

**Madurai Kamaraj University**  
**B.Sc. Botany (Non - Semester)**

**REGULATIONS AND SYLLABUS**

(This will come into force from the academic year 2013 - 2014 onwards)

1. QUALIFICATION FOR ADMISSION:

Candidates should have passed the Higher Secondary Examination conducted by the board of higher secondary education, Government of Tamil Nadu or any other examination accepted by syndicate, as equivalent thereto, with Botany or Biology as one of the subjects in Higher Secondary Education

2. DURATION OF THE COURSE

The students shall undergo the prescribed course of study for a period of three academic years

3. MEDIUM OF INSTRUCTION

English / Tamil

**SUBJECT OF STUDY**

Part 1: Tamil  
Part 2: English  
Part 3: Major 8 Papers

Ancillary 4 Papers

*Zoology 2 papers (1<sup>st</sup> year - 1; 2<sup>nd</sup> year - 1)*

*Chemistry 2 papers (1<sup>st</sup> year - 1; 2<sup>nd</sup> year - 1)*

**Scheme of the Examination**

Duration: 3 Hrs

Max Marks: 100

Passing Min Mark: 35

**Course Structure**

<b>S No</b>	<b>Course</b>	<b>Medium</b>	<b>Course Code</b>
1.	B.Sc. (Botany)	English	B.Sc. Botany (Non – Semester)

**Structure of the Question Paper**  
**Section – A**

**Write Short answer**

**(10x 3 = 30)**

Question No.

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.
- 9.
- 10.

**Section – B**

**Answer the following not exceeding 3 pages each**

**(Choosing either (a) or (b))**

**(5 x 8 = 40)**

Question No.

11. (a) or (b)
12. (a) or (b)
13. (a) or (b)
14. (a) or (b)
15. (a) or (b)

**Section – C**

**Answer any three Questions not exceeding 5 pages each**

**(3 x 10 = 30)**

Question No.

- 16.
- 17.
- 18.
- 19.
- 20.

### Course Structure – Over all view

\* Equal importance should be given to all the units

Non-Semester	Parts	Subjects	Max Marks	Min Marks
B.Sc. Botany	1 <sup>st</sup> Year	Plant Diversity I – Algae, Fungi, Bryophytes, Bacteria and Virus	100	35
		Plant Diversity II – Pteridophytes, Gymnosperms and Paleobotany <b>PRACTICAL PAPER – I</b> ( <i>Plant Diversity – I &amp; II</i> )	100	35
			100	35
	2 <sup>nd</sup> Year	Plant anatomy and embryology	100	35
		Cell Biology and Genetics <b>PRACTICAL PAPER – II</b> ( <i>Plant Anatomy and Embryology &amp; Cell Biology and Genetics</i> )	100	35
			100	35
	3 <sup>rd</sup> year	Taxonomy and Economic botany	100	35
		Plant Physiology	100	35
		<b>PRACTICAL PAPER – III</b> ( <i>Taxonomy and Economic botany &amp; Plant Physiology</i> )	100	35
			100	35
		Ecology and Horticulture	100	35
		Biochemistry and Biotechnology <b>PRACTICAL PAPER – IV</b> ( <i>Biochemistry and Biotechnology &amp; Ecology and Horticulture</i> )	100	35
		100	35	

#### PAPER – I

#### Plant Diversity I – Algae, Fungi, Bryophytes, Bacteria and Virus

##### UNIT – I Viruses and Bacteria

Structure, properties and transmission of viruses and brief account on mycoplasma  
- Bacteria – Structure – Nutrition, reproduction and economic importance

##### UNIT – II Algae

General Characters, Classification - and economic importance - Cyanophyceae – Structure and Reproduction of Nostoc; Chlorophyceae – Structure and Reproduction of Volvox; Phaeophyceae – Structure and Reproduction of Sargassum; Rhodophyceae – Structure and Reproduction of Polysiphonia

### **UNIT – III Fungi**

General Characters, Classification by Alexopolus and Mims and economic importance: Zygomycotina – Structure and Reproduction of Mucor; Ascomycotina – Structure and Reproduction of Saccromyces; Basidiomycotina – Structure and cultivation of Agaricus; Deuteromycotina – Structure and Reproduction of Cerospora; Salient features of lichens with special reference to Usnea

### **UNIT – IV Bryophyta**

Classifications of Bryophyta (Rothmalar) - Structure and reproduction of the following: Hepaticopsida (Marchantia); Anthocerotiopsida (Anthoceros); Bryospida (Funaria)

### **UNIT – V Plant Pathology**

Symptoms, causal organisms and control measures of the following diseases: Tikka disease; Citrus Canker; Bunchy top of Banana

### **PAPER - I**

### **PAPER – I. Plant Diversity I – Algae, Fungi, Bryophytes, Bacteria and Virus**

#### **PRACTICALS**

1. Micro preparation of types prescribed in the syllabus.
2. Identifying the micro slides relevant to the syllabus.
3. Identifying types from algae mixtures.
4. Study of pathological specimens included in the syllabus.

### **Books for study**

1. Vashista Sinha B.R., Singh, V.P., 2002, Botany for Degree students, Algae 9<sup>th</sup> revised edition, S.Chand & Company Ltd., New Delhi.
2. Pandey B.P., 2000 Revised edition, Text Book of Botany Algae, S.Chand & Company, New Delhi.
3. Sharma O.P., 1992, Text Book of Algae, Tata McGraw Hill Publication Company Ltd., New Delhi
4. Vashista B.R. , 1982, Botany for Degree Students – Fungi- S.Chand & Co New Delhi.
5. Chopra G.L., A Text book of Fungi, S.Nagin & Co. Meerut, India
6. Pandey B.P., 1997 College Botany Vol. I Fungi & Pathology.
7. Bilgrami K.S. and Dube H.C. A Text book of Plant Pathology, Vikas, New Delhi.
8. Singh, R.S. Plant diseases, Oxford & IBH.
9. Parihar, N.S., 1967, An introduction to Embryophyta Vol. II –Central Book depot, Allahabad
10. Prem Puri, 1981, Bryophytes –Morphology, growth and differentiation – Atma Ram & Sons, Delhi.
11. Dube, H., 1978, A text book of Fungi, Bacteria and Virus. Vikas Publishers.

## **BOOKS FOR REFERENCE**

1. Fritsch, F.E., 1935-45, The structure and reproduction of Algae. Cambridge University Press UK Vol. I & II
2. Smith, G.M., 1955, Cryptogamic Botany, Vol. I, Tata McGraw Hill book Co., N.Delhi.
3. Chapman, V.J. & Chapman, D.J., 1973, The Algae- 2<sup>nd</sup> edition Edward Arnold, London.
4. Alexopoulos C.J., Mims C.W., and Black Well M., 1996, Introductory Mycology, John Wiley and sons INC. Singapore.
5. Webster J., 1991, Introduction to Fungi.
6. Mishra, A. and Agarwall, R.P., 1978, Lichens – A preliminary text, Oxford.
7. Rangasami, G., & Mahadevan, A., 2002, Diseases of Crop plants in India, Prentice Hall of India Ltd., New Delhi.
8. Watson, E.V., 1981, British Mosses and Liverworts, 2nd edition. Cambridge University Press UK.
9. Pelczar, Chan and Krieg, 1986, Essentials of Microbiology.
10. Presscot, Harley and Klein, 1996, Microbiology, Tata McGraw Hill Publications – IV edition.

## **PAPER – II**

### **Plant Diversity II – Pteridophytes, Gymnosperms and Paleobotany**

**Unit – I: Pteridophytes:** General Characters and Classification based on Smith; Structure and reproduction of the following: Psilotopsida – Psilotum; Lycopsida – Selaginella

**Unit – II:** Sphenosida – Equisetum; Pteropsida – Marsillea

**Unit–III:** Gymnosperms: General Characters and Classification based on Smith; Structure and reproduction of the following: Cycas

**Unit – IV:** Structure and reproduction of the following: Pinus and Gnetum

**Unit – V : Paleobotany:** Brief account of Geological Time Scale; Formation of Fossils; Study of Rhynia and Lyginopteris

## **PAPER II**

### **Plant Diversity II – Pteridophytes, Gymnosperms and Paleobotany**

#### **PRACTICALS**

1. Making suitable micro preparations of types prescribed in Pteridophytes and Gymnosperms.
2. Observing and identifying the fossil slides included in the syllabus.

### **BOOKS FOR STUDY**

1. Parihar, N.S., 1967, An introduction to Embryophyta Vol. I & II Central book depot, Allahabad.
2. Vashista, P.C., 1967, Botany for Degree Students Vol. IV, S.Chand & Co. New Delhi
3. Vashista, P.C., 1976, Botany for Degree Students Vol. V (Gymnosperms) S.Chand & Co. New Delhi.
4. Sukla & Mishra, S.P., 1982, Essentials of Palaeobotany, Vikas Publishing House

### **BOOKS FOR REFERENCE**

1. Smith, G.M., 1955, Cryptogamic Botany Vol. I & II, McGraw Hill Company.
2. Chamberlain, C.A., 1986, Gymnosperms – Structure and Evolution, CBS Publishers & Distributors
3. Sporne, K.R., 1976, Morphology of Pteridophytes B.I.Publishers
4. Sporne, K.R., 1976, Morphology of Gymnosperms, B.I.Publishers.
5. Arnold, C.A., 1947, An introduction to Palaeobotany, McGraw Hill Publisher.

## **PAPER – III** **Plant Anatomy and Embryology**

### **Unit – I**

Classification of meristems ; theories of meristems Simple tissues - Parenchyma, Collenchyma and Sclerenchyma Complex tissues - Xylem and Phloem

### **Unit – II**

Primary structure of stem and root (monocot and dicot)  
Secondary thickening of Dicot stem and root

### **Unit – III**

Internal Structure of monocot and dicot leaf  
Nodal anatomy – unilocular, bilocular and multilocular

### **Unit – IV**

Microsprogenesis – Development of male gametophyte Structure and types of Ovules

Megasprogenesis – Formation of female gametophyte with reference to Polygonum type

### **Unit – V**

Fertilization – Double Fertilization - Triple fusion  
Endosperm – Types of endosperm  
Development of dicot embryo (Capsella)

**PAPER III**  
**PLANT ANATOMY & EMBRYOLOGY**  
**PRACTICALS**

1. Study of primary structure of dicot stem, dicot root, monocot stem & monocot root.
2. Normal secondary thickening in dicot stem and dicot root.
3. Anomalous secondary growth of stems prescribed in the syllabus.
4. Anatomy of dicot and monocot leaves.
5. Nodal anatomy –types included in the syllabus.
6. T.S. of anther showing various stages.
7. Types of ovules (permanent slides)
8. Embryo mounting (*Cucumis* or *Tridax*)

**Books for Study**

1. Tayal, M.S., Plant Anatomy, 3rd edition, (2012), Rastogi Publications, Meerut.
2. Pandey, B.P., 1978, Plant Anatomy, S.Chand & Co., New Delhi,
3. Vasishta, P.C., A Text Book of Plant Anatomy, Pradeep Publications, Jullunder.
4. Bhojwani, S.S. and Bhatnagar, S.P., 1978, The embryology of Angiosperms, publishing House, N.Delhi.
5. Dwinedi, J.N., 1988, Embryology of Angiosperms, Rastogi and Co., Meerut.
6. Singh, V., Pande, P.C., Jain, D.K., Embryology of Angiosperms, 2010-11, Rastogi Publications, Meerut.

**Books for reference**

1. Foster, A.S., Practical Plant Anatomy, Affiliated East-West Press, N.Delhi.
2. Esau, K., 1975, Plant Anatomy, Wiley Eastern Private Ltd., New Delhi.
3. Fahan, A., 1974, Plant Anatomy, Pergoman Press, Oxford.
4. Maheswari, P., 1971, An introduction to Embryology of Angiosperms, Tata McGraw Hill Publishing Co.Ltd, New Delhi.
5. Swamy, B.G.L. and Krishnamurthy, k.V., From Flower to Fruit, Tata McGraw Hill Publishing Company Ltd., New Delhi.
6. Johanson, D.A., 1946, Plant Microtechnique, M c Graw Hill book Company, New York.

**Paper – IV**  
**Cell biology and Genetics**

**UNIT –I** : Ultra structure of plant cell, cell wall and plasma membrane

**UNIT –II** : Structure and Function of the following organelles

- a. Chloroplast
- b. Mitochondria
- c. Endoplasmic reticulum
- d. Ribosomes

**UNIT – III** : Structure and Function of Nucleus, - Cell division – mitosis and meiosis

**UNIT – IV :** Mendel's law of inheritance; monohybrid and dihybrid ratio – linkage and Crossing over

**UNIT – V :** Structure of DNA; DNA Replication, - Genetic variation – mutation – (Chromosomal and gene) – Brief account on RNA and its type

**PAPER IV  
CELL BIOLOGY AND GENETICS  
PRACTICALS**

1. Observation of Plant cells in the onion peeling and *Rheo* leaf
2. Photographs of cell organelles.
3. Root tip squash – Onion.
4. Non-living inclusions-raphides and cystolith
5. Problems in mono and Dihybrid ratios and gene interactions.

**Books for Study**

1. Sharma, N.S., 2005, Molecular cell biology, International book distributors, Dehradun.
2. Verma, P.S. and Agarwal, V.K., 1986, Cell biology and Molecular biology, S.Chand & Company, New Delhi.
3. Gupta, P.K., 2007, Genetics Classical to Modern, Rastogi Publications, Meerut.
4. VeerbalaRastogi, A text Book of Genetics, Kedarnath Ramnath, Meerut.
5. Islam, A.S., Fundamentals of Genetics, Vikas Publishing House.

**Books for Reference**

1. Power, C.B., 1984, Cell biology, Himalayas Publishing House, Mumbai.
2. De Robertis and De Robertis, 1998,, Cell and Molecular Biology,K.M.Verghese and company.
3. David Freifelder, 2<sup>nd</sup> Edition, Molecular biology, Narosa Publishing House,N.Delhi.
4. Gardner, E.J., Principles of Genetics, Wiley Eastern Company.
5. Victor A.McKusick, Human Genetics, Prentice Hall of India.
6. Gunther Stent, Molecular Genetics, CBS Publishers.

**III year  
Paper – V**

**Taxonomy and Economic Botany**

**UNIT – I:** Classification of Angiosperms - Natural – Bentham and Hooker Phylogentic – Engler and Prantal plant Nomenclature – Binomial preparation of Herbarium

**UNIT–II:** Study of the following Dicot Families - Annonaceae, Ructaceae, Cucurbitaceae, Asclepiadaceae, Lamiaceae and Euphorbiaceae

**UNIT–III :** Study of the following monocot families – Orchidaceae, Liliaceae, Arecaceae and Poaceae



**UNIT – IV:** Study of the following cereals with their cultural practice and economic importance- oryza, wheat

Study of the following millets with their cultural practice and economic importance – Ragi, Sorghum

**UNIT – V:** Medicinal Plant a. Neem b. Ocimum c. Coriander d. Ginger

**PAPER – V**  
**TAXONOMY OF ANGIOSPERMS AND ECONOMIC BOTANY**  
**PRACTICALS**

1. Identification, observation and sketching the floral parts of plants belonging to the families included in the syllabus.
2. Key preparation
3. Spotters may be given for economic botany.
4. Submission of record notebook.

**BOOKS FOR STUDY**

1. Naik, V.K., Principles of Plant Taxonomy, IBH Oxford.
2. Vasisha, P.C., 1994, Taxonomy of Angiosperms R.S. Chand & Company
3. Verma, B.K., Introduction to Taxonomy of Angiosperms (2011) PHI Learning Pvt.Ltd. N.Delhi.
4. Sharma, O.P., 1993, Plant Taxonomy, Tata McGraw Hill.
5. Chopra, G.L., 2004, Angiosperms, Pradeep Publications, Jalandar.
6. Pandey, B.P., Economic Botany, S.Chand & Company, New Delhi.
7. Sambamurthy, A text Book of Economic Botany, Wiley Eastern Pvt.Ltd.
8. Saxena, N.B., and Sabena's., 7<sup>th</sup> Edition (2010), Pragati Prakashan, Meerut.

**BOOKS FOR REFERENCE**

1. Lawrence, G. H.M., 1969, Taxonomy of vascular Plants Oxford & IBH Publishing Co.N.Delhi.
2. Rendle, R.B., The Classification of flowering plants, Vol. I, II & III, Oxford-Clarendon.
3. Gamble, J.S., Flora of Presidency of Madras, Vols. I, II & III (1986) Bishen Singh Mahendra Pal Singh, Dehra Dun.
4. Albert F.Hill, Economic Botany, Tata McGraw Hill Publishing Company.

**Paper – VI**  
**Plant Physiology**

**UNIT – I Plant and Water Relation**

- Imbibition, Diffusion and Osmosis
- Mechanism of water absorption
- Transpiration – Stomatal Types – Brief account on Guttation
- Ascent of Sap – Dixon and Jolly Theory

**UNIT – II Metabolism – I**

- Photosynthesis
- Light reaction
- Dark reaction – C3 and C4 plants

- Respiration - Glycolysis, Kerb's cycle, Electron Transport
- Photorespiration

#### **UNIT – III Nitrogen Metabolism**

- Reduction of nitrates – formation of Amino Acids
- Mechanism of protein synthesis
- Lipid Metabolism – B - Oxidation of Fatty Acids

#### **UNIT – IV Growth and Growth Hormones**

Physiological role of Auxin, Gibberriellin, Cytokinins and Ethylene  
Seed Dormancy – Causes and breaking

#### **UNIT – V Physiology and Flowering**

- Photoperiodism and Vernalization
- Brief account of Fruit ripening

### **PAPER VI PLANT PHYSIOLOGY PRACTICALS**

1. Measurement of O.P. by Chardakor's method
2. Measurement of O.P.by gravimetric method
3. Measurement of rate of transpiration with Ganong's photometer.
4. Transpiration equals absorption experiment.
5. Effect of light on photosynthesis
6. Effect of Co<sub>2</sub> concentration on photosynthesis.
7. Separation of pigments – paper chromatography.
8. Measuring R.Q.of the given material.
9. Imbibitional pressure using dilatometer

#### **EXPERIMENTS (Demonstration only)**

1. Ganong's light screen experiment
2. Ganong's Respiroscope
3. Mohl's half leaf experiment.
4. Evolution of O<sub>2</sub> during photosynthesis.
5. Arc auxanometer
6. Phototropism
7. Kuhen's fermentation vessel

#### **BOOKS FOR STUDY**

1. Verma, V., Text book of Plant Physiology, Emkay Publication
2. Jain, V.K., Plant Physiology, S.Chand & Company, N.Delhi.
3. Sinha, R.K., Modern Plant Physiology, Narosa Publishing House

#### **BOOKS FOR REFERENCE**

- 1.Frank B. Salisbury and Celon W. Ross, Plant Physiology,GBS Publishers and distribution, New Delhi.

2. Ray Noggle, G. and George J.Frits, Introductory Plant Physiology, Prentice Hall of India, N.Delhi.
3. Bidwell, R G.S., Plant Physiology, Macmillan Publishing Com., New York.
4. Meyor, Anderson, Bohning and Fratianne, Introduction to Plant Physiology,DVan Nostrand company..
5. Paul J.Kramer, Plant and soil water relationships, Springer International Studies.
6. Malcolm B.Wilkins, Advanced Plant Physiology,ELBS Edition

## **Paper VII Ecology and Horticulture**

**Unit I :** Ecosystem - Concept, components - food chain Food web, Types of ecosystem, ecological pyramids

**Unit II :** Ecological groups and its adaptations - Hydrophytes, Xerophytes and Halophytes  
- Methods of studying vegetation - Quadrat and Transect

**Unit III :** Pollution - causes and effect and control measures of air, water, land and noise

**Unit IV :** Vegetative propagation - Cuttage, Layerage and Graftage

**Unit V :** Meaning and Layout of Kitchen garden – Indoor gardening –Hanging pot Miniature; Rockery; Storage of fruits

## **PAPER – VII ECOLOGY & HORTICULTURE**

### **PRACTICALS**

1. Study of xerophytes, hydrophytes and halophytes.
2. Internal structure of *Casuarina* stem, *Nerium* leaf, *Hydrilla* stem and *Nymphaea* petiole
- 3 Methods of studying vegetation – Quadrat method.
4. Practicals on layering, grafting, budding, potting & terrarium.

### **BOOKS FOR STUDY**

1. Sharma, P.D., Ecology & Environment, Rastogi Publications.
2. Verma, V., A text book on Ecology, Emkay Publications.
3. Ambasht, R.S., Plant Ecology, (2008), CBS Publishers, N.Delhi.
4. Shukla & Chandel, S.Chand & Company N.Delhi.
5. Kumar, N.S., 1990, Introduction to Horticulture, Rohini Agencies, Nagercoil.
6. Prasad, 2005, Principles of Horticulture, International Book Dist. Dehradun

### **BOOKS FOR REFERENCE**

1. Eugene P Odum, Fundamentals of Ecology, Nataraj Publishers
2. Kormondy, E.J., Concepts of Ecology, 4<sup>th</sup> Edition, 2009, PHI Learning

3. Barucha, Plant Geography of India, Oxford University Press.
4. Edmund, J.B., Senn, T.L, Andrews, F.S. and Halforce, R.G., 1990, Fundamentals of horticulture 14<sup>th</sup> ed. Tata Mc Graw Hill Pvt.Ltd., London
5. Jules J Janick, J., 1982, horticulture Science., 3<sup>rd</sup> Edi. Surjeet Publication, N.Delhi.
6. Percy Lancaster, 1979, Gardening in India, Mohan Makhijani and Rekha Printers, N.Delhi

**Paper VIII**  
**Biochemistry and Biotechnology**

**Unit I**

Basic Concept of atom - Types of Bonding - Types of Isomerism  
- Carbohydrates - Classification and Properties

**Unit II**

Amino Acids - Classification, Structure and Properties  
- Proteins - Classification primary, secondary and Tertiary structures  
- Classification of Lipids - Simple, Compounds and derived Lipids (with an example each)

**Unit III**

Enzymes - Nomenclature, properties and classification - Mechanism of enzyme – Action (Lock and key, Induced – Fit Models) - Factors – Affecting Enzyme’s Action

**Unit IV**

Genetic Engineering –Tools and Techniques of Recombinant DNA technology – Enzyme Involved - Cloning Vectors (plasmids, cosmids, T4 Bacteriophages) - steps in Gene Cloning Technology - Application of Genetic Engineering

**Unit V**

Plant Biotechnology - Tissue Culture - Concept, Explant and callus formation Organogenesis and Somatic embryogenesis - Protoplasmic Fusion - Application of Plant Tissue culture in Crop improvement

**PAPER –VIII**  
**BIOCHEMISTRY & BIOTECHNOLOGY**  
**PRACTICALS**  
**BIOCHEMISTRY**

1. Determination of complementary colours
2. Verification of Beer’s Law
3. Measurement of pH
4. Preparation of buffers.
5. Titration curve of weak acid
6. Titration curve of strong acid
7. Preparation of standard graph for starch
8. Estimation of starch in a given material
9. Circular paper chromatography - dyes
10. Ascending paper chromatography

## BIOTECHNOLOGY

Sterilization techniques

Preparation of culture medium

Development of callus – demonstration only

### BOOKS FOR STUDY

1. Salil Bose, Elementary Biophysics, Jyoti Books
2. Jogdand, S.N., Advances in Biotechnology, Oxford University Press
3. Keshav Trehan, 1990, Biotechnology, Wiley Eastern Ltd., N.Delhi
4. Dubey, R.C., Text book of Biotechnology, S.Chand & Company, N.Delhi.
5. Gupta, P.K., 2004, Biotechnology and Genomics, Rastogi Publications, Meerut.
6. Jain, J.L., Jain, S., and Jain, N., Fundamentals of Biochemistry, S.Chand & Company, N.Delhi.

### BOOKS FOR REFERENCE

1. Conn, E.E., Stumpf, P.K., Bruening, G. and Doi, R.H., Outlines of Biochemistry 5<sup>th</sup> edition, Wiley India Ltd., N.Delhi.
2. Lehninger, L., Biochemistry, Kalyani Publishers, Ludhiana, N.Delhi.
3. Lubert Strayer, Biochemistry, Freeman International Edition San Francisco.
4. Primrose, S.B., 1987, Modern Biotechnology, Black well Scientific Publications, Oxford
5. Old, R.W. and Primrose, S.B., 1996, Principles of Gene manipulation – An introduction to Genetic Engineering, Black Well Scientific Publications, Oxford.

## BOTANY MAJOR PRACTICAL EXAMINATION

### Practical Paper – I

**Plant Diversity – I & II (Algae, Fungi, Lichens, Bryophytes, Pteridophytes, Gymnosperms, Paleobotany and Plant Pathology)**

*Time : Three Hours*

*Total Marks: 100*

1. Make suitable temporary micro preparation of A, B, C and D. (4 x 10 = 40)  
Submit the slides for valuation. Draw diagram and give reasons
2. Identify, draw diagrams and write critical notes on E, F, G, H and I. (5x4 = 20)
3. Comment on etiology of J (1x10 = 10)
4. Identify and write the geological era, notes and draw diagrams of K (1x10 = 10)
5. Spot at sight (Genus and group only) L & M (1x10 = 10)
6. Observation note book (1x10 = 10)

### Scheme of Valuation

#### Key and scheme of valuation

1. A, B, C and D Algae, Bryophytes, Pteridophytes and Gymnosperms. materials to be given. (Slide-5 marks Diagram – 2 marks Reasons – 2 marks, identification – 1 marks )
2. E, F, G, H and I Algae, Fungi, Bryophytes, Pteridophytes and Gymnosperms and Lichens. (Diagram – 2 marks reasons – 2 marks, identification – 1 marks )
3. J - Casual Organism – 3 marks, Diagram – 2 marks, reasons – 5

4. K – (Fossil slide identification – 3 marks, geological era – 2 mark, sketch and diagram – 2 marks, reasoning 2 marks)
5. L & M Algae, Fungi, Bryophytes, Pteridophytes and Gymnosperms. (Diagram – 2 marks reasons – 2 marks, identification – 1 marks )
6. Observation note book - 10 marks

### **Major Practical- Paper II**

#### **Plant anatomy, embryology, Cell Biology and Genetics**

Time : 3 hours

Max. Marks: 100

- Make suitable temporary micro preparations of A and B mount it in glycerine and submit the slides for valuation. Draw diagrams, identify and give reasons. (2X15 = 30)
- Dissect and display any one stages any one stages of embryo from the material given in C. Submit the slide for valuation. (1x15=15)
- Make suitable temporary micro preparations of D and identify any one stage. Submit slide for valuation (1x15=15)
- Write critical notes on E, F, G, H and I (5x 6 = 30)
- Submission of Record Note Book (10)

#### **Key and Scheme of valuation:**

- Plant Anatomy (A and B), Identification : 2 Marks; Diagram: 5Marks; Reasons: 7Marks
- Embryology – (embryo stages) –C: Submission of slides: 5 Marks; Diagram: 3 marks; Reasons: 7 Marks
- Cell biology- (onion root tip for mitosis cell division)-D : Submission of slides: 5 Marks; Diagram: 3 marks; Reasons: 7 Marks
- E and F- Genetic- 2 ( Problem-1; Spoter-1);  
G, H and I (Anatomy, Cell Biology and Embryology)  
Identification : 2  
Diagram : 2  
Reasons : 2

### **Practical Paper III**

#### **Taxonomy, Economic Botany and Plant Physiology**

Time: 3hrs

Maximum Marks: 100

- Refer specimen the specimen A and B to its respective families with reasons  
(15x2=30 marks)
- Describe specimen C in technical terms, draw sketches and LS of the flower  
(15x1=15 marks)

- Take a lot write the procedure and conduct the experiment interpret the data

(15x1=15 marks)

- Comment on the physiology set up D (10x1=10 marks)
- Write family, genus, and the part used for the specimen E,F,G,H (05x4=20 marks)
- Record note (10x1=10 marks)

#### **Key and Scheme**

- specimen A and B from families studied (family identification 3m, reasons 7m, sketches 5m)
- specimen C (technical terms 7m; LS of the flower 3m; sketches 5m)
- Physiology experiment (procedure 5m; demonstration 5m; data interpretation 5m)
- Physiology set up (comment 5m; diagram 5m)
- Family 1m;, genus 1m;, and economic importance of the part used 3m
- Record note (10m)

#### **Practical Paper IV**

##### **Ecology, Horticulture, Biochemistry and Biotechnology**

Time: 3hrs

Maximum Marks: 100m

- Take a lot write the procedure and conduct the experiment interpret the data (20x1=20 marks)
- Construct the quadrat and find out the density of vegetation in the selected site (20x1=20 marks)
- Spot at site write notes A, B, C, D (10x4=40 marks)
- Comment on the set up H (10x1=10 marks)
- Record note (10x1=10 marks)

#### **Key and Scheme**

- experiment (procedure 5m; demonstration 5m; data interpretation 5m; inference 5m;)
- Construction of quadrat 10 m; data collection 5m; interpretation 5m
- specimen A B Horticulture; C, D Plant tissue culture/ Biotechnology (diagram 5m; description 5m)
- Comment on the set up H (diagram 5m; description 5m)
- Record note (10m)

**REGULATIONS AND SYLLABUS**  
**(This will come into effect from the academic year 2013 - 2014 onwards)**  
**B.Sc. Botany Ancillary**  
**(Non - Semester)**  
**Course Structure – Over all view**

\* Equal importance should be given to all the units

Non Semester	Parts	Subjects	Max Marks	Min Marks
<b>B.Sc. Botany Ancillary</b>	1 <sup>st</sup> or 2 <sup>nd</sup> Year	Plant Diversity – Algae, Fungi, Bryophytes, Pteridophytes, Gymnosperms, Plant anatomy and embryology	100	35
	2 <sup>nd</sup> or 3 <sup>rd</sup> Year	Taxonomy, Plant Physiology, Ecology and Biotechnology	100	35
		<b>PRACTICAL PAPER – I</b> <b>(Covering above syllabus of 2 papers)</b>	100	35

**PAPER – I**

**Plant Diversity – Algae, Fungi, Bryophytes, Pteridophytes, Gymnosperms, Plant Anatomy and Embryology**

**UNIT – I**

General Characters, Classification - and economic importance - Cyanophyceae – Nostoc; Chlorophyceae – Volvox; Phaeophyceae Sargassam, General Characters, Classification by Alexopolus and Mims and economic importance: Zygomycotina – Mucor; Ascomycotina – Saccromyces; Basidiomycotina – Puccinia,

**UNIT – II**

Classifications of Bryophyta (Rothmalar) - Bryospida (Funaria) General Characters and Classification of Pteridophytes - Lycopsida – Selaginella

**UNIT – III**

General Characters and Classification of Gymnosperms based on Smith; Structure and reproduction of the following: Pinus

**UNIT – IV**

Classification of meristems; theories of meristems; Simple tissues - Parenchyma, Collenchyma and Sclerenchyma; Complex tissues - Xylem and Phloem

**UNIT – V**

Microsprogenesis – Development of male gametophyte Structure and types of Ovules

Megasprogenesis –Formation of female gametophyte with reference to Polygonum type



### **Books for study**

1. Vashista Sinha B.R., Singh, V.P., 2002, Botany for Degree students, Algae 9<sup>th</sup> revised edition, S. Chand & Company Ltd., New Delhi.
2. Pandey B.P., 2000 Revised edition, Text Book of Botany Algae, S. Chand & Company, New Delhi.
3. Sharma O.P., 1992, Text Book of Algae, Tata McGraw Hill Publication Company Ltd., New Delhi
4. Vashista B.R. , 1982, Botany for Degree Students – Fungi- S. Chand & Co New Delhi.
5. Chopra G.L., A Text book of Fungi, S.Nagin & Co. Meerut, India
6. Pandey B.P., 1997 College Botany Vol. I Fungi & Pathology
7. Vashista, P.C., 1967, Botany for Degree Students Vol. IV, S. Chand & Co. New Delhi
8. Vashista, P.C., 1976, Botany for Degree Students Vol. V (Gymnosperms) S. Chand & Co. New Delhi
9. Sporne, K.R., 1976, Morphology of Pteridophytes B.I.Publishers
10. Sporne, K.R., 1976, Morphology of Gymnosperms, B.I.Publishers.
11. Tayal, M.S., Plant Anatomy, 3rd edition, (2012), Rastogi Publications, Meerut.
12. Dwinedi, J.N., 1988, Embryology of Angiosperms, Rastogi and Co., Meerut.

### **PAPER – II**

#### **Taxonomy, Physiology, Ecology, Horticulture and Biotechnology**

##### **UNIT – I**

Classification of Angiosperms - Natural – Bentham and Hooker - Nomenclature – Binomial; Study of the following Families – Annonaceae, Asclepiadaceae, Lamiaceae, Euphorbiaceae and Poaceae

##### **UNIT – II**

Transpiration; Photosynthesis; Respiration; Physiological role of Auxin, Gibberellin

##### **UNIT – III**

Ecosystem - Concept, components - food chain Food web, Types of ecosystem, ecological pyramids; Pollution - causes and effect and control measures of air, water, land and noise

##### **UNIT – IV**

Vegetative propagation - Cuttage, Layerage and Graftage; Meaning and Layout of Kitchen garden – Indoor gardening –Hanging pot Miniature; Rockery; Storage of fruit

##### **UNIT – V**

Tissue Culture - Concept, Explant and callus formation Organogenesis and Somatic embryogenesis - Protoplasmic Fusion - Application of Plant Tissue culture in Crop improvement

## BOOKS FOR STUDY

1. Naik, V.K., Principles of Plant Taxonomy, IBH Oxford.
2. Vasisha, P.C., 1994, Taxonomy of Angiosperms R.S. Chand & Company
3. Verma, B.K., Introduction to Taxonomy of Angiosperms (2011) PHI Learning Pvt.Ltd. N.Delhi.
4. Sharma, O.P., 1993, Plant Taxonomy, Tata McGraw Hill.
5. Chopra, G.L., 2004, Angiosperms, Pradeep Publications, Jalandar
6. Pandey, B.P., Economic Botany, S. Chand & Company, New Delhi.
7. Verma, V., Text book of Plant Physiology, Emkay Publication
8. Jain, V.K., Plant Physiology, S. Chand & Company, N.Delhi.
9. Sinha, R.K., Modern Plant Physiology, Narosa Publishing House
10. Verma, V., A text book on Ecology, Emkay Publications.
11. Eugene P Odum, Fundamentals of Ecology, Nataraj Publishers Prasad, 2005, Principles of Horticulture, International Book Dist.Dehradun
12. Dubey, R.C., Text book of Biotechnology, S. Chand & Company, N.Delhi.

## PRACTICALS

1. Micro preparation of types prescribed in the syllabus.
2. Identifying the micro slides relevant to the syllabus.
3. Identification, observation and sketching the floral parts of plants belonging to the families included in the syllabus.
4. **EXPERIMENTS (Demonstration only)**
  - Ganong's light screen experiment
  - Ganong's Respiroscope
  - Mohl's half leaf experiment
  - Evolution of O during photosynthesis
  - Arc auxanometer
  - Phototropism
  - Kuhen's fermentation vessel

### Practical Paper – I

Time : **Three Hours**

Total Marks: **100**

7. Refer specimen the specimen A and B to its respective families (2 x 10 = 20)
8. Make suitable temporary micro preparation of C, and D (2 x 10 = 20)  
Submit the slides for valuation. Draw diagram and give reasons
9. Identify, draw diagrams and write critical notes on E, F, G, H. (4 x 10 = 40)
10. Comment on set up (1x10 = 10)
11. Observation note book (1x10 =10)

#### Key and scheme of valuation

7. specimen A and B from families studied (family identification 2m, reasons 5m, sketches 3m)
8. C, D Algae, Pteridophytes or Gymnosperms. Materials to be given. (Slide-5 marks  
Diagram – 2 marks Reasons – 2 marks, identification – 1 marks )
9. E, F, G, H (Diagram – 5 m; reasons – 4 m; identification – 1m )
  - a. E – Anatomy
  - b. F – Embryology
  - c. G – Horticulture
  - d. H – Biotechnology
10. Physiology set up (comment 5m; diagram 5m)
11. Observation note book - 10 marks