SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

BOTANY – CURRICULUM

B.Sc. General (Semester Pattern)

B. Sc. THIRD YEAR

With Effect from June - 2015

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

BOTANY – CURRICULUM

B.Sc. General (Semester Pattern)

CURRICULUM DESIGNING COMMITTEE

1. Dr.Bodke S.S. — Chairman
   Yeshwant Mahavidyalaya, Nanded
2. Dr. Kadam A.S. — Member
   D.S.M. Mahavidyalaya, Jintur
3. Dr. Mandge S.V. — Member
   Shri. SGM College, Loha
4. Dr. Gawai D.U. — Member
   Science College, Nanded
5. Dr. Dakore H.G. — Member
   P.N.College, Nanded
6. Dr. Aithal S.V. — Member
   Vai. D.M.Mahavidyalaya, Degloor
7. Dr. Biradar S.D. — Member
   D.S.M.College, Parbhani
8. Dr. Bhadraiah B. — Member
   Osmania University, Hyderbad
9. Dr. Patil D.A. — Member
   SSVP's Dr. Ghogre Science College, Dhule
10. Dr. Mukadam D.S. — Member
    Green Gold seeds Ltd., Walunj
11. Dr. Gacche R.N. — Member
    SRTM University, Nanded

.....

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

BOTANY – CURRICULUM

B.Sc. General (Semester Pattern)

INTRODUCTION

Revising and updating of the curriculum is the continuous process to provide an updated education to the students at large. Up till now there was wide diversity in the curriculum of different Indian Universities which inhibited mobility of students in other universities or states. To ensure and have uniform curriculum at UG and PG levels, curriculum of different Indian Universities and the UGC model curriculum are referred to serve as a base in updating the same.

For developing the final draft of curriculum, the BOS in Botany took into account total number of teaching days available in a year and the guidelines given by the faculty of science of the S.R.T.M.U Nanded. The BOS in Botany held a couple of meetings in which there were thorough and critical discussions.

S.R.T.M.University, Nanded is having B.Sc. (General) Botany course. The course content has been designed on semester pattern.

The course content of each theory paper is divided into units and subunits by giving appropriate titles and subtitles. For each unit, total number of periods required and weightage of maximum marks is mentioned. At the end of each theory paper the list of selected reading material is provided. A list of practical exercises to be completed in the academic year is also given.

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

BOTANY – CURRICULUM

B.Sc. General (Semester Pattern)

OBJECTIVES

1. To provide an updated education to the students at large and to provide mobility to students from one university or state to other

2. To update curriculum by introducing recent advances in the subject and enable the students to face NET, SET, UPSC and other competitive examinations successfully.

3. To create awareness among the students about the botany and train them in the subject.

4. To improve the quality of laboratory and field work, for which study tours and excursions have been made compulsory so that the students can become familiar with the flora and ecosystems of that area.

5. To prepare such a dynamic curriculum by incorporating innovative concepts and a multidisciplinary approach which can attract and develop interest among the students for selecting plant science as their career.

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

BOTANY – CURRICULUM

B.Sc. General (Semester Pattern)

Class: B.Sc. I, II & III Year Curriculum - an outline

Class & Semester	Paper No. & Title	Period /practical	Marks		
			University Examination	Inte-rnal Exam	Total
B.Sc. I Year Semester-I	**Theory Paper-I:** Diversity of Microbes	45	40	10	50
	Theory Paper-II: Cell and Molecular Biology	45	40	10	50
B.Sc. I Year Semester-II	**Theory Paper-III:** Diversity of Cryptogams	45	40	10	50
	Theory Paper-IV: Genetics and Plant Breeding	45	40	10	50
B.Sc. I Year Annual pattern	Practical Paper-V: Practical based on theory papers of semester-I&II	24	100	-	100
B.Sc. II Year Semester-III	**Theory Paper-VI:** Morphology and Taxonomy of Angiosperms	45	40	10	50
	Theory Paper-VII: Histology, Anatomy and Embryology of Angiosperms	45	40	10	50
B.Sc. II Year Semester-IV	**Theory Paper-VIII:** Gymnosperms and Palaeobotany	45	40	10	50
	Theory Paper-IX: Ecology and Environmental biology	45	40	10	50
B.Sc. II Year Annual pattern	**Practical Paper-X:** Based on Theory Paper-VI&VIII	24	50	-	50
B.Sc. II Year Annual pattern	**Practical Paper-XI:** Based on Theory Paper-VII&IX	24	50	-	50
B.Sc. III Year Semester-V	**Theory Paper-XII:** Plant Physiology	45	40	10	50
	Theory Paper-XIII: Optional- any one of the following 1. Plant Pathology-I 2. Systematic botany-I 3. Applied Economic Botany-I 4. Herbal Technology-I	45	40	10	50
B.Sc. III Year Semester-VI	**Theory Paper-XIV:** Plant Metabolism, Biochemistry and Biotechnology	45	40	10	50
	Theory Paper-XV: Optional- any one of the following 1. Plant Pathology-II 2. Systematic botany-II 3. Applied Economic Botany-II 4. Herbal Technology-II	45	40	10	50
B.Sc. III Year Annual pattern	**Practical Paper-XVI:** Based on Theory Paper-XII&XIV	24	50	-	50
B.Sc. III Year Annual pattern	**Practical Paper-XVII:** Based on Theory Paper-XIII&XV	24	50	-	50

Workload: **1. Theory:** Per paper per week three periods
2. Practical: Per batch per week one practical of three periods

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

BOTANY – CURRICULUM

B.Sc. General (Semester Pattern)

Class: B.Sc. III Year Curriculum - an outline

Class & Semester	Paper No. & Title	Period /practical	Marks		
			University Examination	Inte-rnal Exam	Total
B.Sc. III Year Semester-V	**Theory Paper-XII:** Plant Physiology	45	40	10	50
	Theory Paper-XIII: Optional- any one of the following 1. Plant Pathology-I 2. Systematic botany-I 3. Applied Economic Botany-I 4. Herbal Technology-I	45	40	10	50
B.Sc. III Year Semester-VI	**Theory Paper-XIV:** Plant Metabolism, Biochemistry and Biotechnology	45	40	10	50
	Theory Paper-XV: Optional- any one of the following 1. Plant Pathology-II 2. Systematic botany-II 3. Applied Economic Botany-II 4. Herbal Technology-II	45	40	10	50
B.Sc. III Year Annual pattern	**Practical Paper-XVI:** Based on Theory Paper-XII&XIV	24	50	-	50
B.Sc. III Year Annual pattern	**Practical Paper-XVII:** Based on Theory Paper-XIII&XV	24	50	-	50

Workload: **1. Theory:** Per paper per week three periods
2. Practical: Per batch per week one practical of three periods

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

BOTANY – CURRICULUM

B.Sc. General (Semester Pattern)

B. Sc. THIRD YEAR

Semester – V

THEORY PAPER-XII: PLANT PHYSIOLOGY

(Compulsory)

Periods – 45 ***Maximum Marks – 40***

UNIT-I: PLANT WATER RELATIONS *(12 periods)*

Importance of water in plant life, Different bio-physico-chemical phenomenon- Permeability, Diffusion, Osmosis, Plasmolysis and Imbibition, **Ascent of sap:** Introduction and mechanism (transpiration pull theory), **Transpiration-**Definition, types, structure of stomata, mechanism of opening and closing of stomata (starch-sugar theory and K+ pump theory, **Plant movements:** Introduction, classification, paratonic and nastic movements .

UNIT-II: MINERAL NUTRITION *(10 periods)*

Major and Minor elements: Introduction, source, deficiency symptoms and their role, **Mineral salt absorption:** Introduction, mechanism of passive absorption (ion exchange theory) and active absorption (carrier concept theory), **Translocation of organic solutes:** Introduction, mechanism of translocation (Munch-Mass flow hypothesis)

UNIT-III: GROWTH AND DEVELOPMENT *(13 periods)*

Growth-Introduction, phases of growth, measurement of growth (arc indicator and Pfeiffer's auxanometer), factors affecting growth, **Plant growth regulators**- Chemical nature and practical applications of Auxins, gibberellins, cytokinins, abscisic acid and ethylene, **Seed dormancy**-Introduction, causes of seed dormancy and methods of breaking seed dormancy and **Seed germination-** Introduction, types and mechanism of seed germination, **Physiology of flowering-**Introduction, Photoperiodism (LDP, SDP and DNP), Vernalization and devernalization-Introduction, mechanism and significance,

UNIT-IV: BIOMOLECULES AND SECONDARY METABOLITES *(10 periods)*

Biomolecules-Introduction, structure and biological functions of Protein-Primary, secondary (α helix and β sheets), tertiary and quaternary structure, Carbohydrates- Monosaccharides, disaccharides and polysaccharides (starch and cellulose) and Lipids, Secondary metabolites-Biological functions of tannins, terpenoids, flavonoids, alkaloids, essential oils and organic acids

Theory paper-XII: Plant physiology (Compulsory)-**Unit wise distribution of periods and marks**

Unit	Title	Periods Allotted	Maximum Marks
I	Plant Water Relations	12	20
II	Mineral Nutrition	10	18
III	Growth and Development	13	20
IV	Biomolecules and Secondary Metabolites	10	18
	Total	**45**	**76**

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

BOTANY – CURRICULUM

B.Sc. General (Semester Pattern)

Skeleton Question Paper
B. Sc. THIRD YEAR
Semester – V
Theory Paper-XII

Time: Three hours ***Maximum Marks: 40***

Note: - *(i) Attempt all questions*
(ii) All questions carry equal marks
(iii) Draw neat and well labeled diagrams wherever necessary

Q1. Long answer type question from Unit-I **08**
OR
a. Short answer type question from Unit-I
b. Short answer type question from Unit-I

Q2. Long answer type question from Unit-II **08**
OR
a. Short answer type question from Unit-II
b. Short answer type question from Unit-II

Q3. Long answer type question from Unit-III **08**
OR
a. Short answer type question from Unit-III
b. Short answer type question from Unit-III

Q4. Long answer type question from Unit-IV **08**
OR
a. Short answer type question from Unit-IV
b. Short answer type question from Unit-IV

Q5. Write short notes on any four of the following **08**
a. Short note type question from Unit-I
b. Short note type question from Unit-I
c. Short note type question from Unit-II
d. Short note type question from Unit-III
e. Short note type question from Unit-III
f. Short note type question from Unit-IV

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

BOTANY – CURRICULUM

B.Sc. General (Semester Pattern)

B. Sc. THIRD YEAR

Semester – V

THEORY PAPER-XIII: 1. PLANT PATHOLOGY-I

(Optional-I)

Periods – 45 ***Maximum Marks – 40***

UNIT-I: FUNDAMENTALS OF PLANT PATHOLOGY *(10 periods)*

Scope, importance, history and advancement of plant pathology, classification of plant diseases on the basis of causal organism and symptoms, Field and laboratory diagnosis- Isolation of plant pathogens from infected plant parts, soil and air, Pure culture technique, Koch's postulates for pathogenicity

UNIT-II: PLANT DISEASE DEVELOPMENT *(10 periods)*

Disease development- Mode of entry of pathogens (through stomata, wounds, root hairs and buds), Factors affecting disease development- Temperature, moisture, wind and soil pH, Dispersal of plant pathogens (by air, water, insects and animals)

UNIT-III: PLANT DISEASES-I *(12 periods)*

Symptoms, causal organisms, disease cycle and control measures of Green ear of Bajra, leaf spot of tomato, Grain smut of Jowar, Red rot of Sugarcane, Angular leaf spot of cotton, Yellow vein mosaic of Bhendi

UNIT-IV: PLANT DISEASES-II *(13 periods)*

Symptoms, causal organisms, disease cycle and control measures of White rust of Mustard, Whip smut of Sugarcane, Powdery mildew of pea, Leaf spot of Turmeric (Colletotrichum capsci), Citrus canker, Bean mosaic

Theory paper-XIII: 1. Plant pathology-I (Optional-I) - **Unit wise distribution of periods and marks:**

Unit	Title	Periods Allotted	Maximum Marks
I	Fundamentals of Plant Pathology	10	18
II	Plant Disease Development	10	18
III	Plant Diseases-I	12	20
IV	Plant Diseases-II	13	20
	Total	**45**	**76**

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

BOTANY – CURRICULUM

B.Sc. General (Semester Pattern)

Skeleton Question Paper

B. Sc. THIRD YEAR

Semester – V

THEORY PAPER-XIII: 1. PLANT PATHOLOGY-I

(Optional-I)

Time: Three hours ***Maximum Marks: 40***

Note: - *(i) Attempt all questions*
(ii) All questions carry equal marks
(iii) Draw neat and well labeled diagrams wherever necessary

Q1. Long answer type question from Unit-I **08**

OR

a. Short answer type question from Unit-I
b. Short answer type question from Unit-I

Q2. Long answer type question from Unit-II **08**

OR

a. Short answer type question from Unit-II
b. Short answer type question from Unit-II

Q3. Long answer type question from Unit-III **08**

OR

a. Short answer type question from Unit-III
b. Short answer type question from Unit-III

Q4. Long answer type question from Unit-IV **08**

OR

a. Short answer type question from Unit-IV
b. Short answer type question from Unit-IV

Q5. Write short notes on any four of the following **08**

a. Short note type question from Unit-I
b. Short note type question from Unit-II
c. Short note type question from Unit-III
d. Short note type question from Unit-III
e. Short note type question from Unit-IV
f. Short note type question from Unit-IV

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

BOTANY – CURRICULUM

B.Sc. General (Semester Pattern)

B. Sc. THIRD YEAR

Semester – V

THEORY PAPER-XIII: 2. SYSTEMATIC BOTANY-I

(Optional-II)

Periods – 45 ***Maximum Marks – 40***

UNIT –I: CLASSIFICATION *(12 periods)*

Introduction- Definition, aims, scope and application of angiosperm taxonomy, Types of classification- Artificial, Natural and Phylogenetic, Outline of Bentham and Hooker, Engler and Prantle and Hutchinson's systems of classification of angiosperms with merits and demerits

UNIT –II: PRINCIPLES OF TAXONOMY *(10 periods)*

ICBN (International Code of Botanical Nomenclature)-Brief history, principle of priority, effective and valid publication, typification and author citation, Species concept- Morphological, taxonomical and biological, Role of phytochemistry, cytology, anatomy and palynology in relation to taxonomy

UNIT –III: TAXONOMIC TOOLS *(10 periods)*

Herbarium- Techniques of plant preservation, Importance of herbarium, Botanical gardens-Role in plant taxonomy, Important Botanical gardens, Plant identification key-Use of keys in plant identification

UNIT –IV: STUDY OF DICOT FAMILIES (POLYPETALAE) *(13 periods)*

Study of following families according to Bentham and Hooker's system of classification with reference to general characters, pollination, floral formulae, floral diagrams, systematic position, distinguishing features and economic importance

Polypetalae-Papaveraceae, Capparidaceae Combretaceae, Myrtaceae, Rutaceae, Cucurbitaceae

Theory paper-XIII: 2. Systematic botany-I (Optional-II) - **Unit wise distribution of periods and marks:**

Unit	Title	Periods Allotted	Maximum Marks
I	Classification	12	20
II	Principles of Taxonomy	10	18
III	Taxonomic Tools	10	18
IV	Study of Dicot Families (Polypetalae)	13	20
	Total	**45**	**76**

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

BOTANY – CURRICULUM

B.Sc. General (Semester Pattern)

Skeleton Question Paper

B. Sc. THIRD YEAR

Semester – V

THEORY PAPER-XIII: 2. SYSTEMATIC BOTANY-I

(Optional-II)

Time: Three hours ***Maximum Marks: 40***

Note: - *(i) Attempt all questions*
(ii) All questions carry equal marks
(iii) Draw neat and well labeled diagrams wherever necessary

Q1. Long answer type question from Unit-I **08**

OR

a. Short answer type question from Unit-I
b. Short answer type question from Unit-I

Q2. Long answer type question from Unit-II **08**

OR

a. Short answer type question from Unit-II
b. Short answer type question from Unit-II

Q3. Long answer type question from Unit-III **08**

OR

a. Short answer type question from Unit-III
b. Short answer type question from Unit-III

Q4. Long answer type question from Unit-IV **08**

OR

a. Short answer type question from Unit-IV
b. Short answer type question from Unit-IV

Q5. Write short notes on any four of the following **08**

a. Short note type question from Unit-I
b. Short note type question from Unit-I
c. Short note type question from Unit-II
d. Short note type question from Unit-III
e. Short note type question from Unit-IV
f. Short note type question from Unit-IV

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

BOTANY – CURRICULUM

B.Sc. General (Semester Pattern)

B. Sc. THIRD YEAR

Semester – V

THEORY PAPER-XIII: 3. APPLIED ECONOMIC BOTANY-I

(Optional-III)

Periods – 45 ***Maximum Marks – 40***

UNIT-I: INTRODUCTION TO ECONOMIC BOTANY AND STUDY OF CEREAL PLANTS *(10 periods)*

Introduction to economic botany- Brief history, origin, scope, nature of plant products, Vavilov's concept of cultivated plants, classification of economic plants, **Study of Cereal plants-** History, origin, cultivation practices, botanical description, nutritional value, varieties and uses of Jowar, Wheat and Rice

UNIT-II: STUDY OF PULSES AND OIL YIELDING PLANTS *(12 periods)*

History, origin, cultivation practices, botanical description, nutritional value, uses and varieties of **Pulses plants-** Tur, Greengram, Gram, **Oil yielding plants-** Groundnut, Safflower, Soyabean

UNIT-III: STUDY OF VEGETABLE PLANTS *(13 periods)*

History, origin, cultivation practices, botanical description, nutritional value, uses and varieties of **Root vegetables-** Radish, Carrot, Beetroot, **Stem vegetables-** Potato, Amorphophallus, Colocasia, **Foliage(Herbage) vegetables**- Spinach, Methi, Cabbage, **Fruit vegetables-** Bhendi, Brinjal, Tomato

UNIT-IV: STUDY OF MEDICINAL PLANTS *(10 periods)*

History, origin, cultivation practices, botanical description, nutritional value, uses and varieties of **Root drug plant-** Ashwgandha, Shatawari, Safed musli, **Stem drug plant-** Neem, Gulwel, Rui (Ruchki), **Flower drug plant-** Jaswand, Dhaiti, Clove(Lavang), **Fruit drug plant-** Behada, Awala, Murudsheng

Theory paper-XIII: 3. Applied economic botany-I (Optional-III) - **Unit wise distribution of periods and marks:**

Unit	Title	Periods Allotted	Maximum Marks
I	Introduction to Economic Botany	10	18
II	Study of Food Plants	12	20
III	Study of Vegetable Plants	13	20
IV	Study of Medicinal Plants	10	18
	Total	**45**	**76**

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

BOTANY – CURRICULUM

B.Sc. General (Semester Pattern)

Skeleton Question Paper

B. Sc. THIRD YEAR

Semester – V

THEORY PAPER-XIII: 3. APPLIED ECONOMIC BOTANY-I

(Optional-III)

Time: Three hours ***Maximum Marks: 40***

Note: - *(i) Attempt all questions*
(ii) All questions carry equal marks
(iii) Draw neat and well labeled diagrams wherever necessary

Q1. Long answer type question from Unit-I **08**

OR

a. Short answer type question from Unit-I
b. Short answer type question from Unit-I

Q2. Long answer type question from Unit-II **08**

OR

a. Short answer type question from Unit-II
b. Short answer type question from Unit-II

Q3. Long answer type question from Unit-III **08**

OR

a. Short answer type question from Unit-III
b. Short answer type question from Unit-III

Q4. Long answer type question from Unit-IV **08**

OR

a. Short answer type question from Unit-IV
b. Short answer type question from Unit-IV

Q5. Write short notes on any four of the following **08**

a. Short note type question from Unit-I
b. Short note type question from Unit-II
c. Short note type question from Unit-II
d. Short note type question from Unit-III
e. Short note type question from Unit-III
f. Short note type question from Unit-IV

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

BOTANY – CURRICULUM

B.Sc. General (Semester Pattern)

B. Sc. THIRD YEAR

Semester – V

THEORY PAPER-XIII: 4. HERBAL TECHNOLOGY-I

(Optional-IV)

Periods – 45 ***Maximum Marks – 40***

UNIT-I: MEDICINAL AND AROMATIC PLANTS (MAP) *(10 periods)*

Introduction, History, importance, demand and supply of MAP in India and world, Indian trade in MAP, Indian systems of medicine- Ayurvedic, unani, homeopathic, siddha, yoga and naturopathy

UNIT-II: CRUDE PLANT DRUGS *(12 periods)*

Definition, Classification- Alphabetic, taxonomic, morphological, chemical, pharmacological and chemotaxonomic, Methods of cultivation and factors affecting the cultivation of drug plants, Collection, harvesting, drying and storage of crude drugs, Organizes crude drugs- Leaves, stem, flowers, fruits, seeds, barks, underground and entire drugs, Unorganized drugs- Gums, mucilage, resins, dried juices, latex and extracts

UNIT-III: CHARACTERIZATION OF DRUGS *(10 periods)*

Distribution, morphology, botanical and chemical constituents and uses of **Root drugs-** Shatavari, Ashwagandha, **Stem drugs-** Ginger, turmeric, Dudh kuda, Arjun sadada, Gulvel, Chandan, **Leaf drugs-** Adulsa, Korpad (Aloe), **Fruit drugs-** Behda, Hirda and **Entire plant drugs-** Tulsi and Aghada

UNIT-IV: MEDICINAL PLANT BIOTECHNOLOGY AND STANDARDIZATION OF DRUGS *(13 periods)*

Genetics as applied to medicinal herbs and transgenic plants, Plant tissue culture as source of biomedicines, Importance of drug standardization, Problems of standardization of herbs, Drug adulteration, Methods of drug evaluation- Morphological, microscopic, chemical, physical and biological

Theory paper-XIII: 4. Herbal technology-I (Optional-IV) - **Unit wise distribution of periods and marks:**

Unit	Title	Periods Allotted	Maximum Marks
I	Medicinal and Aromatic Plants (Map)	10	18
II	Crude Plant Drugs	12	20
III	Characterization of Drugs	10	18
IV	Medicinal Plant Biotechnology and Standardization of Drugs	13	20
	Total	**45**	**76**

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

BOTANY – CURRICULUM

B.Sc. General (Semester Pattern)

Skeleton Question Paper

B. Sc. THIRD YEAR

Semester – V

THEORY PAPER-XIII: 4. HERBAL TECHNOLOGY-I

(Optional-IV)

Time: Three hours ***Maximum Marks: 40***

Note: - *(i) Attempt all questions*
(ii) All questions carry equal marks
(iii) Draw neat and well labeled diagrams wherever necessary

Q1. Long answer type question from Unit-I **08**

OR

a. Short answer type question from Unit-I
b. Short answer type question from Unit-I

Q2. Long answer type question from Unit-II **08**

OR

a. Short answer type question from Unit-II
b. Short answer type question from Unit-II

Q3. Long answer type question from Unit-III **08**

OR

a. Short answer type question from Unit-III
b. Short answer type question from Unit-III

Q4. Long answer type question from Unit-IV **08**

OR

a. Short answer type question from Unit-IV
b. Short answer type question from Unit-IV

Q5. Write short notes on any four of the following **08**

a. Short note type question from Unit-I
b. Short note type question from Unit-II
c. Short note type question from Unit-II
d. Short note type question from Unit-III
e. Short note type question from Unit-IV
f. Short note type question from Unit-IV

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

BOTANY – CURRICULUM

B.Sc. General (Semester Pattern)

B. Sc. THIRD YEAR

Semester – VI

THEORY PAPER-XIV: PLANT METABOLISM, BIOCHEMISTRY AND BIOTECHNOLOGY

(Compulsory)

Periods – 45 ***Maximum Marks – 40***

UNIT-I: PHOTOSYNTHESIS AND RESPIRATION *(13 periods)*

Photosynthesis- Introduction, significance, ultra structure of chloroplast, photosynthetic pigments, concepts of two Photo systems, **Mechanism of photosynthesis**- Light reaction- Hill reaction, Cyclic and Non cyclic photophoshorylation, Dark phase- Calvin cycle (C3) and Hatch and Slack (C4) pathway, **Respiration-** Introduction, significance, ultra structure of mitochondria, structure and functions of ATP, **Types of respiration**- Aerobic respiration- Glycolysis, Kreb's cycle, Electron Transport System, Anaerobic respiration- Fermentation (alcoholic and lactic acid)

UNIT-II: : ENZYMES AND NITROGEN METABOLISM *(12 periods)*

Enzymes- Introduction, nomenclature and classification (IUB), mechanism of enzyme action (lock and key model, induced fit model), Concept of holoenzyme, mechanism of regulation of enzyme activity-Feedback and allosteric regulation, Nitrogen metabolism- Introduction, sources and forms of nitrogen, types of nitrogen fixation- physical and biological (symbiotic and asymbiotic), Ammonification, nitrification and denitrification

UNIT –III: BIOTECHNOLOGY *(10 periods)*

Introduction, basic aspects of tissue culture, media, culture techniques, cellular totipotency, **Applications of tissue culture:** Micropropagation, Production of disease free plants; production of secondary metabolites, Anther culture and production of haploids, protoplast culture and somatic hybridization, synthetic seeds

UNIT-IV: GENETIC ENGINEERING *(10 periods)*

Introduction, tools and techniques of recombinant DNA technology, Cloning vectors, Gene cloning, Genomic library and cDNA library, Agrobacterium mediated gene transfer, transgenic plants

Theory paper-XIV: 4. Plant metabolism, biochemistry and biotechnology (Compulsory) - **Unit wise distribution of periods and marks:**

Unit	Title	Periods Allotted	Maximum Marks
I	Photosynthesis and Respiration	13	20
II	Enzymes and Nitrogen Metabolism	12	20
III	Biotechnology	10	18
IV	Genetic Engineering	10	18
	Total	**45**	**76**

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

BOTANY – CURRICULUM

B.Sc. General (Semester Pattern)

Skeleton Question Paper

B. Sc. THIRD YEAR

Semester – VI

THEORY PAPER-XIV: PLANT METABOLISM, BIOCHEMISTRY AND BIOTECHNOLOGY

(Compulsory)

Time: Three hours ***Maximum Marks: 40***

Note: - *(i) Attempt all questions*
(ii) All questions carry equal marks
(iii) Draw neat and well labeled diagrams wherever necessary

Q1. Long answer type question from Unit-I **08**

OR

a. Short answer type question from Unit-I
b. Short answer type question from Unit-I

Q2. Long answer type question from Unit-II **08**

OR

a. Short answer type question from Unit-II
b. Short answer type question from Unit-II

Q3. Long answer type question from Unit-III **08**

OR

a. Short answer type question from Unit-III
b. Short answer type question from Unit-III

Q4. Long answer type question from Unit-IV **08**

OR

a. Short answer type question from Unit-IV
b. Short answer type question from Unit-IV

Q5. Write short notes on any four of the following **08**

a. Short note type question from Unit-I
b. Short note type question from Unit-I
c. Short note type question from Unit-II
d. Short note type question from Unit-II
e. Short note type question from Unit-III
f. Short note type question from Unit-IV

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

BOTANY – CURRICULUM

B.Sc. General (Semester Pattern)

B. Sc. THIRD YEAR

Semester – VI

THEORY PAPER-XV: 1. PLANT PATHOLOGY-II

(Optional-I)

Periods – 45 ***Maximum Marks – 40***

UNIT-I: AEROBIOLOGY AND SEED PATHOLOGY *(10 periods)*

Aerobiology- Definition, scope and importance and disease forecasting, Seed pathology-Definition, seed borne pathogens (external and internal) detection of seed borne pathogens by blotter paper and agar plate methods, seed treatment (hot water, solar, chemical,) and seed certification

UNIT-II: DEFENSE MECHANISM AND PLANT DISEASE MANAGEMENT *(10 periods)*

Structural (pre existing and post infectional) and biochemical defense-pre existing and post infectional (phytoalexins) Exclusion and eradication, Chemical control-General account of Sulphur, Copper, systemic fungicides and antibiotics, Integrated pest management

UNIT-III: PLANT DISEASES-I *(12 periods)*

Symptoms, causal organisms, disease cycle and control measures of Tikka disease of groundnut, Ergot of Bajra, Loose smut of Wheat, Rust of Jowar, Little leaf of Brinjal, Leaf curl of tomato

UNIT-IV: PLANT DISEASES-II *(13 periods)*

Symptoms, causal organisms, disease cycle and control measures of Downy mildew of Grape, Stem rust of Wheat, Wilt of Tur, late blight of Potato, Grassy shoot of Sugarcane, Papaya mosaic

Theory paper-XV: 1. Plant pathology-II (Optional-I) - **Unit wise distribution of periods and marks:**

Unit	Title	Periods Allotted	Maximum Marks
I	Aerobiology and Seed Pathology	10	18
II	Defense Mechanism and Plant Disease Management	10	18
III	Plant Diseases-I	12	20
IV	Plant Diseases-II	13	20
	Total	**45**	**76**

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

BOTANY – CURRICULUM

B.Sc. General (Semester Pattern)

Skeleton Question Paper

B. Sc. THIRD YEAR

Semester – VI

THEORY PAPER-XV: 1. PLANT PATHOLOGY-II

(Optional-I)

Time: Three hours ***Maximum Marks: 40***

Note: - *(i) Attempt all questions*

(ii) All questions carry equal marks

(iii) Draw neat and well labeled diagrams wherever necessary

Q1. Long answer type question from Unit-I **08**

OR

a. Short answer type question from Unit-I

b. Short answer type question from Unit-I

Q2. Long answer type question from Unit-II **08**

OR

a. Short answer type question from Unit-II

b. Short answer type question from Unit-II

Q3. Long answer type question from Unit-III **08**

OR

a. Short answer type question from Unit-III

b. Short answer type question from Unit-III

Q4. Long answer type question from Unit-IV **08**

OR

a. Short answer type question from Unit-IV

b. Short answer type question from Unit-IV

Q5. Write short notes on any four of the following **08**

a. Short note type question from Unit-I

b. Short note type question from Unit-II

c. Short note type question from Unit-III

d. Short note type question from Unit-III

e. Short note type question from Unit-IV

f. Short note type question from Unit-IV

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

BOTANY – CURRICULUM

B.Sc. General (Semester Pattern)

B. Sc. THIRD YEAR

Semester – VI

THEORY PAPER-XV: 2. SYSTEMATIC BOTANY-II

(Optional-II)

Periods – 45 ***Maximum Marks – 40***

UNIT –I: STUDY OF DICOT FAMILIES (Gamopetalae and Apetalae) *(12 periods)*

Study of following families according to Bentham and Hooker's system of classification with reference to general characters, pollination, floral formulae, floral diagrams, systematic position, distinguishing features and economic importance

Gamopetalae and Apetalae: **Rubiaceae, Asclepiadaceae, Apocynaceae, Convolvulaceae, Verbenaceae, Nyctaginaceae**

UNIT –II: STUDY OF MONOCOT FAMILIES *(13 periods)*

Study of following families according to Bentham and Hooker's system of classification with reference to general characters, pollination, floral formulae, floral diagrams, systematic position, distinguishing features and economic importance

Orchidaceae Musaceae Zingiberaceae, Cannaceae, Marantaceae, Commelinaceae, Cyperaceae

UNIT –III: PALYNOLOGY *(10 periods)*

Morphoforms of pollen grains with reference to size, shape, polarity, symmetry, pollen wall and apertures of the pollen grains of Hibiscus, Datura, Ipomoea and Grasses. Economic importance of palynology

UNIT –IV: ORIGIN OF ANGIOSPERMS *(10 periods)*

Introduction, Benettitalean theory, Gnetalean theory, Pteridosperm theory, Concept of primitive flower of angiosperms

Theory paper-XV: 2. Systematic botany-II (Optional-II) - **Unit wise distribution of periods and marks:**

Unit	Title	Periods Allotted	Maximum Marks
I	Study of Dicot Families (Gamopetalae and Apetalae)	12	20
II	Study of Monocot Families	13	20
III	Palynology	10	18
IV	Origin of Angiosperms	10	18
	Total	**45**	**76**

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

BOTANY – CURRICULUM

B.Sc. General (Semester Pattern)

Skeleton Question Paper

B. Sc. THIRD YEAR

Semester – VI

THEORY PAPER-XV: 2. SYSTEMATIC BOTANY-II

(Optional-II)

Time: Three hours ***Maximum Marks: 40***

Note: - *(i) Attempt all questions*
(ii) All questions carry equal marks
(iii) Draw neat and well labeled diagrams wherever necessary

Q1. Long answer type question from Unit-I **08**

OR

a. Short answer type question from Unit-I
b. Short answer type question from Unit-I

Q2. Long answer type question from Unit-II **08**

OR

a. Short answer type question from Unit-II
b. Short answer type question from Unit-II

Q3. Long answer type question from Unit-III **08**

OR

a. Short answer type question from Unit-III
b. Short answer type question from Unit-III

Q4. Long answer type question from Unit-IV **08**

OR

a. Short answer type question from Unit-IV
b. Short answer type question from Unit-IV

Q5. Write short notes on any four of the following **08**

a. Short note type question from Unit-I
b. Short note type question from Unit-I
c. Short note type question from Unit-II
d. Short note type question from Unit-II
e. Short note type question from Unit-III
f. Short note type question from Unit-IV

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

BOTANY – CURRICULUM

B.Sc. General (Semester Pattern)

B. Sc. THIRD YEAR

Semester – VI

THEORY PAPER-XV: 3. APPLIED ECONOMIC BOTANY-II

(Optional-III)

Periods – 45 ***Maximum Marks – 40***

UNIT-I: STUDY OF SPICES AND FIBRE PLANTS *(10 periods)*

History, origin, cultivation practices, botanical description, nutritional value, uses and varieties of **Spices plants-** Dhaniya, Turmeric and Garlic, **Fibre plants-** Cotton, Sunhemp and Ambadi

UNIT-II: STUDY OF BEVERAGE AND OTHER ECONOMIC IMPORTANT PLANTS *(13 periods)*

History, origin, cultivation practices, botanical description, nutritional value, uses and varieties of **Beverage plants-** Tea, coffee and coca plants, **Timber plants-** Teak, Neem and Babhul, **Wood and cork plants-** Albizzia, Dalbergia and Saffron teak, **Gum and resin plants-** Butea, Khair (*Acacia catechu*) and Grout gum

UNIT-III: STUDY OF INDUSTRIALLY IMPORTANT PLANTS *(12 periods)*

History, origin, cultivation practices, botanical description, nutritional value, uses and varieties of **Sugar yielding plants-** sugarcane, **Pulp and paper yielding plants-** Bamboo, Banana, **Coir plants-** Coconut, **Tannin and dye yielding plants-** Terminalia, Indigofera, Morinda, **Industrial application of-** Grapes, Maize, Potato, Cotton and Rubber plants

UNIT-IV: STUDY OF BIOENERGY PLANTS *(10 periods)*

History, origin, cultivation practices, botanical description, nutritional value, uses and varieties of **Bio-fuel plants-** Acacia sp, Azadirachta sp and Lantana, **Petro plants-** Jatropha, Symaruba (Laxmi taru), Karanj and Euphorbia

Theory paper-XV: 3. Applied economic botany-II (Optional-III) - **Unit wise distribution of periods and marks:**

Unit	Title	Periods Allotted	Maximum Marks
I	Study of Spices and Fibre Plants	10	18
II	Study of Beverage and Other Economic Important Plants	13	20
III	Study of Industrially Important Plants	12	20
IV	Study of Bioenergy Plants	10	18
	Total	**45**	**76**

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

BOTANY – CURRICULUM

B.Sc. General (Semester Pattern)

Skeleton Question Paper

B. Sc. THIRD YEAR

Semester – VI

THEORY PAPER-XV: 3. APPLIED ECONOMIC BOTANY-II

(Optional-III)

Time: Three hours ***Maximum Marks: 40***

Note: - *(i) Attempt all questions*
(ii) All questions carry equal marks
(iii) Draw neat and well labeled diagrams wherever necessary

Q1. Long answer type question from Unit-I **80**

OR

a. Short answer type question from Unit-I
b. Short answer type question from Unit-I

Q2. Long answer type question from Unit-II **08**

OR

a. Short answer type question from Unit-II
b. Short answer type question from Unit-II

Q3. Long answer type question from Unit-III **08**

OR

a. Short answer type question from Unit-III
b. Short answer type question from Unit-III

Q4. Long answer type question from Unit-IV **08**

OR

a. Short answer type question from Unit-IV
b. Short answer type question from Unit-IV

Q5. Write short notes on any four of the following **08**

a. Short note type question from Unit-I
b. Short note type question from Unit-II
c. Short note type question from Unit-II
d. Short note type question from Unit-III
e. Short note type question from Unit-III
f. Short note type question from Unit-IV

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

BOTANY – CURRICULUM

B.Sc. General (Semester Pattern)

B. Sc. THIRD YEAR

Semester – VI

THEORY PAPER-XV: 4. HERBAL TECHNOLOGY-II

(Optional-IV)

Periods – 45 ***Maximum Marks – 40***

UNIT-I: HERBAL FORMULATION *(10 periods)*

Steps of herbal formulation- Grinding, extraction, filtration, concentration, **Dosage forms-** Infusion, decoction, tincture, capsule, medicated wines, syrups, tablets, ointment and creams, **Comparative study of-** Ayurvedic and modern dosage forms

UNIT-II: BIO-PIRACY OF MEDICINAL PLANTS *(10 periods)*

Preparation and therapeutic uses of Triphala churna, Kumari asav, Arjunarishtha (Aristha), Gooti, Vatti and Telam

UNIT-III: PHYTOCHEMICAL STUDY OF MEDICINAL PLANTS *(12 periods)*

Introduction, occurrence and chemistry of carbohydrates, glycosides, alkaloids and steroids

UNIT-IV: DRUG ANALYSIS *(13 periods)*

Colum chromatography- Introduction, principle, elution methods and applications, **Thin layer chromatography (TLC)-** Introduction, principle, sample preparation and applications, **High performance thin layer chromatography (HPTLC)-** Introduction, principle, sample preparation and applications and **Paper chromatography-** Introduction, principle, sample preparation and applications

Theory paper-XV: 4. Herbal technology-II (Optional-IV) - **Unit wise distribution of periods and marks:**

Unit	Title	Periods Allotted	Maximum Marks
I	Herbal Formulation	10	18
II	Bio-Piracy of Medicinal Plants	10	18
III	Phytochemical Study of Medicinal Plants	12	20
IV	Drug Analysis	13	20
	Total	**45**	**76**

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

BOTANY – CURRICULUM

B.Sc. General (Semester Pattern)

Skeleton Question Paper
B. Sc. THIRD YEAR
Semester – VI
THEORY PAPER-XV: 4. HERBAL TECHNOLOGY-II
(Optional-IV)

Time: Three hours ***Maximum Marks: 40***

Note: - *(i) Attempt all questions*
(ii) All questions carry equal marks
(iii) Draw neat and well labeled diagrams wherever necessary

Q1. Long answer type question from Unit-I **08**
OR
a. Short answer type question from Unit-I
b. Short answer type question from Unit-I

Q2. Long answer type question from Unit-II **08**
OR
a. Short answer type question from Unit-II
b. Short answer type question from Unit-II

Q3. Long answer type question from Unit-III **08**
OR
a. Short answer type question from Unit-III
b. Short answer type question from Unit-III

Q4. Long answer type question from Unit-IV **08**
OR
a. Short answer type question from Unit-IV
b. Short answer type question from Unit-IV

Q5. Write short notes on any four of the following **08**
a. Short note type question from Unit-I
b. Short note type question from Unit-II
c. Short note type question from Unit-III
d. Short note type question from Unit-III
e. Short note type question from Unit-IV
f. Short note type question from Unit-IV

B. Sc. THIRD YEAR

Annual Pattern

PRACTICAL PAPER-XVI: BASED ON THEORY PAPERS-XII & XIV

(Compulsory)

Practical–24 ***Maximum Marks – 50***

Practical Exercises:

1. To determine the water potential of potato tuber
2. To determine the osmotic potential of vacuolar sap by plasmolysis
3. To study the effect of temperature on permeability of plasma membrane (Beet root) by using colorimeter/spectrophotometer
4. To study the effect of concentration of different organic solvents on permeability of plasma membrane (Beet root) by using colorimeter/spectrophotometer
5. To study the effect of different organic solvents on permeability of plasma membrane (Beet root) by using colorimeter/spectrophotometer
6. Separation of photosynthetic pigments by paper chromatography
7. Determination of RF value and identification of amino acids in a mixture
8. Preparation of standard graph of starch using Colorimeter/ Spectrophotometer and determination of starch content of the given plant material
9. Preparation of standard graph of glucose using Colorimeter/ Spectrophotometer and determination of glucose content of the given plant material
10. Preparation of standard graph of protein using Colorimeter/ Spectrophotometer and determination of protein content from given plant material
11. To estimate the percentage of oil content in given oil seeds using Soxhlet extractor.
12. Study of catalase activity under different pH
13. Study of catalase activity under different temperature
14. Demonstration of osmosis by potato osmoscope
15. To study the mineral deficiency symptoms in at least four locally available plants
16. Demonstrations of the Arc indicator (lever auxanometer) experiment (Requirements, procedure and workings of the same are expected)
17. Demonstrations of Clinostat (Geotropism) experiment (Requirements, procedure and workings of the same are expected)
18. Demonstrations of Kuhn's fermentation tube experiment (Requirements, procedure and workings of the same are expected)
19. Study of tools used in GE/Tissue culture laboratory for sterilization and inoculation. Principle and working of Autoclave, oven, incubator, Laminar Air flow, Inoculating chamber, callus culture, plantlet, Anther culture and protoplast culture
20. Qualitative analysis of proteins (Biuret/ Xanthoproteic/ Millon tests)
21. Qualitative analysis of Carbohydrates (Molisch /Fehlings /Benedict's) Glucose, sucrose, starch, Cellulose and Pectin
22. Qualitative test of tannin, terpenoids, saponins, flavonoids and alkaloids
23. Micro chemical test for organic acids – Tartaric acid, Citric acid, Oxalic and Malic acid
24. Botanical Excursions (Two short excursions and one long excursion and visits to laboratories / companies/factory etc.)

Note: *Student must submit field notebook, excursion report and collection at the time of practical examinations.*

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

BOTANY – CURRICULUM

B.Sc. General (Semester Pattern)

Skeleton Question Paper
B. Sc. THIRD YEAR
Annual Pattern
PRACTICAL PAPER-XVI: BASED ON THEORY PAPER-XII & XIV
(Compulsory)

Time: Four hours ***Maximum Marks: 50***

Note: - *(i) Attempt all questions*
(ii) Show your preparation to the examiner
(iii) Draw neat and well labeled diagrams wherever necessary

Q1. Perform any one experiment (From practical exercise 1 to 5) **(10 marks)**

Q2. Perform any one experiment (From practical exercise 6 to 13) (**10 marks)**

Q3. Describe procedure and working of any one experiment (From practical exercise 14 to 17) **(06 marks)**

Q4. Perform any four microchemical tests (Protein-1, carbohydrates-1, Seccodary metabolites-1, Organic acids-1) **(08 marks)**

Q5. Spotting- Two spots (Instrument- 1, Callus/Anther/Protoplast culture-1) **(06 marks)**

Q6. i. Record book **(05 marks)**
ii. Viva-voce **(05 marks)**

B. Sc. THIRD YEAR
Annual Pattern
PRACTICAL PAPER-XVII: BASED ON THEORY PAPERS-XIII & XV: PLANT PATHOLOGY-I&II
(Optional-I)

Practical–24 ***Maximum Marks – 50***

Practical Exercises:

1. Study of laboratory equipments- Autoclave, Hot air oven, Inoculating chamber, laminar air flow, Air sampler, Incubator, Centrifuge **(1 practical)**
2. Preparation of culture media- PDA, NA **(1 practical)**
3. Micrometry- Calibration of microscope and measurement of fungal spore **(1 practical)**
4. Isolation of fungal pathogens from diseased plant parts **(1 practical)**
5. Isolation and identification of seed-borne pathogens by blotter / agar plate method **(1 practical)**
6. Study of air-borne pathogens by exposed petri plates / air sampler **(2 practical)**
7. Proving of pathogenicity **(1 practical)**
8. Effect of pH on growth of pathogens (**1 practical)**
9. Effect of Temperature on growth of pathogens (**1 practical)**
10. Effect of fungicide on spore germination by hanging drop technique **(2 practical)**
11. Study of symptoms and causal organisms of Stem rust of wheat **(1 practical)**
12. Study of symptoms and causal organisms of Late blight of potato and Downy mildew of grapes **(1 practical)**
13. Study of symptoms and causal organisms of Tikka disease of groundnut **(1 practical)**
14. Study of symptoms and causal organisms of Leaf spot of tomato and Leaf spot of turmeric **(1 practical)**
15. Study of symptoms and causal organisms of Rust of Jowar and Grain smut of jowar **(1 practical)**
16. Study of symptoms and causal organisms of Loose smut of Wheat **(1 practical)**
17. Study of symptoms and causal organisms of Green ear and ergot of bajra **(1 practical)**
18. Study of symptoms and causal organisms of Wilt of Tur and Whip smut of sugarcane **(1 practical)**
19. Study of symptoms and causal organisms of White rust of Mustard / locally available plants **(1 practical)**
20. Study of symptomology of the following diseases-Citrus canker, Root knot of tomato, Little leaf brinjal, Yellow vein mosaic of bhendi, Angular leaf spot of Cotton, papaya mosaic **(03 practicals)**
21. Botanical excursions-Several local and at least one long excursion **(4 practical)**

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

BOTANY – CURRICULUM

B.Sc. General (Semester Pattern)

Skeleton Question Paper
B. Sc. THIRD YEAR
Annual Pattern
Practical Paper-XVII: Based on theory papers-XIII & XV: Plant pathology-I&II
(Optional-I)

Time: Four hours ***Maximum Marks: 50***

Note: - *(i) Attempt all questions*
(ii) Show your preparation to the examiner
(iii) Draw neat and well labeled diagrams wherever necessary

Q1. Calibrate the microscope and measure the size of given spore-**A** 08

Q2. Identify and describe the symptoms and morphology of causal organism from the given specimen-**B** 08

Q3. Identify and describe the symptoms of diseased specimen-**C** & **D** 08

Q4. Identify, classify and describe any two spore types from exposed culture petriplates / aerobiological slide 08

Q5. Identify and describe the given spots-**E, F, G & H** (**E-**Equipment, **F-** Diseased plant material, **G-** Diseased plant material **H-** Plant protectant)
08

Q6. a) Record book 05
b) Submission 02
c) Viva-voce 03

B. Sc. THIRD YEAR
Annual Pattern
Practical Paper-XVII: Based on theory papers-XIII & XV: Systematic Botany-I&II
(Optional-II)

Practical–24 ***Maximum Marks – 50***

Practical Exercises:

1. Description, identification and classification with sketches, floral formulae and floral diagrams of locally available plants of the following families - Papaveraceae,Capparidaceae,Combretaceae,Myrtaceae,Rutaceae,Cucubitaceae,Rubiaceae,Asclepiadaceae,Apocynaceae,Convolvulaceae,Verbenaceae,Nyctaginaceae,Musaceae,Cannaceae,Commelinaceae (**15 practical)**
2. Preparation of dichotomous key by studying locally available plants of the same family (**1practical**)
3. Identification of at least six locally available plants up to species level with the help of flora (sketches, floral formulae and floral diagrams are not expected) (**2 practical**)
4. Study of pollen morphology by temporary preparation of pollen grains of Hibiscus, Datura, Ipomoea and Grasses by using acetolysis method (**2 practical**)
5. Botanical excursions (**4 practical**)

Note: *Student must attend at least one long and two short botanical excursions. They must submit field notebook, excursion report and collection at the time of practical examinations*

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

BOTANY – CURRICULUM

B.Sc. General (Semester Pattern)

Skeleton Question Paper
B. Sc. THIRD YEAR
Annual Pattern
Practical Paper-XVII: Based on theory papers-XIII & XV: Systematic Botany-I&II
(Optional-II)

Time: Four hours ***Maximum Marks: 50***

Note: - *(i) Attempt all questions*
(ii) Show your preparation to the examiner
(iii) Draw neat and well labeled diagrams wherever necessary

Q1. Describe, identify and classify the given specimen-**A & B** to its respective families with floral formulae and floral diagrams 16

Q2. Identify the given specimen-**C** up to species level using key and flora 08

Q3. Make a temporary preparation of pollen grain of the given specimen-**D** identify and describe 08

Q4. Identify and describe the spots-**E, F, G** and **H** as per the given instructions
(2 spots on morphology; 2 spots on economic importance) 08

Q5. a) Record book 05
b) Submission 02
c) Viva-voce 03

B. Sc. THIRD YEAR
Annual Pattern
Practical Paper-XVII: Based on theory papers-XIII & XV: Applied Economic Botany Botany-I&II
(Optional-III)

Practical–24 ***Maximum Marks – 50***

Practical Exercises:

1. Study of morphology, structure, simple microchemical test of the food storage tissue of Wheat, Jowar, Rice, Maize and Potato **(3 practical)**
2. Microscopic examination of starch in Wheat, Jowar, Rice, Maize and Potato **(2 practical)**
3. Study of cotton flower to trace the origin and development of cellulose**(1 practical)**
4. Study of Jute stem (T.S. and Staining) to show the location and development of fibres and microscopic structure test for lignocellulose **(1 practical)**
5. Study of Vegetble oils (Hand section of groundnut, safflower, soyaben, coconut and staining of oil droplets by sudan-III and sudan black) **(2 practical)**
6. Study of spices and condiments (Identification and description of Dhaniya, Turmeric and Garlic) **(1 practical)**
7. Preparation of an illustrated inventory of **ten** medicinal plants (Botanical and common name, family, uses in indigenous system of medicine and allopathy, diseases/disorders for which they are prescribed) **(4 practical)**
8. Study of boiled coffee and tea leaves for the characterization of structural features**(1 practical)**
9. Study of uses of coconut**(1 practical)**
10. Study of sources of firewood (ten plants), timber yielding plants (ten trees) and bamboos a to be prepared mentioning special features **(4 practical)**
11. Identification and botanical source plant part used and uses of Cotton, coir, sugar, banana and rubber**(2 practical)**
12. Identification , description , botanical source of processed product of garlic, turmeric coriander**(2 practical)**
13. Field visits (Several local and at least a long excursion) **(4 practical)**

B. Sc. THIRD YEAR
Annual Pattern
Practical Paper-XVII: Based on theory papers-XIII & XV: Herbal Technology-I&II
(Optional-IV)

Practical–24 ***Maximum Marks – 50***

Practical Exercises:

1. Macroscopic and microscopic evaluation of medicinal leaf drugs of Vasaka, Eucalyptus, Datura, Senna and Vinka**(3 practical)**
2. Macroscopic and microscopic evaluation of medicinal drugs of Boerhavia root, Shatavari root, Vinka root, Liquorice and Ginger rhizome**(4 practical)**
3. Study of leaf constants (Stomatal number, stomatal index and palisade ratio) **(2 practical)**
4. Preparation of herbal formulation (Tincture, tablets, ointments, creams, capsules and syrups) **(4 practical)**
5. Preliminary photochemical screening of Carbohydrates, Alkaloids, Glycosides, Steroids, Tannins and Phenolic compounds**(4 practical)**
6. Separation of Carbohydrates and Glycosides from crude drug by using chromatography / TLC techniques**(4 practical)**
7. Study of medicinal properties of crude drugs obtained from Vasaka, Senna, Boerhavia, Vinka, Liquorice, Ginger, Shatavari, Datura and Eucalyptus**(3 practical)**
8. Excursion (Several local and at least one long excursion are compulsory) **(4 practical)**

Selected Readings for Semester-V & VI:

- A text book of systematic botany – R.N.Sutaria
- A textbook of plant physiology and Biochemistry – Verma S.K.
- Aerobiology – S.T.Tilak
- Anb introduction to taxonomy of angiosperms – N.C.Kumar
- Angiosperms – G.L.Chopra
- College botany – Das, Datta & Ganguly
- College Botany- Sunder Rajan S
- College botany Vol-III – B.P.Pandey
- Diseases of crop plants in India – G.Rangaswami
- Diseases of crop plants in India – G.Rangaswami & Mahadevan
- Economic Botany – Hill A.F.
- Economic botany – S.N.Pandey & A. Chanda
- Economic botany – Sharma & Avasthi
- Elements of plant physiology – Sarabhai B.P.
- Essentiales of plant pathology – V.N.Pathak
- Experiments in plant physiology – Bajraracharya D.
- Experments in microbiology, plant pathology, tissue culture & mushroom cultivation – K.R.Aneja
- Flora of Kolhapur – S.R.Yadav & Sardesai
- Flora of Maharashtra – Almeda
- Flora of Marathwada – Chief Ed. By Dr. V.N. Naik
- Flora of Osmanabad – V. N. Naik.
- Flora of Tirupati – Madhed Chetty
- Flowering plants – Origin and dispersal – A.L. Takhtajan
- Fungi and plant diseases – B.B.Mundkur
- Fungicides in plant diseases control – Y.L.Nene
- Illustrated genera of fungi imperfectii – Barnett
- Illustrated kingdom of fungi – D.S.Mukadam
- Introduction to Principles of Plant Pathology – R.S.Singh
- Plant Dieases – R.S.Singh
- Plant Pathaology – B.P.Pandey
- Plant Pathaology – G.N.Agrios
- Plant Pathaology – R.S.Mehrotra
- Plant physiology – Dubey B.P.
- Plant physiology – Shrivastava H.S.
- Plant physiology, a laboratory guide – Wadje S.S. & MMV Baig
- Plant protection – Chattopadhay
- Pollen morphology of angiosperms – N.P.K.Nair
- Seed pathology – D. Suryanarayana
- Seed pathology – D.K.Jha
- Seed pathology- Paul Neergaard
- Takhtajan A.L. (1997) Diversity and classification of flowering plant – Colubia University, press New York.
- Taxonomy of angiosperms – B.P.Pandey
- Taxonomy of angiosperms – P.C.Vasistha
- Taxonomy of angiosperms – Singh V. & D.K.Jain
- Taxonomy of angiosperms – V.N.Naik
- Taxonomy of angiosperms – Vasudevan Nair
- Taxonomy of Vascular plants – Lawrence G.H.M.
- Text book of Modern plant pathology – K.S.Bilgrami & H.C.Dube

- The evolution and classification of flowering plants – Cronquist A.
- Woodland, D.W. (1991) – Contemporary plant systematics : Pentice Hall, New Jersey
- Pharmacognosy – Kokate et al.
- Herbal drug technology – Agrawal S.S. and M.Purohit
- Encyclopedia of medicinal plants used in homoeopathy Vol-1&2 – K.S.Gopi
- Indian medicinal plants: Forgotten healers, a guide to ayurvedic herbal medicine – Prakash Paranjape
- Practical pharmacognosy – Khandelwar K.R.
- Biochemical analysis – S. Sadasivam and A. ManiCkam
- Pharm forestry: Field guide to medicinal plants – Dinesh kumar Tyagi
- Modern methods of plant analysis Vol-1&2 – Peach and M.V.trecey

- Davis P. H. and Heywood V.H. (1993) – Principles of Angiosperms Taxonomy, Tobert E. Kreigher Pub. Co. New York
- Grant. V. (1971) – Plant Speciation – Columbia University Press New York.
- Harrison, H.J. (1971) – New concepts in flowering plant Taxonomy – Hieman Educational Books Ltd. London
- Heslop – Harrison J. (1967) – Plant Taxonomy- English Language Book Soc. and Edward Arnold Pub. Ltd. UK.
- Hey wood. V.H. and Moore D.M. (1984) – Current concepts in plant Taxonomy, - Academic press, London.
- Jones A.D. and Wilbins, A.D. (1971) – Variation and adaptations in plant, species. Hieman & Co-Educational Books Ltd. London.
- Jones S.B. Jr. and Luchsinger, A.E. (1986) – Plant systmatics (2nd edition), Mc Graw Hill Book Co., New York.
- Nordenstam, B.EL Gazaly, G. and Kassas, M. Zooo – Plant systematic for 21st Century. Portland press Ltd. London.

- Biochemistry by Mathews C.F. (2003) - Addison Wesley, New Delhi
- Gill P.S. (2000) - Plant Physiology, S.Chand & Co. New Delhi
- JainV.K. ():Fundamental of Plant Physiology, S.Chand &Co., New Delhi
- Jayaraman J. (1992) - Laboratory Manual in Biochemistry, Wiley Eastern Ltd., New Delhi
- Plant Taxonomy and Bio Systematics (2nd, edition) – Edward Arnold Ltd. London
- Radford, A.E. (1986) – Fundamentals of plant systematics – Harper & Row Publications, USA.
- Rastogi (2000) - Biochemistry Tata McGraw Hill, New York
- Salisbury P.B. & W. Ross (1992) - Plant Physiology , New York Pub. Co. California USA
- Shrivastava H.S. (1993) - Elements of Biochemistry Rastogi Publication, Meerut
- Shrivastava H.S.(2000) - Plant Physiology, Rastogi Publication, Meerut
- Stebbins G.L. (1974) – Flowering plant Evolution Above species level – Edward Arnold Ltd., London.
- Subhash Chandra Dutta (1992) - Plant Physiology, Wiley Eastern, New Delhi
- Verma V. (1995) - Text book of Plant Physiology, Emkay Publication N.Delhi

• A manual of laboratory experiments in cell biology	C Edward Gasque	Universal book Stall, New Delhi.
• An Introduction to Microbiology	P. Tauro, K.K. Kapoor, K S Yadav	Wiley Eastrevn Limited, New Delhi.
• Applied Microbiology	Vinita Kale, Kishore Bhusari	Himalaya publishing Hourse, Mumbai.
• Biochemical methods 2nd ed.	S. Sadasivam, A. Manickam.	New Age International Publisher (P) Ltd, New Delhi.

• Biotechniques Theory and Practice	S Y S Rana	Rastogi Publications, Meerat 250002
• Experiments in Microbiology, Plant Pathology and Tissue Culture	K.R. Aneja,	Wishwa Prakashan, New Delhi.
• Frontiers in Applied Microbiology	K.G. Mukerji, N C Pathak, Vedpal Sing	Print Hall, Lucknow
• Industrial Microbiology	Richard W Thomas	Dowden, Hutchinson & Ross Inc. Stroudtiury Penasytuna.
• Instrumental Methods of Chemical Analysis 5th Ed.	Galen W Ewing.	Mc Graw Hill International
• Microbial Genetics	Stanley R Maloy, John E. Cronan David Freitelder	Narosa Publishing House, New Delhi.
• Modern experimental biochemistry 3rd ed.	Rodney Boyer	Pearson education Inc.
• Plant tissue culture	Kalyan Kumar DC	New Central Book Agency (P) Ltd. Calcutta 700009.
• Practical Microscopy	Martin and Johnsen	Blackie and Sen Limited, London
• Research Experiences in plant physiology.-A Laboratary Mannual	Thomas C. Moore	Spinger-Verlag,Berlin.

• Biophysical Chemistry.	M. Sataske, Y. Hayashi, M.S. Sethi, S A Iqbal,	Discovery Publishing House (1997) New Delhi – 110002.
• Instrumental Methods of Chemical Analysis 5th Ed.	Galen W Ewing.	Mc Graw Hill International
• Practical Microbiology.	R. C. Dubey, D K Maheshwari	S Chand and company Ltd. New Delhi
• A manual of laboratory experiments in cell biology	C Edward Gasque	Universal book Stall, New Delhi.
• An Introduction to Microbiology	P. Tauro, K.K. Kapoor, K S Yadav	Wiley Eastrevn Limited, New Delhi.
• Applied Microbiology	Vinita Kale, Kishore Bhusari	Himalaya publishing Hourse, Mumbai.
• Biochemical methods 2nd ed.	S. Sadasivam, A. Manickam.	New Age International Publisher (P) Ltd, New Delhi.
• Biotechniques Theory and Practice	S Y S Rana	Rastogi Publications, Meerat 250002
• Experiments in Microbiology, Plant Pathology and Tissue Culture	K.R. Aneja,	Wishwa Prakashan, New Delhi.
• Frontiers in Applied Microbiology	K.G. Mukerji, N C Pathak, Vedpal Sing	Print Hall, Lucknow
• Industrial Microbiology	Richard W Thomas	Dowden, Hutchinson & Ross Inc. Stroudtiury Penasytuna.
• Microbial Genetics	Stanley R Maloy, John E. Cronan David Freitelder	Narosa Publishing House, New Delhi.

Modern experimental biochemistry 3rd ed.	Rodney Boyer	Pearson education Inc.
Plant tissue culture	Kalyan Kumar DC	New Central Book Agency (P) Ltd. Calcutta 700009.
Practical Microscopy	Martin and Johnsen	Blackie and Sen Limited, London
Research Experiences in plant physiology.-A Laboratary Mannual	Thomas C. Moore	Spinger-Verlag,Berlin.