Subject Code : P8MBE1

Elective Course I (EC) – Biological Techniques

Unit I Microscopy and Related Techniques

Light Microscopy : Microscopic optics, components of microscopes. Basic principles and types of Bright field, Dark field, Phase contrast. Fluorescence, Polarization and confocal microscopes and their applications. Immunofluorescence – In situ hybridization. Electron Microscopy – Principle, Techniques and applications of Transmission Electron microscope (TEM) and Scanning Electron Microscope (SEM), Atomic Force Microscope (AFM). Photomicrography and Video micrography.

Unit II Analytical Techniques

Spectroscopic methods – UV-Visible, Atomic Absorption and Atomic Emission Spectroscopy. Centrifugation – Principles and types centrifugation Electroanalytical methods – electrolytic – Potentiometric, conductimetric, coulometric & voltametric analysis. Biosensors.
Radioactive Analysis : Principles of radioactivity, GM counter & LS counter.

Unit III Principles & Applications of Chromatographic Techniques :

Adsorption – Ion exchange and gel permeation – affinity chromotography for separation of compounds GC and HPLC methods.

Unit IV - Electrophoresis Techniques

Electropohoretic techniques – protein – nucleic acid – immuno – two dimensional electrophoresis.

Unit V Molecular Biological Techniques

a) Isolation of chromosomal and plasmid DNA. Polymerase chain reaction – isolation of specific genes using PCR.
b) Restriction digestion and Phosphatase treatment of cloning
vectors. Cloning techniques – separationand quantification of DNA by spectrophotometric and electrophoretic techniques, gene transfer mechanisms – chemical and electroporation.
c) Methods of detection of clones – Nucleic acid transfer by blotting, Hybridization plaque, colony hybridization. Histochemical detection of β -galactosidase, antibody screening including colour development reaction.

Reference:

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Demain, A.L. and Davies, J.E. (1999). Manual of Industrial Microbiology & Biotechnology, ASM Press.
Glick, B.R. and Pasternak, J.J. (1994). Molecular Biotechnology, ASM Press.
John G. Webster. (2004). Bioinstrumentation. University of Wisconsin, John Wiley & Sons, Inc.
Misener, S. and Krawetz, S.A. (2000). Bioinformatics Methods and Protocols.

Human Press, Totowa, New Jersey.
Rashidi, H.H., and Buehler, L.K. (2002). Bioinformatics Basics: Applications in Biological Science and Medicine, CRC Press, London.
Sambrrok, J. and Ruseell, D.W. (2001) Molecular Cloning – A Laboratory Manual (3rd eidition, Vol. 1,2,3) Cold Spring Laboratory Press, New York.
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Surzeki, S. (2000). Basic Techniques in Molecular Biology, Springer.
Westermeier, R (1993). Electroporesis in practice – VCH – Federal Republic of Germany.
Willett, J.E. (1991). Gas Chromatography, John Wiley & Sons.
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