

**UPDATED SCHEME OF EXAMS. & SYLLABI FOR B.SC.**

**SCHEME OF EXAMINATION OF B. Sc. (MEDICAL)  
BOTANY**

**Semester – I**

|          |                       |                  |             |
|----------|-----------------------|------------------|-------------|
| Paper –I | Diversity of Microbes | Max Marks- 40+10 | Time-3 Hrs. |
| Paper-II | Cell Biology          | Max Marks- 40+10 | Time-3 Hrs. |

**Semester –II**

|           |                                   |                  |                               |
|-----------|-----------------------------------|------------------|-------------------------------|
| Paper-I   | Diversity of Archegoniates        | Max Marks- 40+10 | Time-3 Hrs.                   |
| Paper-II  | Genetics                          | Max Marks- 40+10 | Time-3 Hrs.                   |
| Paper-III | Practicals(Annually)Semester-I&II | Max Marks- 80+20 | Time-6 Hrs.<br>(Two Sessions) |

**Semester-III**

|          |   |                  |              |
|----------|---|------------------|--------------|
| Paper-I  | Biology and Diversity of Seed<br>Plants-I | Max Marks- 40+10 | Time- 3 Hrs. |
| Paper-II | Plant Anatomy                             | Max Marks- 40+10 | Time-3 Hrs.  |

**Semester-IV**

|           |  |                  |                                |
|-----------|--|------------------|--------------------------------|
| Paper-I   | Biology and Diversity of Seed<br>Plants-II | Max Marks- 40+10 | Time- 3 Hrs                    |
| Paper-II  | Plant Embryology                           | Max Marks- 40+10 | Time- 3 Hrs.                   |
| Paper-III | Practicals (Annually)<br>Semester-III & IV | Max Marks- 80+20 | Time- 6 Hrs.<br>(Two sessions) |

**Semester-V**

|          |                  |                  |               |
|----------|------------------|------------------|---------------|
| Paper-I  | Plant Physiology | Max Marks- 40+10 | Time – 3 Hrs  |
| Paper-II | Ecology          | Max Marks- 40+10 | Time – 3 Hrs. |

**Semester-VI**

|           |  |                   |                               |
|-----------|--|-------------------|-------------------------------|
| Paper-I   | Biochemistry & Plant Biotechnology       | Max Marks - 40+10 | Time-3 Hrs                    |
| Paper-II  | Economic Botany                          | Max Marks - 40+10 | Time 3 Hrs.                   |
| Paper-III | Practicals (Annually)<br>Semester-V & VI | Max Marks - 80+20 | Time- 6 Hrs<br>(Two Sessions) |

**Total Marks – 900**

*\*20% marks allotted for Internal Assessment.*

## SEMESTER-I

Max. Marks – 40+10  
Time- 3 Hrs.

### PAPER –I DIVERSITY OF MICROBES

**Note:** Attempt five questions in all, selecting two questions from each unit.

**Question No. 1 is compulsory (short answer type).**

**Nine questions are to be set spread over the entire syllabus. All questions carry equal marks.**

#### UNIT-I

**Bacteria :** Structure, nutrition, reproduction and economic importance; general account of cyanobacteria (with reference to *Nostoc*).

**Algae:** General characters, classification (upto classes) and economic importance; important features and life-history (excluding development) of *Volvox*, *Oedogonium* (Chlorophyceae), *Vaucheria* (Xanthophyceae), *Ectocarpus* (Phaeophyceae) and *Polysiphonia* (Rhodophyceae).

#### UNIT-II

**Viruses:** General account of Viruses including structure of TMV and Bacteriophages.

**Fungi:** General characters, classification (upto classes) and economic importance; important features and life-history of *Phytophthora* (Mastigomycotina), *Mucor* (Zygomycotina), *Penicillium* (Ascomycotina), *Puccinia*, *Agaricus* (Basidiomycotina), *Colletotrichum* (Deuteromycotina); General account of Lichens.

# PAPER –II CELL BIOLOGY

Max. Marks - 40+10

Time- 3 Hrs.

**Note:** Attempt five questions in all, selecting two questions from each unit.

**Question No. 1 is compulsory (short answer type).**

**Nine questions are to be set spread over the entire syllabus. All questions carry equal marks.**

## UNIT-I

**The Cell Envelopes:** Structure and functions of Cell Wall and Plasma Membrane.

Ultrastructure and function of nucleus, Golgi Apparatus, Endoplasmic Reticulum, Chloroplast, Mitochondria, Lysosomes, Peroxisomes and Vacuoles.

## UNIT-II

**Cell Division:** Mitosis and Meiosis.

**Chromosome:** Morphology, organization, ultrastructure of Centromere and Telomere; Chromosomal alterations- deletions, duplications, translocations, inversions; Variations in chromosome number-aneuploidy, polyploidy; sex chromosomes and sex determination.

## **SUGGESTED READINGS**

Smith, G.M. 1971. Cryptogamic Botany. Vol.I. Algae & Fungi. Tata McGraw Hill Publishing Co., New Delhi.

Sharma, P.D. 1991. The Fungi. Rastogi & Co., Meerut.

Dube, H.C. 1990. An Introduction to Fungi, Vikas Publishing House Pvt.Ltd., Delhi.

Clifton, A. 1958. Introduction to the Bacteria: McGraw Hill & Co., New York.

Alberts, B.Bray, D.Lewis, J., Raff, M., Roberts, K. and Watson. I.D. 1999. Molecular Biology of Cell. Garland Publishing Co., Inc., New York, USA.

Atherly, A.G. Girton, J.R. and McDonald, J.F. 1999. The Science of Genetics, Saunders College Publishing , Fort Worth, USA.

Gupta, P.K. 1999. A text book of Cell and Molelcular Biology. Rastogi Publications, Meerut, India.

Kleinsmith, L. J and Kish, V.M. 1995. Principles of Cell and Molecular Biology (2<sup>nd</sup> edition) Harper Collins College Publishers, New York, USA.

Lodish, H., Berk, A., Zipursky, S.L., Matsudaria, P., Baltimoe, D. and Darnell, J. 2000. Molecular, Cell Biology, W.H. Freeman and Co., New York., USA.

Russel, P.J. 1998. Genetics, The Benjamin/Cummings Publishing Co. Inc., USA.

Snustad, D.P. and Simmons, M.J. 2000. Principles of Genetics. John Wiley and Sons, Inc. USA.

## SEMESTER-II

Max. Marks - 40+10

Time- 3 Hrs.

### PAPER –I DIVERSITY OF ARCHEGONIATES

**Note:** Attempt five questions in all, selecting two questions from each unit.

**Question No. 1 is compulsory (short answer type).**

**Nine questions are to be set spread over the entire syllabus. All questions carry equal marks.**

#### UNIT-I

**Bryophyta-** General characters, classification (upto classes), alternation of generations, structure and reproduction (excluding development) of *Marchantia* (Hepaticopsida), *Anthoceros* (Anthocerotopsida), *Funaria* (Bryopsida).

#### UNIT-II

**Pteridophyta-** General characters, classification (upto classes), alternation of generations, structure and reproduction (excluding development) of *Rhynia* (Psilopsida), *Selaginella* (Lycopsida), *Equisetum* (Sphenopsida) and *Pteris* (Pteropsida).

## PAPER –II GENETICS

Max. Marks - 40+10

Time- 3 Hrs.

**Note:** Attempt five questions in all, selecting two questions from each unit.

**Question No. 1 is compulsory (short answer type).**

**Nine questions are to be set spread over the entire syllabus. All questions carry equal marks.**

### UNIT-I

**Genetic Material:** DNA the genetic material, DNA structure and replication, DNA-Protein interaction, the Nucleosome Model, Genetic Code, Satellite and Repetitive DNA.

**Genetic Inheritance:** Mendelism: Laws of segregation and Independent Assortment; Linkage Analysis; Allelic and non-allelic interactions.

### UNIT-II

**Genetic Variations:** Mutations- spontaneous and induced; transposable genetic elements; DNA damage and repair.

**Gene Expression:** Modern concept of gene; RNA; Ribosomes; transfer of genetic information- transcription and translation (Protein Synthesis); regulation of gene expression in prokaryotes and eukaryotes; 1-D, 2-D and 3-D structure of Proteins.

**Extra Nuclear Inheritance:** Presence and function of Mitochondrial and Plastid DNA; Plasmids.

## **SUGGESTED READINGS:**

- Atherly, A.g. Girton, J.R. and McDonald, J.F. 1999. The Science of Genetics, Saunders College Publishing, Fort Worth, USA.
- Gupta, P.K. 1999. A text book of Cell and Molecular Biology. Rastogi Publications, Meerut, India
- Kleinsmith, L.J. and Kish, V.M. 1995. Principles of Cell and Molecular Biology (2<sup>nd</sup> edition). Harper Collins College Publishers, New York, USA.
- Lodish, H., Berk, A., Zipursky, S.L., Matudaria, P., Baltimore, D. and Darnell, J. 2000. Molecular, Cell Biology, W.H. Freeman and Co., New York, USA.
- Russel, P.J. 1998. Genetics, The Benjamin/Cummings Publishing Co. Inc., USA.
- Snustad, D.P. and Simmons, M.J. 2000. Principles of Genetics. John Wiley and Sons, Inc. USA.
- Smith, G.M. 1971. Cryptogamic Botany, Vol.II, Bryophytes & Pteridophytes. Tata McGraw Hill Publishing Co., New Delhi.
- Sharma, O.P. 1992. Text Book of Thallophytes, McGraw Hill Publishing Co.
- Sharma, O.P. 1990. Text Book of Pteridophyta, Mc Millan India Ltd.
- Puri, P., 1980, Bryophyta, Atma Ram & Sons, Delhi.

## PAPER – III PRACTICALS

**Max. Marks -80+20\***  
**Time- 6 Hrs. (2 Sessions)**

1. Identify, classify and write short morphological notes giving well labelled relevant diagrams on the given specimens **A, B, C** and **D** (one each from Algae, Fungi, Bryophytes and Pteridophytes).  
26
2. Prepare the root smear and find out two different stages of Mitosis. Identify and show it to the examiners. Also give characters of identification.  
10
3. Numerical regarding Genetics (Mendelian Inheritance or Gene Interaction) as per syllabus.  
10
4. Identify giving two important characters of identification on spots **1, 2, 3** and **4** (one slide or material each from Algae, Fungi, Bryophytes and Pteridophytes).  
20
6. Note-book, collection and collection report.  
12
7. Viva-voce.  
12

### LIST OF PRACTICALS (Semester I & II)

1. Stages of Mitosis from Material (Onion-root tips).
2. Experiments on Monohybrid and Dihybrid ratios.
3. Gene Interactions and modified Dihybrid ratios.
4. Chi-square analysis.
5. Type study- Specimens from Algae, Fungi, Bryophytes and Pteridophytes as per theory syllabus.
6. Field tour of an area rich in diversity of Archegoniates for collection of plants, plant diseases and preparation of Herbarium.
7. Preparation of Survey/Collection Report.



**B. Sc. II (Botany) Syllabus**

**SEMESTER-III**

**Max. Marks – 40+10\***

**Time- 3 Hrs.**

**PAPER –I BIOLOGY AND DIVERSITY OF SEED PLANTS-I**

**Note: Attempt five questions in all, selecting two questions from each unit.**

**Question No. 1 is compulsory (short answer type).**

**Nine questions are to be set spread over the entire syllabus. All questions carry equal marks.**

**UNIT- I**

General characters and diversity of Gymnosperms (seed plants without fruits).

Pilger and Melchior's (1954) system of classification.

Geological Time Table; Evolution of Seed Habit.

Palaeobotany-Fossils and Fossilization (Processes involved, types of Fossils and Importance of Fossils; Reconstruction of the following fossil plants:

*Lyginopteris*

*Williamsonia*

*Cycadeoidea (=Bennettites).*

**UNIT- II**

Morphology and anatomy of root, stem leaf/leaflet and reproductive parts including mode of reproduction, life-cycle and economic importance of the following:

*Cycas*

*Pinus*

*Ephedra*

General characters of Angiosperms including primitive angiosperms (Amentiferae, Ranales, Magnoliales).

## PAPER –II PLANT ANATOMY

Max. Marks – 40+10\*

Time- 3 Hrs.

**Note:** Attempt five questions in all, selecting two questions from each unit.

**Question No. 1 is compulsory (short answer type).**

**Nine questions are to be set spread over the entire syllabus. All questions carry equal marks.**

### UNIT-I

Diversity in plant forms-annuals, biennials and perennials.

Tissues-meristematic and permanent (simple and complex).

The Shoot system-shoot apical meristem and its histological organizations (monocot and dicot stem);

Cambium-structure and functions.

Secondary growth in dicot stem; characteristics of growth rings; sap wood and heart wood, periderm;

Anomalous secondary growth (*Dracaena*, *Boerhaavia* and *Achyranthes*)

### UNIT-II

Leaf-Types of leaves (simple and compound); phyllotaxy.

Epidermis-uniseriate and multiseriate, epidermal appendages and their morphological types.

Anatomy of typical Monocot and Dicot leaf and cell inclusions in leaves; leaf abscission. Stomatal apparatus and their morphological types.

Root system- the root apical meristem; the histological organization (monocot and dicot root).

Secondary growth in dicot root.

Structural modifications in roots- storage (*Beta*), Respiratory (*Rhizophora*), Epiphytic (*Vanda*).

## Suggested Readings

- Bhatnagar, S. and Moitra, A. 1996. Gynnosperms. New Age International - Limited, New Delhi.
- Davis, P.H. and Heywood, V.H. 1963. Principles of Angiosperm Taxonomy, Oliver and Boyd, London.
- Gifford, E.M. and Foster, A.S. 1988. Morphology and Evolution of Vascular Plants, W.H. Freeman & Company, New York.
- Heywood, V.H. and Moore, D.M. (Eds.) 1984. Current Concepts in Plant Taxonomy. Academic Press, London.
- Jeifrey, C. 1982. An introduction to Plant Taxonomy. Cambridge University Press, Cambridge, London.
- Jones, S.B., Jr. Luchsinger, A.E. 1986. Plant Systematics (2nd edition). McGraw Hill Book Co. New York.
- Maheshwari, J.K. 1963. Flora of Delhi. CSIR, New Delhi.
- Radford, A.E. 1986. Fundamentals of Plant Systamtics. Harper and Row, New York.
- Singh, G. 1999. Plant Systematics: Theory and Practical. Oxford and IBH Pvt. Ltd., New Delhi.
- Sporne, K.R. 1965. The Morphology of Gynnosperms. Hutchinson & Co. Ltd., London.
- Stace, C.A. 1989. Plant Taxonomy and Biosystematics (2nd edition). Edward Arnold, London.
- Stewart, W.M. Paleobotany and the Evolution of Plants. Cambridge University Press, Cambridge

## SEMESTER-IV

Max. Marks – 40+10\*

Time- 3 Hrs.

### PAPER –I BIOLOGY AND DIVERSITY OF SEED PLANTS-II

**Note:** Attempt five questions in all, selecting two questions from each unit.

**Question No. 1 is compulsory (short answer type).**

**Nine questions are to be set spread over the entire syllabus. All questions carry equal marks.**

#### UNIT-I

Taxonomy and Systematics, fundamental components of taxonomy (identification, classification, description, nomenclature and phylogeny).

Role of chemotaxonomy, cytotaxonomy and taxometrics in relation to taxonomy. Botanical

Nomenclature, principles and rules, principle of priority.

Type concept, taxonomic ranks.

Keys to identification of plants.

Flower and Types of Inflorescence.

#### UNIT-II

Salient features of the systems of classification of angiosperms proposed by Bentham & Hooker and Engler & Prantl.

Diversity of Flowering Plants: Diagnostic features and economic importance of the following families: Ranunculaceae, Brassicaceae, Malvaceae, Euphorbiaceae, Rutaceae, Leguminosae, Apiaceae, Asclepiadaceae, Lamiaceae, Solanaceae, Asteraceae, Liliaceae and Poaceae.

## **PAPER-II PLANT EMBRYOLOGY**

**Max. Marks – 40+10\***

**Time- 3 Hrs.**

**Note: Attempt five questions in all, selecting two questions from each unit.**

**Question No. 1 is compulsory (short answer type).**

**Nine questions are to be set spread over the entire syllabus. All questions carry equal marks.**

### **UNIT-I**

Flower-a modified shoot; functions of various floral parts.

Microsporangium, its wall and dehiscence mechanism.

Microsporogenesis, pollen grains and its structure (pollen wall).

Pollen-pistil interaction; self incompatibility.

Pollination (types and agencies); pollen germination (microgametogenesis).

Male gametophyte.

### **UNIT-II**

Structure of Megasporangium (ovule), its curvatures; Megasporogenesis and Megagametogenesis.

Female gametophyte (mono-, bi- and Tetrasporic).

Double fertilization.

Endosperm types and its biological importance.

Embryogenesis in Dicot and Monocot; polyembryony.

Structure of Dicot and Monocot seed.

Fruit types; dispersal mechanisms in fruits and seeds.

## Suggested Readings

- Bhojwani, S.S. and Bhatnagar, S.P. 2000. The Embryology of Angiosperms. 4<sup>th</sup> revised and Enlarged Edition. Vikas Publishing House, Delhi.
- Cutter, E.G. 1969. Plant Anatomy Part-I, Cells and Tissues, Edward Arnold, London.
- Cutter, E.G. 1971. Plant Anatomy :Experiment and Interpretation. Part-II Organs, Edward Arnold London.
- Esau, K. 1977. Anatomy of Seed Plants, 2<sup>nd</sup> Edition. John Wiley & Sons, New York.
- Fageri, K. and Van der Pijl 1979. The Principles of Pollination Ecology. Pergamon Press, Oxford.
- Fahn, A. 1974. Plant Anatomy, 2nd Edition. Pergamon Press, Oxford.
- Hartmann, H.T. and Kestler, D.E. 1976. Plant Propagation; Principles and Practices. 3rd Edition. Prentice Hall of India Pvt. Ltd. New Delhi.
- King. J. 1997. Reaching for the Sun: How Plants Work. Cambridge University Press, Cambridge, U.K.
- Mauseth, J.D. 1988. Plant Anatomy. The Benjamin/Cummings Publishing Company Inc., Menlo Park, California, USA.
- Proctor, M. and Yeo, P. 1973. The Pollination of Flowers. William Collins Sons, London.
- Raven, P.H. Evert, R.F. and Eichhorn, S.E. 1999. Biology of Plants. 5th edition. W.R. Freeman and Co., Worth Publishers, New York.
- Thomas, P. 2000. Trees: Their Natural History. Cambridge University Press, Cambridge.

## PAPER -III PRACTICALS

Max. Marks- 80+20  
Time- 6 Hrs. (2 Sessions)

### **Biology and Diversity of Seed Plants, Plant Anatomy and Plant Embryology**

1. Describe/compare the given flowers A and B in semi-technical language giving V.S. of flowers, T.S. of ovaries, Floral Diagrams and Floral Formulae. Identify and assign them to their respective families giving reasons. 20
2. Identify, classify and write morphological notes on the given specimens C and D '(from Gymnosperms) 10
3. Cut Transverse Section and prepare a double-stained permanent mount of the given material (from angiosperms/gymnosperms). Identify giving reasons and show it to the examiner. 12
4. Identify, giving the important characters of identification, the spots 1 and 2 (one material/slide each from gymnosperms and embryology of angiosperms). 10
5. Write morphological notes on the specimens E and F (from angiosperms). 10
6. Dissect out the globular/heart-shaped embryo from the given material. 4
7. Note-book, Collection and Collection Report. 12
8. Viva-voce. 12

**Paper – I Plant Physiology**

Internal Assessment-10

Max. Marks – 40

Time– 3 Hrs.

**Note:** Five questions to be attempted in all, selecting two questions from each unit. Question No. 1 will be compulsory (short answer type). Nine questions are to be set spread over the entire syllabus. All questions carry equal marks.

**UNIT-I**

**Plant-water Relations:** Importance of water to plant life; physical properties of water; Imbibition, Diffusion, Osmosis and Plasmolysis; absorption and transport of water; transpiration-types, physiology of stomata, factors affecting transpiration, importance of transpiration.

**Mineral Nutrition:** Essential macro and micro elements and their role; mineral uptake; deficiency symptoms.

**Transport of Organic Substances:** Mechanism of phloem transport; source-sink relationship; factors affecting translocation.

**UNIT-II**

**Photosynthesis:** Significance; historical aspects; photosynthetic pigments; action spectra and enhancement effects; concept of two photosystems; Z-scheme; photo-phosphorylation; Calvin cycle; C4 pathway; CAM plants; photorespiration.

**Respiration:** ATP–the biological energy currency; aerobic and anaerobic respiration; Krebs cycle; electron transport mechanism (chemi-osmotic theory); redox -potential; oxidative phosphorylation; pentose phosphate pathway.

Seed dormancy; plant movements; the concept of photoperiodism; physiology of flowering; florigen concept; physiology of senescence; fruit ripening.

**Suggested Readings:**



1. Dennis,D.T., Turpin, D.H., Lefebvre,D.D. and Layzell (eds.). 1997: Plant Metabolism (2<sup>nd</sup> Edition), Longman, Essex, England.
2. Galston, A.W. 1989: Life Processes in Plants, Scientific American Library, Springer-Verlag, New York, USA.
3. Hopkins, W.G., 1995: Introduction to Plant Physiology, John Wiley & Sons, Inc., New York, USA.
4. Mohr, H. and Schopfer, P. 1995: Plant Physiology. Springer-Verlag, Berlin Germany.
5. Salisbury, F.B. and Ross, C.W. 1986: Plant Physiology. CBS Publishers and Distributors, New Delhi.
6. Taiz, L. and Zeiger, E. 2003: Plant Physiology. Panima Publishing Corporation, New Delhi.

**SEMESTER-V****Paper - II Ecology**

Internal Assessment-10

Max. Marks – 40

Time– 3 Hrs.

**Note:** Five questions to be attempted in all, selecting two questions from each unit. Question No. 1 will be compulsory (short answer type). Nine questions are to be set spread over the entire syllabus. All questions carry equal marks.

**UNIT-I**

**Introduction to Ecology:** Definition; scope and importance; levels of organization.

**Environment:** Introduction; environmental factors- climatic (water, humidity, wind, light, temperature), edaphic (soil profile, physico-chemical properties), topographic and biotic factors (species interaction).

Adaptations of plants to water stress and salinity (morphological and anatomical features of hydrophytes, xerophytes and halophytes).

**Population Ecology:** Basic concept; characteristics; biotic potential, growth curves; ecotypes and ecads.

**UNIT-II**

**Community Ecology:** Concepts; characteristics (qualitative and quantitative-analytical and synthetic); methods of analysis; ecological succession.

**Ecosystem:** Structure (components) and functions (trophic levels, food chains, food webs, ecological pyramids and energy flow)

**Biogeochemical Cycles:** carbon and nitrogen; hydrological (water) cycle.

**Phyto-geography:** Phyto-geographical regions of India; vegetation types of India (forests).

**Environmental Pollution:** Sources, types and control of air and water pollution.

**Global Change:** Greenhouse effect and greenhouse gases; impacts of global warming; carbon trading.

**Suggested Readings:**

1. Odum, E.P. 1983: Basic Ecology, Saunders, Philadelphia.
2. Kormondy, E.J. 1996: Concepts of Ecology, Prantice-Hall of India Pvt. Ltd., New Delhi.
3. Mackenzie, A. et al. 1999: Instant Notes in Ecology, Viva Books Pvt. Ltd., New Delhi.

## SEMESTER-VI

### Paper – I Biochemistry and Plant Biotechnology

Internal Assessment-10

Max. Marks – 40

Time– 3 Hrs.

**Note:** Five questions to be attempted in all, selecting two questions from each unit. Question No. 1 will be compulsory (short answer type). Nine questions are to be set spread over the entire syllabus. All questions carry equal marks.

#### UNIT-I

**Basics of Enzymology:** Discovery and nomenclature; characteristics of enzymes; concept of holoenzyme, apoenzyme, coenzyme and co-factors; regulation of enzyme activity; mechanism of action.

**Growth and development:** Definitions; phases of growth and development; Plant hormones- auxins, gibberellins, cytokinins, abscissic acid and ethylene, history of their discovery, mechanism of action; photo-morphogenesis; phytochromes and their discovery, physiological role and mechanism of action.

**Lipid metabolism:** Structure and functions of lipids; fatty acid biosynthesis; B-oxidation; saturated and unsaturated fatty acids; storage and mobilization of fatty acids.

#### UNIT-II

**Nitrogen metabolism:** Biology of nitrogen fixation; importance of nitrate reductase and its regulation; ammonium assimilation.

**Genetic engineering and Biotechnology:** Tools and techniques of recombinant DNA technology; cloning vectors; genomic and cDNA library; transposable elements; aspects of plant tissue culture; cellular totipotency, differentiation and morphogenesis; biology of Agro-bacterium; vectors for gene delivery and marker genes.

**Suggested Readings:**

1. Bhojwani, S.S. 1990: Plant Tissue Culture Applications and Limitations. Elsevier Science Publishers, New York, USA.
2. Lea, P.J. and Leegood, R.C. 1999: Plant Biochemistry and Molecular Biology, John Wiley & Sons, Chichester, England.
3. Nelson, D.L. and Cox, M.M. 2005: Lehninger Principles of Biochemistry. 4<sup>th</sup> Edition. W.H. Freeman and Company, New York.
4. Old, R.W. and Primrose, S.B. 1989: Principles of Gene Manipulation, Blackwell Scientific Publications, Oxford, UK.
5. Palmer, T. and Bonner, P. 2008: Enzymes-Biochemistry, Biotechnology, Clinical Chemistry (2<sup>nd</sup> Edition). East West Press Pvt. Ltd., New Delhi.
6. Raghavan, V. 1986: Embryogenesis in Angiosperms: A Developmental and Experimental Study, Cambridge University Press, New York, USA.
7. Rawn, J.D. 2004: Biochemistry. Panima Publishing Corporation, New Delhi.

**SEMESTER-VI****Paper – II Economic Botany**

Internal Assessment-10

Max. Marks – 40

Time – 3 Hrs.

**Note:** Five questions to be attempted in all, selecting two questions from each unit. Question No. 1 will be compulsory (short answer type). Nine questions are to be set spread over the entire syllabus. All questions carry equal marks.

**UNIT-I**

Origin, distribution, botanical description, brief idea of cultivation and uses of the following:

**Food plants- Cereals** (Rice, Wheat and Maize).

**Pulses-** (Gram, Arhar and Pea).

**Vegetables-** (Potato, Tomato and Onion).

**Fibers-** Cotton, Jute and Flax.

**Oils-** Groundnut, Mustard and Coconut.

**UNIT-II**

Morphology of plant part used, brief idea of cultivation and uses of the following:

**Spices-** Coriander, Ferula, Ginger, Turmeric, Cloves.

**Medicinal Plants-** *Cinchona*, *Rauwolfia*, *Atropa*, *Opium*, *Cannabis*, Neem.

Botanical description and processing of:

**Beverages-** Tea and Coffee.

**Rubber-** *Hevea*.

**Sugar-** Sugarcane.

General account and sources of timber; energy plantations and bio-fuels.

**Suggested Readings:**

1. Kocchar, S.L. 1998: Economic Botany in Tropics, 2<sup>nd</sup> edition, MacMillan India Ltd., New Delhi.
2. Sambammurthy, A.V.S.S. And Subramanyam, N.S. 1989: A Textbook of Economic Botany, Wiley Eastern Ltd., New Delhi.
3. Sharma, O.P. 1996: Hills Economic Botany (Late Dr. A.F. Hill adapted by O.P. Sharma), Tata McGraw Hill Co. Ltd., New Delhi.
4. Simpson, B.B. and Conner-Ogorzaly, M. 1986: Economic Botany- Plants in our World, McGraw Hill, New York.

**Paper-III Practicals : Plant physiology,  
Biochemistry,  
Biotechnology, Ecology, &  
Economic Botany.**

**Int. Assessment-20  
Max. Marks - 80  
Time- 6 hrs. (Two Sessions)**

1. Devise an experiment to demonstrate the physiological process (as per the list).  
Perform it and show it to the examiners. 15
2. Comment on the physiological/Biochemistry experiment  
(Specimen/ set-up / Model / Chart). 10
3. Test for carbohydrates / Proteins / Fats / Peroxidase activity. 5
4. Ecological experiment/Ecological Specimens A & B (as per the list) 10
5. Identify and Classify spots 1, 2, 3, and 4 from the point of view of economic importance  
and morphology of the plant part used. 20
6. Applied Botany experiment (as per the list). 8
7. Note Book, Collection and field report. 6 + 6 = 12
8. Viva-voce. 10



## List of Practicals

### **A. Physiology/Biochemistry**

1. Demonstration of Imbibition by plaster of Paris method.
2. Demonstration of Osmosis by potato osmoscope method.
3. Demonstration of Plasmolysis and Deplasmolysis
4. To study the Structure of stomata (Dicot & Monocot)
5. To study the Osmotic pressure of onion scale/ Rhoec leaf peel by plasmolytic method.
6. Comparison of Stomatal and Cuticular Transpiration by four leaf /Cobalt chloride method.
7. Demonstration of transpiration by Ganong's/ Farmer's potometer.
8. To separate of photosynthetic pigments by thin layer/paper chromatography.
9. Demonstration of Ascent of sap/Transpiration pull.
10. To study the rate of photosynthesis under varying CO<sub>2</sub> concentration using Wilmott's bubbler.
11. To study the effect of light intensity on oxygen evolution during photosynthesis using Wilmott's bubbler.
12. Demonstration of aerobic respiration.
13. Demonstration of anaerobic respiration.
14. To study the evolution of heat during respiration
15. Demonstration of Manometric determination of R. Q.
16. Demonstration of phototropism, geotropism and hydrotropism.
17. Determination of peroxidase activity.
18. Simple tests for the detection of Carbohydrates(Monosaccharides, Disaccharides and Starch); Proteins and Fats.

### **B. Ecology**

1. Determination of pH of soil and water samples by using Universal Indicator.
2. Study of physical properties of soil-soil density, water holding capacity etc.
3. Study of community structure by quadrat / line transect method.
4. Determination of density, abundance and frequency of species by quadrat method.
5. Morphological and anatomical features of hydrophytes, xerophytes and parasites in relation to their habitats.
6. To prepare a report on local visit to an industry to identify the source and types of Pollutants.

### **B. Utilization of plants & Applied Botany**

1. Study of plant parts / products from the point of view of economic importance (as per theory syllabus).
2. To prepare any one of the tissue culture medium.
3. To prepare the slants and Petri plates for plant tissue culture.
4. Study of techniques of sterilization, culturing and sub-culturing of cell, tissues and organs.
5. Demonstration of anther culture, protoplast isolation and culture using suitable models / charts / photographs etc.
6. Brief introduction to the components and working of the instruments (oven, autoclave, incubator, centrifuge, laminar air flow and spectrophotometer)

