

PAPER – II (BOTANY)

CW 02: TOOLS AND TECHNIQUES

UNIT – I

Fundamental Tools: ICBN - Principles, major rules, revisions and recommendations, effective and valid publications, typification, rejection of taxa, starting date point, priority & authority. Melbourne code - Salient features. Crop Improvement- Selection and Hybridization in self and cross pollination crops applied in improvement of crops. Herbarium - Preparation, Methodology, application and storage. Standard solutions: Molar, Molal, Normal and percent (%) solutions. pH of solutions, role of buffers and their preparation. Microbial staining techniques. Cytological-technique - Fixatives, treatments and staining. Physicochemical properties and analysis of water.

UNIT – II

Instrumentation: Microscopy - Confocal, Phase contrast and Electron microscopy. Chromatography - Principle, protocol and application of TLC, GLC and HPLC. Spectrophotometry - Principle and applications. NMR, MASS spectrometry. Centrifugation - Principle, types and applications. Electrophoresis - Principle, protocol and applications. Principle and applications of pH meter, flow cytometer, colony counter, turbid meter and Microtome.

UNIT – III

Basic Techniques: Micrometry - Determination of factor, techniques and applications of micrometry in research. Isolation of Cyanobacteria, Bacteria free cultures, Continuous cultures, Synchronous culture and mass culture. Isolation and culture of bacteria from air, water and soil- general requirement Nutrient Media - common media [Knop's (Modified) Modified Chu¹⁰ medium, Allen and Arnon's Medium (Modified), BG-11 medium]. Isolation and culture of fungi from air, water and soil- general requirement, Media, Screening of fungi for production of antibiotics and organic acids.

UNIT – IV

Applied Botany: Introduction. Scope and status of ethnobotanical studies in Chhattisgarh and India. Ethnobotanical aspects of conservations and management of the resources. Introduction, classification of Growth regulators-Growth analysis of crop plants and its significance, Applications of PGRs in agriculture. Production of microbial biomass, Primary and Secondary metabolites and enzymes. Algal and Bacterial fertilizers - preparations and applications. Role of microbes in the production of alcohol, organic acids and antibiotics. Sources, Biodiesel production techniques from -Sugarcane, Jowar, and Maize. Methods to study crop weed interactions. Processing of data on weeds in terms of Weed Indices: Weed control efficiency, Weed Index, Weed Smothering Efficiency.

UNIT – V

Advanced Techniques: Cell and tissue culture in plants, totipotency, Callus culture, Micro-propagation, Embryo culture, Secondary metabolites. Basic Principles, nature of electromagnetic radiation, Beer-Lamberts law. UV-VIS Absorption. Isotopes in biochemistry, applications of radioisotopes. Recombinant DNA technology and gene cloning techniques of restriction mapping, construction of chimeric DNA, cloning in bacteria and eukaryotes. PCR and gene amplification. Applications of biotechnology in agriculture, medical, forestry and crop improvement.

Books suggested –

1. Naik, V. N. (1985) Taxonomy of Angiosperms. Tata McGraw-Hill Co. New Delhi,
2. Mondal, A.K. (2005) Advanced Plant Taxonomy. New Central Book Agency, Kolkata, India.
3. Aneja, K.R. (2004) Experiments in Microbiology, Plant Pathology and Bitechology (4th Ed.). New Age International Publishers, New Delhi, India.
4. Dwivedi, J.N. and R.B.Singh (1990) Essentials of Plant Techniques. Scientific Publishers, Jodhpur, India.
5. Razdan, M.K.(1995) An Introduction to Plant Tissue Culture. Oxford and IBH publishing co, New Delhi, India.
6. Trivedi, R.R. and Goel D.K.: Chemical and Biological Methods for water Pollution studies, Environmental Publication, Karad (MS), India.
7. APH (1975) Standard Methods for Examination of Water and Waste Water (14th Ed.) American Public Health Association, New York, USA.
8. Bhojwani, S.S.(1990) Plant Tissue Culture: Applications and Limitations, Elsevier Science Publishers, New York, USA.
9. Hand Book of field and herbarium Techniques.-S K Jain and R R. Rao.
10. Practical Biochemistry -Principles and Techniques: Wilson and J K Walkers. Cambridge Publishing Coy. (2000).
11. Applied Radiobiology and Radiation Protection: GranierR and Gambini D J Ellis Harward.
12. Biochemistry: L. Virakumary. MJP Publishers.Tamilnadu Book House 47 Nalathambi Street, Chennai.600005.
13. Spectroscopy of organic compounds: P S Kalasi New Age International Publishers.DaryaGanj, New Delhi.110002.
14. Electron Microscopy .PrakashTrivedi, Oxford Book Company Jaipur –New Delhi.
15. Nuclear and Radiochemistry. G Friedlander, J W Kennedy S Macias M Miller John Wiley and Sons, New York.
16. Text Book of Spectroscopy. JyotiKumar, Sonali Publications, New Delhi.110002.
17. Spectroscopy. B K Sharma Goel Publishing House, Krishna Prakashan Media Pvt Ltd. Shivaji Road Meerut. 250001. U P.
18. Chromatography: .KamaleshBhansal,Campus Books International,Prahlad Street,Ansari Road, Darya ganj New Delhi 110002.
19. Biopesticides and pest management.G. S. Dhaliwal and Openderkoul, Kalyani Publishers.New Delhi.
20. Plant Growth substances in Agriculture; Weaver J.1972, W H.Freeman&Co.San Francisco.
21. Fuels and Biofuels; Vijayalaxmi, Meena Devi and Nagendra Prasad. Published B UpadeshPurohit for Agrobios, Shriya Computers and Printers Chopasani Road Jodhapur 342002.

➤ *Any other books suggested by Course coordinator/ Course Teacher/ Supervisor concerned may be applied.*