLANT TISSUE CULTURE AND ITS BIOTECHNOLOGICAL APPLICATIONS** Marks:100

W.e.f.(2017 – 2018) AC Batch **SYLLABUS**

OBJECTIVES: To enable the students to

1. Understand the basic principles of plant tissue culture
2. Understand the methods in biotechnology
3. Learn different culture techniques
4. Get an insight into Recombinant DNA technology and Methods of gene transfer.
5. Gain knowledge about the applications of Biotechnology

COURSE:

UNIT- I: PLANT TISSUE CULTURE – 1

1. History of plant tissue culture research - basic principles of plant tissue callus culture, meristem culture, organ culture, Totipotency of cells, differentiation and dedifferentiation.
2. Methodology - sterilization (physical and chemical methods), culture media, Murashige and Skoog's (MS medium), phytohormones, medium for micro-propagation/clonal propagation of ornamental and horticulturally important plants.
3. Callus subculture maintenance, growth measurements, morphogenesis in callus culture – organogenesis, somatic embryogenesis.

UNIT – II: PLANT TISSUE CULTURE – 2

1. Endosperm culture – Embryo culture -culture requirements – applications, embryo rescue technique.
2. Production of secondary metabolites.
3. Cryopreservation; Germ plasm conservation.

UNIT – III: Recombinant DNA technology

1. Restriction Endonucleases (types I-IV, biological role and application); concepts of restriction mapping.
2. Cloning Vectors: Prokaryotic(pUC 18, pBR322,Ti plasmid and Lambda phage, Eukaryotic Vectors (YAC and briefly PAC)
3. Gene cloning (Bacterial Transformation and selection of recombinant clones, PCR mediated gene cloning)
4. Construction of genomic and cDNA libraries, screening DNA libraries to obtain gene of interest by complementation technique, colony hybridization.

UNIT – IV: Methods of gene transfer

1. Methods of gene transfer- Agrobacterium-mediated, direct gene transfer by Electroporation, Microinjection, Micro projectile bombardment.
2. Selection of transgenics– selectable marker and reporter genes (Luciferase, GUS, GFP).

UNIT – V: Applications of Biotechnology

1. Applications of Plant Genetic Engineering – crop improvement, herbicide resistance, insect resistance, virus resistance.
2. Genetic modification – transgenic plants for pest resistant (Bt-cotton);herbicide resistance (Round Up Ready soybean); improved agronomic traits - flavr Savr tomato, Golden rice); Improved horticultural varieties (Moon dust carnations)

Text Book: Botany-Plant tissue culture and its biotechnological applications, by B. R. C. Murthy & V. S. T. Sai, Venkateswara Publications, Guntur, 2017

Books for Reference:

1. Pullaiah. T. and M.V.Subba Rao. 2009. Plant Tissue culture. Scientific Publishers, New Delhi.

2. Bhojwani, S.S. and Razdan, M.K., (1996). Plant Tissue Culture: Theory and Practice. Elsevier Science Amsterdam. The Netherlands.

3. Glick, B.R., Pasternak, J.J. (2003). Molecular Biotechnology- Principles and Applications ofrecombinant DNA. ASM Press, Washington.

4. Bhojwani, S.S. and Bhatnagar, S.P. (2011). The Embryology of Angiosperms. VikasPublicationHouse Pvt. Ltd., New Delhi. 5th edition.

5. Snustad, D.P. and Simmons, M.J. (2010). Principles of Genetics. John Wiley and Sons, U.K. 5th edition.

6. Stewart, C.N. Jr. (2008). Plant Biotechnology & Genetics: Principles, Techniques and Applications. John Wiley & Sons Inc. U.S.A.

Suggested Activities: In vitro initiation of callus on artificial medium, seminars on utilization of rDNA technology, debates on applications of Biotechnology (whether it is a boon or bane to the society) studying growth patterns, vegetative characteristics of Bt.cotton and identifying the features of its pest resistance

** ** **

ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNA

VI SEMESTER **BOTANY** TIME:2 Hrs/week

B-A2-6152 (2) **PLANT TISSUE CULTURE &PLANT BIOTECHNOLOGY** Max. Marks: 50

w.e.f. 'U' (2017 – 2018) Batch **PRACTICAL SYLLABUS – IV C**

COURSE:

1. (a) Preparation of MS medium.
   (b) Demonstration of in vitro sterilization methods and inoculation methods using leaf and nodal explants of Tobacco/ Datura/ Brassica etc.
2. Study of embryo culture, micro propagation of Banana, somatic embryogenesis, artificial seeds through photographs.
3. Construction of restriction map of circular and linear DNA from the data provided.
4. Study of methods of gene transfer through photographs: Agrobacterium-mediated, direct gene transfer by electroporation, microinjection, and micro projectile bombardment.
5. Different steps involved in genetic engineering for production of Bt. cotton, Golden rice, Flavr Savr tomato through photographs.
6. Isolation of plasmid DNA.
7. Restriction digestion and gel electrophoresis of plasmid DNA (optional)
8. Field visit to a lab involved in tissue culture
9. Study project under supervision of lecturer – tissue culture/ genetic engineering

Expected domain skills to be achieved: Ability to prepare artificial nutrient media, preparing independently, applying various sterilization procedures for media, glassware and biological materials, in vitro propagation of Banana callus, morphogenesis--s, clonal propagation methods, isolation of plasmid DNA individually and as a group.

** ** **

ST.JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) , VISAKHAPATNAM

VI SEMESTER **BOTANY** TIME:4Hrs/Week

B-E1-6102 (3) **ANATOMY, NURSERY, GARDENING AND FLORICULTURE** Marks:100

w.e.f. 2018-2019 (AD batch) **SYLLABUS**

OBJECTIVES: To enable the students to –

- Understand the tissues, tissue system in plant body and the anatomy.
- Know the wood structure and the features of some local timber yielding plants
- Gain knowledge in Nursery management, Gardening and Landscaping methods
- Learn methods of propagation and Bonsai technique
- Know different types of plants and understand cultivation and harvest practices of flowering crops

UNIT – I: Anatomy: Tissues and Tissue systems

1. Meristems - Root and Shoot apical meristems and their histological organization.
2. Tissues – Meristematic and permanent tissues outlines of (simple, complex, secretory)
3. Tissue systems **–** Epidermal, ground and vascular.

UNIT – II: Secondary growth

1. Anomalous secondary growth in *Boerhaavia* and *Dracaena*.
2. Study of local timbers of economic importance Teak, Rosewood, Red sanders and Arjun (Tella maddi).

UNIT – III: Nursery & Gardening

1. Definition, scope and Planning of nursery.
2. Nursery Management – Management of Soil , water, manures and fertilizers, pests & diseases
3. Different types of gardening; Some Famous gardens of India
4. Gardening operations: soil laying, manuring, watering.
5. Landscaping and home gardening - parks and its components, plant materials and design.

UNIT – IV: Methods of Propagation

1. Sowing/ raising of seeds and seedlings, transplanting of seedlings.
2. Air-layering, cutting, selection of cutting , propagule collecting season, treatment of cutting, rooting medium and planting of cuttings – Hardening of plants.
3. Propagation of ornamental plants by rhizomes, corms tubers, bulbs and bulbils
4. Green house - mist chamber, shed root, shade nets and glass house for propagation.
5. Bonsai Technique.

UNIT – V: Floriculture:

1. Ornamental Plants: Flowering annuals, perennials; Divine vines; Shade and ornamental trees.
2. Ornamental bulbous and foliage plants; Ferns, Cacti and succulents, Ornamental palms.
3. Production and packaging of cut flowers; Flower arrangements; Methods to prolong freshness of flowers
4. Cultivation of Important cut flowers - Carnation, Aster, Dahlia, Anthuriams, Gladiolous, Marigold, Rose, Lilium
5. Methods of harvesting.

Books for Reference:

1. Eames, A.J., & Mc Daniels, L.H.(1979) : An Introduction to Plant anatomy Tata-McGraw-Hill Publishing Co., (P) Ltd. Bombay, New Delhi.
2. Esau. K.(1980) : Plant Anatomy, (2nd Edition) Wiley Eastern Ltd., New Delhi.
3. Bose T.K. & Mukherjee, D., 1972, Gardening in India, Oxford & IBH Publishing Co., New Delhi.
4. Sandhu, M.K., 1989, Plant Propagation, Wile Eastern Ltd., Bangalore, Madras.
5. Kumar, N., 1997, Introduction to Horticulture, Rajalakshmi Publications, Nagercoil. institution)
6. Randhawa, G.S. and Mukhopadhyay, A. 1986. Floriculture in India. Allied Publishers.

Suggested Activities: Raising a nursery, managing it, studying and drawing various land scaping designs, practicing layering methods, using shade nets to protect horticultural crops, practicing indoor gardening techniques, visiting florists and recording their methods of prolonging vase life of commercial cut flowers.

** ** **

ST.JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS),VISAKHAPATNAM

VI SEMESTER **BOTANY** TIME:2Hrs/Week

B-E1-6152(2) **ANATOMY, NURSERY, GARDENING AND FLORICULTURE** Marks: 50

w.e.f 2018-2019 (AD batch) **PRACTICAL SYLLABUS – IV**

OBJECTIVES : To enable the students to –

- Make suitable preparations / handmade slides in the laboratory for the study of the anatomy of the plant organs.
- Identify important timbers
- Develop practical skills in various propagation methods
- Design gardens and land scapes
- Understand cultivation methods of important Flower crops

COURSE

ANATOMY:

1. Shoot apex organization.
2. Tissues-Simple, complex and special
3. Stomatal types-Dicot and Monocot
4. Secondary structure of Stem : Pongamia
5. Demonstration of double staining technique
6. Study of anomalous secondary growth by double stained slides of Achyranthus, Boerhavia, Bignonia, Dracaena; Important timber plants

NURSERY:

7. Tools, implements and containers used for propagation and nursery techniques.
8. Propagation by cutting, layering, budding and grafting
9. Seed propagation- preparation of portable trays, seed treatments, sowing and seedling production
10. Identification and description of annuals, biennials, perennials, climbers, creepers, foliage and flowering shrubs, palms, ferns, succulents, ornamental grasses

GARDENING:

11. Planning and designing of gardens, functional uses of plants in the landscape
12. Preparation of land for lawn and planting.

FLORICULTURE:

13. Identification of commercially important flower crops and their varieties.
14. Propagation practices in flower crops, sowing of seeds and raising of seedlings .
15. Use of chemicals and other compounds for prolonging the shelf life of cut flowers.

FIELD VISITS & PROJECT:

16. Visit to commercial nurseries and Gardens
17. Study project under supervision of lecturer – nursery/ornamental flowers/plants/lawn designing/ landscape designing

EXPECTED DOMAIN SKILLS TO BE ACHIEVED: Ability to identify different tissues and anomalous secondary growth in stems, important timber yielding plants, use a variety of garden tools and implements, proficiency in layering and grafting techniques (cleft grafting and bud grafting), land scape drawings using computers, raising of healthy nurseries of flowering plants, managing vase life of cut flowers etc.

** ** **

PRACTICAL MODEL PAPER

Paper-VII-(B): Nursery, Gardening and Floriculture

Q1.	**Project report (A)**	**- 15 marks**
	Viva-voce on study project	**-05 marks**
Q2.	**Identify and write notes on B, C, D, and E (4x5)**	**-20 marks**
	B- Tool/instrument/container used in nursery	
	C-Seed propagation technique **D- Plant used in lawn (plant specimen/photograph)**	
	E-ornamental flower (photograph/live specimen)	
Q4.	**Field report**	**- 05 marks**

Q5. Record **- 05 marks**

50 marks

ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM

VI SEMESTER **BOTANY** TIME: 3Hrs/week

B-A1-6101(3) **BIOLOGICAL INSTRUMENTATION AND METHODOLOGY** Marks: 100

w.e.f.(2018 – 2019) '15AC' Batch **SYLLABUS**

OBJECTIVES: To enable the students to

1. Understand the Principles of microscopy
2. Understand the structure and functioning of various biological instruments
3. Get enlighten their knowledge in various biochemical methods

COURSE:

UNIT - I: IMAGING AND RELATED TECHNIQUES:

Principles of microscopy; Light microscopy; Fluorescence microscopy; Electron Microscopy TEM SEM (a) Flow cytometry (b) Chromosome banding,– sample preparation for electron microscopy, cryofixation, negative staining, shadow casting, freeze fracture, freeze etching.

UNIT- II: pH AND CENTRIFUGATION:

pH meter: Principles and instrumentation, Centrifugation: Principles, types of centrifuges, types of rotors, differential and density gradient centrifugation, application. Sonication, Freeze drying.

UNIT- III: SPECTROPHOTOMETRY:

Principle involved in Spectrophotometer; Spectrophotometric techniques, Instrumentation: ultraviolet and visible spectrophotometry.

UNIT- IV: CHROMATOGRAPHY:

Chromatographic techniques: Principle and applications – Column - thin layer –paper, affinity and gaschromatography - Gel filtration - Basic principles of electrophoresis.

UNIT–V: Preparation of molar, molal and normal solutions, buffers, the art of scientific writing: Molarity and normality of common acids and bases. Preparation of solutions. Dilutions. Percentage solutions. Molar, molal and normal solutions. Technique of handling micropipettes; Knowledge about common toxic chemicals and safety measures in their handling.

The art of scientific writing and presentation of scientific matter. Scientific writing and ethics. Writing references. Introduction to copyright- plagiarism in scientific writing.

Suggested Readings:

1. Bajpai, P.K. 2006. Biological Instrumentation and methodology. S. Chand & Co. Ltd.
2. K. Wilson and J. Walker Eds. 2005. Biochemistry and Molecular Biology. Cambridge University Press.
3. K. Wilson andKHGoulding. 1986. Principles and techniques of Practical Biochemistry. (3 edn) Edward Arnold, London.
4. Dawson, C. (2002). Practical research methods.UBS Publishers, New Delhi.
5. Stapleton, P., Yondeowei, A., Mukanyange, J., Houten, H. (1995). Scientific writing for agricultural research scientists – a training reference manual. West Africa Rice Development Association, Hong Kong.
6. Ruzin, S.E. (1999). Plant micro technique and microscopy. Oxford University Press, New York, U.S.A.

Suggested activities: Preparing various laboratory reagents, operating laboratory instruments, noting instrument readings, calculating results accurately, Skills on writing scientific articles, presentation of scientific resultsthrough tables, graphs, poster presentations and practicing power point presentations.

** ** **

ST. JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS) VISAKHAPATNAM

VI SEMESTER **BOTANY** TIME: 2Hrs/week

B-A1-6151(2) **BIOLOGICAL INSTRUMENTATION AND METHODOLOGY** Marks: 50

PRACTICAL SYLLABUS – IV B

1. Microscopy – Light microscopy: principles, parts & function
2. Micrometry- principle and measurement of microscopic objects: Low power and high power.
3. Principle and working of phase contrast microscope
4. Principle & operation of Centrifuge
5. Preparation of standard acid and alkali and their standardization.

   b) Preparation of various solutions (normal, molar, and percent) and ppm/ppb by serial dilutions

6. Study of principle and working of pH meter and Measurement of pH of Milk, Pepsi, Lemon juice etc. using pH paper and pH meter
7. Study of principle of Chromatography and separation of amino acids mixture By ascending Paper Chromatography
8. Principle & operation of Colorimeter
9. Principle & operation of Spectrophotometer
10. Chromosome banding, (photograph demo)
11. Principle and technique of TLC (demonstration)
12. TLC separation of Amino acids from purified samples and biological materials (demonstration)
13. PCR - The Polymerase Chain Reaction (protocol) -demonstration
14. Study visit to an institute /laboratory

Domain skills expected to achieve:

Skill in operating laboratory equipment, their upkeep, and adept at various biological techniques. Ability to prepare molar, molal, normal solutions and solutions of different dilutions.Interpreting scientific results, and ability to present results in a scientific way through graphs, photographs, poster presentations and power point presentations.

** ** **

ST.JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS), VISAKHAPATNAM

V SEMESTER **BOTANY** TIME: 3 Hrs/Week

B 5101(3) **CELL BIOLOGY, GENETICS & PLANT BREEDING** Max. Marks: 100

w.e.f 2017-2018 (15AC batch) **SYLLABUS**

OBJECTIVES: To enable the students to

- Understand the ultra structure of envelopes of plant cell, nucleus, chromosomes and cell division.
- Understand and comprehend the basic principles of heredity
- Acquire an insight of molecular biology.
- Comprehend the types of mutations and polyploidy
- Concepts, methods and recent trends of Plant Breeding

COURSE:

UNIT – I: CELL BIOLOGY:

1. Cell, the unit of life- Cell theory, Prokaryotic and eukaryotic cells; Eukaryotic cell components.
2. Ultra structure and functions of cell wall and cell membranes.
3. Chromosomes**:** morphology, organization of DNA in a chromosome - nucleosome & solenoid model, Euchromatin and heterochromatin, Karyotype
4. Cell Division: Cell cycle, Mitosis, Meiosis & their significance

UNIT – II: GENETIC MATERIAL:

1. DNA as the genetic material: Griffith's and Avery's transformation experiment, Hershey – Chase bacteriophage experiment.
2. DNA structure -Watson & Crick model and replication of DNA :semi-conservative method
3. Types of RNA - mRNA, tRNA, rRNA, their structure and function.

UNIT – III: MENDELIAN INHERITANCE:

1. Mendel's laws of Inheritance: Mono- and Di- hybrid crosses; backcross and test cross.
2. Chromosome theory of Inheritance.
3. Linkage: concept, complete and incomplete linkage, coupling and repulsion; linkage maps based on two and three factor crosses.
4. Crossing Over: concept & significance.

UNIT – IV: PLANT BREEDING: INTRODUCTION & METHODS

1. Introduction to plant breeding
2. Methods in plant breeding: outlines of Procedure, advantages and limitations of
   i) Introduction
   ii) Selection
   iii) Hybridization
3. Hybrid Vigour,/Heterosis, inbreeding depression

..2..

UNIT – V: MUTATION BREEDING & BIOTECHNOLOGY IN CROP IMPROVEMENT:

1. Role of mutations in crop improvement.
2. Role of somaclonal variations in crop improvement.
3. Molecular breeding – use of DNA markers in plant breeding and crop improvement (RAPD, RFLP).
4. Genetically Modified (GM) Crops- Golden rice, BT Cotton; International & National Research Institutes – ICRISAT, IARI, ICAR

SUGGESTED ACTIVITY: Seminar, Debate, Quiz, observation of live cells and nucleus in Onion peels, observation of Meiotic nuclei in Maize pollen. Solving Genetics problems.

TEXT BOOKS:*VST Sai and K.Ramakrishna – (2011), A Text Book of Common Core Botany - Vol. IV – Sri Vikas Publications, Guntur.(*Subject to revision based on CBCS pattern)

REFERENCES:

1. Gupta, P.K.- (1999) – A Text Book of Cell and Molecular Biology, Rastogi Publications, Meerut.
2. Singh, B.D. – (1995) – Fundamentals of Genetics – Kalyani Publishers, New Delhi.
3. Sinnott, Dunn & Dobzhansky – (1999) Principles of Genetics. McGraw Hill Book & Co., New Delhi.
4. Snustad D.P. & Simmons M.J. – (2004) – Principles of Genetics ; John Wiley & Sons, Inc. New York.
5. Strickberger, M.W. – (1999) – Genetics – McMillan Publishing Corpn, New York.
6. Agarwal .V.K. (2006) Genetics. S.Chand & Co. New Delhi.
7. Allard R.W(1999): The Principles of Plant Breeding, John & Wiley and Sons.
8. Gupta, P.K., Plant breeding, Rastogi Publications, 2008
9. Singh B.D., Plant Breeding principles & Methods , 2015
10. Plant Breeding by Chowdary

** ** **

ST.JOSEPH'S COLLEGE FOR WOMEN (AUTONOMOUS), VISAKHAPATNAM

V SEMESTER **BOTANY** TIME: 3 Hrs/Week

B 5151(2) **CELL BIOLOGY , GENETICS & PLANT BREEDING** Max. Marks: 50

w.e.f 2017-2018 (15AC Batch) **PRACTICAL-III A**

OBJECTIVES : To enable the students to –

- Know the cytochemical methods of fixation and nuclear staining.
- Make suitable cytological preparations for study of mitosis, meiosis and karyotype.
- Solve problems in genetics.
- Understand principles and techniques of Plant Breeding

COURSE:

CELL BIOLOGY

I. Demonstration of Cytochemical methods: Fixation of plant material and nuclear staining.
2. Study of structure of plant cell through temporary mounts.
3. Study of effect of temperature & organic solvent on permeability of cell membrane.
4. Study of the structure of cell organelles through photomicrographs.
5. Study of different stages of Mitosis by squash preparations of Onion roots.
6. Preparation of karyotype slides from dividing root tip cells of Onion.
7. Study of different stages of Meiosis by squash preparations of anthers of Onion/Maize flower buds.
8. Study of DNA packing by micrographs.
9. Calorimetric estimation of DNA by diphenylamine method

GENETICS

Numerical problem solving in Mendel' Laws of inheritance

1. Problems on Monohybrid Ratio
2. Problems on Dihybrid Ratio
3. Problems on Incomplete Dominance
4. Chromosome mapping using 3 point test cross data.

PLANT BREEDING

1. Hybridization techniques
   i) Emasculation
   ii) Hybridization
   iii) Bagging & tagging
2. Field visit to a plant breeding research station.

REFERENCE BOOKS:

1. Santra. S.C., Chatterjee, T.P and as A.P. (1989) College Botany Practical – Vol. I. New Central Book Agency, Calcutta.
2. Sharma, O.P. (2001) Experiments and techniques in Plant Sciences – Vol. II. Pragati Prakasan, Meerut
3. Practical Handbook of Plant Breeding by Vikas Pal, 2016

** ** **