

SHIVAJI UNIVERSITY, KOLHAPUR



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(2014) with CGPA 3.16

**Faculty of Interdisciplinary studies
Structure, Scheme and Syllabus for
Bachelor of Vocation (B. Voc.)**

Sustainable Agriculture Management

Part III- Sem. V & VI

(Subject to the modifications that will be made from time to time)
Syllabus to be implemented from June, 2020 onwards.

SHIVAJI UNIVERSITY, KOLHAPUR
STRUCTURE AND SYLLABUS OF B. Voc.
Bachelor of Vocation (B. Voc.)
Sustainable Agriculture Management

TITLE	: B. Voc. Part. III (Degree) Syllabus (Semester Pattern) Under Faculty of Interdisciplinary studies
YEAR OF IMPLEMENTATION	: Syllabus will be implemented from academic year 2020-2021
DURATION	: B. Voc. Part I, II and III (Three Years) : B. Voc. Part I - Diploma (One Year) NSQF Level 5 : B. Voc. Part II - Advanced Diploma (Second Year) NSQF Level 6 : B. Voc. Part III – Degree (Third Year) NSQF Level 7
PATTERN OF EXAMINATION	: Semester Pattern
• Theory Examination –	At the end of semester as per Shivaji University Rules
• Practical Examination –	i) In the 1 st , 3 rd and 5 th semester of B. Voc. there will be internal assessment of practical record, related Report submission and Project reports at the end of semester. ii) In the second semester of B. Voc. I, there will be internal practical examination at the end of semester. iii) In the 4 th and 6 th semester of B. Voc. there will be External practical examination at the end of semester.
MEDIUM OF INSTRUCTION	: English
STRUCTURE OF COURSE	: B. Voc. Part – I, II and III Two Semesters per Year Two General Papers per year / semester Three Vocational Papers per Year / Semester Three Practical papers per Year / Semester One Project/Study Tour/ Survey/Industrial Visit/Internship/Industrial training
SCHEME OF EXAMINATION:	

A) THEORY:

- The theory examination shall be at the end of the each semester.
- All the general theory papers shall carry 40 marks and all vocational theory papers shall carry 50 marks.
- Evaluation of the performance of the students in theory shall be on the basis of semester examination as mentioned above.

- Question paper will be set in the view of entire syllabus preferably covering each unit of the syllabus.
- **Nature of question paper for Theory examination**
- **A) For skill component papers: Total marks: 50**
 - Q. No. 1: Multiple choice questions (ten questions) ($1 \times 10 = 10$ marks)
 - Q. No. 2: Long answer type questions (any two out of four) ($2 \times 10 = 20$ marks)
 - Q. No. 3: Short Notes (any four out of six) ($4 \times 5 = 20$ marks)
- **B) For General education Component Papers: Total marks: 40**
 - Q. No.1: Multiple choice questions (eight questions) ($1 \times 8 = 8$ marks)
 - Q. No.2: Long answer type questions.
(any two out of four) ($2 \times 10 = 20$ marks)
 - Q. No.3: Short Notes (any three out of five) ($4 \times 3 = 12$ marks)

B) PRACTICAL:

Evaluation of the performance of the students in practical shall be on the basis of semester examination. (Internal assessment at the end of Semester I, II and III and V and external examination at the end of Semester IV and VI as mentioned separately in each paper.

Standard of Passing:

As per the guidelines and rules for B. Voc. (Attached Separately – Annexure I)

STRUCTURE OF THE COURSE:

B. Voc. - III Semester- V

Sr. No	Paper No.	Title	Theory /Practical/ Project	Marks (Total)	Distribution of Marks	
					Theory	Practical
General Education Component :						
1.	XXXVII	Green Technology & Sustainable Development	Theory /Practical	50	40	10
2.	XXXVIII	Forest Biodiversity and Ecosystem	Theory /Practical	50	40	10
Skill Component :						
3.	XXXIX	Farm Power and Machinery	Theory	50	50	-
4.	XL	Plant Breeding	Theory	50	50	-
5.	XLI	Vegetable Crop Production	Theory	50	50	-
6.	XLII	Laboratory Work: Farm Power and Machinery	Practical	50	-	50
7.	XLIII	Laboratory Work: Plant Breeding	Practical	50	-	50
8.	XLIV	Laboratory Work: Vegetable Crop Production	Practical	50	-	50
9.	XLV	Project / Nursery /Forest visit / Nursery training	--	50	-	50

B. Voc. – III Semester- VI

Sr. No	Paper No.	Title	Theory /Practical/ Project	Marks (Total)	Distribution of Marks	
					Theory	Practical
General Education Component :						
1.	XLVI	Computer and its Application in Agriculture	Theory/ Practical	50	40	10
2.	XLVII	Weed and Weed Management	Theory/ Practical	50	40	10
Skill Component :						
3.	XLVIII	Landscape Designing	Theory	50	50	-
4.	XLIX	Plant Biochemistry	Theory	50	50	-
5.	L	Fruit: Plantation, Production & Harvesting	Theory	50	50	-
6.	LI	Laboratory Work: Landscape Designing	Practical	50	-	50
7.	LII	Laboratory Work: Plant Biochemistry	Practical	50	-	50
8.	LIII	Laboratory Work: Fruit: Plantation, Production & Harvesting	Practical	50	-	50
9.	LIV	Project / Biotechnology lab. Visit	--	50	-	50

Scheme of Teaching: B. Voc. - Part III Semester – V

Sr. No	Paper No	Titles	Distribution of Workload (Per Week)		
			Theory	Practical	Total
1.	XXXVII	Green Technology & Sustainable Development	4	2	6
2.	XXXVIII	Forest Biodiversity and Ecosystem	4	2	6
3.	XXXIX	Farm Power and Machinery	4	-	4
4.	XL	Plant Breeding	4	-	4
5.	XLI	Vegetable Crop Production	4	-	4
6.	XLII	Laboratory Work: Farm Power and Machinery	-	4	4
7.	XLIII	Laboratory Work: Plant Breeding	-	4	4
8.	XLIV	Laboratory Work: Vegetable Crop Production	-	4	4
9.	XLV	Project / Nursery /Forest visit / Nursery training	-	-	-
Total--			20	16	36

Scheme of Teaching: B. Voc. - Part III Semester - VI

Sr. No	Paper No	Titles	Distribution of Workload (Per Week)		
			Theory	Practical	Total
1.	XLVI	Computer and its Application in Agriculture	4	2	6
2.	XLVII	Weed and Weed Management	4	2	6
3.	XLVIII	Landscape Designing	4	-	4
4.	XLIX	Plant Biochemistry	4	-	4
5.	L	Fruit: Plantation, Production & Harvesting	4	-	4
6.	LI	Laboratory Work: Landscape Designing	-	4	4
7.	LII	Laboratory Work: Plant Biochemistry	-	4	4
8..	LIII	Laboratory Work: Fruit: Plantation, Production & Harvesting	-	4	4
9	LIV	Project / Biotechnology lab. Visit	-	-	-
		Total--	20	16	36

Eligibility for Admission:

10 +2 from any faculty or equivalent Diploma / Advanced Diploma in any related Stream.

Eligibility for Faculty:

- 1) M.Sc. in Agriculture / Horticulture / Agriculture Economics / Agri-Business Management / Botany / Agriculture Engineering with NET / SET/ Ph.D. with 05 years of experience in the Relevant field.
- 2) M.A, M.Com./MBA/MCA with SET/NET/Ph.D. for General Component Syllabus

Eligibility for Laboratory Assistant:

B.Sc. in Agriculture / Botany or Diploma in the relevant field.

Staffing Pattern:

One Assistant Professor for three years (purely on contractual basis). Assistant Professors on CHB basis and Visiting faculty as per the need of workload and requirement may be appointed.

Subject wise credit assignment for B. Voc. – Part III, Semester – V

Sr. No.	Paper No.	Titles	Theory/ Practical/ Project	Marks (Total)	Distribution of Marks		Credits	
					Theory	Practical	Theory	Practical
1.	XXXVII	Green Technology & Sustainable Development	Theory/ Practical	50	40	10	3	2
2.	XXXVIII	Forest Biodiversity and Ecosystem	Theory/ Practical	50	40	10	3	2
3.	XXXIX	Farm Power and Machinery	Theory	50	50	--	3	--
4.	XL	Plant Breeding	Theory	50	50	--	3	--
5.	XLI	Vegetable Crop Production	Theory	50	50	--	3	--
6.	XLII	Laboratory Work: Farm Power and Machinery	Practical	50	--	50	--	3
7.	XLIII	Laboratory Work: Plant Breeding	Practical	50	--	50	--	3
8.	XLIV	Laboratory Work: Vegetable Crop Production	Practical	50	--	50	--	3
9.	XLV	Project / Nursery /Forest, visit / Nursery training	--	50	--	50	--	2

Subject wise credit assignment for B. Voc. –Part III, Semester – VI

Sr. No.	Paper No.	Titles	Theory/ Practical/ Project	Marks (Total)	Distribution of Marks		Credits	
					Theory	Practical	Theory	Practical
1.	XLVI	Computer and its Application in Agriculture	Theory/ Practical	50	40	10	3	2
2.	XLVII	Weed and Weed Management	Theory/ Practical	50	40	10	3	2
3.	XLVIII	Landscape Designing	Theory	50	50	--	3	--
4.	XLIX	Plant Biochemistry	Theory	50	50	--	3	--
5.	L	Fruit: Plantation, Production & Harvesting	Theory/ Practical	50	50	--	3	--
6.	LI	Laboratory Work: Landscape Designing	Practical	50	--	50	--	3
7.	LII	Laboratory Work: Plant Biochemistry	Practical	50	--	50	--	3
8.	LIII	Laboratory Work: Fruit: Plantation, Production & Harvesting	Practical	50	--	50	--	3
9.	LIV	Project / Biotechnology lab. Visit	--	50	--	50	--	2

* For Project/Industrial visit /study tour /Excursion /internship, the workload includes self-study outside of class hours i.e.4 lectures per week.

B. Voc. Part-III, Semester - V
Sustainable Agriculture Management
Paper No: XXXVII
Green Technology & Sustainable Development.

Work Load – 6
Theory – 4 Lectures / Week
Practical – 2 Lectures / Week/Batch

Total Marks – 50
Theory – 40 Marks
Practical – 10 Marks

Objectives:

- To present different concepts of green technologies.
- To acquire principles of Energy efficient technologies.
- To learn the importance of green fuels and its impact on environment.

UNIT 1: Impact and Introduction of Green Technology.

- 1.1 Definition, Importance, Impact on promoting green technology.
- 1.2 Need, Aim, scope, Goal of green technology.
- 1.3 Limitation of green technology.
- 1.4 Principles of Green Technology.

UNIT 2: Biogas and Biofuel.

- 2.1 Classification of biofuels, liquid and gaseous.
- 2.2 Application to the production of biogas from waste & solid substrates.
- 2.3 Cattle manure, municipal organic waste, sewage sludge.
- 2.4 Processes for the production of liquid biofuels.

UNIT 3: Energy Sources.

- 3.1 Conventional and Non-conventional energy sources.
- 3.2 Solar Energy-solar energy conversion technologies and devices, their principles, and application.
- 3.3 Commercial energy sources.
- 3.4 Major environmental problems related to the conventional and non- conventional energy resources.

UNIT 4: National Policies of Green Technology.

- 4.1 National policies for green development.
- 4.2 Draft National Energy Policy, Government of India.
- 4.3 Environment policy of India.
- 4.4 Green growth development agenda.

Reference Books:-

1. Green Technologies - Soli J. Arceivala, Mc Graw Hill Education.
2. Handbook of Organic Waste Conversion - Bewik M.W.M.
3. Non-conventional Energy Sources - Rai G.D.
4. Waste Energy Utilization Technology - Kiang Y. H.
5. Energy- The Solar Hydrogen Alternative- Bokris J.O.
6. Biogas technology transfer & diffusion –M.M. El Halwagi.
7. The Biogas Handbook: Science, Production and Applications - Wellinger, J. D Murphy, D. Baxter.

Practicals:

1. Biogas model setting.
2. Biofuel resources.
3. Maintenance of biofuel and biogas.
4. Organize a management by becoming a manager.
5. Microbe strain for biogas generation.
6. Workshop planning to train farmers.
7. Field visit to a biomethanation plant.
8. Study of biogas unit.

Scheme of Practical Evaluation:**Internal Practical Evaluation:**

Q.1: Any one of the practical above

5 marks

Q.2: Oral and Journal

5 marks

B. Voc. Part-III, Semester - V
Sustainable Agriculture Management
Paper No: XXXVIII
Forest Biodiversity and Ecosystem

Work Load – 6
Theory – 4 Lectures / Week
Practical – 2 Lectures / Week/Batch

Total Marks – 50
Theory – 40 Marks
Practical – 10 Marks

Objectives:

- To identify the different types of biodiversity.
- To describe the importance of biodiversity.
- To discuss and reflect on the strategies developed and used to protect biodiversity.
- Discuss the threats towards biodiversity.

UNIT 1: Biodiversity Patterns.

- 1.1 Definition, Types, Spatial patterns: latitudinal and elevational trends in biodiversity, temporal patterns: seasonal fluctuations in biodiversity patterns.
- 1.2 Sampling strategies and surveys: floristic, faunal, and aquatic, qualitative and quantitative methods: scoring, habitat assessment, richness, density, frequency, abundance, evenness, diversity, biomass estimation.

UNIT 2: Importance of Biodiversity.

- 2.1 Economic values.
- 2.2 Ecological services - primary productivity.
- 2.3 Ecosystem services.
- 2.4 social, aesthetic, consumptive, and ethical values of biodiversity.

UNIT 3: Ecosystem Ecology.

- 3.1 Types of ecosystem: forest, grassland, estuarine, marine, desert, wetlands; ecosystem.
- 3.2 structure and function of abiotic and biotic components of ecosystem, ecosystem metabolism.
- 3.3 ecological pyramids: pyramids of number, biomass, and energy.

UNIT 4: Biogeochemical Cycles and Nutrient Cycling

- 4.1 Carbon cycle, nitrogen cycle, phosphorus cycle.
- 4.2 Sulphur cycle, hydrological cycle, nutrient cycle models
- 4.3 Ecosystem input of nutrients, biotic accumulation, ecosystem losses
- 4.4 Nutrient use efficiency; nutrient budget; nutrient conservation strategies.

Reference Books.

1. Essentials of forest management – Balakrat. S., 1986, Nataraj Pub. Dehra Dun (India).
2. Global Biodiversity: Earth's Living Resources in the 21st Century- Groom. B. & Jenkins. M
3. Fundamentals of Ecology- Odum, E.P.
4. The Biological Diversity Crisis- Wilson, E.O.
5. Biodiversity: An Introduction - Gaston, KJ. & Spicer, J.I.
6. An Advanced Text Book of Biodiversity - Principles and Practices- Krish. K.V Oxford

Practicals:

1. Field study in ecology from any one of the following bio-geographical area (coastal/forest/wetlands) with report submission and field viva voce
2. Study tour of three week duration in the respective part of India. To familiarise the students with the fauna, flora and other research activities of Research institute, forest industries, Govt. and private organizations of different parts of respective states/ part of India. To expose the students to various national / heritage monuments as part of national integration activity.

Scheme of Practical Evaluation:**Internal Practical Evaluation:**

- | | |
|-------------------------------------|---------|
| Q.1: Any one of the practical above | 5 marks |
| Q.2: Oral and Journal | 5 marks |

B. Voc. Part-III, Semester - V
Sustainable Agriculture Management
Paper No: XXXIX
Farm Power and Machinery

Work Load
Theory – 4 Lectures / Week

Total Marks – 50

Objectives:

- To acquaint and equip with the latest design procedures of farm power and machinery systems.
- To acquaint with principles of farm machineries and their working.
- To equip the students with sufficient theoretical knowledge and practical skills about farm power and tractor power.

Unit 1: Farm Power and Tractors:

- 1.1 Farm power in India - sources, IC engines
- 1.2 Working principles, two stoke and four stoke engines, IC engine terminology, and different systems of IC engine
- 1.3 Tractors – types and utilities.

Unit 2: Tillage and Tillage Machinery:

- 2.1 Tillage – ploughing methods – primary tillage implements.
- 2.2 Mould board, disc plough and chisel plough.
- 2.3 Secondary tillage implements – cultivators, harrows and rotovators
- 2.4 Wetland equipment – peddlers, trammers and cage wheels.

Unit 3: Sowing, Planting and Intercultural Equipment:

- 3.1 Sowing methods. Seed drills, seed cum fertilizer drills. Paddy transplanters - nursery requirements.
- 3.2 Implements for intercultural operations. Wet land, dry land and garden land intercultural tools
- 3.3 Equipment for land development and soil conservation. Cost of operation of farm machinery. Tractor and implement selection.

Unit 4: Plant Protection Gadgets, Harvesting Machinery and Horticulture Tools:

- 4.1 Plant protection equipment.
- 4.2 Harvesting tools and equipments - reapers and combine.
- 4.3 Harvesting machinery for groundnut, tuber crops and sugarcane.
- 4.4 Tools for horticultural crops.

Reference Books:

1. A Text Book of Farm Machinery- Senthilkumar, T., R. Kavitha and V.M. Duraisamy.
 2. Elements of Agricultural Engineering - Jagadishwar Sahay.
 3. Principles of Agricultural Engineering Vol I- Ojha, T.P and A.M. Michael.
 4. Farm Machinery and Equipment: - Nakra C.P 1970.
 5. ELEMENTS OF FARM MACHINERY - Sricastava, A.C.
- www.agricoop.nic.in/dacdivision/Machinery/directory.htm
www.farmmachineryshow.org

B. Voc. Part-III, Semester - V
Sustainable Agriculture Management
Paper No: XL
Plant Breeding

Work Load
Theory – 4 Lectures / Week

Total Marks – 50

Objectives:

- To enable students to develop varieties with better characteristics in higher yield, Disease resistance, Flood resistance.
- To develop varieties with better characteristics in Early to mature, Resistance to alkaline and saline soil conditions, Better quality, Drought resistance.

UNIT 1: Plant Breeding

- 1.1 Definition, history of plant breeding, aims and general objective of plant breeding
- 1.2 Land marks of plant breeding
- 1.3 Indian plant breeders
- 1.4 General objectives of plant breeding, major achievements, Future Prospects

UNIT 2: Self-incompatibility, Male sterility

- 2.1 Definition, classification
- 2.2 Features, utilization of self-incompatibility in plant breeding
- 2.3 Definition, Classification/types, Genetic MS, Thermo sensitive Genetic MS.
- 2.4 Chemical Hybridizing Agents

UNIT 3: Breeding Methods

- 3.1 Breeding Methods in self pollinated crops.
- 3.2 Definition, purpose, types, primary and secondary, advantages &disadvantages
- 3.3 Breeding in cross pollinated crops, its types and its procedure.
- 3.4 Hybridization techniques- Definition, aim and objectives, types of hybridization.

UNIT 4: Mutation and Heterosis

- 4.1 Definition of mutation breeding, applications, its merits, demerits and achievements.
- 4.2 Definition of haploid, monoploid, diploid, polyploid, genome, heteroploidy, aneuploidy, euploidy, types of aneuploidy
- 4.3 Definition, heterosis and hybrid vigour, effects and estimation of heterosis, genetic basis/theories of heterosis

Reference Books:-

1. Plant Breeding Principles and Methods - B. D. Singh.
2. Essentials of Plant Breeding - Phundansingh Kalyani.
3. Principles and Practices Plant Breeding-J. R. Sharma.
4. Plant Breeding Theory and Practices - V. L. Chopra.
5. Introduction to Plant Breeding - R. C. Choudhary.
6. Elementary Principles of Plant Breeding- R. C. Choudhary.

B. Voc. Part-III, Semester - V
Sustainable Agriculture Management
Paper No: XLI
Vegetable Crop Production

Work Load
Theory – 4 Lectures / Week

Total Marks – 50

Objectives:

- Demonstrate proficiency in the cultural and management considerations of successful sustainable vegetable crops production.
- To prepare students to successfully grow vegetables for commercial vegetable production
- Be familiar with vegetable crops environmental modification.
- Be familiar with successful vegetable crops harvest and marketing.

UNIT 1: Vegetable

- 1.1 Introduction to Vegetable Industry
- 1.2 Vegetable Growing Principles
- 1.3 Greenhouse Vegetables
- 1.4 Root & Tuberous Crops: Sweet Potato & Irish Potato

UNIT 2: Vegetable crops

- 2.1 Solanaceaeous Crops
- 2.2 Root Crops- Onions and Allium species
- 2.3 Cole Crops- Cucumber and Cucurbit Vegetables

UNIT 3: Vegetable Management

- 3.1 In brief -origin, area, production, improved varieties.
- 3.2 Cultivation practices such as time of sowing, sowing, transplanting techniques, planting distance
- 3.3 fertilizer requirements, irrigation, weed management, harvesting, storage, disease and pest control.

UNIT 4: Vegetable Marketing.

- 4.1 Post Harvest Handling
- 4.2 Direct Marketing – Farmers Markets; Local / Community Food Programs
- 4.3 Multistoried cropping
- 4.4 Seed production of important vegetables

Reference Books:-

- 1 Vegetables B. Choudhary
- 2 Vegetable Crops T. K. Bose, M. G. Som and T. Kabir
- 3 Vegetable, Tuber and Spices S.Thamburaj
- 4 Production technology of vegetable crops S. P. Singh
- 5 Vegetables – Production Technology -Haldavnekar, P.C.; Parulekar, Y.R., Mali, Haldankar.

B. Voc. Part-III, Semester - V
Sustainable Agriculture Management
Paper No: XLII

Laboratory Work: Farm Power and Machinery

Work Load

Marks- 50

Practical- 4 lectures / Week / Batch

Practicals:

1. Introduction to various farm machines & equipments used on the farm.
2. Study of different weeding equipments and their uses.
3. Study of sprayers and dusters and measurements of nozzle discharge.
4. To study construction details adjustments and working of cultivator.
5. To study construction details adjustments and working of rotavator.
6. To study construction details adjustments and working of Disc Harrow.
7. To study construction details adjustments and working of Plough.
8. Tractor driving, operation, maintenance & servicing.
9. To study different agriculture power machinery use by farmers.
10. Project on agriculture machinery in Kolhapur region.

Scheme of Practical Evaluation:

Internal Practical Evaluation:

Q.1: Perform any two practical from the above

20 marks

Q.2: Practical record book

20 marks

Q.3: Viva – voce

10 marks

B. Voc. Part-III, Semester - V
Sustainable Agriculture Management
Paper No: XLIII
Laboratory Work: Plant Breeding

Work Load
Practical- 4 lectures / Week / Batch

Marks- 50

Practicals

1. Study of floral structure of self pollinated crops.
2. Study of floral structure of cross pollinated crops.
3. Prediction of performance of double cross hybrids.
4. Emasculation and hybridization techniques in self pollinated crops: Green gram, Black gram, Rice, Wheat, Groundnut, Soybean,
5. Emasculation and hybridization techniques in cross pollinated crops: Maize, Sunflower, Papaya, Sugarcane,
6. Study of male sterility system.
7. Handling of segregation populations.
8. Methods of calculating mean, range, variance, standard deviation, heritability
9. Designs used in plant breeding experiment
10. To work out the mode of pollination in a given crop and extent of natural out crossing

Scheme of Practical Evaluation:

Internal Practical Evaluation:

Q.1: Perform any one practical from the above	20 marks
Q.2: Practical record book	20 marks
Q.3: Viva – voce	10 marks

B. Voc. Part-III, Semester - V
Sustainable Agriculture Management
Paper No: XLIV

Laboratory Work: Vegetable Crop Production

Work Load-

Practical- 4 lectures / Week / Batch

Marks- 50

Practicals:

1. Identification of vegetables crops and their seeds (Solanaceae, Cucurbits, Okra)
2. Identification of vegetables crops and their seeds (Leguminous, leafy)
3. Nursery raising 6 direct seed sowing and transplanting
4. Study of morphological characters of different vegetables
5. Study of morphological characters of different spices
6. Fertilizers applications 10 Propagation and raising of nursery of vegetables
7. Propagation and raising of nursery of spices
8. Vegetables & spices seed extraction
9. Harvesting & preparation for market of vegetables
10. Economics of vegetables cultivation 16 Economics of spices cultivation

Scheme of Practical Evaluation:

Internal Practical Evaluation:

- | | |
|---|----------|
| Q.1: Perform any two practical from the above | 20 marks |
| Q.2: Practical record book | 20 marks |
| Q.3: Viva – voce | 10 marks |

B. Voc. Part-III, Semester - V
Sustainable Agriculture Management
Paper No: XLV

Project / Nursery /Forest visit / Nursery training

Work Load-

Practical- 4 lectures / Week / Batch

Marks- 50

Students must submit detailed report related to topics on:

- 1) Green technology / Biodiversity / Ecosystem.
- 2) Based on Crop Nursery visit / Agriculture mall / Agriculture Exhibition.
- 3) Based on Nursery training

Note: Students should complete Nursery training for the required duration and submit report in the department where the training is completed.

Scheme of Report Evaluation:

Internal Evaluation:

- | | |
|----------------------------|----------|
| • Report related to above. | 40 marks |
| • Viva- voce | 10 marks |

B. Voc. Part-III, Semester - VI
Sustainable Agriculture Management
Paper No: XLVI

Computer and its Application in Agriculture

Work Load – 6
Theory – 4 Lectures /Week
Practical – 2 Lectures /Week/Batch

Total Marks – 50
Theory – 40 Marks
Practical – 10 Marks

Objectives:

- To enable students to develop skills of the basic operations of a computer system.
- To use computer applications software to solve problems.
- To evaluate the object based classification with respect to urban land use and land cover

UNIT 1: Introduction to Computer

- 1.1 Introduction, Characteristics, History & Evolution, Organization of Computers, Concept of Hardware & Software.
- 1.2 Applications of Computers in Various Fields, Computer Hardware and Software.
- 1.3 Computer Languages

UNIT 2: MS- Office

- 2.1 Introduction to MS-Office
- 2.2 MS-word-Introduction, Menus, Shortcuts, Document types, working with Documents, formatting, creating tables, tools etc.
- 2.3 MS-Excel- Introduction, Spread sheet application, Menus, Tool bars and icons.
- 2.4 MS-Power Point (15) Introduction, Opening new presentation, Presentation templates, presentation layout, Creating Presentation.

UNIT 3: Remote Sensing Application in Agriculture-I

- 3.1 Crop Identification, Crop production forecasting.
- 3.2 Horticulture, Cropping Systems Analysis, Soil mapping
- 3.3 Identification of planting and harvesting dates
- 3.4 Identification of pests and disease infestation
- 3.5 Irrigation monitoring and management

UNIT 4: Remote Sensing Application in Agriculture-II

- 4.1 Climate change monitoring
- 4.2 Water resources mapping
- 4.3 Collection of past and current weather data
- 4.4 Determination of water content of field crops
- 4.5 Crop health analysis

Reference Books:-

- 1) Remote Sensing: Techniques in Agriculture - D.D. Sahu
- 2) Applications of Remote Sensing in Agriculture - M. D. Steven, J. A. Clark
- 3) UAV or Drones for Remote Sensing Applications: Felipe Gonzalez Toro, Antonios Tsourdos
- 4) Microsoft Office 2010 Bible- WILEY.
- 5) Microsoft Office-Word 2007 inside out Microsoft Press Publication.

- 6) Microsoft Office-Excel 2007 inside out Microsoft Press Publication.
- 7) Computer Fundamentals by P.K. Sinha and Priti Sinha.
- 8) Computer fundamentals by Rajaraman.

Practicals:

1. MS-Word - Creating & Editing Document. Formatting Document. Use of Auto-text, Autocorrect, Spelling and Grammar Tool. Page Formatting, Page Border, Background,
2. MS-Excel - Creating & Editing Worksheet, Fill Handle. Use Formulas and Functions. Preparing Charts
3. MS-PowerPoint - Creating, Manipulating & Enhancing Slides. Inserting Organizational Charts, Excel Charts. Using Word Art

Scheme of Practical Evaluation

Internal Practical Evaluation

- Q.1: Creating folder, cut, copy, paste, managing file and folder in windows. Arrange icons, set display properties 5 marks
or
Creating, Manipulating & Enhancing Slides.

- Q.2: Journal 5 marks

B. Voc. Part-III, Semester - VI
Sustainable Agriculture Management
Paper No: XLVII
Weed and Weed Management

Work Load – 6
Theory – 4 Lectures /Week
Practical – 2 Lectures /Week/Batch

Total Marks – 50
Theory – 40 Marks
Practical – 10 Marks

Objectives:

- To familiarize the students about the weeds, herbicides.
- To familiarize the students about different methods of weed control.

Unit 1: Weed

- 1.1 Definition, classification and general characteristics of weeds, Advantages and disadvantages of weeds
- 1.2 Crop-weed competition including allelopathy
- 1.3 Principles and methods of weed control and classification

Unit 2: Herbicides

- 2.1 Herbicides introduction and history of their development
- 2.2 classification based on chemical, physiological application and selectivity
- 2.3 mode and mechanism of action of herbicides.

Unit 3: Weed management

- 3.1 Weed management in major crops and cropping systems
- 3.2 parasitic weeds; weed shifts in cropping systems
- 3.3 aquatic and perennial weed control
- 3.4 Degradation of herbicides in soil and plants; herbicide resistance in weeds and crops, herbicide rotation.

Unit 4 Weed cost-benefit

- 4.1 Integrated weed management system and its importance
- 4.2 Weed management in major cereals, pulses, oilseeds, fibre and forage crops;
- 4.3 Problematic weeds and their control -Parthenium, Cynodon.
- 4.4 cost : benefit analysis of weed management

Reference Books:-

- 1) Principles in Weed Management - Aldrich RJ & Kramer RJ. 1997
- 2) Mode of Action of Herbicides - Ashton FM & Crafts AS
- 3) Sustainable Weed Management- Singh HP, Batish DR & Kohli RK. 2006
- 4) Winning the war on weed – John Moody.
- 5) Principals of weed – V.S. Rao.
- 6) Weed Control – Nicholas, Nilda, O. Duke.
- 7) Recent Advances in weed Management -Rakesh Deosharan Singh, Rakesh Kumar Sud.

Practicals:

1. Identification of important weeds of different crops.
2. Preparation of a weed herbarium.
3. Weed survey in crops and cropping systems
4. Crop-weed competition studies
5. Preparation of spray solutions of herbicides for high and low-volume sprayers
6. Use of various types of spray pumps and nozzles and calculation of swath width
7. Economics of weed control
8. Herbicide resistance analysis in plant and soil
9. Bioassay of herbicide resistance
10. Calculation of herbicide requirement

Scheme of Practical Evaluation:**Internal Practical Evaluation:**

- | | |
|-------------------------------------|----------|
| • Visit to Crop field – weed survey | 05 marks |
| • Journal & Oral | 05 marks |

B. Voc. Part-III, Semester - VI
Sustainable Agriculture Management
Paper No: XLVIII
Landscape Designing

Work Load
Theory – 4 Lectures / Week

Total Marks - 50

Objectives:

- To know the importance of landscape gardening in India.
- To know the different types of gardens.
- To study about lawns & Bonsai.

Unit 1: Introduction of Landscaping

- 1.1 Definition of Landscaping.
- 1.2 Importance and scope of landscaping
- 1.3 Principles of landscaping

Unit 2: Garden

- 2.1 Garden definition, styles and types, terrace gardening, vertical gardening
- 2.2 Garden components, adornments, lawn making, rockery, water garden.
- 2.3 Walk-paths, bridges, other constructed features etc
- 2.4 Gardens for special purposes

Unit 3: Trees & Climbers

- 3.1 Trees: selection, propagation, planting schemes
- 3.2 Canopy management, shrubs and herbaceous perennials
- 3.3 Selection, propagation, planting schemes, architecture
- 3.4 Climber and creepers: importance, selection, propagation, planting.
- 3.5 Garden plants: palms, ferns, grasses and cacti succulents.
Pot plants: selection, arrangement, management.

Unit 4: Bio-aesthetic planning

- 4.1 Definition, need, planning
- 4.2 Landscaping of urban and rural areas landscaping, Landscaping of schools, public places like bus station, railway station, townships, river banks, hospitals, play grounds, airports, industries, institutions
- 4.3 Bonsai: principles and management.
- 4.4 Lawn: establishment and maintenance.
- 4.5 CAD application.

Reference Books:-

- 1) Complete Gardening in India – Gopalswamiengar
- 2) Complete Home Gardening – Dey, S.C.
- 3) Floriculture and Landscaping – Bose, T.K.
- 4) Floriculture and Landscaping – Deshraj
- 5) Floriculture in India – Randhawa and Mukhopadhyay
- 6) Introduction to Landscaping, Designing, Construction and Maintenance – Ronald J.Biondo and Charles B. Schroder
- 7) Landscape Gardening & Design with Plants – Supriya Kumar Bhattacharjee
- 8) Landscaping principles and practices – Jack E. Ingels

B. Voc. Part-III, Semester - VI
Sustainable Agriculture Management
Paper No: XLIX
Plant Biochemistry

Work Load
Theory – 4 Lectures / Week

Total Marks – 50

Objectives:

- Students should be able to demonstrate advanced knowledge and understanding in Protein, enzymes, lipids etc.
- Research and present orally contemporary biochemical topics.

Unit 1: Introduction- Carbohydrates

- 1.1 Introduction, scope and importance in agriculture.
- 1.2 Carbohydrates - Definition, Classification, Chemistry and Structural formula of saccharides
- 1.3 Glucose, fructose, Galactose, Sucrose. Lactose.
- 1.4 Starch & Cellulose

Unit 2 Proteins & Amino acids

- 2.1 Proteins: Definition, Classification, Composition, Properties, Primary and secondary structure and its important functions
- 2.2 Definition Classification, important properties and their nutritional significance

Unit 3: Lipids

- 3.1 Definition, Classification, important common saturated and unsaturated fatty acids found in fats and oils and structural formula.
- 3.2 Saturated fatty acids - Butyric, caproic, palmitic and stearic acid.
- 3.3 Unsaturated fatty acids – oleic, linolenic, erucic acid.

Unit 4: Enzymes, Vitamins

- 4.1 Definition, nomenclature and function and factors affecting of enzyme activity.
- 4.2 Vitamins: Definition Classification and their sources, biochemical functions.
- 4.3 Structural formula of vitamin A, D, E, K, Thiamine, Riboflavin and Nicotinic acid.

Reference Books:

- 1) Biochemistry and Molecular Biology of Plants (2015) Buchanan, Gruissem and Jones
- 2) Plant Physiology, Biochemistry and Biotechnology- S K Verma and Mohit Verma
- 3) Plant Biotechnology: The Genetic Manipulation of Plants -Adrian Slater and Nigel W Scott
- 4) The New Frontiers in Plant Biochemistry (Advances in Agricultural Biotechnology)” by T Akazawa and T Asahi
- 5) Introduction to Protein structure – Carl Branden, Tooze.
- 6) Principals of Biochemistry – Laurence, Moran.
- 7) Molecular Biology of Cell – Bruce Alberts.

B. Voc. Part-III, Semester - VI
Sustainable Agriculture Management
Paper No: L

Fruit: Plantation, Production & Harvesting.

Work Load

Total Marks – 50

Theory – 4 Lectures / Week

Practical – 2 Lectures / Week

Objectives:

- To study about different disease of fruit, plantation, medicinal & aromatic crops.
- To develop skills on various control measures of disease.
- To understand the loss caused by various disease, their eco-biology, in details on different Fruits.

UNIT 1: Fruits Plantations

- 1.1 Fruit plantation techniques.
- 1.2 Importance, scope and present position of fruit plantation.
- 1.3 High density planting, Use of root stocks.
- 1.4 Special Horticulture practices

UNIT 2: Fruit Production

- 2.1 Production techniques of plantation crops: Coconut, Cashew nut, Tea, Coffee.
- 2.2 Diseases of fruit plants
- 2.3 Practices involved in the production of fruits: Mango, Guava, lime, Banana, Grape, Papaya, Ber, Jack Fruit, Apple

UNIT 3: Fruit Harvesting

- 3.1 Pre-harvest factors affecting postharvest quality and Maturity
- 3.2 Importance of fruits and possible causes of post-harvest losses
- 3.3 Ripening and changes occurring during ripening
- 3.4 Heat, chilling & freezing injury

UNIT 4: Methods of Preservation

- 4.1 Drying/ Dehydration of fruits - Concept and methods, osmotic drying
- 4.2 Canning - Concepts and Standards
- 4.3 Packaging of products

Reference Books:-

1. Handbook of Horticulture ICAR publication
2. Tropical and Subtropical Fruit crops -T.K. Bose
3. Fruit Culture in India -Sham Singh
4. Fruits - Ranjit Singh
5. Physiology of Fruit Production - Amar Singh
6. Coconut –Thumpan.
7. Advance s in Horticulture - K.L. Chadha.
8. Temperate fruits - Mitra, Thakur and Bose.
9. Introduction to spices and Plantation crops- N. Kumar.
10. Plantation Crops - J.S. Pruthi.

B. Voc. Part-III, Semester - VI
Sustainable Agriculture Management
Paper No: LI
Laboratory Work: Landscape Designing

Work Load-

Practical- 4 lectures / Week / Batch

Marks- 50

Practicals:

1. Identifications and propagation of annual, herbs and shrubs
2. Identifications and propagation of climbers, creepers and perennials
3. Identifications and propagation palms, ferns, grasses, cacti and succulents
4. Planning, designing and layout of formals and informal gardens
5. Planning, designing and layout special gardens.
6. Study of different potting mixtures, soilless cultures and preparation of potted plants
7. Maintenance and repairs of potted plants
8. Planting and Maintenance of Lawn
9. Irrigation and nutrient management in Landscape garden
10. Practicing terrarium gardens and vertical garden
11. Development and Maintenance of topiary
12. Practicing flower Arrangement
13. Bonsai Practicing and training
14. Canopy Management in ornamentals shrubs and perennials
15. Visit to Landscape gardens.

Scheme of Practical Evaluation:

Internal Practical Evaluation:

- | | |
|---|----------|
| Q1: Visit to a Gardens and submit assignment on it. | 20 Marks |
| Q2: Make a Report of Garden Visit | 20 marks |
| Q3: Oral | 10 marks |

B. Voc. Part-III, Semester - VI
Sustainable Agriculture Management
Paper No: LII
Laboratory Work: Plant Biochemistry

Work Load-
Practical- 4 lectures / Week / Batch

Marks- 50

Practicals:

1. Qualitative test of important sugars in plants.
2. Estimation of reducing and non reducing in sugar cane juice and jaggery.
3. Quantitative determination of protein in pulses and fats and oils in oil seeds.
4. Estimation of Ca as CaO and CaCO₃ in plant HCl extract.
5. Qualitative test of important proteins in plants.

Scheme of Practical Evaluation

Internal Practical Evaluation

Q.1: Perform any one practical from the above	20 marks
Q.2: Practical record book	20 marks
Q.3: Viva – voce	10 marks

B. Voc. Part-III, Semester - VI
Sustainable Agriculture Management
Paper No: LIII

Laboratory Work: Fruit: Plantation, Production & Harvesting.

Practical- 4 lectures / Week / Batch

Marks- 50

Practicals:

1. Identification of fruits and plantation crops.
2. Orchard layout and planting.
3. Practice of different propagation methods with special reference to fruits.
4. Practice of training and pruning of fruit plants.
5. Plant protection practices.
6. Visit to orchards, nurseries and research centres of fruits and plantation crops.
7. Preparation of practical record.

Scheme of Practical Evaluation

Internal Practical Evaluation

Q1: Perform any one practical from the above	20 marks
Q2: Preparation of practical record.	20 marks
Q3: Oral	10 marks

B. Voc. Part-III, Semester - VI
Sustainable Agriculture Management
Paper No: LIV
Project / Biotechnology lab. / Agri.-Mall Visit

Work Load-

Practical- 4 lectures / Week / Batch

Marks-50

Students must submit detailed report related to topics on:

1) Types of weeds / Agricultural apps. / Tissue culture lab visit.

Or

2) Based on Landscape designing / Fruit survey.

Scheme of Report Evaluation:

Internal Evaluation:

Q.1. Report related to above.

40 marks

Q.2. Viva- voce

10 marks
