Resolution No.: AC/I(19-20).2.RUS4

S.P. Mandali's

RAMNARAIN RUIA AUTONOMOUS COLLEGE

Syllabus for: F. Y

Program: B. Sc.

Course Code: Botany (RUSBOT)

(Credit Based Semester and Grading System with effect from the academic year 2019–2020)

SEMESTER I

Course Code	UNIT	TITLE	Credits	Lectures/ Week
	PLANT DIVERSITY I			
RUSBOT 101	**I**	Algae	**02**	**1**
	II	Fungi		**1**
	III	Bryophyta		**1**
RUSBOT 102	**FORM AND FUNCTION I**			
	I	Cell biology	**02**	**1**
	II	Ecology		**1**
	III	Genetics		**1**
RUSBOTP 101,102	**Practicals**	Plant Diversity I, Form and Function I (Practicals I and II)	**02**	**2**
			06	

SEMESTER II

Course Code	UNIT	TOPICS	Credits	Lectures/ Week
	PLANT DIVERSITY II			
RUSBOT 201	**I**	Pteridophytes	**02**	**1**
	II	Gymnosperms		**1**
	III	Angiosperms		**1**
RUSBOT 202	**FORM AND FUNCTION II**			
	I	Anatomy	**02**	**1**
	II	Physiology		**1**
	III	Medicinal Botany		**1**
RUSBOTP 201,202	**Practicals**	Plant Diversity II, Form and Function II (Practicals I and II)	**02**	**2**
			06	

Course Code: RUSBOT 101
Course Title: Plant Diversity I
Academic year 2019 - 20

Learning Objectives:

- Morphology, structure and importance of the organisms and differentiation between various groups of Algae, Fungi and Bryophyta.
- The life cycles of individuals belonging to Algae, Fungi and Bryophyta.

Learning Outcomes: Students will be able to understand the morphological and systematic knowledge about different plant groups. They will be able to make use of this knowledge for detailed study in their disciplines.

Detailed Syllabus

RUSBOT 101	**Title: Plant Diversity I**	**Credits – 2**
UNIT I	**Algae**	**15 Lectures**
	General characters of Chlorophyta and Cyanophyta. Outline of Classification according to G.M. Smith	
	Life cycle and systematic position of *Nostoc* and *Spirogyra*.	
	Economic importance of Algae.	
UNIT II	**Fungi**	**15 Lectures**
	Introduction, definition, general characters, mode of nutrition, thallus structure, reproduction, economic importance, Outline of Classification according to G. M. Smith	
	Structure, lifecycle and systematic position of *Rhizopus*and*Albugo*	
	Economic importance of Fungi.	
	Modes of nutrition in Fungi (Saprophytism, predation and Parasitism).	
UNIT III	**Bryophyta**	**15 Lectures**
	Outline of classification according to G.M. Smith	
	General characters of Hepaticae	
	Structure, life cycle and systematic position of *Riccia*.	
	Economic importance of Bryophyta	
PRACTICALS		
RUSBOTP 101	**Plant Diversity I**	**Credits - 1**
1	Study of stages in the life cycle of *Nostoc* from fresh/ preserved material and permanent slides	
2	Study of stages in the life cycle of *Spirogyra* from fresh/ preserved material and permanent slides	
3	Economic importance of algae: *Ulva* (food), *Scendesmus and Chlorella* (Biofuel), *Spirulina*(Neutraceutical), *Gelidium* (Agar)	
4	Study of stages in the life cycle of *Rhizopus* from fresh/ preserved material and permanent slides	
5	Study of stages in the life cycle of *Albugo* from material and permanent slides	
6	Economic importance of Fungi: Mushroom, Yeast, wood rotting fungi (any bracket fungus).	
7	Study of stages in the life cycle of *Riccia* from fresh/ preserved material.	

Course Code: RUSBOT 102
Course Title:Form and function I
Academic year 2019 - 20

Learning objectives:

- The structure and functions of various plant cell organelles.
- The interactions taking place in the Ecosystems and the flow of energy.
- The ecological adaptations of various plants.
- The basic principles of Mendelian Genetics.

Learning outcome: Students will be able to understand the basic principles of plant cell organelles and plant ecology. They will further their knowledge in Mendelian Genetics. Students will perform experiments; gather data, test hypotheses, and draw conclusions based on data and understand the use of biometrics in biological sciences.

Detailed Syllabus

RUSBOT 102	**Title: Form and Function I**	**Credits – 2**
UNIT I	**Cell Biology**	**15 Lectures**
	Prokaryotic and eukaryotic cell structure , General structure of plant cell: cell wall, Plasma membrane (bilayer lipid structure, fluid mosaic model) Mitosis	
	Ultra structure and functions of the following cell organelles: Endoplasmic reticulum and Chloroplast.	
UNIT II	**Ecology**	**15 Lectures**
	Energy pyramids, energy flow in an ecosystem.	
	Types of ecosystems: aquatic and terrestrial.	
	Biogeochemical cycles: Carbon, Nitrogen and Water.	
	Biodiversity Hotspots and PAN	
UNIT III	**Genetics**	**15 Lectures**
	Phenotype/Genotype, Mendelian Genetics- monohybrid, dihybrid ratios, test cross and back cross.	
	Epistatic and non epistatic interactions; multiple alleles.	
	Sex determination **Chromosomal Methods:** heterogametic males and heterogametic females. Sex determination in monoecious and dioecious plants. Genic Balance Theory of sex determination in *Drosophila*, Lyon's Hypothesis of X chromosome inactivation. **Sex linked inheritance-** eye colour in *Drosophila*, Haemophilia, colour blindness **Sex influenced inheritance**- baldness in man	
PRACTICALS		
RUSBOTP 101	**Form and Function II**	**Credits - 1**
1	Examining various stages of mitosis in root tip cells (*Allium*)	
2	Cell inclusions**:** Starch grains (Potato and Rice); Aleuronelayer, Maize	
3	Cystolith (*Ficus*); Raphides (*Pistia*); Sphaeraphides (*Opuntia*).	
4	Identification of cell organelles with the help of photomicrograph Plastids: Chloroplast, Amyloplast, Endoplasmic reticulum and Nucleus.	
5	Identification of plants adapted to different environmental conditions and	

	internal structure adaptations: Hydrophytes free floating (*Pistia /Eichhornia*), Rooted floating (*Nymphaea*), submerged (*Hydrilla),* Mesophytes (any common plant), Hygrophytes (*Typha, Cyperus*)
6	Calculation of mean, median and mode.
7	Calculation of Standard deviation.
8	Frequency distribution, graphical representation of data- frequency polygon, histogram, pie chart.

Course Code: RUSBOT 201
Course Title: Plant Diversity II
Academic year 2019 - 20

Learning Objectives:

- Learn the life cycles of individuals belonging to Pteridophyta and differentiate between different types of steles.
- The classification, life history and economic importance of Gymnosperms.
- The taxonomical terminology and understand the meaning of the same.
- The morphology, structure and functions of various parts of plants.

Learning Outcome: Students will be able to understand the Pteridophyte and Gymnosperm life cycles, Angiosperm families and their economic importance and also their systematic position.

Detailed Syllabus

RUSBOT 201	**Title: Plant DiversityII**	**Credits – 2**
UNIT I	**Pteridophytes**	**15 Lectures**
1	Salient features and classification of Psilophyta and Lepidophyta upto orders according to G. M. Smith's classification.	
2	Structure life cycle, systematic position and alternation of generations in *Selaginella.*	
3	Stelar evolution.	
4	Economic importance and propagation of ferns.	
UNIT II	**Gymnosperms**	**15 Lectures**
1	General characters, Outline of classification according to C.J. Chamberlin	
2	Structure life cycle systematic position and alternation of generations in *Cycas.*	
3	Economic importance of Gymnosperms.	
4	Geological time scale.	
UNIT III	**Angiosperms**	**15 Lectures**
1	Definition of taxonomy, systematic botany, concepts of taxonomy, aims of taxonomy.	
2	Study of following families: Magnoliaceae, Malvaceae, Leguminosae, Solanaceae, Amaryllidaceae.	
PRACTICALS		
RUSBOTP 201	**Plant Diversity II**	**Credits - 1**

1	Study of stages in the life cycle of *Selaginella*, T.S. of rachis.
2	T.S. of *Selaginella* stem
3	Stelar evolution with the help of permanent slides, Protostele, haplostele , actinostele, plectostele, mixed protostele, siphonostele, ectophloic, amphiphloic, dictyostele, eustele and atactostele.
4	*Cycas*: T.S of leaflet (*Cycas* pinna) microsporophyll, megasporophyll, coralloid root, microspore, L.S. of ovule of *Cycas*– all specimens to be shown.
5	Economic importance of Gymnosperms: *Pinus* (turpentine, wood, seeds)
6	Leaf: simple leaf, types of compound leaves, Incisions of leaf, leaf base, apex, margins and leaf shapes. Modifications of leaf: spine, tendril, hooks, phyllode, pitcher, *Drosera* or insectivorous plants.
7	Inflorescence: Racemose: simple raceme, spike, catkin, corymb, umbel, spadix, capitulum. Cymose, monochasial, dichasial, polychasial. Compound: Panicle, cyathium, verticellaster, hypanthodium.
8	Study of following families: Magnoliaceae, Malvaceae, Leguminosae, Solanaceae,Amaryllidaceae.
9	Propagation of ferns

Course Code: RUSBOT 202
Course Title: Form and function II
Academic year 2019 - 20

Learning Objectives:

- The primary anatomical structure and functions of various tissues System in plants. Primary Structure of Dicot and Monocotstem, leaf and root.
- The basic physiological processes including photosynthesis and differentiate between C_3, C_4 and CAM plants.
- The use of plant resources for food and medicine.

Learning Outcomes: Students will able to understand the anatomical structure and functions of various tissues System in plants. Understand physiological processes and their importance. Study the basic concept of primary and secondary metabolites.Study about the economic use, morphology, products and uses of several economically important plants.

Detailed Syllabus

RUSBOT 202	**Title: Form and function II**	**Credits – 2**
UNIT I	**Anatomy**	**15 Lectures**
1	Simple tissues, complex tissues, meristematic tissues, permanent tissues, wall ingrowths and transfer cells, adcrustation and incrustation, ergastic substances.	
2	Primary structure of dicot and monocot root, stem and leaf (Kranz anatomy).	
3	Epidermal tissue system: types of hair, monocot and dicot stomata.	
UNIT II	**Physiology**	**15 Lectures**
1	Photosynthesis: Light reactions, photolysis of water photophosph non-cyclic), carbon fixation phase (C_3, C_4 and CAM pathways).	
2	Plant immune system	
UNIT III	**Medicinal Botany**	**15 Lectures**

1	History of medicinal botany	
2	Concept of primary and secondary metabolites, difference between primary and secondary metabolites.	
3	Grandma's pouch: Following plants have to be respect to botanical source, part of the plant used, active constituents present and medicinal uses: *Ocimum sanctum, Justicia adhatoda, Zinziber officinale, Curcuma longa, Santalum album, Aloe vera*.	
4	Functional Foods : Garlic, Carrot, Citrus, Jackfruit, Drumstick and Dill	
PRACTICALS		
RUSBOTP 202	**Form and function II**	**Credits - 1**
1	Primary structure of dicot and monocot root.	
2	Primary structure of dicot and monocot stem.	
3	Study of dicot and monocot stomata.	
4	Epidermal outgrowths: with the help of mountings: Unicellular: *Gossypium/*Radish Multicellular: *Lantana/*Sunflower Glandular: *Drosera* and Stinging: *Urtica* – only identification with permanent slides. Peltate: *Thespesia* Stellate: *Erythrina/ Sidaacuta/ Solanum/ Helecteris* T-shaped: *Avicennia*	
5	Separation of chlorophyll pigments by strip paper chromatography.	
6	Separation of amino acids using strip paper chromatography.	
7	Extraction of anthocyanin pigments and their use as a pH indicator.	
8	Tests for tannins.	
9	Identification of plants/plant parts found in Grandma's Pouch.	
10	Identification of functional foods.	

Note: Two short field excursions for habitat studies are compulsory.
Field work of not less than eight hours duration is equivalent to one period per week for a batch of 15 students.

References

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MODALITY OF ASSESSMENT

Theory Examination Pattern:

A) Internal Assessment - 40% :40 marks.

Sr No	Evaluation type	Marks
1	Assignment / Field Visit/ Submission/ On-line test /Active Participation (attentiveness/ability to answer questions)/Participation in academic or Co-curricular activities	20
2	One class Test (multiple choice questions / objective)	20

B) External examination - 60 %

Semester End Theory Assessment - 60 marks

i. Duration - These examinations shall be of **2 hours** duration.

ii. Paper Pattern:

1. There shall be **03** questions each of **16** marks and **01** question of **12** marks. On each unit there will be one question & last question will be based on all the **03** units.
2. All questions shall be compulsory with internal choice within the questions.

Questions	Options	Marks	Questions on
Q.1) A, B, C	Any 2 out of 3	16	Unit I
Q.2) A, B, C	Any 2 out of 3	16	Unit II
Q.3) A, B, C	Any 2 out of 3	16	Unit III
Q.4) a, b, c, d , e.	Any 3 out of 5	12	All units

Practical Examination Pattern:

(A) Internal Examination:

Heading	Practical
Journal	05
Practical/ Field Report/ Presentation	15
Total	20

(B) External (Semester end practical examination):

Particulars	Practical
Laboratory work and/or *Viva voce*	30
Total	**30**

PRACTICAL BOOK/JOURNAL

The students are required to present a duly certified journal for appearing at the practical examination, failing which they will not be allowed to appear for the examination.

In case of loss of Journal and/ or Report, a Lost Certificate should be obtained from Head/ Co-ordinator / Incharge of the department; failing which the student will not be allowed to appear for the practical examination.

Overall Examination and Marks Distribution Pattern

Semester- I and II

Course	101/201			102/202			Grand Total
	Internal	External	Total	Internal	External	Total	
Theory	40	60	100	40	60	100	200
Practicals	20	30	50	20	30	50	100

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