



# **RAJARSHI SHAHU MAHAVIDYALAYA, LATUR**

**AFFILATED TO**

**SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY,  
NANDED**

**B. Sc. GENERAL (SEMESTER PATTERN)**

**B. Sc. FIRST YEAR**

**BOTANY – CURRICULUM**

**UNDER ACADEMIC AUTONOMOUS STATUS 2013 -2018**

**(MCQ + Theory Pattern)**

**w. e. f. JUNE, 2013**

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**B. Sc. GENERAL (SEMESTER PATTERN)**

**B. Sc. FIRST YEAR**

**BOTANY – CURRICULUM**

**(MCQ Pattern + Theory Pattern)**

Semester	Paper No. & Title	Period / practical	Marks		
			In Sem. Evaluation	End Sem. Evaluation	Total
Semester-I	<b>Theory Paper-I:</b> Biodiversity of Cryptogams and Gymnosperms	45	20	30	50
	<b>Theory Paper-II:</b> Cell biology and Molecular biology	45	20	30	50
	<b>Lab course -I:</b> Practical bases on theory papers -I&II	12	--	--	50
Semester-II	<b>Theory Paper-IV:</b> Histology Anatomy and Embryology of Angiosperms	45	20	30	50
	<b>Theory Paper-V:</b> Fundamentals of Genetics	45	20	30	50
	<b>Lab course -II:-VI:</b> Practical based on theory papers -IV&V	12	--	--	50

**Workload:**

**1. Theory:** Per paper per week three periods

**2. Practical:** Per batch per week one practical (Three periods)

# **RAJARSHI SHAHU MAHAVIDYALAYA, LATUR**

**B.Sc. First Year  
Semester – I  
(MCQ + Theory Pattern)**

## **BOTANY**

**Theory Paper-I:** Biodiversity of Cryptogams and Gymnosperms

(Viruses, Bacteria, Fungi, Lichens, Algae, Bryophytes, Pteridophytes and Gymnosperms)

Periods – 45

Maximum Marks – 50

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### **OBJECTIVES**

1. To awaken the students about microbial world and the nature of diseases of plants.
2. To understand the principles and concept in plant pathology.
3. To understand the relationships between pathogens and plants.
4. To become familiar with algae and bryophytes
5. To develop the awareness about the importance of Viruses, Bacteria, Fungi, Lichens, Algae, Bryophytes, Pteridophytes
6. To learn the life cycles of, Fungi, Lichens, Algae, Bryophytes, Pteridophytes.

### **COURSE OUT COMES**

- 1) Students are able to classify microorganism on the basis of host.
- 2) Able to distinguish between reproductive stage of cryptogams.
- 3) Able to study systematic position, thallus and occurrence of algae. Students are able to classify microorganism on the basis of host.
- 4) Able to distinguish between reproductive stage of cryptogams.
- 5) Able to study systematic position, thallus and occurrence of algae.

## **UNIT – I: BACTERIA AND VIRUSES (10 L)**

### **BACTERIA:**

1. General characters.
2. Size, Shape and Ultra structure.
3. Asexual reproduction (By binary fission).
4. Sexual reproduction (By conjugation).
5. Economic importance.

### **VIRUSES :**

1. General characters.
2. Classification based on host.
3. Ultra structure of TMV.
4. Economic importance.

## **UNIT – II: FUNGI (12 L)**

1. General characters and.
2. Classification (Alexopolous and Mims,1979).
3. Systematic position, occurrence, structure, reproduction, and graphic life cycle of *Erysiphe*.
4. Economic importance.
5. Mycorrhiza (General characters).
6. General characters of lichens.
7. Types of Lichens.
8. Economic importance of Lichens.

## **UNIT – III: ALGAE AND BRYOPHYTES (10 L )**

### **ALGAE:**

1. General characters.
2. Classification (F.E.Fritsch,1935).

3. Systematic position, occurrence, thallus structure, reproduction and graphic life cycle of *Oedogonium*.

#### **BRYOPHYTES:**

1. General characters.
2. Classification (N.S.Parihar).
3. Systematic position, occurrence, thallus structure(external and internal), reproduction, and graphic life cycle of (Developmental stages not expected)

*Funaria*.

#### **UNIT – IV: PTERIDOPHYTES AND GYMNOSPERMS (13 periods)**

##### **PTERIDOPHYTES :**

1. General characters.
2. Classification ( N.S.Parihar)Systematic position, occurrence, thallus structure (external and internal), reproduction, and graphic life cycle with alternation of generation of (Developmental stages not expecte) *Nephrolepis (ferm)*.

##### **GYMNOSPERMS:**

1. General characters.
2. Classification (Arnold, 1948).
3. Morphology of vegetative and reproductive structures(Developmental stages are not expected), and life cycle of *Cycas*

# **RAJARSHI SHAHU MAHAVIDYALAYA, LATUR**

**B.Sc. First Year  
Semester – I  
(MCQ + Theory Pattern)**

**BOTANY**

**Theory Paper- II: Cell and Molecular Biology**

Periods – 45

Maximum Marks – 50

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## **OBJECTIVES**

1. To acquire good knowledge about cell biology
2. To acquire good knowledge about chemistry of active constituents of medicinal plants.
3. To Know the techniques of Molecular biology.
4. Identification of different stages of cell division

## **COURSE OUT COMES**

- 1) Students are able to karyotype and Idiogram and their significance.
- 2) Able to distinguish between mitotic & meiosis.
- 3) They are able to justify structural aspect of DNA& RNA.

### **UNIT –I: CELL BIOLOGY (12 L)**

**1.Cell:** Ultra structure of Prokaryotic cell and Eukaryotic cell.

**2. Structure and functions of:** Cell wall & Plasma membrane.

**3. Structure and functions of cell organelles:** Nucleus, Golgi apparatus, Endoplasmic reticulum and Ribosomes, Chloroplast and Mitochondria.

### **UNIT –II: CHROMOSOME (10 L)**

1. Organisation of Chromosome (Nucleosome Solenoid Model).
2. Morphology, structure and function of typical chromosome.
3. Types of chromosome.
4. Karyotype and Idiogram and their significance.
5. Chromosomal Abberations (structural and numerical).

**UNIT –III: CELL DIVISION (11 L )**

1. Cell cycle: Inter phase G<sub>1</sub> - S - G<sub>2</sub>–M phase and G<sub>0</sub> phase
2. Phages and significance of Mitosis.
3. Phages and significance of Meiosis.

**UNIT –IV: MOLECULAR BIOLOGY (12 L )**

1. Structure of DNA (Watson and Crick model).
2. Replication of DNA.
3. Structure, function and types of RNA.
4. Protein synthesis.

# RAJARSHI SHAHU MAHAVIDYALAYA, LATUR

B.Sc. First Year  
Semester – I  
BOTANY

Practicals: 12      **Practical Paper-III:** Practical based on theory papers -I&II

Marks: 50

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## **OBJECTIVES**

1. To introduce cryptogamic plant forms to students.
2. To understand the process of cell division.
3. To understand the technique of slide preparation for Mitosis and Meiosis.
4. To become familiar with microbes and lichens
5. To understand the technique of temporary slide preparation .

## **COURSE OUT COMES**

- 1) Able to differentiate various Stages of mitosis.
- 2) Students are able to identify the different microbes.
- 3) Students are able to identify the different types of algae, bryophyte etc.
- 4) Students are able to understand that the number of chromosome is
- 5) They are able to distinguish between types of lichen.
- 6) Students are able to identify algae, bryophytes and pteridophytes.

**Practical 1:** Study of forms of Bacteria.

**Practical 2:** Study of external features of *Oedogonium*.

**Practical 3:** Study of external features of *Erysiphe* with classification.

**Practical 4:** Study of types of Lichens (Crustose, Foliose and Fructicose).

**Practical 5:** Study of external and internal features of *Funaria*.



**Practical 6:** Study of external and internal features of *Nephrolepis*.

**Practical 7:** Study of cell organelles with the help of photocopies / slides.

**Practical 8:** Study of mitosis (Onion/Garlic Root tips).

**Practical 9:** Study of Mitotic index (Onion/Garlic Root tips).

**Practical 10-11 :** Study of Meiosis from onion floral buds or any other available material.

**Practical 12:** Study of karyotype and idiogram from photocopies of onion / Aloe plant material.

**Practical 13: Botanical excursions (one short excursion is compulsory)**

# RAJARSHI SHAHU MAHAVIDYALAYA, LATUR

B.Sc. First Year  
Semester – II  
BOTANY

**Theory Paper-III:** Histology, Anatomy and Embryology of Angiosperms

Periods – 45

Maximum Marks – 50

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## **OBJECTIVES**

1. Awaken the students about Tissue system of plants.
2. To understand the process and technique of permanent double stained preparation .
3. To understand the internal structures of plants organs.
4. To become familiar process of embryology
4. To understand the role of different in inheritance of characters

## **COURSE OUT COMES**

- 1) Able to differentiate various tissues.
- 2) They are able to perform sectioning of various ovules .
- 3) Developed approach for embryology study.

### **UNIT – I: HISTOLOGY**

#### **Plant Tissues**

(12 L )

**A. Meristematic tissues** and their classification based on position

#### **B. Permanent Tissues**

##### **I Simple Tissues:**

1. Parenchyma
2. Collenchyma
3. Sclerenchyma

##### **II Complex Tissues**

1. Xylem

2. Phloem

### **III Secretory Tissues**

#### **1. Laticiferous Tissues**

ex. Latex cells

#### **2. Glandular Tissues**

##### **a. External glands**

ex. Digestive glands

##### **b. Internal glands**

ex. Oil glands

### **UNIT – II: ANATOMY (12 periods)**

1. Anatomy of dicot Stem (Sunflower).

2. Anatomy of monocot Stem (Maize).

3. Secondary growth in dicot stem.

4. Leaf anatomy of dicotyledons (Sunflower) and monocotyledons (Maize).

5. Anomalous secondary growth in *Dracaena* stem.

### **UNIT –III: EMBRYOLOGY –I (11 periods)**

1 Structure of a Microsporangium (T.S. of anther).

2. Structure of a Microspore.

3. Development of male gametophyte (Microgametogenesis).

4. Structure of a Megasporangium.

5. Anatropous ovule

6. Types of ovule.

7. Development of female gametophyte (Monosporic).

### **UNIT – IV: EMBRYOLOGY –II (10 L )**

1. Fertilization.

2. Post fertilization changes.

3. Endosperm and its types.

4. Development of dicot embryo (Crucifer type).

5. Structure of Dicot seed.
6. Structure of Monocot seed.

# **RAJARSHI SHAHU MAHAVIDYALAYA, LATUR**

**B.Sc. First Year  
Semester – II  
BOTANY**

## **Theory Paper-IV: Fundamentals of Genetics**

Periods – 45

Maximum Marks – 50

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### **Objectives**

1. To awaken the students about genetic terms
2. To understand the principles of genetics and laws of inheritance.
3. To understand the relationships between epistatic and non epistatic genes.
4. To develop the awareness about genetic disorders

### **COURSE OUT COMES**

- 1) Developed understanding about inheritance Biology.
- 2) Solved problems independently on Genetic disorder.
- 3) Able understood Gene related diseases & its control.

#### **UNIT –I: MENDELISM**

(10 L )

1. Mendel's experiments (biography)
2. Genetic terminologies
3. Explanation and examples of (monohybrid cross, dihybrid cross and back cross and test cross)
4. Mendel's Laws of Inheritance.

#### **UNIT –II: GENE INTERACTIONS**

(12 L )

A. Allelic interactions: Explanation and examples of Incomplete dominance, Co- dominance

( 4 0 clock plant inheritance of coat color in cattle)

B. Non-Allelic interactions i. Epistatic: Explanation and examples of 9:7,12:3:1,15:1

ii. Non-epistatic: Explanation and examples of Collaborator gene

**UNIT –III: SEX DETERMINATION: (11 L )**

1. Sex determination: Discovery of sex chromosomes,
2. Chromosomal theory of sex determination .
  - i. Sex determination in Animals XX,XY ( *Drosophila* )
  - ii. Sex determination in insects (XO-XX),
  - iii. Sex determination in Birds (ZW-ZZ method),
  - iv. Sex determination in Plants (*Asparagus*).

Linkage: Definitions, significance, Coupling and repulsion hypothesis.

**UNIT –IV: SEX LINKED INHERITANCE: (12 L )**

1. Sex linked inheritance: Definition classification (x-linked, y-linked and xy-linked)
  - a) Sex linked inheritance in *Drosophila* (White eye colour)
  - b) Sex linked inheritance in Man (Hemophilia, colour blindness and hypertrochosis
- C ) inheritance bobbed bristles in *Drosophila*
2. Gene related diseases : Phenylketonuria (PKU), Alkaptonuria (AKU) and Albinism.
3. Syndromes in Man (Autosomal and sex - chromosomal syndromes).
  - i) Down's syndrome ii) Klinefelter's Syndrome.

# RAJARSHI SHAHU MAHAVIDYALAYA, LATUR

B.Sc. First Year  
Semester – II  
BOTANY

**Practical Paper-VI:** Practical based on theory papers - IV& V  
Practicals: 12

Marks: 50

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## **OBJECTIVES**

1. To enable the students to differentiate between different Tissues.
2. To understand the process and technique of preparation double stained permanent slides.
3. To understand the relationships between different gens and their inheritance .
4. To become familiar with Embryology
5. To learn the internal structures of plant organs.

## **COURSE OUT COMES**

- 1) Able to differentiate various tissues.
- 2) They are able to perform sectioning of various ovules .
- 3) Developed approach for embryology study.
- 4) Students are able to recognize that genetics is based on concept of genes as unit of inheritance.
- 5) Students are able to prepare double stained permanent slides

**Practical 1:** Study of permanent tissues (Mechanical and Complex) with the help of permanent slides/models/ Charts/photocopies.

**Practical 2:** Study of T.S. of Anther and types of ovule with the help of permanent slides/models/ charts/photocopies.

**Practical 3:** Preparation of double stained permanent slides of Sunflower Stem.

**Practical 4:** Preparation of double stained permanent slides of Maize Stem.

**Practical 5-10:** Problems based on monohybrid/Dihybrid ratio; 9:7//12:3:1/15:1 and collaborator gene.

**Practical 11-12:** Problems based on sex-linked inheritance.

**Practical 13-14 :**Botanical excursions (one long excursion is compulsory)