PAPER I – BOT 401

CYTOLOGY AND GENETICS

UNIT-I

• The dynamic cells, Structural organization of the plant cell, specialized plant celltype
chemical foundation, biochemical energetics.
• Cell wall - Structure and functions, biogenesis growth.
• Plasma membrane; structure, models and functions, site for ATPase, ion carrierschannels and pumps, receptors.

Unit II
Structural and numerical alterations in chromosomes: breeding behaviour ofduplications,
deficiency, inversion and translocation heterozygotes. Origin, occurrence, production and
meiosis of haploids, aneuploids, euploids and allopolyploids. Evolution of major crop plants.

UNIT-III
• Chloroplast-structure, genome organization, gene expression, RNA editing.
• Mitochondria; structure, genome organization, biogenesis.
• Plant Vacuole - Tonoplast membrane, ATPases transporters as a storageorganelle.

Unit IV
Mendelian and Non-Mendelian Inheritance. Independent assortment, crossingover, linkage
groups and chromosome mapping. Genetic recombination and genetic mapping: Correlation
of genetic and physical maps; molecular markers and construction of linkage maps.

UNIT-IV
• Nucleus : Structure, nuclear pore, Nucleosome organization.
• Ribosome- Structure and functional significance.

• Cell cycle and Apoptosis; Control mechanisms, role of cyclin dependent kinases.
• Retinoblastoma and E2F proteins, cytokinesis and cell plate formation,mechanisms
of programmed cell death.

UNIT-V
• Other cell organelles: Structure and functions of microbodies, microtubules,microfilaments, Golgi apparatus, lysosome, endoplasmic reticulum.
• Techniques in cell biology: Immuno techniques, in situ hybridization to locatetranscripts in cell types FISH, GISH, Confocal microscopy.

Suggested Reading:-
1. De Robertis and De Robertis 2005 (Eight edition) (Indian) Cell and MolecularBiology,
Lippincott Williams, Philadelphia. [B.I Publications Pvt. Ltd. New Delhi].
2. Sadova David – 2004 (First Indian Edition). Cell Biology, New Delhi.
3. Albert Etal 2002 (Fourth Edition). Molecular Biology of the cell, GarlandScience (Iaylar
and Francis) New York Group (wt)
4. Lodish Etal 2004 (Fifth Edition). Molecular Cell Biology, W H Freeman andcompany,
New York.
5. Giese Arthur 1979 (Fifth Edition). Cell Physiology, Toppan company Ltd.,Tokyo, Japan.

PAPER –II BOT 402 PLANT BIO TECHNOLOGY

Unit-I

Tools of Genetic engineering - Enzymes, Cloning vectors (Plasmids, Bacteriophages, Cosmids, Phagemids, Shuttle vectors, transposons vectors, artificial chromosomes as vector and eukaryotic vectors), Constriction of genomic library , and cDNA library, Staggered cleavage, addition of oligopolymer tailing ,blunt end ligation, Polymerase Chain Reaction (PCR) Principals, technique and modifications, Gene cloning Vs PCR, application ,Applications of PCR.

UNIT- II

Plant Tissue Culture: General introduction, History and Scope and basic concepts ,laboratory Organization; media preparation and sterilization techniques, Nutritionof plant tissues-Growth limiting Factor, Concept of cellular differentiation and totipotency, Types of culture, Embryo and Endosperm culture, Induction and maintence of Callus and suspension Cultures

Unit-III

DNA synthesis and gene sequencing, Aims, strategies for the development of transgenic –Transformation vectors, Promoters from heterologous sources and itsutility, Terminators, Markers and Reporter genes, *Agrobacterium* mediated gene transfer, Molecular genetics of TDNA transfer from *Agrobacterium* to plants, Direct gene transfer methods, Comparison of vector – mediated & vector free methods, Gene tagging in transgenic plants

Unit-IV

Chloroplast and Mitochondrial Transformation, Mechanism and Genetics of nitrogen fixation, *nif* & *nod* gene cluster, Fermentation Technology, Genetic improvement of industrial microbes & N2 fixer, Biofertilizer, Nutritional qualityimprovement - Golden rice and other development

Unit-V

Molecular markers for introgression of useful traits in plants, Genomics and Proteomics: Genome project, Microarray, protein profiling and its significance,Applications of G.E. to Health, Industry & Agriculture, including gene therapy,IPR and regulatory requirements

References

1.Foster and Twell. (1997).Plant gene isolation: Principles and Practice

2. Owen and Pen (1997.Transgenic plants :(a production system for industrial and pharmaceutical proteins)

3. Kung and Wu (1993).Transgenic Plants: Vols 1&2

4. Potrykus and Spangenberg 1995.Gene Transfer to Plants

5. Brown.T.A. 1995. Gene Cloning an Introduction. (3rd edition). Chapman Hall, 2-6 Bundary Row, U.K.

6. Rissler and Mellon 1996.Ecological risks of transgenic crops

PAPER –IVBOT 403

PLANT DISEASES AND THEIR MANAGEMENT

Unit 1

Non- infectious disease: Black heart of Potato, Khaira disease of Rice,
Viroid and Viral disease: Potato spindle tuber, Tobacco Mosaic, Yellow veinmosaic of
Bhindi, Leaf curl of Papaya.
Phytoplasma disease: Little leaf of Brinjal, Witches broom of legumes.

Unit II

Bacterial disease: Citrus canker, Angular leaf spot of cotton, Tundu disease ofwheat, Bacterial wilt of Cucurbit and Crown gall of fruits plants,

Unit III

Fungal disease: Wart disease of potato, Damping off of chilli, Late blight of potato,Downy mildew & Green ear disease of bajra and Powdery mildew of cereals.

Unit IV

Fungal disease: Ergot of Bajra, Smut of Bajra, Rust of Wheat, Early blight of Potato, Tikka disease of Groundnut, Blast of Rice, Red rot of Sugarcane, Wilt of cotton and Blight of Gram.

Unit V

Nematode disease: Ear cockle of Wheat, Molya disease of Barley and Root Knotdisease of
vegetables.

Suggested Reading

Agrios, G.N. 1997. Plant Pathology. Academic Press, London.

Albajes, R., Gullino, M.L., Van Lenteren, J.C. and Elad, Y. 2000. Integrated Pest and Disease management in Greenhouse Crops. Kiuwel AcademicPublishers.

Mehrotra, R.S. 1993. Plant Pathology, Tata McGraw Hill.

Rangaswamy, G. and Mahadevan, A. 1999. Disease of crop plants in India.Prentice Hall of India, New Delhi.

Trivedi, P.C. 1998. Nematode disease in Plants CBS Publisher & Distributors,New Delhi.

Singh, R.S. 2005. Introduction to Principles of Plant Pathology. Oxford & IBH Publication Co. Pvt. Ltd.

Sharma, P.D. 2006. Plant Pathology. Narosa Publishing House, India

Pandey, B.P. 1997. Plant Pathology, Pathogen and Plant Disease. S. Chand andCompany

LABORATORY PRACTICAL-I
Lab Work I (based on Course BOT401 and BOT402)
(Excursion/field work/ Project)

LABORATORY PRACTICAL-2
Lab Work I (based on Course BOT401 and BOT403)
(Excursion/field work/ Project)

Dissertation / Thesis

The topic would be decided by the candidate in consultation with the respective supervisor. Dissertation/thesis will be based on existing branches of botany and the title will be decided keeping the view on the modern aspect in the related discipline. It will be the part of semester IV; however, the title of dissertation / thesis will be assigned by concerned faculty member/board in the beginning of semester III to provide sufficient time to complete dissertation / thesis.