SEMESTER – V

Core Paper – V

TAXONOMY OF ANGIOSPERMS AND ECONOMIC BOTANY

Ins. Hrs. : 75 **Sub. Code : 13BOUC505**

Max. Marks : CIA- 25; ESE -75 **Credits: 4**

Objectives : To identify the families of the plants in the theory syllabus. To identify medicinally and economically important plants and plant products.

UNIT – I **15 Hrs.**

Descriptive terms used in taxonomy - *stem- leaf-* inflorescence- flower fruit. Systems of classification – Natural - (Bentham and Hooker)- Modern – (Takhtajan) (outline only).

UNIT – II **15 Hrs.**

Herbarium techniques and uses- Nomenclature - ICBN-Priority - Typification- Effective and Valid publication- *Author citation.*

UNIT – III **15 Hrs**.

A detailed study of the following families Systematic position- Description and the *economic importance of the types* and pollination mechanisms wherever applicable. Annonaceae- Capparidaceae- Sterculiaceae- Rutaceae- Myrtaceae- Curcurbitaceae- Apiaceae.

UNIT – IV **15 Hrs.**

Rubiaceae-Asclepiadaceae-Convolvulaceae-Scrophulariaceae-Acanthaceae-Verbenaceae-*Lamiaceae.*

UNIT - V **15 Hrs.**

Amarantaceae- Euphorbiaceae- Moraceae- Orchidaceae -Liliaceae- Arecaceae and *Poaceae.*

Note : Italics denote Self Study Topics

PRACTICALS:

1. Taxonomic studies of selected plant species included in the families mentioned in the theory.
2. Study of economic products of the plants belonging to the families mentioned.
3. Students should submit 20 herbarium sheets at the time of Practical examinations.
4. Field trip for 5 days to study vegetation and for specimen collection.

REFERENCE BOOKS:

1. **Lawrence- G.H.M,** " *Taxonomy of Vascular plants"*, Oxford and IBU Publishing Co. Pvt.. Ltd., New Delhi, 1951.
2. **Pandey, B.P,** " *Taxonomy of Angiosperms*", S. Chand & Company Ltd. 1982, New Delhi.
3. **Pandey, B.P,** "*Economic Botany*", S. Chand & Company Ltd., New Delhi, 2007.
4. **Saxena, N.B.** and **Saxena, S,** "*Plant Taxonomy"*, Pragati Prakashan, Revised Edition, 2001.
5. **Singh, V. and Jain, D.K,** "*Taxonomy of Angiosperms*", Rastogi Publications, Second Edition, 2004.

SEMESTER –V

Elective - II

FUNDAMENTALS OF COMPUTER AND BIOINFORMATICS

Ins. Hrs. : 45 **Sub. Code : 13BOUE502**

Max. Marks : CIA 25; ESE - 75 **Credits : 4**

Objectives: To study the capabilities of an electronic magic machine-the computer. To acquire the knowledge of worldwide collection of computer networks. To acquire the knowledge of Drug locking.

UNIT – I **9 Hrs.**

Introduction to computer – Components of Computer - Capabilities of Computer – Hardware and Software – Input - Output devices - Operating System - *Computer applications.*

UNIT –II **9 Hrs.**

Microsoft Office - M.S Word - Creation of documents – Excel - Spread sheet- workbook *charts and table* - Power Point presentation - Access – Creating a database.

UNIT – III **9 Hrs.**

Introduction to Internet – Data communication concepts – WWW - E- mail- Smiley- Service Provider – Internet addressing (Domine IP) - Net Browser- search engine - *News groups*.

UNIT – IV **9 Hrs.**

Bioinformatics – Types of Database – Nucleotide sequence Database – NCBI - GENBANK- EMBL. Protein Sequence Database – SWISS-PROT- Literature Database – Pub Med - AGRICOLA- *Virtual library* - Data Mining.

UNIT – V **9 Hrs.**

Gene finding algorithm and tools for sequence analysis – Protein Prediction - Similarity Search - Phylogenetic analysis –*Drug Designing*.

Note : Italics denote Self Study Topics

PRACTICALS:

1. Creating, editing and printing a document in MS - word.
2. Preparation of worksheet in Microsoft Excel.
3. Creating a database in Microsoft access.
4. Web browsing.
5. E-mailing.
6. Gene finding.

REFERENCE BOOKS :

1. **Arthur M. Lesk**, "*Introduction to Bioinformatics",* Oxford University Press, First Edition,NewDelhi, 2003.
2. **Attwood, T. K.** and **Parry Smith**, **D.J,** " *Introduction to Bioinformatics"*, Pearson Education Ltd., Fifth Edition, NewDelhi, 2003.
3. **Irfan A. Khan** and **Atiya Khanum**, "*Emerging trends in Bioinformatics",* Ukaaz Publications, First Edition, Hyderabad, 2002.
4. **Mani, K.,** and **Vijayaraj, N,** "*Bioinformatics for beginners*". Kalaikathir Achchagam, Coimbatore, First Edition, 2002.
5. **Sundara Rajan, S.** and **Balaji, R,** *"Introduction to Bioinformatics",* Himalaya Publishing Housing, First Edition, Mumbai, 2002.

SEMESTER - V

Skill Based Subject - III

HERBAL COSMETICS AND AYURVEDIC MEDICINES

Instructional Hrs. : 45 **Sub. Code : 13BOUS503**

Max. Marks : CIA – 25; ESE - 75 **Credits : 3**

Objectives: To study the application of medicinal plants. To study the recipes for herbal refreshments and remedial plants for common diseases.

UNIT – I **9 Hrs.**

Ethnic people of India – Wild edible and medicinal plants used by Ethnic people of Himalayas- Assam- Kerala and *Tamil Nadu.*

UNIT – II **9 Hrs.**

Herbal home remedies – Skin diseases- Skin care compounds- Skin pigmentation- *Memory power intelligence* and Kidney stone.

UNIT – III **9 Hrs.**

Traditional drugs as laxative- Cardiotonics- Anti-diabetics- Antiseptics and *Anti-malaria.*

UNIT – IV **9 Hrs.**

Herbal Cosmetics: Oral products- Tooth paste- Cosmetics for bath products- Bath oil, Bath soap- Hair care herbal products –Hair shampoo, Hair dye.

UNIT – V **9 Hrs.**

Perfumes – Rose- Jasmine- Lilac- Magnolia and Narcissus.

Note : *Italics* denote Self Study Topics

REFERENCE BOOKS:

1. **Arumugam, KR and Murugesh, N.,** "*Text Book of Pharmacognosy*", Sathya Publishers, Madurai, Reprinted, 2008.

2. **Handa, S.S and Kapoor, V.K.,** "*Pharmacognosy*", Vallabh Prakashan, Delhi, Second Edition, 2003.

3. **Kokate, C.K, Purohit, A and Gokhale, S.R.,** "*Pharmacognosy*", Nirali Prakashan, Pune, 43rd Edition, 2009.

4. **Kumar, N.C.,** "*An Introduction to Medical Botany and Pharmacognosy*", Emkay Publications, New Delhi, 1993.

5. **Wallis, T.E.,** "*Text book of Pharmacognosy*", CBS publishers and distributors, Delhi, First Edition, 1985.

6. **Gokhale, S. B., Kokate,C.K, and Purohit, A** "*Pharmacognosy*", Nirali Prakashan, Pune, Sixteenth Edition, 2002.

7. **Handa, S.S and Kapoor, V.K.,** "*Pharmacognosy*", Vallabh Prakashan, Delhi, Revised Edition, 1993.

8. **Panda, H.,** " Herbal perfumes and Cosmetics", National Institute of Industrial Research, Delhi.

9. **Panda, H.,** " Herbal Cosmetics" -Handbook, Asia Pacific Business Press Inc. Delhi.

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SEMESTER –VI

Core Paper – VIII

Ecology and Phytogeography

Ins. Hrs. : 60 **Sub. Code : 13BOUC608**

Max. Marks : CIA 25;ESE - 75 **Credits: 4**

Objectives : To enable the students to acquire knowledge about the environment and to identify the environmental problems**.** To facilitate the students to find out remedial solutions.

UNIT- I **12 Hrs.**

Ecological factors: Principles **-** Role of climatic - edaphic **-** Biotic factors on plants **–** Kinds and Structure of Ecosystem - Biogeochemical cycles (*Nitrogen* - Carbon).

UNIT - II **12 Hrs.**

Autecology – Ecological life history of species- Characteristics of Population- Dispersal and migration - Synecology – Vegetation – Units of Vegetation - Methods of studying vegetation – Quadrat- *Belt and Line transect.*

UNIT – III **12 Hrs.**

Ecological Adaptations - Hydrophytes **–** Mesophytes - Xerophytes – *Halophytes*- Morphological and Anatomical features in relation to their habitats.

UNIT – IV **12 Hrs.**

Plant Distribution – Factors affecting distribution- Concept of Barriers **-** Continental drift **–** Endemism - Major and Minor biomes of the world - Plants and Plant communities as indicators.

UNIT – V **12 Hrs.**

Plant geography – Principles and vegetational types of India – Tropical rain forest **-** Sholas and deciduous forest – Sand dunes **-** Scrub jungle - *Phytogeographical regions of India.*

Note : Italics denote Self Study Topics

PRACTICALS:

1. Study of morphological and anatomical adaptations of hydrophytes, xerophytes, including halophytes and mesophytes using representative samples.
2. Determination of frequency and density constituent of plant species in a terrestrial community through Quadrat and Transect (line, belt).
3. Phytogeographical regions of India.

REFERENCE BOOKS:

1. **Eugene P. Odum ,** "*Fundamentals of Ecology"*, W.B Saunders company, Philadelphia and London, Third Edition, 2005.

2. **Sharma P.D.,**. "*Ecology & Environment"*, Rastogi Publications, Meerut, Eleventh Edition, 2005.

3. **Shukla, R.S, Chandel,P.S.,** "*A text book of plant Ecology Including Ethnobotany and soil science"*,S.Chand & company Ltd. New Delhi, First edition, 2003.

4. **Vasishta. P.C.,** "*A text book of Plant Ecology*", Vishal Publications, NewDelhi, Second Edition, 1979.

5. **Verma, P.S.** and **Agarwal,V.*K.,*** *"Environmental Biology*", S. Chand & Company Ltd, New Delhi, Fourth edition. 1993.

6. **Subrahmanyam, N.S.** and **Sambamurthy**, A.V.S.S. "*Ecology*", Narosa Publishing House Pvt. Ltd. Second edition, 2006.

SEMESTER -VI

Core Paper – IX

GENETICS, PLANT BREEDING AND BIOSTATISTICS

Instructional Hrs. : 60 **Sub. Code : 13BOUC609**

Max. Marks : CIA 25; ESE - 75 **Credits: 4**

Objectives : To study the basics of Mendelian genetics. To understand the mechanism of gene expression and regulation. To understand the concept of mutation. To know the skills and methods involved in plant breeding**.**

UNIT- I **12 Hrs.**

Mendelism and Interaction - Monohybrid - Dihybrid Cross - Back Cross - Test cross - Incomplete dominance - – Complementary – Supplementary and *Duplicate*.

UNIT- II **12 Hrs.**

Classical Genetics - Linkages and Crossing over - multiple alleles - blood groups in man –- Sex determination in plants- *Meiosis* - Cytoplasmic inheritance (plastid only)

UNIT-III **12 Hrs.**

Mutation and Gene Regulation – Types of mutation - Somatic mutation- Physical and chemical mutagens – Polyploidy - genetic code - gene regulation in prokaryotes – *Operon concept*.

UNIT-IV **12 Hrs.**

Plant breeding – *Objectives* – methods of selection (Mass - Pureline and Clonal) - Hybridization methods- Hybridization techniques - Hybrid vigour.

UNIT- V **12 Hrs.**

Biostatistics – Collection of data - Sampling types - Measures of Central tendency - *Arithmetic Mean*- Median. Measures of Dispersion- Range- Coefficient of Range- Standard deviation and Standard error (only theory).

Note : Italics denote Self Study Topics

PRACTICALS:

1. Study of Meiosis.
2. Observation of Charts for Mendelian ratios. Gene interaction and linkage. Simple problems in genetics.
3. Simple problems in Mean, Median, Mode in Biostatistics. Standard deviation, Standard error.

REFERENCE BOOKS:

1. **Allard, R.W, "***Principles of plant breeding"*, John Wiley & sons, INC. Singapore, 2000.
2. **Rama Krishnan, P, "***Biostatistics"* Saras Publications, Nagercoil, First Edition, 2001.
3. **Sharma, J.R,** " *Principles and Practice of Plant breeding",* Tata MCG raw–Hill publishing Company Ltd., New Delhi, 1994.
4. **Singh, J. R, "***Plant breeding principles and methods",* Kalyani Publishers, Ludiana, Seventh Edition, 2008.
5. **Verma, P. S., Agarwal, V.K,** "*Genetics",* First Edition , S. Chand & Company Ltd, New Delhi, 2002.

SEMESTER – VI

CORE PAPER –X

BIOTECHNOLOGY I – CONCEPTS AND TECHNIQUES

Ins. Hrs. : 60 **Sub. Code : 13BOUC610**

Max. Marks : CIA 25; ESE - 75 **Credits: 4**

Objectives : To know the outlines of genetic engineering.To develop the skill on gene transfer methods. To understand the applications and the uses of various bio molecules separation techniques. To study the extraction and separation of enzymes used in industries.

UNIT- I **12 Hrs.**

Biotechnology – Biotechnology and its branches – Scope – Applications of Genetic Engineering- Enzymes used in gene cloning – DNA Polymerases- Restriction endonucleases - Ligases and *Reverse transcriptase*.

UNIT- II **12 Hrs.**

Cloning vectors – Plasmids - Transposons and YAC – *CaMV* - Methods of Gene cloning – Preparation of desired genes - Isolation of DNA vector - Construction of Recombinant DNA- Introduction of Recombinant DNA into the Host cell - Selection and Multiplication of recombinant host cells - Expression of Cloned Gene.

UNIT- III **12 Hrs.**

Gene Cloning Strategies -Methods of direct gene transfer – Electrophoration – *Microinjection*- Liposome fusion - Gene cloning in higher plants – use of Agrobacterium Ti-Plasmid as vehicle -

UNIT - IV **12 Hrs.**

Techniques in biotechnology - Application and uses of PCR - DNA finger printing - Southern and Western blotting techniques - *Agarose gel electrophoresis*.

UNIT - V **12 Hrs.**

Enzyme technology – Extraction- separation and purification of enzymes - Immobilization-methods - *Application of enzymes.*

Note : Italics denote Self Study Topics

REFERENCE BOOKS:

1. **Balasubramanian, P.,** Bryce, CFA., Dharmalingam, K. Green,J., Kunthala Jayaraman "*Concepts in biotechnology"*, Universities press India Pvt. Ltd., Hyderabad, 2004.

2. **Dubey, R.C., "***A text book of Biotechnology*" , S.Chand & Company Ltd, New Delhi, Third Edition, 2004.

3. **Gupta, P.K., "***Elements of Biotechnology*", Rastogi publications – Meerut first edition, 2004.

4. **Joshi, P., "***Genetic Engineering and its Applications*", Student Edition Jodhpur, 2000.

5. **Kumaresan, V., "***Biotechnology",* Saras Publications, Nagercoil, 2009.

6. **Purohit, S.S., Mathur, S.K., "***Biotechnology Fundamentals & Applications",* Agro botanical Publishers India, 1996.

7. **Purohit, S.S.,"** *Bitechnology Fundamentals & Applications"* Mrs. Saraswathi Purohit for student Edition, India, Third Edition, 2005.

8. **Razdan, M.K.,** ***"Introduction to plant tissue culture"*** , Oxford & IBH publishing Co. Pvt. Ltd., Second Edition, New Delhi, 2008.

9. **Trevan, M.D., Boffey, S., Goulding, K.H., Stanbury, P., "***Biotechnology the Bological principles*", Tata McGraw-Hill publishing company Ltd., New Delhi, 1996.

SEMESTER – VI

Core Paper – XI

Biotechnology II –Applied Biotechnology

Ins. Hrs. : 60 **Sub. Code : 13BOUC611**

Max. Marks : CIA 25; ESE - 75 **Credits: 4**

Objectives : To understand the application of genetic manipulation in Agriculture, Food, . Medicines, Biopesticides. To study Bioprocess Technology and their applications.

UNIT - I **12 Hrs.**

Food Technology – SCP as microbial food for future - Mass cultivation and nutritional value of Spirulina- *Scenedesmus, Yeast and* Bacteria (Methylophilus) - Mushroom Technology – Cultivation techniques and nutritional value of Pleurotus sajor-caju – Agaricus bisporous.

UNIT - II **12 Hrs.**

Biofertilizers – Advantages of mass cultivation and application technique of Rhizobium- Azospirillum- Blue Green Algae (Nitrogen Fixers)- *Phosphobacteria*- Azolla and VAM.

UNIT - III **12 Hrs.**

Application of genetic engineering - Agriculture (transgenic plants) *– Biological control of pathogens through engineered microbes- Bacillus thuringiensis* - Medicine - Insulin- Vaccines- Gene therapy - Monoclonal antibodies and Hybridoma techniques.

UNIT - IV **12 Hrs.**

Biotechnology in pollution control – Xenobiotic Compounds – Radioactive wastes- Bioremediation - Phytoremediation – Bioleaching – Biosorption – Bioplastics.

UNIT - V **12 Hrs.**

Biofuels - BioEthanol- BioDiesel - Biogas production - Methane - BioHydrogen production - *Petrochemical plants* - Plant biomass - Types- Composition - Biomass energy.

Note : Italics denote Self Study Topics

PRACTICALS:

1. Cultivation of Pleurotus sajor-caju and Agaricus bisporous
2. Culture of Yeast and Azolla.
3. Demonstration of Biofetilizers – Azospirillum- Agrobacterium – Slides or photographs.
4. Blotting techniques –Photographs.
5. Petrochemical plants – Materials / Photographs
6. Biogas production - Photographs.

REFERENCE BOOKS:

1. **Balasubramanian, P.,** Bryce, CFA., Dharmalingam, K. Green,J., Kunthala Jayaraman , "*Concepts in biotechnology",* Universities Press India Pvt. Ltd., Hyderabad, 2004.
2. **Dubey, R.C., "***A text book of Biotechnology*" , S.Chand & Company Ltd, New Delhi, Third Edition, 2004.
3. **Gupta, P.K., "***Elements of Biotechnology*", Rastogi publications – Meerut first edition, 2004.
4. **Joshi, P., "***Genetic Engineering and its Applications*", Student Edition Jodhpur, 2000.
5. **Kumar, H.D.**, *"Modern Concepts of Biotechnology*", Vikas publishing house Pvt. Ltd., 2001.
6. **Kumaresan, V., "***Biotechnology",* Saras Publications, Nagercoil, 2009.
7. **Purohit, S.S.,"** *Bitechnology Fundamentals & Applications"* Mrs. Saraswathi Purohit for student Edition, India, Third Edition, 2005.
8. **Trevan, M.D., Boffey, S., Goulding, K.H., Stanbury, P., "***Biotechnology the Bological principles*", Tata McGraw-Hill publishing company Ltd., New Delhi, 1996.