MOHANLAL SUKHADIA UNIVERSITY, UDAIPUR

B. Sc. BIOTECHNOLOGY III YEAR TDC (2016-17)

Paper V *: Plant Biotechnology and its Commercial Applications*

Unit-I

Micropropagation – Definition, pathways of micropropagation and various stages of plantlet recovery. Role of micropropagation in silviculture, horticulture, agriculture, and conservation of biodiversity and threatened plant species. Somatic embryogenesis with special reference to production of synthetic seeds, encapsulation of shoot meristems and other plant parts for conservation and regrowth.

15 Credit hours

Unit-II

Applications of plant biotechnology in plant pathology with special reference to culture of obligate parasites and production of virus-free plants. Screening of germplasm and cell line selection. Application of somaclonal variation with special reference to development of disease resistant cell lines.

15 Credit hours

Unit-III

Applications of plant biotechnology in breeding and crop improvement with special reference to production of haploids and triploids. Application of protoplast culture in development of somatic hybrids and cybrids. Role of tissue culture in genetic engineering for crop improvement – *Agrobacterium* mediated gene transfer in plants and development of genetically modified organisms with special reference to drought and salinity, insect and virus resistance and improvement in plant nutritional contents.

15 Credit hours

Unit-IV

Bioreactors for production of secondary metabolites. Introduction types : stirred-tank type, air-lift type, membrane type bioreactor, packed bed reactor. Modes of culture applied in bioreactors – batch culture, fed-batch culture, semi-continuous culture, continuous culture. Optimization of conditions for growth of cells in bioreactors for production of secondary metabolites.

15 Credit hours

Unit-V

Secondary products in tissue cultures – production of alkaloids, phenols, steroids, lignins, coumarins, flavonoids, anthroquinones and naphthoquinones, isoprenoids, Plant cell immobilization, gel entrapment, applications of immobilization techniques. Secondary metabolite production using immobilized cells. Use of

transgenic plants in production of secondary metabolites and therapeutic proteins. Plants as bioreactors.

15 Credit hours

Suggested Readings

1. Chrispeels, M.J. and Sadava, D.E. Plant, genes and agriculture. Jones and Barlett Pub., Boston, London.
2. Kyte, L. and Kleyn. Plant From test tube. Timber Press, Portland, Oregon.
3. Ravishanker, G.A. and Venkatraman, L.V. Biotechnology application of plant tissue and cell culture. Oxford and IBH Publishing Co. Pvt. Ltd.
4. Reinert, J. and Bajaj, Y.P.S. Applied and Fundamental Aspects of Plant Cell, Tissue and Organ Culture. Narosa.
5. Chawla, H.S. Biotechnology in Crop Improvement. International Book Distributing Company.
6. Henery, R.J., Chapman and Hall. Practical application of plant molecular Biology.
7. Hammond, J. and McGarvey, P. Plant Biotechnology. Springer Verlag.