

SCHEME OF EXAMINATION FOR B.Sc. (BOTANY) SEMESTER SYSTEM
w.e.f. Session 2016-17
Scheme of B.Sc. 1st Year

Semester I					
Sr. No.	Paper code	Nomenclature	Marks+IA	Periods / week	Exam. Duration
1.	BOT.1.1	Diversity of Microbes	40+10	4	3 hrs.
2.	BOT 1.2	Cell Biology	40+10	4	3 hrs.
3.	P-101	Practical (1.1& 1.2)	50	8	3hrs
Semester II					
4.	BOT 2.1	Diversity of Archegoniates	40+10	4	3 hrs.
5.	BOT 2.2	Genetics	40+10	4	3 hrs.
6.	P-102	Practical (2.1& 2.2)	50	8	3 hrs
Total Semester I & II			300		

Scheme of B.Sc. II (2017-18)

Semester III					
Sr. No.	Paper code	Nomenclature	Marks+IA	Periods / week	Exam. Duration
1.	BOT 3.1	Biology and Diversity of Seed Plants-I	40+10	4	3 hrs.
2.	BOT 3.2	Plant Anatomy	40+10	4	3 hrs.
3.	P-201	Practical (3.1& 3.2)	50	8	3 hrs
Semester IV					
4.	BOT 4.1	Biology and Diversity of Seed Plants II	40+10	4	3 hrs.
5.	BOT 4.2	Plant Embryology	40+10	4	3 hrs.
6.	P-202	Practical (4.1& 4.2)	50	8	3hrs
Total Semester III & IV			300		

Scheme of B.Sc. III (2018-19)

Semester V					
Sr. No.	Paper code	Nomenclature	Marks+IA	Periods / week	Exam. Duration
1.	BOT 5.1	Plant Physiology	40+10	4	3 hrs.
2.	BOT 5.2	Ecology	40+10	4	3 hrs.
3.	P-301	Practical (5.1& 5.2)	50	8	3hrs
Semester VI					
4.	BOT 6.1	Biochemistry & Plant Biotechnology	40+10	4	3 hrs.
5.	BOT 6.2	Economic Botany	40+10	4	3 hrs.
6.	P-302	Practical (6.1& 6.2)	50	8	3hrs
Total Semester V & VI			300		
Grand Total Semester I – VI			900		

Note: -

- There will be an internal assessment of 20%, in each theory paper.
- I Period =45 minutes
- Practical examination will be held conducted at the end of each semester.

B.Sc. Botany

SEMESTER-I

PAPER CODE: BOT. 1.1

PAPER –I DIVERSITY OF MICROBES

Internal Assessment-10

Max. Marks – 40

Time- 3 Hours

Note: Attempt five questions in all, selecting one question 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
Cyanobacteria: General characters; life-history of *Nostoc*

Algae: General characters, classification (upto classes) and economic importance;
General account of algal blooms

UNIT II

Important features and life-history (excluding development) of *Volvox*, *Oedogonium* (Chlorophyceae), *Vaucheria* (Xanthophyceae), *Ectocarpus* (Phaeophyceae) and *Polysiphonia* (Rhodophyceae)

UNIT-III

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

Fungi: General characters, classification (upto classes) and economic importance;
General account of Lichens

UNIT- IV

Important features and life-history of *Phytophthora* (Mastigomycotina), *Mucor* (Zygomycotina), *Penicillium* (Ascomycotina), *Puccinia*, *Agaricus* (Basidiomycotina), *Colletotrichum* (Deuteromycotina)

B.Sc. Botany

SEMESTER-I

PAPER CODE: BOT. 1.2

PAPER –II CELL BIOLOGY

Internal Assessment-10

Max. Marks – 40

Time- 3 Hours

Note: Attempt five questions in all, selecting one question 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, Plasma Membrane, Golgi Apparatus, Endoplasmic Reticulum, Lysosomes, Peroxisomes and Vacuoles

UNIT II

Ultra-structure and function: Chloroplast, Mitochondria, Nucleus and Nucleolus

Chromosome: Morphology, ultra-structure - kinetochore, centromere and telomere

UNIT-III

Cell Cycle: General account

Cell Division: Mitosis and Meiosis - Stages and Significance

UNIT - IV

Chromosomal aberrations: Structural and Numerical - deletions, duplications, translocations, inversions, aneuploidy, polyploidy

Sex chromosomes and Sex determination in Plants

PRACTICALS
B.Sc. 1st Botany (First Semester)

Diversity of Microbes and Cell Biology (Code: P 101)

Max. Marks: 50

Time allotted: 3 Hours

1. Identify, classify and write short morphological notes giving well labelled relevant diagrams on the given two specimens A, B & C (15)
2. Prepare smear/squash and find out two different stages of mitosis/meiosis. Identify and show it to the examiners and also give characters of identification. (12)
3. Identify giving two important characters of identification of the given spots 1, 2, 3,4 (one slide/ material from virus, bacteria, fungi, lichen). (8)
4. Field visit and collection records (5)
5. Practical records (5)
6. Viva-voce (5)

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 Publising , Fort Worth, USA.
- Gupta, P.K. 1999. A text book of Cell and Molelcular Biology. Rastogi Publications, Meerut, India.

**B.Sc. Botany
Semester-II**

PAPER CODE: BOT. 2.1

PAPER –I DIVERSITY OF ARCHEGONIATES

Internal Assessment-10

Max. Marks – 40

Time- 3 Hours

Note: Attempt five questions in all, selecting one question 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, evolution of sporophytes and economic importance

UNIT -II

Bryophyta: Structure and reproduction (excluding development) of *Marchantia* (Hepaticopsida), *Anthoceros* (Anthocerotopsida) and *Funaria* (Bryopsida)

UNIT-III

Pteridophyta- General characters, classification (upto classes), alternation of generations, heterospory, apospory, apogamy and economic importance;
General account of stellar evolution

UNIT IV

Pteridophyta: Structure and reproduction (excluding development) of *Rhynia* (Psilopsida), *Selaginella* (Lycopsidea), *Equisetum* (Sphenopsida) and *Pteris* (Pteropsida)

**B.Sc. Botany
SEMESTER-II
PAPER CODE: BOT. 2.2
PAPER –II GENETICS**

**Internal Assessment-10
Max. Marks – 40
Time- 3 Hours**

**Note: Attempt five questions in all, selecting one question 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.

UNIT - II

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

UNIT-III

Extra-nuclear Inheritance: Presence and function of Mitochondrial and Plastid DNA; Plasmids.

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

UNIT - IV

Gene Expression: Modern concept of gene; RNA; Ribosomes; Transfer of genetic information - transcription and translation; Structure of proteins; Regulation of gene expression in prokaryotes and eukaryotes

PRACTICALS

B.Sc. 1st Botany (Second Semester)

Diversity of Archegoniates and Genetics

(Code: P-201)

Max Marks: 50

Time: 3hrs

1. Identify, classify and write short morphological notes giving well labelled diagrams on the given two specimens from Bryophytes and Pteridophytes. (12)
2. One numerical regarding genetics (Mendelian inheritance or gene interaction) as per syllabus. (12)
3. Identify giving two important characters of identification of the given spots 1, 2, 3,4 (8)
4. Field Visit and collection records (8)
5. Practical records (5)
6. Viva-voce (5)

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 (2nd 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.

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.

B.Sc. Botany
SEMESTER-III
PAPER CODE: BOT. 3.1

Paper -I BIOLOGY AND DIVERSITY OF SEED PLANTS –I

Internal Assessment-10
Max. Marks - 40
Time – 3 hrs.

Note : Attempt five questions in all, selecting one question 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, origin and evolution of Gymnosperms
Geological Time Table; Evolution of Seed Habit.
Pilger and Melchior's (1954) system of classification of Gymnosperms.

UNIT-II

Palaeobotany- Fossils and Fossilization (Process involved, types of fossils and importance of fossils);
Reconstruction of the following fossil plants:
Lyginopteris
Williamsonia
Cycadeoidea (= Bennettites)

UNIT-III

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

UNIT-IV

Morphology and anatomy of root, stem, leaf/leaflet and reproductive parts including mode of reproduction, life-cycle and economic importance of *Ephedra*
Economic importance of Gymnosperms
General characters, origin and evolution of Angiosperms

B.Sc. Botany
SEMESTER-III
PAPER CODE: BOT. 3.2
PAPER-II PLANT ANATOMY

Internal Assessment-10
Max. Marks - 40
Time – 3 hrs.

Note : Attempt five questions in all, selecting one question 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

Tissues - meristematic and permanent (simple, complex and secretory) Tissue systems (Epidermal, ground and vascular)
The Shoot system - shoot apical meristem and its histological organizations.

UNIT-II

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-III

Leaf: Types of leaves (simple and compound); phyllotaxy. Epidermis-uniseriate and uliseriate, 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

UNIT-IV

Root system: Root apical meristem; histological organization
Secondary growth in dicot root.
Structural modifications in roots: Storage (*Beta*), Respiratory (*Rhizophora*), Epiphytic (*Vanda*).

PRACTICALS

B.Sc. IInd Botany (Third Semester)

Biology & Diversity of Seed Plants-I and Plant Anatomy(Code: P 301)

Max. Marks: 50

Time : 3Hours

1. Cut the section of given material A and prepare a double-stained permanent mount of the given material. Identify giving reasons and show it to the examiner. (10)
- 2 Identify, classify and write morphological notes on the given material/specimens B & C from Gymnosperms. (10)
- 3 Identify, giving the important characters of identification of the spots/specimen 1 and 2 from Gymnosperms and 3 and 4 from angiosperms (10)
- 4 Filed visit and collection records. (10)
- 5 Note-book (5)
- 6 Viva-voce (5)

Suggested Readings

Bhatnagar, S. and Moitra, A. 1996. Gymnosperms. New Age International Limited, New Delhi.

Davis, P.H. and Heywood, V.H. 1963. Principles of Angiosperms 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.

Jeffrey, C. 1982. An introduction to Plant Taxonomy. Cambridge University Press, Cambridge, London.

- Jones, S.B. , Jr. Luchsinger, A.E. 1986. Plants 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 Systematics. Harper and Row, New York.
- Singh, G. 1999. Plant Systematics: Theory and Practical. Oxford and IBH Pvt. Ltd., New Delhi.
- Sporn, K.R. 1965. The Morphology of Gymnosperms. Hutchinson & Co. Ltd., London.
- Stace, C.A. 1989. Plant Taxonomy and Biosystematics (2nd edition). Edward Arnold, London.
- Steward, W.M. Paleobotany and the Evolution of Plants. Cambridge University Press, Cambridge.

B.Sc. Botany

SEMESTER- IV

PAPER CODE: BOT. 4.1

PAPER-I BIOLOGY AND DIVERSITY OF SEED PLANTS-II

Internal Assessment-10

Max. Marks - 40

Time – 3 hrs

Note: Attempt five questions in all, selecting one question 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, Keys to identification of plants.

UNIT-II

Type concept, taxonomic ranks, Salient features of the systems of classification of angiosperms proposed by Bentham & Hooker and Engler & Prantl, Floral Terms and Types of Inflorescence

UNIT-III

Diversity of Flowering Plants: Diagnostic features and economic importance of the following families: Ranunculaceae, Brassicaceae, Malvaceae, Euphorbiaceae, Rutaceae, Fabaceae, Cucurbitaceae

UNIT-IV

Diversity of Flowering Plants: Diagnostic features and economic importance of the families: Apiaceae, Asclepiadaceae, Lamiaceae, Solanaceae, Asteraceae, Liliaceae and Poaceae

B.Sc. Botany

SEMESTER- IV

PAPER CODE: BOT. 4.2

PAPER-II PLANT EMBRYOLOGY

Internal Assessment-

10 Max. Marks - 40

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, Microsporangium, its wall and dehiscence mechanism.

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

UNIT -II

Pollen germination (microgametogenesis), Male gametophyte, Pollen-pistil interaction; self incompatibility, Pollination: types and agencies

UNIT-III

Structure of Megasporangium (ovule), its curvatures; Megasporogenesis and Megagametogenesis, Female gametophyte (mono, bi and tetrasporic), Double fertilization, Endosperm types and its biological importance.

UNIT-IV

Embryogenesis in Dicot and Monocot; Polyembryony, Structure of Dicot and Monocot seed, Fruit types; Dispersal mechanisms in fruits and seeds.

PRACTICALS

B.Sc. IInd Botany (Fourth Semester)

Max. Marks: 50

Time: 3Hours

- 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. (12)
- 2 Dissect out the globular/heart-shaped embryo from the given material. (10)
- 3 Identify, giving the important characters of identification of the spots 1, 2 and 3 from embryology (9)
- 4 Field visit and collection records. (9)
- 5 Practical records (5)
- 6 Viva-voce (5)

Suggested Readings

- Bhojwani, S.S. and Bhatnagar, S.P. 2000. The Embryology of Angiosperms. 4th revised and enlarge 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, 2nd 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 Works. 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.

B. Sc. III (Botany) Syllabus

PAPER CODE: BOT. 5.1

SEMESTER-V

Paper – I Plant Physiology

Internal Assessment-
10 Max. Marks – 40
Time – 3 hrs.

Note: Five questions to be attempted in all, selecting one question 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 and osmosis; absorption and transport of water; transpiration; physiology of stomata.

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

UNIT -II

Transport of organic substances: Mechanism of phloem transport; source-sink relationship; factors affecting translocation.

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.

UNIT-III

Growth and development : Definitions; phases of growth and development; seed dormancy; plant movements; the concept of photoperiodism; physiology of flowering; florigen concept; physiology of senescence; fruit ripening;

UNIT -IV

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.

Suggested Readings:

1. Dennis, D.T., Turpin, D.H., Lefebvre, D.D. and Layzell (eds.). 1997: Plant Metabolism (2nd 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.

**B. Sc. III (Botany) Syllabus
SEMESTER-V**

PAPER CODE: BOT. 5.2

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).

UNIT-II

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-III

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, nitrogen, phosphorus and hydrological cycle.

UNIT-IV

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; Ozone layer depletion; Biomagnification

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 V

Practical

Plant Physiology and Ecology (P-501)

Max. Marks: 50

Time: 3hrs.

- | | |
|--|----|
| 1. Devise an experiment to demonstrate the physiological process
(As per list). Perform it and show it to the examiner. | 12 |
| 2. Comment on physiological experiment
(Specimen set up/ model/chart). | 10 |
| 3. Ecological experiment/ecological specimen
(As per list) | 12 |
| 4. Note Book, Collection and field report | 10 |
| 5. Viva-voce | 6 |

B.Sc. Botany

SEMESTER-VI

PAPER CODE: BOT. 6.1

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.

UNIT-II

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

UNIT-III

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

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

UNIT-IV

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 *Agrobacterium*; 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. Old, R.W. and Primrose, S.B. 1989: Principles of Gene Manipulation, Blackwell Scientific Publications, Oxford, UK.
4. Raghavan, V. 1986: Embryogenesis in Angiosperms: A Developmental and Experimental Study, Cambridge University Press, New York, USA.

SEMESTER-VI

PAPER CODE: BOT. 6.2

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

Vavilov's centres of origin of crop plants, Origin, distribution, botanical description, brief idea of cultivation and economic uses of the following:

Food plants - cereals (rice, wheat and maize), pulses (gram, arhar and pea),
vegetables (potato, tomato and onion).

UNIT-II

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

Fibers- cotton, jute and flax.

Oils- groundnut, mustard, sunflower and coconut.

UNIT-III

Morphological description, brief idea of cultivation and economic uses of the following:

Spices- coriander, ferula, ginger, turmeric, cloves.

Medicinal plants- *Cinchona*, *Rauwolfia*, *Atropa*, *Opium*, *Cannabis*, *Azadirachta*, *Withania*.

UNIT-IV

Botanical description, processing and uses of:

Beverages- tea and coffee;

Rubber - *Hevea*;

Sugar- sugarcane

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

Semester VI

Practical

Biochemistry, Biotechnology and Economic Botany (P-601)

Max. Marks: 50

Time: 3 hrs.

1. Device an experiment to test the carbohydrate/protein/fats/peroxidase activity.
Perform it and show it to the examiner. 10
2. Perform /Comment on Biotechnological experiment 12
(As per list).
3. Identify and classify spots 1,2,3 & 4 from the point of view of
economic important and morphology of the plant part used 12
4. Note Book, Collection and field report. 10
5. Viva-voce 6

Suggested Readings:

1. Kocchar, S.L. 1998: Economic Botany in Tropics, 2nd 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

