RAJARSHI SHAHU MAHAVIDYALAYA, LATUR

(AUTONOMOUS)

AFFILIATED TO

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

B. Sc. GENERAL (SEMESTER PATTERN)

B. Sc. THIRD YEAR (CBCS)

BOTANY – CURRICULUM

(MCQ + THEORY PATTERN)

w. e. f. JUNE, 2021

Rajarshi Shahu Mahavidyalaya (Autonomous), Latur

B. Sc. General (Semester Pattern)

B. Sc. Third Year (CBCS)

Botany – Curriculum

(MCQ + Theory Pattern)

Semester	Paper No.	Paper Title	Course Code	Marks		Lectures/ Practicals	Total Marks	Credits
				In Sem. Evaluation	End Sem. Evaluation			
V	IX	Plant Physiology and Metabolism	U-BOT-583	20	30	45	50	02
	X	Plant Pathology-I/Plant Biotechnology (DSE)	U-BOT-584	20	30	45	50	02
	Lab Course-VII	Based on theory Paper – IX	U-BOT-585	--	--	24	50	02
	Lab Course-VIII	Based on theory Paper – X	U-BOT-586	--	--	24	50	02
	SEC-III	Fruits and Fruit Processing	U-ADC-540F	--	50	45	50	02
VI	XI	Plant Biochemistry and Bioinformatics	U-BOT-683	20	30	45	50	02
	XII	Plant Pathology-II / Cytogenetics (DSE)	U-BOT-684	20	30	45	50	02
	Lab Course -IX	Based on theory Paper –XI& XII	U-BOT-685	--	--	24	50	02
	Lab Course- X	Based on theory Paper –XI& XII	U-BOT-686	--	--	24	50	02
	SEC-IV	Basics in Horticulture	U-ADC-640H	--	50	45	50	02
					Total		**500**	**20**

Workload:

1. Theory: Three Lectures / Paper / Week.

2. Practical: One Practical (Three Lectures) / Batch / Week

Chairman

RAJARSHI SHAHU MAHAVIDYALAYA (AUTONOMOUS), LATUR

B.Sc. Third Year
Semester – V
(MCQ + Theory Pattern)
BOTANY
Theory Paper-IX: Plant Physiology and Metabolism
Periods – 45 Maximum Marks – 50 Cridits:02 Curse outcomes: U BOT-583

Objectives:

1. To understand the different physiological phenomenon of plants.
2. To understand the different metabolic processes in plants.
3. To understand the energy flow in plants.
4. To understand carbon cycle in plants.

Course outcomes

1) Able to understand energy flow in plants.
2) Able to understand different physiological phenomenon of plants.
3) Able to recognize need of mineral nutrients by plants and its recycling.

UNIT-I: PLANT WATER RELATIONS (12 L)

1. Importance of water in plant life,

2. Different bio-physico-chemical phenomenon-Permeability and its importance, definition of diffusion, osmosis (exosmosis, endosmosis) plasmolysis, imbibition.

3. Absorption of water- Introduction, mechanism of water absorption (active and passive)

4. Ascent of sap- Definition, transpiration pull theories.

5. **Transpiration-** Definition, types, structure of stomata, mechanism of opening and closing of stomata (starch-sugar theory)

UNIT-II: PLANT GROWTH AND DEVELOPMENT (10 L)

I. Vegetative Growth:

1. Seed dormancy: Seed dormancy- Introduction, methods of breaking seed dormancy, factors affecting seed dormancy

2. **Seed germination:** Seed germination- types, factors affecting seed germination.
3. **Plant growth hormones:** Auxins, gibberellins, cytokinins, abscisic acid, Ethylene (only practical applications).

II. Reproductive Growth: Physiology of flowering: Photoperiodism (long day plants, short day plants, day neutral plants),

UNIT-III: PHOTOSYNTHESIS AND PHOTORESPIRATION (13 L)**:**

I. Introduction photosynthetic pigments, concepts of two Photo systems;

II. **Mechanism of photosynthesis:**

1. Light phase- Hill reaction, Cyclic and Non cyclic photophosphorylation.

2. Dark phase- Calvin cycle (C3 pathway), Hatch and Slack cycle (C4 pathway), significance of photosynthesis;

III. **Photorespiration:** Introduction, Glycolate metabolism (C2 cycle) significance.

UNIT-IV: RESPIRATION (10 L)**:**

I. Introduction

II. Types of respiration:

1. Aerobic respiration- Glycolysis, Kreb's cycle, Electron Transport System (oxidative phosphorylation), ATP structure and function.
2. Anaerobic respiration- Fermentation , significance of respiration.

SUGGESTED READINGS:

1. Gill P.S. (2000) - Plant Physiology, S.Chand & Co. New Delhi

2. Verma V. (1995) - Text book of Plant Physiology, Emkay Publication N.Delhi

3. Salisbury P.B. & W. Ross (1992) - Plant Physiology , New York Pub. Co. California USA

4. Subhash Chandra Dutta (1992) - Plant Physiology, Wiley Eastern, New Delhi

5. Shrivastava H.S.(2000) - Plant Physiology, Rastogi Publication, Meerut

6. Shrivastava H.S. (1993) - Elements of Biochemistry Rastogi Publication, Meerut

7. Rastogi (2000) - Biochemistry Tata McGraw Hill, New York

8.Biochemistry by Mathews C.F. (2003) - Addison Wesley, New Delhi

9. Jayaraman J. (1992) - Laboratory Manual in Biochemistry, Wiley Eastern Ltd., New Delhi

RAJARSHI SHAHU MAHAVIDYALAYA, LATUR

(AUTONOMOUS)

B.Sc. Third Year
Semester – V
(MCQ + Theory Pattern)

BOTANY
Theory Paper-X: Plant pathology –**I (DSE)**

Periods – 45 Maximum Marks – 50 Cridits:02 Curse outcomes: U BOT-584

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 terms and references used to diagnose plant disease.
5. To develop the awareness about the importance of plant disease in human life.
6. To learn the basic biology of major groups of plant pathogens.
7. To explain the concept of plant disease and disease pyramid.
8. To describe main modes of plant disease transmission.

Course outcomes

1) Students able to identify the nature of disease of plants.
2) Able to describe modes of plant disease transmission.
3) Students are able to prepare plant disease pyramid

UNIT-I: FUNDAMENTALS OF PLANT PATHOLOGY (10 L)

1. Scope, importance and history of plant pathology.
2. Classification of plant diseases on the basis of causal organism and symptoms.
3. Pure culture technique, Koch's postulates for pathogenicity.

UNIT-II: PLANT DISEASES-I (12 L)

Symptoms, causal organisms, disease cycle and control measures of :

1. Green ear of Bajara.
2. Leaf spot of Tomato.

3. Red rot of Sugarcane.
4. Angular leaf spot of Cotton.
5. Yellow vein mosaic of Bhendi.

UNIT-III: PLANT DISEASES-II (13 L)

Symptoms, causal organisms, disease cycle and control measures of:

1. Ergot of Bajara.
2. Whip smut of Sugarcane.
3. Leaf spot of Turmeric (*Colletotrichum capsici*)
4. Citrus canker.
5. Little leaf of Brinjal.

UNIT-IV: PLANT DISEASE DEVELOPMENT (10 L)

1. Definition of disease and disease pyramid
2. Disease development- Mode of entry of pathogens (through stomata, wounds, root hairs and buds),
3. Dispersal of plant pathogens (by air, water, insects and animals)

SUGGESTED READINGS:

1.Pathak, Khatri, Pathak, 2003, *Fundamentals of plant pathology*, Agrios

2. Mehrotra, R.S. 1991, *Plant Pathology*, Tata Mc Graw Hill Co.Delhi

3. Chattergee, P.B., 1997, *Plant Protection Techniques*, Bharati Bhawan, Publ. Patana

4. Agrios, G.N. 2006-*Plant Pathology*, Elsevier Academic Press.

5. Pandey, B.P.2009, *Plant Pathology*, S.Chand Co.

6. Dickinson, M.2008,-*Molecular Plant Pathology, Bios* Scientific Publishers, London

7. Trigiano, Windham and Windham, 2003, *Plant pathology, Concepts and laboratory exercises.* CRC Press London

8. Gupta, G.P.,2004, *Text book of plant diseases*, Discovery Publ.House ,New, Delhi

9. Aneja, K.R. 2001, *Experiments in Microbiology, plant pathology, tissue culture and Mushroom production technology*, New Age International Publishers.

10. Dubey, R.C.,Maheshwari, D.K. 2005, *Practical Micrbiology*,S.Chand & CO.

11. Singh, R.S.2004, *Plant Diseases*, Oxford & IBH Publishing Co. Pvt. Ltd., Delhi.

12. Rangaswami,G.,Mahadevan,A.,2002, *Diseases of Crop plants of India* ,Prantice Hall of Indi

RAJARSHI SHAHU MAHAVIDYALAYA, LATUR
(AUTONOMOUS)

B.Sc. Third Year
Semester – V
BOTANY
Theory Paper- X: PLANT BIOTECHNOLOGY (DSE)

Periods – 45 Maximum Marks – 50 Cridits:02 Curse outcomes: U BOT-584 A

Objectives:

1. To understand the different phenomenon of Plant Biotechnology

2. To understand the different genetic engineering processes in plants.

3. To understand the gene transfer in plants.

4. To understand carbon cycle in plants.

Unit-I. Introduction to Biotechnology (10L)

1.1 Introduction

1.2 History of Biotechnology

1.3 Traditional and Modern Biotechnology

1.4 Global Impact and Current excitements of Biotechnology - Health care,

Environment, genomics and proteomics.

1.5 Biotechnology in India and Global Trends

1.6 Achievements of Biotechnology-

Genetic Foods (GMO's), Prevention and Misused biotechnology, Biodiversity

conservation, Intellectual Property Rights and Protection- forms of protection,

Cryopreservation of plant stock cells and Gene bank

Unit-II. Genetic Engineering (12L)

2.1 Introduction

2.2 Brief history of G.E.

2.3 Molecular Tools of G.E.-Restriction endonuclease, DNA ligase, Alkaline Phosphatase, DNA modifying enzymes.

2.4 Steps and tools in G.E: Gel permeation, PAGE, SDS-PAGE, 2-D gel electrophoresis, spectroscopy, colorimeter,

2.5 Genetic engineering and human welfare-

Insulin, Genes for Vaccine,

DNA probe, Monoclonal antibodies, Hybridoma

Unit-III. Agricultural Biotechnology (10L)

3.1 Introduction

Bio fertilizers-Algal, Bacterial, Azolla, Frankia, Mycorrhizal with reference to Structure, Characterization, Mass production and application

3. 2Biotechnology of Biological Nitrogen Fixation-

3.2 Non symbiotic Nitrogen Fixation-Diazotrophs and their ecology, special features, Mechanism of N_2 Fixation

3.4Symbiotic N_2 Fixation- establishment of symbiosis, factors affecting and mechanism of symbiotic N_2 Fixation

3.5 Genetics of Diazotrophs- Nod genes, Nif gene

Unit-IV.Plant Tissue Culture (8L)

4.1 Brief History

4.2 Plant protoplast culture

4.3 Somaclonal variation

4.4 Plant tissue culture in Forestry

4.5 Application of Tissue culture in GMO's, Plant pathology, Plant breeding, molecular farming

4.6 Nutritional quality (cyclodextrins, Vit. A, quality of seed protein, edible vaccines, edible antibodies, edible interferons)

Reference Books:-

R. C. Dube(2008)- A Text Book of Biotechnology, S. Chand

P.K. Gupta-Elements of Biotechnology

Satyanarayana-Biotechnology

Kalyan Kumar De-Plant tissue culture

Pal J.K. and Ghaskadabi S.S.(2008)- Fundamentals of Molecular Biology.

Verma and Agrawal- Molecular Biology

Devi P.2008-Principle and Methods of plant Molecular Biology, Biochemistry and Genetics Agrobios, Jodhpur, India.

Glick B.R. and Tompson J.E. 1993 Methods in Plant Molecular Biology and Biotechnology CRC Press Boca Raton, Florida.

Hall R.D. (Ed.)1999 Plant cell culture Protocol human press Inc., New Jersey, USA

Kumar H.D. 2002 A Text Book of Biotechnology 2nd Edn. Affiliated Easyt-West Press Private Ltd New Delhi.

Ramawat K.G. 2003 Plant Biotechnology, S. Chand & Co. Ltd .Ramnagar New Del

RAJARSHI SHAHU MAHAVIDYALAYA, LATUR

B. Sc. Third Year
Semester – V
(MCQ + Theory Pattern)
BOTANY
SEC -III: Fruits and Fruit Processing

Periods – 45 Maximum Marks – 50 Cridits:02 Curse outcomes: U BOT-
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Objectives:

1. To Develope skills and making the students become self-reliable and employable besides giving them an edge when they seek employment in other Government and private sectors.
2. To pass out of the college with their degrees, they also are equipped with additional skills to meet the challenges in future.
3. To know about various fruit product and their processes.
4. To gain knowledge about fruit nutritional value for health.
5. To know about various preservative techniques of fruits.

Unit I: A) Biology, Biochemistry, Nutrition, and Microbiology

1. Physiology and Classification of Fruits.

2. Biochemistry of Fruits and Fruit Products .

3. Flavor of Fruits and Fruit Products and their Sensory Qualities .

4. Microbiology of Fresh and Processed Fruits .

5. Nutritional Quality of Fruits.

B) Postharvest Handling and Preservation Technologies

1. Postharvest Storage Systems: Biology, Physical Factors, Storage, and Transport.

2. Freezing Preservation of Fruits.

3. Conventional Thermal Processing and Preservation.

4. Dehydration Preservation of Fruits.

5. Developments in Minimal Processing of Fruits.

6. Aseptic Processing and Packaging.

7. Food Additives in Fruit Processing.

Unit II: A) Processed Fruit Products and Packaging

1. Manufacturing Fruit Beverages and Concentrates.

2. Manufacturing Jams and Jellies.

3. Fresh-Cut Fruits.
4. Fruit and Fruit Products as Ingredients.
5. Developments in Packaging of Fresh Fruits and Fruit Products.

B) Processing Plant, Safety, and Regulations

1. Fruit Processing Plants and Equipments.

3. Fruit Processing Waste Management.

4. Microbial Safety and Sanitation of Fruits and Fruit Products.

5. Fresh and Processed Fruits: Safety and Regulations.

Practicals:

1-2. Preparation of Wine from different fruits. (Grapes, Orange)

3. Processing of Citrus Juices. 4. Preparation of Amla Candy.

5-7. Production, Processing and Quality of Guava, Mango and Papaya.

8. Preparation of Jam and Jellies from different fruits.

9. Visit to Fruit cultivated farm.

RAJARSHI SHAHU MAHAVIDYALAYA, LATUR

B. Sc. Third Year
Semester – V
BOTANY
Lab. Course-VII

(Based on theory paper - IX)

Periods – 45 Maximum Marks – 50 Cridits:02 Curse outcomes: U BOT-585

Course outcomes

1) Students able to perform different techniques.
2) Students able to experiment on water potential.
3) Students able to perform estimation of pigment from leaf extract.
4) Students get knowledge of fermentation process.

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1. Effect of temperature on plasma membrane (Beet root) in terms of pigment leaked out.

2. Effect of different organic solvents on plasma membrane (Beet root) in terms of pigment leaked out.

3. Effect of different concentrations of organic Solvent on plasma membrane (Beet root) in terms of pigment leaked out.

4. Separation of the Photosynthetic pigments by paper chromatography

5. Determine the Osmotic Potential of Vacuolar Sap by plasmolysis

6. Determine the water potential of potato tuber.

7. Demonstrations of Moll's half leaf experiments (Requirements, procedure, workings)

8. Demonstrations of Kuhne's fermentation tube (Requirements, procedure, workings)

9. Effect of intensity of light on photosynthesis.

10. Effect of different colors of light on photosynthesis.

11. Estimation of chl-a and chl-b from plant leaf extract.

12. Demonstrations ofR. Q (Carbohydrate / fat/ proteins)

13. Demonstration of osmosis by potato osmoscope.

14-15: Botanical Excursions (one Short excursion and one Long excursion and Visits

to laboratories / companies/factory etc

RAJARSHI SHAHU MAHAVIDYALAYA, LATUR

B. Sc. Third Year
Semester – V
BOTANY
Lab. Course- VI (DSE)

(Based on theory paper - X)
Periods – 45 Maximum Marks – 50 Cridits:02 Curse outcomes: U BOT-586

Course outcomes

1) Students will do the different tests of lipids, fat and oils.
2) Students perform experiment on catalase activity.
3) Students estimate the amount of Starch, glucose from given material.

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1. Study of laboratory equipments- Autoclave, Hot air oven, inoculating chamber, Laminar air flow, Air sampler, Incubator, Centrifuge
2. Preparation of culture media- PDA, NA
3. Micrometry- Calibration of microscope and measurement of fungal spore.
4. Effect of pH on growth of pathogens.

5-6. Study of symptoms and causal organisms of Leaf spot of tomato and Leaf spot of turmeric

7. Study of symptoms and causal organisms of Green ear and Ergot of bajra

8. Study of symptoms and causal organism of oil spot disease of pomegranate.
9. Study of symptoms and causal organism of Whip smut of sugarcane
10. Study of symptoms and causal organism of Rust of soybean
11. study of symptomology of the Bunchy top of banana
12: study of symptoms and causal organism of Red rot of sugarcane.

13-14: study of symptoms and causal organisms of little leaf of brinjal and Citrus canker.

15-16: stady of symptoms and causal organisms of Yellow vein mosaic of bhendi and Angular leaf spot of Cotton

17-18: Botanical excursions- several local and at least one long excursion.
One local excursion is equal to one to two practicals.
One long excursion is equal to Three to Four practic

RAJARSHI SHAHU MAHAVIDYALAYA, LATUR

B. Sc. Third Year

Semester – V

BOTANY
(Based on theory paper - X)

Lab Course- VIII: PLANT BIOTECHNOLOGY (DSE)
Periods – 45 Maximum Marks – 50 Cridits:02 Curse outcomes: U BOT-586 A

Ptracticals :

1. Preparation and sterilization of the medium, slant preparation and

Inoculation-MS medium.

2-4. Micro propagation of Banana / Sugarcane/ Gerbera

5. Aseptic seed germination-legume seed

6. Study of different biofertilizers.

7. Isolation of protoplast.

8-9. Somatic Hybridization

10-12. PAGE, SDS-PAGE

N.B: 1) any ten Practicals
2) Several Short Excursions and Atleast one Long Excursion

RAJARSHI SHAHU MAHAVIDYALAYA, LATUR

B.Sc. Third Year
Semester –VI
(MCQ + Theory Pattern)

BOTANY
Theory Paper-XI Biochemistry and Bioinformatics
Periods – 45 Maximum Marks – 50 Cridits: 02 Curse outcomes: U BOT-683

Objectives:

1. To understand the biochemical constituents of the plant cell.
2. To characterize the biological impacts of different biomolecules on plants
3. to learn an understanding of the methods of biochemical analysis.
4. To understand the technique sequencing.

Course outcomes

1) Students are able to characterize the biological.
2) Able to learn methods of biochemical analysis
3) Able to analyze biochemical constituents of the plant cell

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UNIT -I: BASIC BIOCHEMISTRY (10 L)**:**

1 **.**Introduction of different organic constituents of the cell;
2. Introduction and Biological functions of :
   i. Carbohydrates
   ii. Lipids
   iii. Proteins
   iv. Nucleic acids
3. Importance of essential oils, resins, tannins, alkaloids, organic acids, gums and mucilage.

UNIT -II: MINERAL NUTRITION (12 L)**:**

1. Essential elements**:** Major elements (macro nutrients), trace elements (micro nutrients),

2. Physiological role of essential elements (functions and deficiency symptoms). phytosederophores
3. Mineral salt absorption: Introduction, mechanism of passive absorption (ion exchange theory), active absorption (carrier concept theory).
4. Translocation of organic solutes: Introduction, direction of translocation, mechanism of translocation (Munch hypothesis, protoplasmic streaming theory)

UNIT – III: ENZYMOLOGY (12 L):

1. Introduction, nomenclature and classification (IUB).
2. Properties of enzymes.
3. Mechanism of mode of enzyme action (lock and key model, induced fit model)
4. Factors affecting enzyme activity
5. Concept of holoenzyme, apoenzyme, co-enzymes and co-factors.
6. Abzyme
7. Ribozyme

UNIT – IV BIOINFORMATICS (11L):

1. Introduction
2. History
3. Biological Databases
   i. protein databases
   ii. Nucleic acid databases
4. Bioinformatics applications.

SUGGESTED READINGS :

1. Gill P.S. (2000) - Plant Physiology, S.Chand & Co. New Delhi

2. Verma V. (1995) - Text book of Plant Physiology, Emkay Publication N.Delhi

3. Salisbury P.B. & W. Ross (1992) - Plant Physiology , New York Pub. Co. California USA

4. Subhash Chandra Dutta (1992) - Plant Physiology, Wiley Eastern, New Delhi

5. Shrivastava H.S.(2000) - Plant Physiology, Rastogi Publication, Meerut

6. Shrivastava H.S. (1993) - Elements of Biochemistry Rastogi Publication, Meerut

7. Rastogi (2000) - Biochemistry Tata McGraw Hill, New York

8.Biochemistry by Mathews C.F. (2003) - Addison Wesley, New Delhi

9. Jayaraman J. (1992) - Laboratory Manual in Biochemistry, Wiley Eastern Ltd., New Delhi

10. Bioinformatics Methods and Applications, R.S.Rastogi, Namita Mendiratta, P. Rastogi, PHI pvt.LTD

RAJARSHI SHAHU MAHAVIDYALAYA, LATUR

B.Sc. Third Year
Semester – VI
(MCQ + Theory Pattern)

BOTANY
Theory Paper-XII Plant pathology –II **(DSE)**

Periods – 45 Maximum Marks – 50 Cridits:02 Curse outcomes: U BOT-684

Objectives:

1. To understand the aerobiology as a science and its applications
2. To know the sampling techniques used in aerobiology.
3. To learn identification of selected pollen and fungal spores.
4. To know the relationships between aerobiology and human health.
5. To understand strategies for identifying and detecting plant pests and pathogens.
6. To identify major challenges associated with preventing and managing different types of pathogens and pests.
7. To understand principles of plant disease control.
8. To study the seed borne pathogens and the techniques of their detection.

Course outcomes

1) Able to assess relationship between.
2) Able to use different techniques for pathogen detection.
3) Able to identify major challenges associated with preventing and managing different types of pests.

UNIT-I: AEROBIOLOGY AND SEED PATHOLOGY (10 L)

1. Aerobiology- Definition, scope and importance
2. Disease forecasting.
3. Seed pathology-Definition,
   i. Seed borne pathogens (external and internal).
   ii. Detection of seed borne pathogens by blotter paper and agar plate methods.
   iii. Seed treatment (hot water, solar, chemical,)
   iv. Seed certification

UNIT-III: PLANT DISEASES-I (12 L)

Symptoms, causal organisms, disease cycle and control measures of

1. Tikka disease of groundnut,
2. White rust of Mustard,

3. Loose smut of Wheat,
4. Rust of Jowar,
5. Grain smut of Jowar,
6. Leaf curl of tomato.

UNIT-IV: PLANT DISEASES-II (13L)

Symptoms, causal organisms, disease cycle and control measures of

1. Downy mildew of Grape,
2. Stem rust of Wheat,
3. Wilt of Tur,
4. Late blight of Potato,
5. Powdery mildew of pea
6. Papaya mosaic
7. Root Knot of vegetables

UNIT –IV: DEFENCE MECHANISM AND PLANT DISEASE MANAGEMENT (10 L)

1. Structural defense (pre existing and post infectional)
2. Biochemical defense- pre existing and postinfectional (phytoalexins)
3. Exclusion and eradication,
4. Chemical control-General account of Sulphur, Copper, systemic fungicides and antibiotics,
5. Integrated pest management
6. Biological control

SUGGESTED READINGS :

1.Pathak, Khatri, Pathak, 2003, *Fundamentals of plant pathology*, Agrbios

2. Mehrotra, R.S. 1991, *Plant Pathology*, Tata Mc Graw Hill Co.Delhi

3. Chattergee, P.B., 1997,*Plant Protection Techniques*, Bharati Bhawan, Publ. Patana

4. Agrios, G.N. 2006-*Plant Pathology*, Elsevier Academic Press.

5. Pandey, B.P.2009, *Plant Pathology*, S.Chand Co.

6. Dickinson, M.2008,-*Molecular Plant Pathology* ,Bios Scientific Publishers, London

7. Trigiano, Windham and Windham, 2003, *Plant pathology , Concepts and laboratory exercises.* CRC Press London

8. Gupta, G.P.,2004, *Text book of plant diseases*, Discovery Publ.House ,New, Delhi

9. Aneja, K.R. 2001, *Experiments in Microbiology,plant pathology, tissue culture and Mushroom production technology*, New Age International Publishers.

10. Dubey, R.C.,Maheshwari, D.K. 2005, *Practical Micrbiology*,S.Chand & CO.

11. Singh, R.S.2004, *Plant Diseases*, Oxford & IBH Publishing Co. Pvt. Ltd., Delhi.
12. Rangaswami,G.,Mahadevan,A.,2002, *Diseases of Crop plants of India* ,Prantice Hall of India.

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RAJARSHI SHAHU MAHAVIDYALAYA, LATUR

B. Sc. Third Year
Semester – VI
(MCQ + Theory Pattern)

BOTANY
Theory Paper-XII CYTOGENETICS (DSE)
Periods – 45 Maximum Marks – 50 Cridits:02 Curse outcomes: U BOT-684 A

Objectives:

1. To understand the cell structure, function and different aspects of cytogenetical studies.

2. To study importance of plants and inculcate the importance of farming based

3. To reveal the different aspects of plant breeding.

4. To provide platform to develop the investigation abilities by using biological tools.

5. To provide training in scientific and transferable skills through modular lecture courses.

6.To provide basic knowledge to be able to sustain in upcoming green revolution.

Credit: I (12L)

1. Cell division: Mitosis and Meiosis.

2 .Concept of Gene: Allele, Multiple allele, Pseudoallele, Complementation test.

3. Mendelian Principles: Dominance, Segregation and Independent assortment.

4. Extensions of Mendelian Principles: Codominance, Incomplete dominance,Gene interaction, Pleiotropy, Genomic imprinting, Penetrance, Expressivity and Phenocopy.

Credit II: (12L)

1.Microbial genetics: Mapping of bacterial genome by interrupted mating.

2. Mutation: Types, causes and detection, Mutant types-lethal , Conditional, Biochemical, Gain of function, Loss of function, Germinal vs somatic mutant, Insertional mutagene.

3. Linkage and mapping in eukaryotes: Linkage and crossing over, Sex linkage , Sex limited and sex influenced characters.Recombination: homologous and non-homologous includ- -ing transposition,

Credit III: (11L)

. 1. Extra chromosomal inheritance: Inheritance of mitochondria and chloroplast genes, Maternal inheritance and its effect.

2 Quantitative genetics- Introduction to complex traits, Polygenic inheritance. Heritability & its measurement, QTL Mapping.

3.Structural alterations of chromosomes: Deletion, Duplication, Inversion, Translocation, Complex translocation heterozygotes, Robertsonian translocations, BA translocations and their genetic implications.

4. Numerical alterations of chromosomes: Euploidy and aneuploidy and their genetic implications.

Credit IV: (10L)

1**.** Linkage maps, Lod score for linkage testing, Mapping by 3 point test cross, Mapping by tetrad analysis in Yeast and Neurospora,mapping with molecular markers, Mapping by using somatic cell hybrids, Development of mapping population in plants.

2. Karyotypes and genetic disorders.

Selected Readings:

1. Atherly, A.G., Girton, J.R. and Mcdonald, J. F. (1999) The science of genetics. Sauders College Pub. Fort Worth USA.

2. Burnham, C.R.(1962) Disscussions in cytogenetics. Burgess Pub. Co., Minnesota.

3. Hartl, D.L., Jones E.W.(2001). Genetics: Principle and analysis (4th edn) Jones and Barlett Pub., USA.

4. Khush, G S (1973) Cytogenetics of Aneuploids. Academic press New York, London.

5. Lewin, B. Genes VIII. Oxford, University press. New York, USA.

6. Russel, P.J. 1998. Genetics (5th edn).The Benjamin/ Cummins Pub. Co., Inc. USA.

7. Snustad, D.P. and Simmons, M.J. 2000. Principles of genetics (4th edn). John Wiley and Sons, Inc., USA.

8. Freifelder, D. (1987) Microbial Genetics.

9. Strickberger, M.W: Genetics (4th edn). Mcmillan Publishing company, New York.

10. Griffiths, A.J.F. and Gilbert, W.M (2nd edn). Modern genetic analysis. W.H. Freeman and Company, New york.

11. Singh, B.D.(2005). Plant breeding: principles and methods. 7th edn.

12. Allard, R.W.(1960). Principles of plant breeding.John Wiley and sons, Inc., New York.

13. Chopra, V.L. (2000) Plant breeding: Theory and practice 2nd edn. Oxford & IBH Pub., Co., Ltd. New Delhi.

14. Jain, H.K. and Kharwal, M.C.(2003) Plant breeding: Mendelian to molecular Approaches. Navrosa Publishing House Pvt. Ltd., New Delhi.

15. Mandal, A.K. Ganguli, P.K., Banergee, S.P. (1991). Advances in Plant breeding.Vol 1 and 2, CBS Pub.& distributors.

RAJARSHI SHAHU MAHAVIDYALAYA, LATUR

B. Sc. Third Year
Semester – VI
(MCQ + Theory Pattern)
BOTANY
SEC -IV: Basics in Horticulture

Periods – 45 Maximum Marks – 50 Cridits:02 Curse outcomes: U BOT-

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Objectives

- To promote the importance of horticulture
- To promote educational and training opportunities and encourage the development in horticulture
- To promote food and ornamental plant production
- To provide employment opportunities, often in rural areas.
- To improve the environment.
- To provide one of the main leisure pursuits - gardening

Credit – I

1. Definition – Horticulture – scope and importance of horticultural crops.
2. Nutritive value of horticultural crops.
3. Division and classification of horticultural crops.

Credit – II

1. Definition – propagation, merits and demerits and propagation methods.
2. Seed propagation – merits and demerits.
3. Importance of seed treatments, sowing and seedling establishment.

Credit - III

1. Vegetative propagation – merits and demerits.
2. Propagation through cuttings – merits and demerits.
3. Propagation through layering – merits and demerits.
4. Propagation through grafting – merits and demerits.
5. Propagation through budding – merits and demerits.

Credit – IV

1. Protected cultivation – Principles and special structure used for propagation.
2. Mist chamber and their maintenance.
3. Poly house and their maintenance.
4. Shade net house and their maintenance.
5. Green house and their maintenance.

Practical

1. Study of Horticultural tools and implements used for various operations.

2. Preparation of pot mixture, potting and repotting.

3-6 Practicing propagation methods- Cutting, layering Budding and grafting.

7. Pruning practices in horticultural crops.

8. Preparation and use of growth regulators.

9. Disease management in horticultural crops.

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RAJARSHI SHAHU MAHAVIDYALAYA, LATUR
B. Sc. Third Year
Semester – VI
BOTANY
Lab. Course-VI
(Based on theory paper - XI)

Periods – 45 Maximum Marks – 50 Cridits:02 Curse outcomes: U BOT-685

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1. Estimation of Starch using colorimeter/ Spectrophotometer from given material.

2. Estimation of Glucose using colorimeter/ Spectrophotometer from given material.

3 Estimation of Protein using colorimeter/ Spectrophotometer from given material.

4. Estimate the percentage of oil content in given oilseeds using Soxhlet extractor.

5. Identify the amino acids in a mixture and find out the RF value.

6. Study of catalase activity under different pH

7. Study of catalase activity under different temperature

8. Micro chemical Carbohydrate (Molisch /Fehlings /Benedict's) Glucose, sucrose, starch, Cellulose, Pectin

9. Micro chemical tests for cutin, Latex, Lignin, Tannin Lipid, fats & oils.

10. Micro chemical Test of organic acids – Tartaric acid, Citric acid, Oxalic and Malic acid

11. Micro chemical Test for proteins (Biuret/ Xanthoproteic/ Millon tests)

12. Study of acid phosphatase activity from fruits.

13.Estimation of chlo-a and b from leaf extracts.

Botanical Excursions (one Short excursion and one Long excursion and Visits to laboratories / companies/factory etc

RAJARSHI SHAHU MAHAVIDYALAYA, LATUR

B. Sc. Third Year
Semester – V
BOTANY
Lab. Course- VI

(Based on theory paper - XII) CYTOGENETICS (DSE)

Periods – 45 Maximum Marks – 50 Cridits:02 Curse outcomes: U BOT-686 A

1.Preparation of stains, Fixatives, preservatives and pretreatments to plant material .

2.Problems on determination of blood grouping

3.Problems based on Multiple alleles.

4.Problems based on Gene mapping.

5.Problems based on linkage.

6.Study of meiotic configuration from suitable plant material.

7.Study of chromosomal aberrations in irradiated plant material .

8.Study of Polygenic inheritance.

9.Problems of Mendelian inheritance and estimation of gene frequencies and heterozygotic frequencies, population genetics and Linkage.

10.Neurospora tetrad analysis.

11.Linear differentiation of chromosomes through banding techniques such as C-Banding,G-Banding and Q-Banding.

12.Floral Biology, study of Pollen Viability, germination in vitro and staining of any two major crops.

15.Use of Colchicine for induction of polyploidy in appropriate plant material.

N.B: 1)Any ten Practicals
2) Several Short Excursions and Atleast one Long Excursion

RAJARSHI SHAHU MAHAVIDYALAYA,LATUR

B.Sc. Third Year
Semester – V
BOTANY
Lab. Course- VI

(Based on theory paper - XII) Pathology II (DSE)

Periods – 45 Maximum Marks – 50 Cridits:02 Curse outcomes: U BOT-686

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1. Isolation of fungal pathogens from diseased plant parts.
2. Isolation and identification of seed borne pathogens by blotter/ agar plate method.
3-4. Study of air borne pathogens by exposed petri plates/ air sampler.
5-6. Study Effect of fungicide on spore germination by hanging drop technique.
7-8. Study of symptoms and causal organism of Stem rust of Wheat.
9-10. Study of symptoms and causal organism of Late blight of Potato and Downey mildew of Grapes.
11. Study of symptoms and causal organism of Tikka disease of Groundnut.
12-13. Study of symptoms and causal organism of Rust if Jowar and Grain smut of Wheat.
14. Study of symptoms and causal organism of Loose smut of Wheat.
15. Study of symptomology and causal organism of White rust of Mustard.
16. Study of symptoms and causal organism of Wilt of Tur.
17. Study of symptoms and causal organism of Powdery mildew of Pea.
18-19. Study of symptoms and causal organisms of Papaya mosaic and Root knot of Vegetables.
20. Study of plant protectants.
21.To determine air borne pathogens from crop field

22. Botanical excursions-**Several local and at least one long excursion.(Each local excursion is equal to 1-2 practicals and long excursion is equal to 3-4 practicals.**

N.B: 1)Any ten Practicals from above mentioned list.

SKELETON OF QUESTION PAPER
B.Sc. Second Year

Semester – V & VI

Theory Paper-IX, X, XI and XII

Time*: 1.30 hours* ***Maximum Marks: 30***

Note: (i) Attempt all questions.
(ii) Draw neat and well labeled diagrams wherever necessary.

Q1. Attempt all of the following (Each 3 marks) 12

a)
b)
c)
d)

Q2. Attept any ONE of the following 08

a)
b)

Q3. Attept any ONE of the following 10

a)
b)

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RAJARSHI SHAHU MAHAVIDYALAYA, LATUR

(Autonomous)

B.Sc.III PRACTICAL EXAMINATION IN BOTANY

SEE WINTER/SUMMER

Time: Three Hours ***Maximum Marks: 30***

Note: - (i) Attempt all questions.

(ii) Draw neat and well labeled diagrams wherever necessary.

Q. 1. Long answer type question. 15

Q. 2. Short answer type question. 10

Q. 3. Viva- Voce. 05

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S.N.Shinde
Chairman
Board of Studies in Botany
Rajarshi Shahu Mahavidyalaya (Autonomous),
Latur

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