

CIRCULAR :-

A reference is invited to the Ordinances, Regulations and Syllabi relating to the B.Sc. degree course vide pamphlet No. 141 and vide this office Circular No. UG./ 430 of 2003 dated 5th September 2003 and the Principals of the affiliated colleges in Science are hereby informed that the recommendation made by the Board of studies in Botany at its meeting held on 17th January 2009 has been accepted by the Academic Council at its meeting held on 13th February, 2009 vide item No. 4.3 and that, in accordance therewith, the scheme and syllabus of the S. Y .B.Sc. in the subject of Botany (Theory and Practicals) is revised as per Appendix and that the same has been brought into force with effect from the academic year 2009-2010

MUMBAI-400 032
4th May, 2009

PRIN.K. VENKATARAMANI
REGISTRAR

To,

The Principals of the affiliated college in Science.

A.C./4.3/13.02.2009

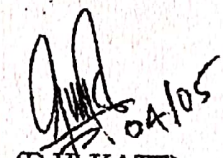
No.UG/131 - A of 2009,

MUMBAI-400 032

4th May, 2009

Copy forwarded with compliments for information to :-

- 1) The Dean, Faculty of Science
- 2) The Chairperson, Board of Studies in Botany.
- 3) The Controller of Examinations,
- 4) The Co-Ordinator, University Computerization Centre,


(D.H. KATE)
DEPUTY REGISTRAR
(U.G./P.G SECTION)

Copy to :-

The Director, Board of College and University Development, the Deputy Registrar (Eligibility and Migration Section), the Director of Students Welfare, the Executive Secretary to the Vice-Chancellor, the Pro-Vice-Chancellor, the Registrar and the Assistant Registrar, Administrative sub-center, Ratnagiri for information.

The Controller of Examinations (10 copies), the Finance and Accounts Officer (2 copies), Record Section (5 copies), Publications Section (5 copies), the Deputy Registrar, Enrolment, Eligibility and Migration Section (3 copies), the Deputy Registrar, Statistical Unit (2 copies), the Deputy Registrar (Accounts Section), Vidyanaagari (2 copies), the Deputy Registrar, Affiliation Section (2 copies), the Director, Institute of Distance and Open Learning (IDOL) (10 copies) the Director University Computer Center (IDE Building), Vidyanaagari, (2 copies) the Deputy Registrar (Special Cell), the Deputy Registrar, (PRO) the Assistant Registrar, Academic Authorities Unit (2 copies) and the Assistant Registrar, Executive Authorities Unit (2 copies). They are requested to treat this as action taken report on the concerned resolution adopted by the Academic Council referred to in the above Circular and that no separate Action Taken Report will be sent in this connection. the

13.2.2009

UNIVERSITY OF MUMBAI



Revised Scheme & Syllabus
for the
S.Y.B.Sc. Examination
(THEORY & PRACTICALS)
In
BOTANY

(w. e. f. academic year 2009-2010)

Revised syllabus in Botany
at the S.Y.B.Sc. Examination
(Theory & Practical)

to be brought into force from academic
year 2009- 2010

PREAMBLE

The revised Botany syllabus for S.Y.B.Sc to be introduced w.e.f. 2009-2010 is in continuity with the F.Y.B.Sc. Syllabus, revised in academic year 2008-2009. In paper- I, the second year students are exposed to more number of plant groups and more Plant Bio-diversity which is partially covered at the first year level. Form and function: paper II covers many interesting aspects of various plant groups, sharpening their observation skills and analytical mind setup. Paper III, Current trends in Plant sciences deals with various applied branches of botany and highlights applications of the subject.

The revised Syllabus in Botany for S.Y.B.Sc. course will be implemented from the academic year 2009-2010.

The unit wise distribution of the S.Y.B.Sc. syllabus along with the unit wise distribution for F.Y.B.Sc. syllabus is given below.

Unit wise distribution of F.Y.B.Sc. Syllabus brought into force W.E.F. 2008-2009

Paper-I: PLANT DIVERSITY-I

Paper-II: Form and Function-I

Paper	Unit	I-Term	Unit	II-Term
I	I	Microbiology & Algae (15)	IV	Bryophyta & Pteridophyta (15)
	II	Fungi & Lichens (15)	V	Gymnosperms (15)
	III	Anatomy (15)	VI	Angiosperms (15)
II	I	Plant Bio-chemistry & physiology (15)	IV	Environmental Botany (15)
	II	Cell Biology & Microscopy (15)	V	Molecular Biology & Biotechnology (15)
	III	Genetics (15)	VI	Current Trends in Botany (15)

Unit wise distribution of S.Y.B.Sc. Syllabus to be brought into force W.E.F. 2009-2010

Paper-I: PLANT DIVERSITY-II

Paper-II: Form and Function-II

Paper-III: Current Trends in Plant Sciences-I

Paper	Unit	I-Term	Unit	II-Term
I	I	Algae & Bryophyta (15)	IV	Microbiology (15)
	II	Fungi Plant Pathology (15)	V	Pteridophyta, Paleobotany & Gymnosperms (15)
	III	Angiosperms (15)	VI	Angiosperms (15)
II	I	Instrumentation & Techniques (15)	IV	Anatomy (15)
	II	Plant Bio-chemistry & Plant physiology (15)	V	Environmental Botany & Plant Physiology (15)
	III	CytoGenetics (15)	VI	Molecular Biology & Biostatistics (15)
III	I	Pharmacognosy (15)	IV	Economic Botany (15)
	II	Forestry (15)	V	Horticulture (15)
	III	Ecology (15)	VI	Bio-technology & Bio-informatics (15)

Revised Scheme of examination & syllabus in Botany for S.Y.B.Sc. Course to be brought into force with effect from academic year 2009-2010

* Duration:- one year

* Number of theory papers:- Three

Each paper= 90 lectures = 90 Periods [Each period of 48 minutes duration]
Each paper =6 units (Units 1 to 3 to be completed in I term & units 4 to 6 in II term)

* Number of practical papers = Three

Each practical paper = one practical per week of 3 periods
duration [1 period=48 minutes]

*Number of students per batch for practical = First batch of 20 students
& additional batches of 15 students each.

* Excursions=Two local excursions = 4 Practicals

* Theory examinations= Two theory examinations, to be conducted
at the end of each term

* Paper 1:- of 60 marks & of two hours duration

* Paper 2:- of 60 marks & of two hours duration

* Paper 3:- of 60 marks & of two hours duration

* Practical examination=Only one practical examination to be
conducted at the end of the year.

- Batch size for the practical examination= 15 students
- Practical- I, II, III = Each of 40 marks of 3 hours duration
- Students shall not be allowed to appear for practical examination without duly certified journal & field report. If the journal or field report is lost the student will be allowed for the practical examination only on submitting a certificate from the head of the department or the principal, but will not get any marks assigned for journal work or field report.

Theory Examination

Paper I

Term-I			Term II		
Q.No.	Portion	Marks	Q.No.	Portion	Marks
1	Units 1,2,3	15	1	Units 4,5,6	15
2	Unit 1	15	2	Unit 4	15
3	Unit 2	15	3	Unit 5	15
4	Unit 3	15	4	Unit 6	15
Total Marks =60			Total Marks =60		

Marks out of 60 to be converted out of 30 for both the terms.

Paper II

Term-I			Term II		
Q.No.	Portion	Marks	Q.No.	Portion	Marks
1	Units 1,2,3	15	1	Units 4,5,6	15
2	Unit 1	15	2	Unit 4	15
3	Unit 2	15	3	Unit 5	15
4	Unit 3	15	4	Unit 6	15
Total Marks =60			Total Marks =60		

Marks out of 60 to be converted out of 30 for both the terms

Paper III

Term-I			Term II		
Q.No.	Portion	Marks	Q.No.	Portion	Marks
1	Units 1,2,3	15	1	Units 4,5,6	15
2	Unit 1	15	2	Unit 4	15
3	Unit 2	15	3	Unit 5	15
4	Unit 3	15	4	Unit 6	15
Total Marks =60			Total Marks =60		

Marks out of 60 to be converted out of 30 for both the terms

Paper I : PLANT DIVERSITY -II
(First Term Portion : lectures 45)

Unit I : Algae and Bryophyta		15
• Algae		09
• Structure, life cycle and systematic position of		
<i>Sargassum</i>		
<i>Batrachospermum</i>		
• Pigments and reserve food in Algae		
• Range of thallus structure in Algae.		
• Bryophytes		06
• Structure, life cycle and systematic position of		
<i>Anthoceros</i>		
<i>Funaria</i>		
Unit II : Fungi and Plant Pathology		15
• Structure, life cycle and systematic position of		08
<i>Erysiphe</i>		
<i>Agaricus</i>		
<i>Ustilago</i>		
• Diseases- Symptoms, causative organism, disease cycle and control measures of		07
Rust		
Early blight		
Powdery mildew		
Unit III: Angiosperms		15
• Concerns of taxonomy		02
• Systematics		
• Taxonomic structure		
• Nomenclature		
• Documentation		
• Characters of Taxonomic importance		07
• Exomorphic characters : Morphological characters of stem, root, leaf, flower, fruit, seed		
• Cytological characters : Chromosome number and chromosome morphology		
• Phytochemical characters		
Primary constituents – Proteins, DNA, polysaccharides.		
Secondary constituents – Tannins, alkaloids		
• Bentham and Hooker's system of classification for flowering plants up to family with respect to the following prescribed families and economic and medicinal importance for members of the families:		06
• Cruciferae		
• Tilliaceae		
• Meliaceae		
• Myrtaceae		
• Combretaceae		

Paper II : FORM AND FUNCTION –II

(First Term portion: Lectures 45)

Unit I : Instrumentation and Techniques

• Microscopy – Phase contrast and electron microscopy	15
• Chromatography- Principles and types of chromatography- absorption and partition chromatography, paper and thin layer chromatography.	04
• Electrophoresis- Horizontal and vertical gel electrophoresis. Staining techniques for proteins	06
	05

Unit II : Plant Biochemistry and Plant Physiology

• Photophysiology and Photorespiration:	15
Electromagnetic spectrum, Plant pigments and their interaction with light, Concept of fluorescence and Phosphorescence, Light reaction and dark reaction of photosynthesis, C3, C4 and CAM pathways, Photorespiration.	08
• Carbohydrate Metabolism.	07
Structure, synthesis and degradation of Sucrose, Starch, Fructans and Cellulose.	

Unit III : Cytogenetics

• Genetic Mapping in eukaryotes	15
Introduction to meiosis (crossing over and recombination during meiosis), Linkage, crossing over and construction of chromosome maps (through 3- point test cross).	06
• Extranuclear Genetics	03
• Organelle hereditary	
• Chloroplast determines heredity - Plastid transmission in plants, Male sterility in plants, Streptomycin resistance in <i>Chlamydomonas</i> .	
• Mitochondrion determined heredity- petite colonies in yeast	
• Maternal effect - Coiling in snail, Pigmentation in <i>Ephestia</i> moth	
• Extra chromosomal inheritance in prokaryotes	
• Variation in Chromosome Number	06
Origin and production, morphological and cytological features, applications in crop improvement and evolution of Aneuploids and Euploids (Monoploids, Autopolyploids and allopolyploids)	

Paper III : CURRENT TRENDS IN PLANT SCIENCES – I
(First Term Portion : Lectures 15)

Unit I : Pharmacognosy

• Introduction to Pharmacognosy - History, present and future	15
• Introduction to pharmacopoeia	01
• Concept of Primary and secondary metabolites	01
• Study of secondary metabolites (sources, properties and uses) with reference to Alkaloids, Glycosides, Tannins, Volatile oils and Gums and resins	10
• Crude drugs - Classification of crude drugs	02
• Cosmetology	01

Unit II : Forestry

• Types of forests – classification of forests, different types of forests in India	15
• Applications of forestry- Social forestry, Reforestation, Aforestation, Deforestation.	10
	05

Unit III : Ecology

• Ecological factors	15
• Concept of environmental factors. Soil as an edaphic factor, Soil composition, types of soil, soil formation, soil profile.	05
• Community ecology	10
• Concept of community	
• Qualitative characters of community- physiognomy, growth forms (Raunkiaer's classification), Biological spectrum, Stratification, species diversity and abundance.	
• Quantitative characters of community- frequency, density, cover and biomass, species abundance.	

Paper I : PLANT DIVERSITY –II
(Second Term Portion : Lectures 45)

Unit IV : Microbiology

• Methods of microbiology Basic principles of staining. Culture media preparation. Pure culture methods.	15
• Classification of Bacteria based on mode of nutrition.	09
• Bacterial biofertilizers with reference to <i>Rhizobium</i> – mass propagation and methods of application.	02
• Ecological microbiology – Bacteria in sulphur cycling and phosphate solubilisation.	02

Unit V : Pteridophyta, Paleobotany and Gymnosperms

• Pteridophyta	15
• Smith's Classification of Pteridophyta upto classes. Salient features of Psilophyta, Lepidophyta, Calamophyta and Pterophyta.	07
• Structure life cycle and systematic position of <i>Selaginella</i> and <i>Equisetum</i>	
• Paleobotany	03
• Structure and systematic position of form genera <i>Rhynia</i> and <i>Calamites</i>	
• Gymnosperms	05
• Structure life cycle and systematic position of <i>Pinus</i> .	

Unit VI : Angiosperms

• Units of classification	15
• Hierarchy of categories in taxonomic structure	02
• Tools of angiosperm taxonomy	02
• Museum (herbarium)	04
• Gardens (Botanical and Public)	
• Sacred grooves	
• Bentham and Hooker's system of classification for flowering plants up to family with respect to the following prescribed families and economic and medicinal importance for members of the families:	07
• Rubiaceae	
• Apocynaceae	
• Convolvulaceae	
• Urticaceae	
• Commelinaceae	
• Sub family – Cannaceae	

Paper II : FORM AND FUNCTION –II
(Second Term Portion : Lectures 45)

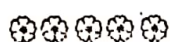
Unit IV : Anatomy		15
• Mechanical Tissue system		06
• Tissues providing mechanical strength and support and their disposition		
• Liganders in aerial and underground organs		
• Conducting tissue system :		06
• Primary xylem and phloem, Types of Vascular Bundles, Steelar Evolution and Conducting system in various plant systems.		
• Defence mechanism in plants:		03
• Morphological, Anatomical, Physiological and Biochemical Defence mechanisms		
Unit V : Environmental Botany and Plant Physiology		15
• Environmental Botany		09
• Ecological Succession: Hydrosere and xerosere		
• Plant indicators		
• Environmental Impact Assessment (EIA)		
• Protected Area Network (PAN)		
• Environment legislation		
• Ecotourism		
• Plant Physiology – Phytochrome Response and Vernalization with reference to flowering in higher plants		06
• Physico-chemical properties of phytochrome, Pr-Pfr interconversion, role of phytochrome in flowering of SDPs and LDPs; Vernalization – mechanisms and applications.		
Unit VI : Molecular Biology and Biostatistics		15
• Molecular Biology Protein synthesis		09
• Central dogma of Protein synthesis		
• Transcription, RNA molecules and RNA processing, The transcription process, RNA synthesis, Transcription in prokaryotes and eukaryotes.		
• Nature of the genetic code, Translation of the genetic message, Protein sorting in the cell		
• Biostatistics		06
• Testing of hypothesis: Chi square test and Student t – test, paired and unpaired		

Paper III : CURRENT TRENDS IN PLANT SCIENCES -I
(Second Term Portion : Lectures 45)

Unit IV: Economic Botany		15
• Fibres: Types of fibres, fibre yielding plants		05
• Paper: Types of paper, paper yielding plants		05
• Spices and condiments: Nutmeg, Mace, Clove, Cardamom and Saffron		05
Unit V: Horticulture		15
• Locations in the garden- edges, hedges, fence, lawn, flower beds, avenue, water garden (with two examples of each). Focal point.		
• Formal and informal gardens		
• Species diversity in different locations		
• National parks, Botanical gardens		
Unit VI : Biotechnology and Bioinformatics		15
• Biotechnology		10
• Recombinant DNA Technology and manipulation of DNA, Transgenic plant production by <i>Agrobacterium</i> mediated gene transfer (molecular basis), selectable markers, reporter genes, promoters used in plant vectors, Transgenic plants used for improving quality of seeds, edible vaccines.		07
• Solid State Fermentation for production of Fungal Biomass (for industrial enzymes)		03
• Bioinformatics		05
• Introduction to bioinformatics- www, internet and its uses, tools used in bioinformatics related to Biotechnology, NCBI data models and other data bases, services offered by NCBI and EBI		

PRACTICAL: I

Microbiology	03
1 Sterilization techniques (wet and dry). Preparation of nutrient agar.	1
2 Preparation of slants and plates. Study of streak plate technique.	1
3 Effect of plant extract (turmeric/garlic) on microbial growth by the agar-diffusion method	1
Algae	04
1 Study of stages in the life cycle of <i>Sargassum</i> from fresh/ preserved material and permanent slides.	1
2 Study of stages in the life cycle of <i>Batrachospermum</i> from fresh/ preserved material and permanent slides.	1
3 Study of Algal pigments – chromatographic separation	1
4 Study of range of thallus in Algae with the help of permanent slides and fresh/preserved material	1
Fungi	03
7 Study of stages in the life cycle of <i>Erysiphe</i> and <i>Agaricus</i> from fresh/ preserved material and permanent slides.	1
8 Study of stages in the life cycle of <i>Ustilago</i> from fresh/ preserved material and permanent slides.	1
9 Study of fungal diseases as prescribed for theory.	1
Bryophyta	02
10 Study of stages in the life cycle of <i>Anthoceros</i> from fresh/ preserved material and permanent slides.	1
11 Study of stages in the life cycle of <i>Funaria</i> from fresh/ preserved material and permanent slides.	1
Pteridophyta and Paleobotany	02
12 Study of stages in the life cycle of <i>Selaginella</i> from fresh/ preserved material and permanent slides.	1
13 A. Study of stages in the life cycle of <i>Equisetum</i> from fresh/ preserved material and permanent slides.	1
B. Study of form genera <i>Rhynia</i> and <i>Calamites</i> with the help of permanent slides/ photomicrographs	
Gymnosperms	02
14 Study of stages in the life cycle of <i>Pinus</i> from fresh/ preserved material and permanent slides.	
Angiosperms	06
15 Study of one plant from each family prescribed for theory: morphological peculiarities and economic importance of the members of these families.	6
Total Practicals	22



PRACTICAL: II

Instrumentation and Techniques		
1	Preparation of herbarium and wet preservation technique	05
2	Preparation of a report on visit to any Herbarium.	1
3	Chromatography: Separation of monosaccharides by circular paper chromatography	1
4	Separation of Carotenoids by thin layer chromatography	1
5	Horizontal Gel Electrophoresis - Demonstration	1
Plant Physiology and Plant Biochemistry		03
6	Study of Hill's Reaction	1
7	A. Quantitative estimation of photosynthetic pigments B. Study of absorption spectrum pattern of the chlorophyll / carotenoid pigment	1
8	Qualitative tests for various types of sugars	1
Cytogenetics , Molecular Biology		06
9	Study of inheritance pattern with reference to Plastid Inheritance	1
10	Quantitative estimation of plant genomic DNA and plant RNA.	2
11	DNA sequencing -Sanger's Method	1
12	Determining the sequence of amino acids in the protein molecule synthesised from the given m-RNA strand (prokaryotic and eukaryotic).	2
Biometry		03
13	Chi square test	1
14	Student t-test paired and unpaired	2
Anatomy		06
15	Types of mechanical tissues, mechanical tissue system in aerial, underground organs.	1
16	Study of conducting tissues- Xylem and phloem elements in Gymnosperms and Angiosperms as seen in LS and through maceration technique.	2
17	Study of different types of vascular bundles and stellar evolution with the help of permanent slides.	2
18	Study of defence mechanism in plants	1
Total Practicals		22

PRACTICAL: III

Pharmacognosy

1	A. Tests for alkaloids from <i>Strychnos</i> (seeds) and <i>Holarrhena</i> (bark)	0.5
	B. Tests for glycosides from <i>Glycyrrhiza</i> rhizome/ <i>Aloe</i> leaf/ <i>Senna</i> leaf	2
	C. Test for tannins from Clove/ <i>Arjuna</i> bark/ <i>Catechu</i> .	

2	Identification of drugs from grandma's pouch, comments on their uses.	1
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3	Preparation of any herbal cosmetic.	1
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4	Stomatal Index, Palisade Ratio, Vein islet number.	1
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Economic Botany

5	Sources, properties and uses of : fibres, paper and spices and condiments	0.2
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Forestry

6	Study of Biodiversity Composition of different types of forests in India.	0.2
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Ecology

7	Study of the working of the following Ecological Instruments- Soil thermometer, Soil testing kit, Soil pH, Wind anemometer	0.5
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8	Mechanical analysis of soil by the sieve method.	1
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9	Study of vegetation by the list quadrat method	1
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10	Estimation of Biomass of aerial parts of herbaceous plants	1
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11	Quantitative estimation of organic matter of the soil by Walkley and Black's Rapid titration method.	1
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Horticulture

12	Study of five examples of plants for each of the garden locations as prescribed for theory	0.5
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13	Preparation of garden plans - formal and informal gardens	2
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14	Bottle and dish garden preparation.	1
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Biotechnology

15	Identification of the cloning vectors Ti plasmid for the production of transgenic plants.	0.1
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Bioinformatics

16	Internet search, BLAST	0.2
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	Total Practicals	22
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LIST OF REFERENCE BOOKS

PAPER-I

Algae

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- Smith, Gilbert M. **Cryptogamic Botany Vol. I Algae & Fungi.** McGraw-Hill Book Company.

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- Prof. Sahgal, A.C. **Text Book of Botany** Shiva Lal Agarwal & Company, New Delhi.
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- Pandey, B.P. **A Text Book of Botany. Angiosperms** S.Chand & Company Ltd. Ram Nagar, New Delhi- 110055. 2001
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- Salle, A.J. **Fundamental principles of Microbiology** VII ed. 1993 Reprint. Tata McGraw-Hill Publishing Co. Ltd. New Delhi.
- Frobisher, Hinsdill, Crabtree Goodheart. **Fundamentals of Microbiology.** 9th ed. 1974. Topan Co. Ltd. Tokyo, Japan.
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- Wilson and walker (Ed) **Practical Biochemistry –Principles and techniques** (5th edition) Cambridge Univ Press.

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- Heldt, Hans –walter **Plant Biochemistry** (3rd Edition) Academic Press an imprint of Elsevier.
- * Noggle and Fritz **Plant Physiology**
- * Hopkins W. G. And Huner Norman. P. **Introduction to Plant Physiology** (3rd Edition) Wiley International edition
- * Sinha R K (2004) **Modern Plant Physiology** Narosa Publishing House India

Cytogenetics

- 1 Russel, Peter J. **Genetics** (fifth edition) Addison Wesley Longman, Inc. California
- 2 Gardner, Simmons and Snustaa (1991) **Principles of Genetics**. (eighth edition) Wley International edition.
- 3 Singh B. D. **Fundamentals of Genetics** Katyani Publishers
- 4 Gupta P K **Genetics** Rastogi Publications Meerut.

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- Das., Ganguli, Datta College Botany Vol.II
- Pandey, S.N. & Chadha, A. **Plant Anatomy & Embryology**. Vikas Publ. House. 2007

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Misra, B.N. & Misra, M.K. Introductory Practical Biostatistics. Darbari Prokashan, Calcutta. 1992.

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PAPER-III

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* Rao, Sitaram. Introduction to Social Forestry.

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* Dash, M.C. Fundamentals of Ecology. Tata Mac Graw Hill 2001

* Cunningham, W.P., Cunningham, M.A. Principles of Environment Science : Inquiry & Application. Tata Macgraw Hill.

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* Verma, V. A Text Book of Economic Botany.

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- Dubey, R.C. A Text book of Biotechnology 2nd rev ed. S.Chand & Co. 1996
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