Hindi Vidya Prachar Samiti's

Ramniranjan Jhunjhunwala College

of Arts, Science & Commerce

(Autonomous College)

Affiliated to

UNIVERSITY OF MUMBAI

Syllabus for the S.Y.B.Sc.

Semester III & IV

Program: B.Sc. BOTANY

Program Code: RJSUBOT

(CBCS 2020-21)

S.Y.B.Sc Botany Syllabus Semester III & IV

DISTRIBUTION OF TOPICS AND CREDITS

S.Y.B.Sc. BOTANY SEMESTER III

Course	Nomenclature	Credits	Topics
RJSUBOT301	Plant Diversity II	02	1. Algae 2. Bryophyta 3. Pteridophyta and Palaeobotany
RJSUBOT302	Forms & Functions II	02	4. Cytology 5. Physiology 6. Genetics
RJSUBOT303	Current Trends in Plant Sciences– I	02	7. Instrumentation 8. Economic Botany 9. Molecular Biology
RJSUBOTP301, RJSUBOTP302 & RJSUBOTP303	Practical I, II & III	03	

S.Y.B.Sc. BOTANY SEMESTER IV

Course	Nomenclature	Credits	Topics
RJSUBOT401	Plant Diversity II	02	1.Fungi 2. Gymnosperms 3. Angiosperms
RJSUBOT402	Forms & Functions II	02	4.Anatomy 5.Ecology 6. Pharmacognosy
RJSUBOT403	Current Trends in Plant Sciences – I	02	7. Biotechnology I 8. Horticulture 9. Biostatistics I & Bioinformatics I
RJSUBOTP401, RJSUBOTP402 & RJSUBOTP403	Practical I, II & III	03	

SEMESTER III (THEORY)		L	Cr
Paper-I: Plant Diversity- II	**Paper Code: RJSUBOT301**	45	2
UNIT I		15	
THALLOPHYTA- ALGAE			
1	Outline classification of Phaeophyta up to order as per G.M. Smith.		
2	General characters of Phaeophyta based upon Thallus, Reproduction. Economic importance of Phaeophyta.		
3	*Sargassum*- Systematic position, Life cycle and Alternation of generations.		
4	General characters of Bacillariophyta based upon thallus structure, cell structure, reproduction.		
5	*Pinnularia*- Systematic position, Life cycle and Alternation of generations.		
UNIT II		15	
BRYOPHYTA			
1	Outline classification of Anthocerotae up to order as per G.M. Smith.		
2	General characters of Anthocerotae based upon Thallus, Reproduction.		
3	*Anthoceros*- Systematic position, Life cycle and Alternation of generations.		
4	*Funaria*- Systematic position, Life cycle and Alternation of generations.		
UNIT III		15	
PTERIDOPHYTA AND PALEOBOTANY			
1	Outline classification of Psilophyta and Lepidophyta up to order as per G M Smith.		
2	General characters of Psilophyta and Lepidophyta. Based upon Plant structure and Reproduction.		
3	*Selaginella*- Systematic position, Life cycle and Alternation of Generations.		
4	Stelar evolution.		
5.	Geological time scale.		
6.	Formation and types of Fossils.		
7.	*Rhynia*- Systematic position and structure.		

S.Y.BSc	Semester III Theory
RJSUBOT301 Paper I Plant Diversity II	Course Outcome 3.1 : 1. Algae: Phaeophyta general structure and *Sargassum* a type genus to study the various stages of the life cycle. 2. Bacillariophyta and its features with *Pinnularia* as a representative. Diatoms and their role in aquatic ecosystem 3. Fungi: Students to learn the classification of Ascomycetes important fungi like yeast, *Penicillium*. Life cycle study of *Aspergillus* and *Xylaria.* Symbiotic relationships lichen and their ecological significance 4. Bryophyta: Anthocerotae and Musci with *Anthoceros* and *Funaria* as type genera. Learning outcome: ➢ Detailed study of diversity in algae, fungi, bryophyte and its future applications in industry and environment

SEMESTER III (THEORY)		L	Cr
Paper-II: Forms and Functions-II	**Paper Code: RJSUBOT302**	45	2
UNIT I		15	
CYTOLOGY			
1	Ultra-structure and functions of the following cell organelle: Chloroplast, microbodies, glyoxysomes, peroxisomes.		
2	Cell Cycle		
3.	Cell division and its significance, Mitosis, Meiosis.		
UNIT II		15	
PHYSIOLOGY			
1	Photosynthesis: Light reaction Photosystem I and II , Dark reaction, C_3 ,C_4 and CAM pathways		
2	Photorespiration- Mechanisms and it's significance.		
3	Photoperiodism: Phytochrome Response and Vernalization with reference to flowering in higher plants; Physio-chemical properties of phytochrome; Pr-Pfr interconversion; role of phytochrome in flowering of SDPs andLDPs. .		
UNIT III		15	
GENETICS			
1	Variation in Chromosome structure (Chromosomal Aberrations) Definition, Origin, Cytological and Genetic Effects of the following: Deletions, Duplications, Inversions and Translocations.		
2	Variation in Chromosome Number - Origin and production, morphological and cytological features, applications in crop improvement and evolution of Aneuploids and Euploids (Monoploids, Autopolyploids and Allopolyploids).		
3	Sex linkage and Sex determination		
4	Introduction to the concept of Extra chromosomal inheritance		

S.Y.BSc	Semester III Theory
RJSUBOT302 Paper II Form and Function II	Course Outcomes 3.2: 1. Cell Biology Ultrastructure of cell organelles like Chloroplast with the photosynthetic apparatus, microbodies. Cell Division to learn how cells divide by equational division and reduction division. 2. Detailed study of Photosynthesis- C3, C4 and CAM pathways 3. Photorespiration and Photoperiodism study in plants. 4. Chromosomal aberrations, and variations in chromosome number, Polyploidy, sex determination in plants and animals and extra nuclear inheritance. Learning outcome: ➢ Basic concept of cell biology and cell division. ➢ Understanding the mechanism of Photosynthesis, Photoperiodism. ➢ Knowing the effect of Chromosomal Aberrations, Variation in Chromosome Number, Sex linkage and Sex determination and Extranuclear inheritance. Application in genetic counselling

SEMESTER III (THEORY)		L	Cr
Paper-III: Current Tends in Plant Sciences – I	**Paper Code: RJSUBOT303**	45	2
UNIT I		15	
INSTRUMENTATION			
1	Microscopy – light, Phase contrast- Instrumentation, Principles and working.		
2	Colorimetry and Spectrophotometry (Visible)- Instrumentation, Principles, Working and Applications.		
3	Chromatography – Paper and TLC- Instrumentation, Principles, Working and Applications.		
UNIT II		15	
ECONOMIC BOTANY			
1	Fibers: Types of fibers, fiber yielding plants. Paper: Types of paper, paper yielding plants, paper processing.		
2	Spices and condiments: Botanical source and Uses- Nutmeg, Mace, Clove, Cardamom and Saffron.		
UNIT III		15	
MOLECULAR BIOLOGY			
1	Types, structure and functions of DNA and RNA.		
2	Structure of Chromosome.(Eukaryotic and Prokaryotic)		
3	DNA replication in prokaryotes and eukaryotes.		

S.Y.BSc	Semester III Theory
RJSUBOT303 Paper III Current trends in Plant Science I	Course Outcomes 3.3 : 1. Analytical techniques learning (microscopy, colorimeter and chromatography. 2. Introduction of Pharmacopoeia, Indian, herbal and Ayurvedic Pharmacopoeia. Study of monographs from Pharmacopoeia *Saraca asoka, Centella asiatica*.. Secondary metabolites and adulterants in common medicinal plants. 3. Learners would learn about the importance of forest, agro forestry, urban forestry and organic farming, Silviculture. Various government and non government schemes with the help of case studies- jute, cotton. 4. Economic importance of plants with the help of examples of plants yield 5. Basic molecular biology concept learning of DNA, RNA, chromosome and DNA replication. Learning outcome: ➢ Learning of principles and working of microscopy, colorimetric, Spectrophotometry and Chromatography. Research orientation ➢ Identification and understanding the economic importance of forest products and Spices and condiments. Develop Entrepreneurial skills among the learners ➢ Basic molecular biology concept learning. Research orientation

SEMESTER IV (THEORY)		L	Cr
Paper-I: Plant Diversity - III	**Paper Code: RJSUBOT401**	45	2
UNIT I		15	
FUNGI			
1	Outline classification of Ascomycetes up to order as per G.M. Smith.		
2.	General characters of Ascomycetes based upon Thallus, Reproduction Economic importance of Ascomycetes.		
3	*Aspergillus*- Systematic position, Life cycle and Alternation of generations.		
4	*Xylaria*- Systematic position, Life cycle and Alternation of generations.		
5	Lichens – classification, general characters, methods of reproduction economic importance, ecological significance.		
UNIT II		15	
GYMNOSPERMS			
1	Outline classification of Coniferophyta as per Chamberlain.		
2	*Pinus*- Systematic position, Life cycle and Alternation of Generations.		
3	*Cordaites*- Systematic position and structure.		
4	Global distribution of Conifers		
UNIT III		15	
ANGIOSPERMS			
1	Morphology of Inflorescence- All types.		
2	Morphology of Flower- Terminologies associated with description of flowers, Calyx and its modifications, Corolla and its modifications, Perianth, Androecium- structure, Adhesion and Cohesion types, staminodes, Gynoecium- carpels, Gynostegium, Placentation types.		
3	Study of National Parks in the city of Mumbai. Biodiversity of Mahim Nature Park, Sanjay Gandhi National Park.		
3	Taxonomy – study of plant families- a) Magnoliaceae b) Asteraceae c) Myrtaceae d) Apocynaceae		

	e) Amaranthaceae f) Palmae		

S.Y.BSc	Theory Semester IV
RJSUBOT401 Paper-I Plant Diversity – III	Course Outcomes 4.1 : 1. Detailed study of classification of Psilophyta and Lepidophyta 2. Study of *Selaginella*- Systematic position, Life cycle and Alternation of Generations. 3. Palaeobotany study with Stelar evolution, Geological time scale and Formation and types of Fossils. 4. Study of*Rhynia*- Systematic position and structure. 5. Study of Coniferophyta and *Cordaites* 6. Detailed study of *Pinus* and Distribution of Conifers in India. 7. Study of flower morphology and all types of inflorescence 8. Angiosperm learning using Magnoliaceae, Asteraceae, Myrtaceae, Apocynaceae, Amaranthaceae and Palmae. Learning outcomes: ➢ Learning the diversity in Pteridophyta. ➢ Understanding the past environment with the study of palaeobotany, fossils and geological time scale. ➢ Learning the diversity in gymnosperms and distribution of Conifers in India. Climate change and its effect. ➢ Detailed study of morphology of flowers and some angiosperm families. Plant identification skills

SEMESTER IV (THEORY)		L	Cr
Paper-II: Forms and Functions-III	**Paper Code: RJSUBOT402**	45	2
UNIT I		15	
ANATOMY			
1	Secondary growth in Dicot stem and root, Monocot stem Dracaena		
2	Mechanical tissue system- Distribution, I- girders, Inextensibility, Incompressibility, Inflexibility, Shearing stress.		
3	Types of Vascular bundles.		
4	Growth rings, Periderm and Tyloses		
UNIT II		15	
ECOLOGY			
1	Ecological factors: Concept of environmental factors. Soil as an edaphic factor, Soil composition, types of soil, soil formation, soil profile.		
2	Community ecology- Qualitative characters- Phenology, Growth forms- Raunkiaer's Classification, Biological spectrum, Stratification. Quantitative characters- Density, Frequency.		
3	Soil Pollutants- Pesticides and synthetic fertilizers.		
UNIT III		15	
Pharmacognosy			
1	Introduction to Pharmacopoeia.		
2	Study of secondary metabolites (sources, classification, properties and uses) with reference to Alkaloids, Glycosides, Tannins, Volatile oils and Gums and resins (example of one plant for each category).		

S.Y.BSc	Theory Semester IV
RJSUBOT402 Paper *II* Forms and Functions-III	Course Outcomes 4.2 : 1. Understanding the secondary growth structure and types of vascular bundles of dicot and monocot stem and root. 2. Soil profile and composition analysis 3. Understanding Qualitative characters of Community ecology 4. Study of secondary metabolites (sources, properties and uses) with reference to Alkaloids, Glycosides, Tannins, Volatile oils and Gums and resins. Learning outcomes: ➢ Knowing the reason of secondary growth, mechanical tissue system and vascular bundles functions in plant ➢ Study of Ecological factors, community ecology and assessment of Soil Pollutants ➢ Detailed study of secondary metabolites and its application for drug making. Industrial applications of fine chemicals

SEMESTER IV (THEORY)		L	Cr
Paper-III: Current Trends in Plant Sciences - I	**Paper Code: RJSUBOT403**	45	2
UNIT I		15	
BIOTECHNOLOGY			
1	Introduction to plant tissue culture- Totipotency, organogenesis, organ culture, root culture, meristem culture, pollen and embryo culture.		
2	R-DNA technology – Gene cloning, enzymes in gene cloning and vectors in gene cloning.		
UNIT II		15	
HORTICULTURE			
1	Introduction to Horticulture: Branches of Horticulture.		
2	Gardening: Locations in the garden- Paths and Pathways, Avenue, Edges, Hedges, Lawn, Flower beds, Arches and Pergolas, Topiary, Water Garden (with names of two plants for each category). Focal point.		
3	Formal and Informal gardens, Landscape designing		
UNIT III		15	
BIOSTATISTICS AND BIOINFORMATICS- I			
1	Biostatistics -Testing of hypothesis - Chi square; Coefficient of correlation. Theory and Problems based on these.		
2	Bioinformatics – a) Introduction and aims – Information technology, history, Internet & its uses. b) Data organization and Retrieval- Biological databases, Software tools related to Biology (Biotechnology), Nucleic Acid Database, Protein Database, ENTREZ. c) BLAST d) Institutes- NCBI, EBI, Bioinformatics programme and Institutes in India.		

S.Y.BSc.	Theory Semester IV
RJSUBOT403 Paper III Current Trends in Plant Sciences - I	Course Outcomes 4.3 : 1. Introduction and learning of plant tissue culture. 2. Study of R-DNA technology. 3. Introduction to Horticulture and gardening study. 4. Biostatistics -Testing of hypothesis - Chi square; Coefficient of correlation. Theory and Problems based on these. 5. Study of Bioinformatics. Learning outcome: ➢ Application of plant tissue culture and R-DNA technology. ➢ Designing of gardens and application of horticulture. (Entrepreneurship) ➢ Understanding the application of biostatistics with the given data.(Data Analysis) ➢ Virtual data/ literature study and use of bioinformatics. (Computational biology)

Semester III (PRACTICALS)		L	Cr
Practical-I: Plant Diversity- II	**Paper Code: RJSUBOTP301**		1
1	**Algae-**Study of stages in the life cycle of *Sargassum* from fresh/ preserved material and permanent slides.		
2	Study of stages in the life cycle of *Pinnularia* from fresh/ preserved material and permanent slides.		
3	Economic importance of Phaeophyta & Bacillariophyta.		
4	Range of thallus in Phaeophyta.		
5	**Bryophyta**- Study of stages in the life cycle of *Anthoceros* from fresh/ preserved material and permanent slides.		
6	Study of stages in the life cycle of *Funaria* from fresh/ preserved material and permanent slides.		
7	**Pteridophyta**-Study of stages in the life cycle of *Selaginella* from fresh/ preserved material and permanent slides.		
8	Study of form genera *Rhynia* with the help of permanent slides/ photomicrographs.		
9	Study of different types of stele		
Practical-II: Forms and Functions - II	**Paper Code: RJSUBOTP302**		1
1	Study of the ultra-structure of cell organelles prescribed for theory from Photomicrographs (Mitochondrion, Glyoxysome, Peroxisome).		
2	Isolation and localization of mitochondria using density gradient centrifugation		
3	Identification of CAM plants by testing pH of sap in the morning, introduction to TAN.		
4	Estimation of sugars colorimetrically and preparation of standard graph.		
5	Study of inheritance pattern with reference to Plastid Inheritance		
6	Aberrations --- Karyotypes - Cri – du- chat, Philadelphia, D-G translocation, Down's Syndrome.		

Practical-III: Current Trends in Plant Sciences – I		**Paper Code: RJSUBOTP303**	50	1
1	Separation of amino acids using circular paper chromatography.			
2	Separation of carotenoids using TLC.			
3	Determination of λ max for the given-colored solution. Experiments based on Beer Lambert's Law from the given-colored solution.			
4	Sources, properties and uses of: a) Fibers b) Paper.			
5	Extraction of fiber from the given plant material and to check the tensile strength of fiber.			
5	Sources, properties and uses of: (as per theory) a) Spices b) Condiments.			
6	Determining the sequence of amino acids in the protein molecule synthesized from the given m-RNA strand (prokaryotic and eukaryotic).			
7	Estimation of DNA by DPA method.			

S.Y.BSc	Semester III Practical
RJSUBOTP301 Practical Plant Diversity II	Course Outcomes They aim at enhancing the skills of the students learning by doing 1. Experiential learning to mount the specimens of Sargassum, *Pinnularia, Aspergillus., Xylaria*., *Anthoceros* and *Funaria* and learn about the details of the life cycles. 2. Identification of fungal pathogens and disease caused by them. Learning outcomes: ➢ Learning the diversity in algae, fungi, bryophyte and its future application ➢ Understanding the effect of pathogens on plants

S.Y.BSc	Semester III Practical
RJSUBOTP302 Practical II Forms and Functions - II	Course Outcomes: 1. Study of the ultra-structure of cell organelles 2. Preparation of standard graph using sugars. 3. Study of inheritance pattern and Aberrations using Karyotypes Learning outcomes: ➢ Understanding the ultra-structure of cell organelles ➢ Able to identify morphology of chromosomes ➢ Understanding the mechanism of respiration by determination of Q_{10}andanaerobic respiration using Kuhn's tube. ➢ Construction of standard graphs, calibration curves data interpretations ➢ Knowing the effect of Chromosomal Aberrations with the study of karyotypes (Cri-du chat, Philadelphia, D-G translocation, Down's syndrome). Genetic counselling

S.Y.BSc	Semester III Practical
RJSUBOTP303 Practical III Current Trends in Plant Sciences – I	Course Outcomes: Skill enhancement 1. Learning Circular paper chromatography and thin layer chromatography techniques. 2. Determination of λ max 3. Analysing the interpretation of DNA sequencing- Sanger's method and sequencing of amino acids in the protein molecule synthesised from the given m-RNA strand. 4. Quantifying the DNA by DPA method. Learning outcomes: ➢ Separating amino acid and carotenoids with Chromatography. ➢ Determination of λ max for any given-coloured solution, role of monochromators, absorbance, transmittance. ➢ Identification and knowing the economic importance of forest products andSpices and condiments ➢ Basic molecular biology concept learning of DNA sequencing and m-RNA strand.

Semester IV (PRACTICALS)		L	Cr
Practical-I: Plant Diversity- II	**Paper Code: RJSUBOTP401**		1
1	**Fungi-** Study of life cycle of *Aspergillus.*		
2.	Study of life cycle of *Xylaria*.		
3.	Study of Lichens.		
4.	Plant Pathology- Powdery Mildew.		
5.	Plant Pathology-Late Blight of Potato.		
6.	**Gymnosperm-**Study of stages in the life cycle of *Pinus* from fresh/ preserved material and permanent slides		
7.	Study of the form genus *Cordaites* with the help of permanent slide/ photomicrographs.		
8	**Angiosperms**- Study of inflorescence.		
9	Study of flower morphology and functional modifications of floral whorls.		
10.	Study of the following angiosperm families: a) Magnolianceae b) Asteraceae c) Myrtaceae d) Apocyanaceae e) Amaranthaceae f) Palmae		
Practical-II: Forms and Functions - II	**Paper Code: RJSUBOTP402**		1
1	Study of normal secondary growth in the stem and root of a Dicotyledonous plant.		
2	Study of secondary growth in monocot stem (*Dracena*).		
3	Types of mechanical tissues, mechanical tissue system in aerial, underground organs.		
4	Study of conducting tissues- Xylem and Phloem elements in Gymnosperms and Angiosperms as seen in LS and through maceration technique.		
5	Study of different types of vascular bundles.		
6	Mechanical analysis of soil by the sieve method & pH of soil.		
7	Study of water holding capacity of different soil samples.		

8	Quantitative estimation of organic matter of the soil by Walkley and Black's Rapid titration method.		
9	Study of vegetation by the list quadrat method.		
10	Tests for alkaloids from *Strychnos*(seeds)and *Holarrhena*(bark)		
11	Tests for glycosides from *Glycyrrhiza* rhizome/ *Aloe* leaf.		
12	Tests for tannins.		
13	Stomatal index.		
14	Measurement of length of fibre		
Practical-III: Current Trends – I	**Paper Code: RJSUBOTP403**		1
1	Various sterilization techniques in Plant Tissue Culture.		
2	Technique of seed sterilization, callus induction and plant regeneration from callus.		
3	Encapsulation of axillary buds /formation of synthetic seeds.		
4	Identification of the cloning vectors – pBR322, pUC 18, Ti plasmid.		
5	Bottle and dish garden preparation.		
6	Preparation of Terrarium		
7	Study of five examples of plants for each of the garden locations as prescribed for Theory.		
8	Preparation of garden plans – formal and informal gardens.		
9	Chi square test.		
10	Calculation of coefficient of correlation.		
11	Web Search – Google- NCBI, EBI		
12	ENTREZ, BLAST.		

S.Y.BSc	Semester IV Practical
RJSUBOTP401 Practical I Plant Diversity II	Course Outcomes: Skill development plant identification in field 1. Slide preparation of *Selaginella, Pinus.* 2. Understanding *Rhynia, Pinus* and *Cordaites* with the help of permanent slide (Evolution of plants) 3. Study of inflorescence, flower morphology and functional modifications of floral whorls. 4. Study of Magnoliaceae, Apocynaceae, Amaranthaceae and Palmae family. Learning outcomes: ➢ Learning the diversity and stages of life cycle in Pteridophyta and gymnosperms. ➢ Understanding the past environment with the study of palaeobotany, fossils and geological time scale. ➢ Detailed study of morphology of flowers and some angiosperms. families.

S.Y.BSc	Semester IV Practical
RJSUBOTP402 Practical II Forms and Functions - II	Course Outcomes: Skill development 1. Exploring the normal secondary growth in the stem and root of a Dicotyledonous plant and Monocot stem (*Dracena*). 2. Study of different types of vascular bundles and conducting tissues- Xylem and phloem elements in Gymnosperms and Angiosperms. 3. Analysis of soil by the sieve method & pH of soil and water holding capacity of different soil samples. 4. Quantitative estimation of organic matter of the soil by Walkley and Black's Rapid titration method. (Industrial application) 5. Study of vegetation by the list quadrat method. 6. Tests for alkaloids, glycosides and tannins. 7. Study of Stomatal index, Palisade ratio, vein islet number. Learning outcomes: ➢ Knowing the reason of secondary growth, mechanical tissue system and vascular bundles functions in plant. ➢ Study of Ecological factors andassessment of soil pH, water holding capacity and organic content. ➢ Detailed study of secondary metabolites and its application for drug making. ➢ Analysis of Stomatal index, palisade ratio and vein islet number.

S.Y.BSc	Semester IV Practical
RJSUBOTP403 Practical III Current Trends in Plant Sciences – I	Course Outcomes: Entrepreneurial skills 1. Exploring the sterilization techniques in Plant Tissue Culture, Technique of seed sterilization, callus induction and plant regeneration from callus. 2. Encapsulation of axillary buds /formation of synthetic seeds. 3. Study of pBR322, pUC 18, Ti plasmid. 4. Preparation of Bottle and dish garden and study of five examples of plants for each of the garden locations. 5. Data analysis using Chi square test. 6. Data collection using Web Search – Google- NCBI, EBI and ENTREZ. Learning outcomes: ➢ Application of plant tissue culture and R-DNA technology ➢ Identification of the cloning vectors – pBR322, pUC 18, Ti plasmid. ➢ Designing of gardens and application of horticulture (Entrepreneurship). ➢ Understanding the application of biostatistics on data. (data analysis) ➢ Virtual data/ literature study and use of bioinformatics.

References

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Scheme of Examinations

1. Two Internals of 20 marks each. Duration 30min for each.
2. One External (Semester End Examination) of 60 marks. Duration 2 hours.
3. One Practical at the end of Semester consisting of Practical I- 50 marks, Practical II- 50 marks and Practical III -50 marks but passing combined out of 150.
4. Minimum marks for passing Semester End Theory and Practical Exam is 40 %.
5. Student must appear for at least one of the two Internal Tests to be eligible for the Semester End Examination.
6. For any ATKT examinations, there shall be ODD-ODD/EVEN-EVEN pattern followed.
7. Two short field excursions for habitat studies are compulsory. A field report must be submitted
8. Field work of not less than eight hours duration is equivalent to one period per week for a batch of 15students.
9. A candidate will be allowed to appear for the practical examinations if he/she submits a certified journal of S.Y.B.Sc. Botany or a certificate from the Head of the department / Institute to the effect that the candidate has completed the practical course of S.Y.B.Sc. Botany as per the minimum requirements.
10. In case of loss of journal, a candidate must produce a certificate from the Head of the department /Institute that the practicals for the academic year were completed by the student. However, such a candidate will be allowed to appear for the practical examination, but the marks allotted for the journal will not be granted.
11. HOD's decision, in consultation with the Principal, shall remain final and abiding to all.

Evaluation and Assessment

Evaluation (Theory): Total marks per course - 100.

CIA- 40 marks

CIA 1: Written test -20 marks

CIA 2: Written Test / Assignment / Field Trip/mini project/ & Report - 20 marks

Semester End Examination – 60 marks

Question paper covering all units

Evaluation of Practicals 100 marks (50 marks for each practical RJSUBOTP301, RJSUBOTP302& RJSUBOTP303, RJSUBOTP401, RJSUBOTP402 & RJSUBOTP403)

Course Semester End Examination in Semester III and IV
(RJSUBOT301, RJSUBOT302 & RJSUBOT303, RJSUBOT401, RJSUBOT402 & RJSUBOT403)

Question	Knowledge	Understanding	Application and Analyses	Total Marks- Per Unit
Unit 1	08	03	04	15
Unit 2	08	03	04	15
Unit 3	08	03	04	15
Short notes from topics covering all the units	08	03	04	15
-TOTAL- Per objective	32	12	16	**60**
% WEIGHTAGE	53	20	27	**100%**

Evaluation of Practicals 150 marks/Semester
SEMESTER III: (50 marks for each practical RJSUBOTP301, RJSUBOTP302 & RJSUBOTP303)
SEMESTER 1V: RJSUBOTP401, RJSUBOTP402 & RJSUBOTP403)

Continuous Evaluation of practical components which require adequate duration for completion of the task, observation and interpretation: 25%
Course end Practical Evaluation of skills of students in terms of skill, analysis, interpretation and conclusion.

ASSESSMENT OF BOTANY FIELD TRIP REPORT

Dept. of Botany Course Code_____Date_____Roll No _____

Name of student:_____UID No_____

Marks____/20

Place of visit _____

Assessment Grid: Place one tick in each appropriate row. Overall mark should reflect the positions of ticks in the individual rows

(20)	**Field Trip and Report**	**80-100% 17-20 Marks**	**60-80% 13-16 Marks**	**40-60% 09-12 Marks**	**20-40% 05-08 Marks**
30% (06)	**Organization of report** -	Introduction about the location, vegetation, Botanical Names, Family, Local name, Description using Botanical Term, reporting all the species seen, Handwritten or typed. 6	Few mistakes, 5	Many mistakes 4	Inadequate presentation 3
50% (10)	**Content**	Excellent reporting of all the species observed in the field, ecological and morphological data, 10/9	Good reporting, species observed in the field but few of them missing in the list 8	Satisfactory, many species or relevant data missing from the report 6	Poor, inadequate and insufficient data or just a list of the species without any data. 5
10% (02)	**Conclusion** **----Marks----**	Conclusion based on self observation. Type of forest and vegetation 2	Good conclusion, comments not independent 2 / 1	Satisfactory, but insufficient 1 /0.5	Poor,irrelevant conclusion 0.5
5% (01)	**References** **----Marks----** -	Proper references, in required format 1	Proper references but no format 1	Few references 0.5	Irrelevant references 0
5% (01)	**Attendance / participation** **----Marks-----**	Attended and participated actively 1	Attended and participated 1	Infrequent Participation 0.5	No participation 0

Comments:

Name and Signature of Faculty.

Mini Project Undergraduate level

Dept. of_____

Course Code_____

Date_____

UIDNo_____RollNo_____Marks_____/20

Name of student: _____

Title of Assignment: _____

Assessment Grid : Place one tick in each appropriate row. Overall mark should reflect the positions of ticks in the individual rows. In boxes that have more than one set of marks, cancel out the marks that are not applicable and circle the correct marks.

Project work and report (Parameters)	**Marks**	**80 – 100% Excellent**	**60 -80% Good**	**40 – 60% Satisfactory**	**20 – 40% Average**
Project work done	10	10 / 9	8 / 7	6 / 5	4 /3
Report writing and conclusions	10	10 / 9	8 / 7	6 / 5	4 /3

Mapping of the course to employability/ Entrepreneurship/skill development

Class	Course Name	Course Code	Topic focussing on Employability/ Entrepreneurship/skill development	Employability/ Entrepreneurship/ Skill development	Specific activity
S Y B Sc Botany	Plant Diversity I & II	RJSUBOT301 , RJSUBOT401	Plant Diversity III,IV focuses on identification of plants ranging from microbes	The topics focuses on identifying plants ranging from lower forms Thallophyta till higher forms	Preparation of bio fertilizers
S Y B Sc Botany	Forms and functions II	RJSUBOT302 RJSUBOT402	Concepts in Plant Anatomy, Biochemistry, Physiology, Genetics and Ecology which are essential to take up a career in research and teaching since these provide the Domain knowledge. Medicinal Botany gives a glimpse on plant-based drugs and economically important products	Employability in field of the teaching and research. To learn the techniques to identify plant based drugs.	Seminars, presentation, poster making and problem solving
S Y B Sc Botany	Current trends in plant sciences I	RJSUBOT303 RJSUBOT403	Instrumentation, economic botany, biotechnology, horticulture, biostatistics and bioinformatics	Analytical skills, interpretation skills for employability in laboratories. Aesthetic skills	Handling of instruments, standardisation, gardening activities
S Y B Sc Botany	Practicals	RJSUBOTP301 RJSUBOTP302 RJSUBOTP303 RJSUBOTP401 RJSUBOTP402 RJSUBOTP403	Microscopical identification of lower forms of plants, identification of higher forms using morphological studies. Study of plants in different habitats and their adaptation.	1Analytical skills 2Interpretation skills 3Writing skills	Mini project for developing Entrepreneurial skills, Field trips enhances skills of identification of plants in situ, organisational skills, team work.