GOVERNMENT COLLEGE (AUTONOMOUS), RAJAMAHENDRAVARAM

Department of Botany – Course Code: BOTCC-1

Certificate Course: Bioinstrumentation

Course objectives: This course is aimed to inculcate required bio-instrumentation skills to students and hone them towards biological research.

Course outcomes: On successful completion of this course the learners will be able to:

1. Understand the biosafety issues in laboratories and handle the prime biological equipment.
2. Demonstrate skills of various microscopic techniques.
3. Perform experiments using chromatography, electrophoresis and spectroscopy techniques.

Syllabus:

Unit I: Basic laboratory techniques **12 Hrs.**

1. Biosafety measures in laboratories: General safety measures, personal protection, chemical and biological hazards, spillage and waste disposal, first aid.
2. Theory, principle, working and applications of: pH meter and Laminar Air Flow.
3. Centrifuge machine types and centrifugation: Differential, Rate zonal, Density gradient, Rotor types and Ultra centrifugation.

Unit II: Microscopic techniques

1. Bright field Microscopy: Objectives, eyepiece, condenser; characteristics of lenses-resolution, magnification, numerical aperture, focal length, working distance, depth of focus.
2. Theory, principle, apparatus, methods and applications of: Dark Field Microscopy, Phase Contrast, Fluorescence Microscopy, Electron Microscopy: TEM and SEM

Unit III: Chromatography techniques **12 Hrs.**

1. Theory, principle, apparatus, methods and applications of:
   Paper chromatography, Thin Layer Chromatography (TLC), Soxhlet extraction, Gas Chromatography (GC).

Unit IV: Electrophoretic techniques **12 Hrs.**

1. Theory, principle, apparatus, methods and applications of: Paper Electrophoresis, Poly Acrylamide Gel Electrophoresis (PAGE), Agarose Gel Electrophoresis.

Unit V: Spectroscopic techniques **12 Hrs.**

1. Principle, working, instrumentation and applications of:
   Colorimetry, Flame photometry, Visible spectrophotometry, UV/Vis spectrophotometry, Fourier Transform Infrared Spectroscopy (FTIR).

Reference books:

1.Veerakumari, L. (2015) Bioinstrumentation, MJP Publishers, Chennai

2. Avinash Mancharkar, Ashok Jadhavar and Ashok Jadhav (2020) Bioinstrumentation, Vision Publications, Pune