Accredited by NAAC with 'A' grade
with CGPA 3.16

CREDIT BASED SYSTEM

Faculty of Inter-Disciplinary Studies

Structure, Scheme and Syllabus
for

Bachelor of Vocation
in
Sustainable Agriculture

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

SHIVAJI UNIVERSITY, KOLHAPUR

Structure, Scheme and Syllabus of B.Voc. (Sust. Agri.)

TITLE OF PROGRAMME : B. Voc.(Sustainable Agriculture) Part-III (B.Voc. Degree) Under Faculty of Inter-Disciplinary Studies (IDS)

YEAR OF IMPLEMENTATION : Syllabus will be implemented from July, 2020

DURATION : B. Voc. Part III (One Year)

NATURE OF AWARD : Awards are to be given at each stage as per the cumulative credits awarded to the learners as shown in the following table :

Course/Awards	Normal Duration	General Education Credit	Skill Component Credit	Total Credit for Award	NSQF Level
Certificate	One Semester	12	18	30	4
Diploma	Two Semester	24	36	60	5
Advanced Diploma	Four Semester	48	72	120	6
B.Voc. Degree	Six Semester	72	108	180	7

PATTERN OF EXAMINATION : Semester Pattern

- Theory Examination : At the end of semester as per Shivaji University Rules
- Practical Examination :
  i) In the 1st,3rdand 5th 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 4th and 6th 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 Semester Per Year
Two General Papers per year / semester Three Vocational Papers per Year / Semester Three Practical papers per Year / Semester One Project / Industry Visit/ Study Tour / Survey

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 Core Theory examination. (50 Marks)
  i. There will be seven questions carrying equal marks.
  ii. Students will have to solve any five questions.

Q. No. 1: Multiple choice selection, True or False, Match with Appropriate (10 Marks)
Q. No. 2 to Q. No. 6 : Long answer type questions Attempt any Three (30 Marks)
Q. No. 7: Short Notes, Two out of Three (10 Marks)

- Nature of question paper for General Theory examination (40 Marks)
  i. There will be seven questions carrying equal marks.
  ii. Students will have to solve any five questions.

Q. No. 1: Multiple choice selection, True or False, Match with Appropriate (8 Marks)
Q. No. 2 to Q. No. 6 : Long answer type questions Attempt any Three (24 Marks)
Q. No. 7: Short Notes, Two out of Three (8 Marks)

B .PRACTICAL: (For 3 Core subject Practical 50 Marks and For 2 General subject Practical 10 Marks)

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.

C. STANDARD OF PASSING:

The standard of passing with minimum grade points will be as per the guidelines and rules of UGC – NSQF. The details are as follows

Letter Grade	Grade Point
O (Outstanding)	10
A+ (Excellent)	9
A (Very Good)	8
B+ (Good)	7
B (Above Average)	6
C (Average)	5
P (Pass)	4
F(Fail)	0
Ab (Absent)	0

A student obtaining Grade F shall be considered failed and will be required to reappear in the examination.

D.SCHEME OF PRACTICAL EVALUATION

Evaluation of General Subject-10Marks

Que.1- Report submission	05 Marks
Que.2-Viva/Journal /ppt./ Seminar presentation	05 Marks

Evaluation of Core Subject-50Marks

Que.1-Spotting	15 Marks
Que.2-Short note/long answer	15 Marks
Que.3-journal	05 Marks
Que.4-Field work/ visit Report	10 Marks
Que.5-Viva/Oral	05 Marks

B. Voc – Part III, Semester – V

Sr No	Paper No	Title	Marks (Total)	Distribution of Marks		Credits	
				Theory	Practical	Theory	Practical
	I. General Education Components						
1	XXXVII	Principles of Agribusiness Management	50	40	10	3	2
2	XXXVIII	Tissue Culture	50	40	10	3	2
	II. Skill Education Components						
3	XXXIX	Principles of Organic Farming	50	50	--	3	--
4	XXXX	Principles of Soil Science, Soil, Water, Plant Fertilizer Analysis	50	50	--	3	--
5	XXXXI	Commercial enterprises	50	50	--	3	--
6	XXXXII	Lab.Work-Principles of Organic Farming	50	--	50	--	3
7	XXXXIII	Lab Work-Principles of Soil Science, Soil, Water, Plant Fertilizer Analysis	50	--	50	--	3
8	XXXXIV	Lab work-Commercial enterprises (Module)	50	--	50	--	3
9	XXXXV	Project / Field Work (Sustainable Agriculture & Organic Farming)	50	--	50	--	2

B. Voc – Part III, Semester – VI

Sr No	Paper No	Title	Marks (Total)	Distribution of Marks		Credits	
				Theory	Practical	Theory	Practical
	I. General Education Components						
1	XXXXVI	Govt. Policies and Programmes Related to Agriculture	50	40	10	3	2
2	XXXXVII	Computer hardware and networking	50	40	10	3	2
	II. Skill Education Components						
3	XXXXVIII	Agro Meteorology	50	50	--	3	--
4	XXXXIX	Farming System Approach for Sustainable Crop Production	50	50	--	3	--
5	XXXXX	Landscape Designing and Indoor Gardening	50	50	--	3	--
6	XXXXXI	Lab work- Agro Meteorology	50	--	50	--	3
7	XXXXXII	Lab work-Farming System Approach for Sustainable Crop Production	50	--	50	--	3
8	XXXXXIII	Lab work-Landscape Designing and Indoor Gardening	50	--	50	--	3
9	XXXXXIV	RAWE & AIA Programme (Rural Agricultural Work Experience and Agro-Industrial Attachment)	50	--	50	--	2

Scheme of Teaching

B. Voc. – Part III, Semester – V

Sr No	Paper No.	Title	Distribution of Workload (Per Week)		
			Theory	Practical	Total
I. General Education Components					
1	XXXVII	Principles of Agribusiness Management	4	2	6
2	XXXVIII	Tissue Culture	4	2	6
II. Skill Education Components					
3	XXXIX	Principles of Organic Farming	4	--	4
4	XXXX	Principles of Soil Science, Soil, Water, Plant Fertilizer Analysis	4	--	4
5	XXXXI	Commercial enterprises	4	--	4
6	XXXXII	Lab work-Principles of Organic Farming	--	4	4
7	XXXXIII	Lab work-Principles of Soil Science, Soil, Water, Plant Fertilizer Analysis	--	4	4
8	XXXXIV	Lab work-Commercial enterprises (Module)	--	4	4
9	XXXXV	Project / Field Work (Sustainable Agriculture & Organic Farming)	--	--	--
		Total	20	16	36

B. Voc. – Part III, Semester – VI

Sr No	Paper No.	Title	Distribution of Workload (Per Week)		
			Theory	Practical	Total
I. General Education Components					
1	XXXXVI	Govt. Policies and Programmes Related to Agriculture	4	2	6
2	XXXXVII	Computer hardware and networking	4	2	6
II. Skill Education Components					
3	XXXXVIII	Agro Meteorology	4	--	4
4	XXXXIX	Farming System Approach for Sustainable Crop Production	4	--	4
5	XXXXX	Landscape Designing and Indoor Gardening	4	--	4
6	XXXXXI	Lab work-Agro Meteorology	--	4	4
7	XXXXXII	Lab work-Farming System Approach for Sustainable Crop Production	--	4	4
8	XXXXXIII	Lab work-Landscape Designing and Indoor Gardening	--	4	4
9	XXXXXIV	RAWE & AIA Programme (Rural Agricultural Work Experience and Agro-Industrial Attachment)	--	--	--
		Total	20	16	36

Shivaji University, Kolhapur
B. Voc. Part – III (Sustainable Agriculture)
Semester V
Paper – XXXVII
Principles of Agribusiness Management – Theory

Objectives-

. To familiarize with the fundamentals of information and communication management.
To understand entrepreneurship strategies.

UNIT 1

Information and communication management, Fundamentals of information and communication- solving agricultural problems with information systems- a managerial overview of information and communication, Information- characteristics, Information Vs Knowledge, ABC nature of information, Information as a crucial resource, Different channels of information - communication- Radio, TV, Video, E-mail, Network connecting devices- intranet, internet, Photography, basics -its use in ICM, Digital Photography -its advantages, Agricultural Information System - Agricultural databases - Definition and objectives, Decision Support system, Expert system, Remote Sensing - Geographic data and maps, Geographical information system.

UNIT 2

Management of agro based industries, Understanding entrepreneurship-need for EDP,entrepreneurial process, entrepreneurial traits and competence-dynamics of entrepreneurship. Agribusiness-concept, nature and scope of agri. Business-status-present role and future prospects, forms of agribusiness organizations-their advantages and disadvantages. Special economic zone-It's advantages and disadvantage. Preparing business plan-what is a business plan. Characteristics of a good business plan, elements of business plan, why some plans fail, licensing- government policies and sanction, certification and patent law. Agribusiness development, steps in setting up a small enterprise analysis of opportunities. Small business management, the process of management, organizing the enterprise.

UNIT 3

Financial accounting and manpower management, Basic principles of financial accounting. Basic principles of financial management- book keeping, accounting records, People management-man power planning, recruitment and selection, orientation, training and development, creating a positive work environment, building up a team of advisors, networking for entrepreneurs, employment regulations.

UNIT 4

Marketing management, Concept of marketing management - Marketing - new concept - business marketing - , holistic marketing - scope- marketing management process, Marketing mix- Market structure and Consumer buying behavior. Marketing environment- Responding to market environment. Marketing opportunities analysis - marketing management tasks, Marketing Planning Process. New product development process - Challenges in new product development, Organizational arrangements,

managing the development process, consumer adoption process. Marketing segmentation, Product, Brand, Selection of Market and product, Source of Information, Global Sourcing, Marketing intelligence. Basic principles of international trade, foreign exchange and export.

Agricultural Projects, Project concept- definitions- project approach to development,

Agricultural projects. Characteristics- relationship of projects with plans and programmes. Phases of project cycle- identification- formulation, appraisal- implementation- monitoring and evaluation- Risk in agricultural projects- methods of handling risk projects. Preparation of a model agricultural project.

References:

1. Drilon, Dr.J.D, 1971, Introduction to Agri-Business Management (Asian Productivity
Organization, Tokyo).
2. Developing Entrepreneurship, Asia pacific Theories and practices ASEED, New Delhi.
3. Alagumani ,T , Chinnaiyan, P and Elangovan, S . 1998. Agricultural Management .Publishers K9 International, Madurai
4. Reddy,S., Raghuram,P., Neelakantan,T.V and Bhavani Devi I.2004.Agricultural Economics. Oxford and IBH Publishers, New Delhi.
5. Reddy,Subba,S. and Raghu Ram.P. 1996. Agricultural Finance and Management. Oxford IBH, New Delhi.
6. Book Keeping and Accountancy.Choudhari, Chopde
7. Dahama.O.P. and O.P. Bhatnagar, 1980.Education and Communication for development, Oxford and IBH, New Delhi.
8. Fuller.R, 2000.Special Edition using MS Power point, McMillan Publishing Company,
USA.
9. Boctor.B.S., 2000. MS Office 2000-Microsoft Press Release, USA.
10. Chandrakanthan.K and Palanichamy.S., 2002. Advances in Communication Technology, Indian publishers and distributor, New Delhi.

Practical
Agribusiness Management

1. Solving agricultural problems with information system.
2. Agricultural databases - Definition and objectives, Decision Support system, Expert system, Remote Sensing - Geographic data and maps,

Geographical
information system.

3. Agribusiness development, steps in setting up a small enterprise analysis
4. Marketing management, Marketing Planning Process. & Networking for entrepreneurs.

Shivaji University, Kolhapur
B. Voc. Part – III (Sustainable Agriculture)
Semester V
Paper – XXXVIII
Tissue Culture - Theory

UNIT 1

Principles of Totipotency and Morphogenesis, Nutritional requirements of in-vitro cultures.

UNIT 2

Techniques of In-vitro cultures: Micro propagation, Anther culture, Pollen culture,
Ovule culture, Embryo culture, Test tube fertilization, Endosperm culture, Factors affecting above in-vitro culture; Applications and Achievements.

UNIT 3

Soma clonal variation, Types, Reasons: Somatic embryogenesis and synthetic seed production technology; Protoplast isolation, Culture, Manipulation and Fusion; Products of somatic hybrids and cybrids.

UNIT 4

Secondary plant metabolites-definition-their value as medicinal, aromatic and
industrial materials-plant cell and tissue culture as an alternative source of secondary and natural products. Tissue culture as a tool in genetic engineering. Applications in crop improvement.

References:

1. Chawla H S. 2003. Oxford & IBH Publishing Co. Pvt. Ltd. Chawla H. S. Introduction to Plant Biotechnology.
2. Brown, T.A. 1995. Gene cloning an Introduction (3rd edition). Chapman Hill, U.K.
3. Lehninger. 1993. Principles of Biochemistry. CBS Publications, New Delhi. Lewin, B. Genes VII. Oxford University Press, Inc., New York.
4. Watson, J.D., N.H. Hopkins, J.W. Roberts, J.A. Steits and A.M. Weiner. 1987. Molecular
5. Biology of the Gene. The Benjamin/Cummings Publishing Co. Inc. Menlo Park
6. Singh, B.D. 1998. Biotechnology. Kalyani Publications, New Delhi
7. Bhojwani, S.S. and Razdan, M.K. 1993. Plant Tissue Culture. Theory and Practice. Elsevier Science Publications, Netherlands.

Practical
Tissue Culture

1. Requirements for Plant Tissue Culture Laboratory.
2. Media components and preparations.
3. Preparation and sterilization of media.
4. Aseptic manipulation and inoculation of various explants.
5. Callus induction, subculturing and plant regeneration.
6. Micro propagation of important crops.
7. Demonstraion of Anther culture.

8. Demonstraion of embryo culture.
9. Hardening/ acclimatization of regenerated plants.

B. Voc. Part – III (Sustainable Agriculture.)
Semester V
Paper – XXXIX
Principles of Organic Farming – Theory

Objectives-

- To familiarize with the concept of sustainability and sustainable development.
- To acquaint with the fundamentals of organic farming.
- To have the knowledge about the organic certification procedures.

UNIT 1

The concept of sustainability and sustainable development-emerging issues- Sustainable agriculture- concept themes- differences between conventional, sustainable, and alternate agriculture- Various alternate agricultural systems- Conventional, sustainable, and alternate agriculture- Alternate agricultural systems- biodynamic farming, natural farming, organic farming, permaculture, homa farming, and other formslimitations- Modernization of agriculture and its relation to sustainability.
of soil productivity.

UNIT 3

Biological pest control: Biological agents -Mass multiplication and familiarization with field application, Different traps and pheromones for pest control. Biocontrol of weeds, diseases and insect pests, Sanitation, Tillage and cultivation, Mulching, Supplemental fertilization, Biorational pesticides, Foliar fertilization.

UNIT 4

Socio-economic impacts; Marketing and export potential - Current status of organic
farming - Initiatives in India and Maharashtra- National Programme for Organic Production National Standards for Organic Products (NSOP)-inspection and certification procedures.

References:

1. Ananthakrishnan, T.N. (ed.) 1992. Emerging Trends in Biological Control of Phytophagous insects.Oxford & IBH, New Delhi.
2. Chhonkar, P.K. and Dwivedi, B.S. 2004. Organic farming and its implications on India's
food security.Fertil. News 49(11): 15-18,21-28,31&38.
3. Gaur, A.C. 1982. A Manual of Rural Composting. FAO/UNDP Regional Project Document, FAO, Rome.
4. Howard, A. 1940. An Agricultural Testament. Oxford University, London. Lampin, N. 1990. Organic Farming. Farming Press Books, Ipswitch, U.K.
5. Palaniappan, S.P and Anandurai, K. 1999. Organic Farming- Theory and Practice, Scientific Pub., Jodhpur.
6. Reddy, M.V. (ed.) 1995.Soil organism and Litter decomposition in the Tropics. Oxford &IBH, New Delhi.
7. Singh, S.P. (ed.) 1994. Technology for Production of Natural Enemies, Project Directorate of Biological Control, Bangalore.
8. Trewavas, A. 2004. A critical assessment of organic farming and food assertions with
9. Trivedi, R.N. 1993. A Text Book of Environmental Sciences, Anmol Pub., New Delhi.
10. Veeresh, G.K., Shivashankar, K. and Singlachar, M.A. 1997. Organic Farming and Sustainable Agriculture, Association for Promotion of Organic Farming, Bangalore.
11. Woomer, PL. and Swift, M.J. 1994. The Biological Management of Tropical Soil Fertility,.S.B.F. & Wiley.

Shivaji University, Kolhapur
B. Voc. Part – III (Sustainable Agriculture.)
Semester V
Paper – XXXX
Principles of Soil Science, Soil, Water, Plant, Fertilizer Analysis – Theory

Unit – 1

History of soil fertility and plant nutrition. Soil as a source of plant nutrients, essential and beneficial nutrients and their role. Criteria of essentiality, forms of nutrients in soil. Introduction and importance of organic manures. Sources of organic matter, recycling, composition and C:N ratio. Definition, properties and classification of bulky and concentrated organic manures, their composition and nutrient availability. Preparation of FYM, composts, different methods of composting, decomposition process and nutrient losses during handling and storage.

Unit – 2

Vermicomposting, green manuring; types, advantages and disadvantages and nutrient availability. Sewage and sludge, Biogas plant slurry; their composition and effect on soil and plant growth. Integrated nutrient management; concept, components and importance. Fertilizer; Definition and their classification; N fertilizers: classification, manufacturing process and properties their fate and reaction in soils.

Unit – 3

Phosphatic fertilizers, manufacturing process and properties, classification, their fate and reaction in soils. Potassic fertilizers: classification, manufacturing process, properties, their fate and reaction in soils. Complex fertilizers their fate and reaction in the soil. Nano fertilizers. Secondary &micronutrient fertilizers: Types, composition, reaction in soil and effect on crop growth. Soil amendments. Handling and storage of fertilizers: Fertilizer control order. Mechanism of nutrient transport to plants: Factors affecting nutrient availability to plants.

Unit – 4

Measures to overcome deficiencies and toxicities. Chemistry of soil N,P, K, calcium, magnesium, sulphur and micronutrients. Soil fertility evaluation and different approaches. Soil Testing (Available nutrients) :Chemical methods and critical levels of different nutrients in soil. Plant analysis methods : Critical levels of nutrients, DRIS approach, rapid tissue test, indicator plants. Soil test based fertilizer recommendations to crops. Methods and scheduling of nutrient applications for different soils and crops grown under rain fed and irrigated conditions. Factors influencing nutrients use efficiency (NUE) in respect of N, P, K, S, Fe and Zn fertilizers.

Shivaji University, Kolhapur
B. Voc. Part – III (Sustainable Agriculture.)
Semester V
Paper – XXXXI
Commercial Enterprises

Objectives-

. To understand various commercial enterprises in agricultural sector through observation, field visits and presentation.

UNIT 1

Beekeeping -history and development. Honey bees- kinds of bees, biology-Hiving and domestication. Seasonal management of bees. Bee pasturage. Bee products-extraction, uses, composition and preservation. Diseases and enemies of honey bees and their control. Bee poisoning. Scope of apiculture in Maharashtra. Recent advances in apiculture research.

UNIT 2

Sericulture - history and development. Types of silkworms in India - morphology, biology, rearing of silkworms. Host plants and their cultivation. Diseases and enemies of silkworm and their control. Use of biotechnology in sericulture. Scope of sericulture in Maharashtra. Recent advances in sericulture research. Lac culture -behavior and development of lac insects. Different strains and their host plants. Inoculation, harvesting and processing of lac.Lac and its uses. Enemies of lac insect and their control. Scope for cultivating lac in Maharashtra. Recent advances in lac culture research.

UNIT 3

Mushroom cultivation, Importance of mushroom cultivation - definition of mushroom-its importance-present scenario of mushroom cultivation - general morphological features, taxonomy and identification of different mushrooms-poisonous, hallucinogenic and medicinal Mushrooms. Pure culture of mushrooms and their nutritional requirements. Definition of spawn, substrate for spawn, types of spawn, methods of spawn production, characteristic of a good spawn, storage of spawn. Cultivation of Agaricus species - composting - its formulation, casing, preparation of casing mixture, sterilization, cultivation of pleurotus, Volvariella, Lentinus, Calocybe and Auricularia. Different types of substrates, substrate preparation and sterilization, Spawning, methods of spawning, spawn run phase, cropping. Identification and management of different pests and diseases of mushrooms. Methods of harvesting mushrooms, post harvest treatments and preservation of mushrooms. Packing and processing - Different methods of processing, canning and dehydration. Nutritive value of mushrooms and preparation of different recipes.

UNIT 4

Commercial floriculture, Status and prospects of commercial cultivation of flowers.

Cultivation aspects of traditional and cut flowers - jasmine, crossandra, marigold, tuberose, gladiolous, heliconia etc. Protected cultivation of rose, gerbera, chrysanthemum etc. general concepts and practices. Commercial cultivation of orchid's and anthurium. Status and prospects of Maharashtra. Classification and varieties, planting material production, methods of planting, media components and management, shade regulation, irrigation, nutrition, plant protection, stage and method of harvest, postharvest handling and marketing. Economics of cultivation.

References:

1. David, B. V. and Kumarawami, T. 1978. Elements of Economic Entomology Popular Book Depot, Madras.
2. Ganga, G. and Sulochanachetty. 1999. An Introduction to Sericulture Second edition. IBMand Oxford Publishing Company, New Delhi.
3. Groul, R.A. 1963.The Hive and the Honeybee.Dadani and Sons.Inc. Illinois.
4. Krishnaswami, S., Narasimhanna, Suryanarayana and Kumararaj. 1991. FAO Manuals onMulberry Cultivation, silkworm rearing and silk reeling. IBM and Oxford Publishing Company, New Delhi.
5. Mishra, R. C. 1998.Perspectives in Indian Apiculture. Agro botanica, Bikaneer, Rajasthan

6. Sardar Singh. 1962. Bee Keeping in India. ICAR, New Delhi.
7. Chang, S. T. Miles, P. G. and Hays, W. A. 1978.The Biology and Cultivation of Edible Mushrooms. Academic Press, London.
8. Lulu Das. 2002. Mushroom Recipes. (Released in the VIII Biennial meeting of AICMIP).
9. Nair, M. C. 1995.Beneficial Fungi and TheirUtilization.Scientific publishers, New PaliRoad, Jodhpur.
10. Randhawa, G.S. and Mukhopadhyay, A. 1986.Floriculture in India. Allied publishers New Delhi.
11. Rogers, J. 1974.Flower arranging. Hamlyn, London.

Shivaji University, Kolhapur
B. Voc. Part – III (Sust. Agri.)
Semester V
Paper – XXXXII
Practical
Principles of Organic Farming

Objectives:

To familiarize with the production and utilization of biofertilizers and biocontrol

1. Preparation of enriched farm yard manure.
2. Coir pith composting.
3. Preparation of Vermicompost.
4. Study and field application of biofertilizers.
5. Raising green manure crops and cover crops.
6. Plant protection through bio-agents and traps.
7. Plant protection using pheromones.
8. Visit to urban waste recycling unit.
9. Study of profitable utilization of agricultural wastes.
10. Visit to poultry and dairy units to study resource allocation, utilization and economics.
11. Visit to an organic farm to study various components and utilization.
12. Raising of crops and ornamental nursery raising organically through nutrient, diseases

and pest management.

References:

1. Ananthakrishnan, T.N. (ed.) 1992. Emerging Trends in Biological Control of Phytophagous insects. Oxford & IBH, New Delhi.
2. Chhonkar, P.K. and Dwivedi, B.S. 2004. Organic farming and its implications on India's food security.Fertil. News 49(11): 15-18,21-28,31&38.
3. Gaur, A.C. 1982. A Manual of Rural Composting. FAO/UNDP Regional Project Document, FAO, Rome.
4. Howard, A. 1940. An Agricultural Testament. Oxford University, London. Lampin, N. 1990.
5.Palaniappan, S.P and Anandurai, K. 1999. Organic Farming- Theory and Practice, Scientific Pub., Jodhpur.
6. Reddy, M.V. (ed.) 1995.Soil organism and Litter decomposition in the Tropics. Oxford & IBH, New Delhi.
7. Singh, S.P. (ed.) 1994. Technology for Production of Natural Enemies, Project Directorate of Biological Control, Bangalore.
8. Trewavas, A. 2004. A critical assessment of organic farming and food assertions with
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11. Sustainable Agriculture, Association for Promotion of Organic Farming, Bangalore.
12 Woomer, PL. and Swift, M.J. 1994. The Biological Management of Tropical Soil Fertility,.S.B.F. & Wiley.

Shivaji University, Kolhapur
B. Voc. Part – III (Sustainable Agriculture.)
Semester V
Paper – XXXXIII
Practical
Principles of Soil Science, Soil, Water Plant Fertilizer Analysis

1. Principle and application of spectro-photometry / Colorimetry .
2. Principle and application of flame photometry and atomic absorption spectrophotometer (AAS).
3. Determination of moisture from organic manures and its preparation for nutrient analysis.
4. Determination of organic carbon from organic manures by ignition method.
5. Estimation of available nitrogen in soil (Alkaline permanganate method)
6. Estimation of available phosphorus in soil.
7. Determination of available potassium in soil using flame photometer.
8. Determination of exchangeable Ca& Mg in soil by EDTA method.
9. Estimation of available sulphur in soil (Turbidity method).
10. Estimation of DTPA extractable micronutrients from soil using AAS.
11. Estimation of total N from plant sample by Micro Kjeldahl's method.
12. Plant analysis for P,K, secondary and micronutrients.
13. Fertilizer adulteration test / identification of adulteration in fertilizer / Detection of adulteration in fertilizers (Rapid test).
14. Determination of nitrate nitrogen content of potassium nitrate.
15. Determination of water soluble phosphorus in superphosphate (Pumberton method).
16. Determination of acid soluble phosphorus from rock phosphate.

17.Determination of total potassium content of muriate of potash (flame photometer).
18. Determination of zinc content from micronutrient fertilizer (EDTA Method).

Shivaji University, Kolhapur
B. Voc. Part – III (Sustainable Agriculture.)
Semester V
Paper – XXXXIV
Practical
Commercial Enterprises (Module) –

Objectives-

- To develop awareness on bee keeping, sericulture and lac culture through observation, field visit and reporting.
- To develop skill in cultivation of edible mushrooms and to develop skill in dry flower production and bouquet making.

1. Different types of bees and bee equipments.
2. Handling of bee colonies.
3. Extraction and processing of honey.
4. Visit to apiaries.
5. Identification of silkworms
6. Laboratory rearing of mulberry silkworms and visit to rearing units.
7. Protected cultivation of vegetable crops.
8. Value addition milk products
9. Identification of common edible and poisonous mushrooms.
10. Preparation of substrates for mushroom cultivation.
11. Mushroom cultivation (Oyster, Paddy straw, Button, etc.)
12. Visit to a commercial mushroom production unit.
13. Methods of harvesting mushrooms.
14. Poultry farming .
15. Green house / Poly house technology

Shivaji University, Kolhapur
B. Voc. Part – III (Sustainable Agriculture)
Semester V
Paper –XXXXV
Project/ Field Work (Sustainable agriculture and organic farming)

Objectives-

- To acquaint with organic cultivation of vegetables

Main field preparation, transplanting, nutrient management, water management, and plant protection aspects by allotting each student 5 cent land for setting up of a organically grown vegetable field in a sustainable way.

Shivaji University, Kolhapur
B. Voc. Part – III (Sustainable Agriculture)
Semester VI
Paper – XXXXVI
Government Policies and Programmes Related to Agriculture - Theory

Objectives-

- To acquaint with various Government Policies related to Agriculture in Maharashtra and India.
- To familiarise with five year plans and Panchayathiraj system in India.

UNIT 1 - Introduction to agricultural policies

Introduction to agricultural policies of Maharashtra and of India - need and importance - National Agricultural Policy in brief.

UNIT 2 –

Agricultural policies regarding land and labour Agricultural policies regarding land - need and scope for land reforms - Abolition ofintermediaries - Tenancy reforms - Ceiling on land holdings - appraisal of land reforms.-Sizepattern of operational holdings, problem of sub-division and fragmentation of holdings.Agricultural policies regarding labour - present position of agricultural labour - minimum
wages - abolition of bonded labour - Recommendations of the National Commission on Rural Labour – NREGP.Agricultural policies regarding seeds and fertilizers - Agricultural policies regarding seeds - National Seeds Policy -varietal development and plant variety protection – seed production - quality assurance - seed distribution and marketing - infrastructure facilities - transgenic plant varieties - import of seeds and planting material - export of seeds -promotion of domestic seed industry Agricultural policies regarding fertilizers.Fertilizer pricing policy - payment of subsidy. Agricultural policies regarding plantprotection chemicals - pesticide production and consumption in India - protection ofconsumers from adverse impacts of

pesticides. Agricultural policies regarding irrigation,machinery, technology etc.

UNIT 3 - Agricultural policies regarding credit Agricultural policies regarding credit - Co-operatives and rural credit - Commercial banks and rural credit - Regional Rural Banks - Lead Bank Scheme - NABARD. Agricultural policies of Maharashtra and of India- regarding agricultural products and their marketing, export and prices - food security.

UNIT 4 - Five Year plans and Panchayathiraj

Concept of planned growth- Five Year Plans-Government policies and programs in agriculture and rural development. IADP - IAAP- IWDP- Watershed development Programmes- IRDP-NREGP- SGSY - etc. Peoples' Plan- Decentralised planning- current Plans - Agricultural development programmes and schemes of the dept. of Agriculture-liaison with Local Self Government. Panchayati raj system and institutions- gramasabha-Preparation of plan projects in agriculture.

References:

1. Government of India. Five year Plan Documents.
2. Government of India.Economic Survey. Published by Planning Commission (various issues)
3. Government of India.Economic Review. Published by State Planning Board (various issues)

Shivaji University, Kolhapur
B. Voc. Part – III (Sustainable Agriculture)
Semester VI
Paper – XXXXVII
Computer Hardware & Networking - Theory

Objectives-

- Understand the hardware components of a system.
- Understand basic issues in installing and using software.
- Understand how a network functions and the issues of network security.

UNIT 1- Basics of Computer and Hardware

Input & Output Devices, their types and specifications, CPU, Memory devices- types primary and secondary, BIOS/ CMOS setting.
Study of Motherboard RAM,ROM,CMOS,POST, BUS, (Address, Data, SYSTEM), Connections of various devices such as Display Adapter, Ports (Serial, Parallel) , Modem on the Mother Board, Importance of CPU cooling, Motherboard troubleshooting.

UNIT 2 - Storage Devices

HDD: HDD types, integrated, SCSI, Magnetic recording, Formatting (Track, Sector) Cluster, Bad Sector, Jumper Setting, Common Problem and its trouble Shooting, External Drive (HDD), Optical Drives. FDD: FDD types and working and its related problem, CD and DVD drives- ROM and Writer, USB Devices, Hub, Pen Drives.

UNIT 3 - Serial Devices & Parallel Devices

Key Board: Switches, Keyboard organization, Key board type, Wireless Keyboard Trouble shooting. Mouse: Mouse type- Scroll & Optical Mouse, Function Connecting Mouse, Trouble shooting Mouse. FILE SYSTEM: Types of file Sequential, index, direct access, creation and updates of file and access method. Printers: Working of DMP, Ink Jet, Laser Printer, line printer, MFP (Multi Functional Printer and its Trouble shooting, Scanners, BOOT PROCESS, POWER SUPPLY, TYPES OF PC'S : Desktop, Laptop, Palmtop.

UNIT 4 - Introduction to LAN and WAN networking

Emergence and history of network, What is network, Need of network or benefits of network, Types of networks -LAN and WAN, How to assign IP address mask and gateway, Familiar with ping, ipconfig/all netstat and tracert commands, Types of wan technologies, Explain about structure of intranet and internet.

References:

1. The Indispensable PC Hardware Book (4th Edition) by Hans-Peter Messmer.
2. USB Mass Storage by Jan Axelson.
3. Bigelow's PC Hardware Desk Reference – 2002 by Stephen J. Bigelow
   Shivaji University, Kolhapur.
4. PC Architecture. An online book in by Michael Karbo.

B. Voc. Part – III (Sustainable Agriculture.)
Semester VI
Paper – XXXXVIII
Agro Metrology - Theory

Objectives:
To study various meteorological aspects in relation with crop production

UNIT 1

Introduction to Meteorology and Agricultural Meteorology - Scope and importance of Agricultural Meteorology - Composition of Atmosphere - Role of greenhouse gases in global cooling and warming - Concept of weather and climate - Micro-meso-macro and phyto climates soil temperature and its variations.

UNIT 2

Electromagnetic Spectrum - Nature and properties of solar radiation - shortwave radiation and long wave radiation - Radiation balance - Response of plants to solar radiation and photosynthetically active radiation - Thermal structure of atmosphere - vertical profiles - factors affecting surface air temperature - spatial and temporal variations in surface air temperature - soil temperature and its variations - Atmospheric pressure and its variation with height - Global distribution of pressure and wind - Atmospheric humidity - saturation and actual vapour pressure - relative humidity and dew point temperature.

UNIT 3

Cloud classification and measurements - cloud seeding - Rainfall and its mechanisms - forms and types of rainfall - Indian monsoons - southwest monsoon - northeast monsoon - monsoon variability across Maharashtra and India - Rainfall over India and Maharashtra Rainfall and its mechanisms - forms and types of rainfall - Indian monsoons – southwest monsoon - northeast monsoon - monsoon variability across Maharashtra and India – Rainfall over India and Maharashtra Role of weather on insect pest and diseases. Importance of weather forecasting in Agriculture - weather service to farmers - agricultural seasons - crop weather diagrams and calendars - crop weather relationships – Role of weather on insect pest and diseases.

UNIT 4

Meteorological and Agro meteorological Stations, Types of agro meteorological Stations. Crop weather diagrams and calendars Preparation of crop weather calendars – weather and climate related natural disasters, risk and management - Climate change and global warming - weather modification - Introduction to Remote Sensing.

References:

Das.P.K. 1968.The Monsoons. NBT, New Delhi.

Khadekar, S.R. 2001.Meteorology.Agromet publishers, Nagpur.

Mavi, H.S. 1986. Introduction of Agrometeorolgy. Oxford & IBH Publishing Co. New Delhi.

Menon, P.A. and Rajan, C.K. 1989. Climate of Maharashtra. Classic publishing house, Kochi.

PrasadaRao, G.S.L.H.V. 2005. Agricultural Meteorology. Second Edition. Maharashtra agricultural University, Thrissur.

Sachati, A.K. 1985. Agricultural Meteorology - Instruction-cum-practical manual, NCERT, New Delhi

Varshneya,M.C.andBalakrishnaPillai,B.2003.Textbook of Agricultural Meteorology. ICAR, New Delhi.

Venketaraman, S. and Krishnan, A. 1992.Crops and weather. ICAR, New Delhi.

Wilsie, P.C. 1961.Crop Adaptation and distribution. Eurasia Publishing House (P) ltd., New Delhi.

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B. Voc. Part – III (Sustainable Agriculture.)
Semester VI
Paper – XXXXIX
Farming System Approach for Sustainable Crop Production - Theory

Objectives:

- Familiarising with the Farming System Approach for Sustainable Crop Production
- To make idea about different non-traditional practices in organic farming.

UNIT 1

Introduction-importance of system approach in crop production, different cropping systems-Terms and definition- Cropping pattern - Multiple cropping and various forms-advantages and disadvantages- Intercropping- ecological basis of intercropping systems-types- sequential cropping and crop rotation-planned crop rotation- Mixed farming and farming systems of Maharashtra.

UNIT 2

Crop planning, crop calendar and cropping scheme preparation-factors affecting cropping schemes. Plant interactions- Allelopathy, Competition- Measures to minimize competition-Criteria for assessment of yield advantage, land use efficiency and monitory advantage.

UNIT 3

Cropping systems prevalent in Maharashtra-Rice based cropping system- Coconut based multi-tier cropping system- crop cafeteria for multiple cropping- Tapioca based cropping system-Homestead farming in Maharashtra, Agro forestry – Silvi-culture, Agri-silvi culture, Agri-horticulture, Agri-silvopastural system, Alley cropping, and Social forestry definitions and - Organic recycling in cropping systems. Important cropping systems in India.

UNIT 4

Farming systems- components- Livestock- poultry- aquaculture- apiculture-sericulture. Incorporation of components of Integrated farming system in homestead farming. Integrated farming system (IFS) models for uplands and low lands for sustainable and organic agriculture- Evaluation of farming systems.

Familiarisation with the organic farming ideas in the book one straw revolution by Masanobu Fukuvoka. Introduction to the practices followed by farmers in “zero budget farming”.

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B. Voc. Part – III (Sustainable Agriculture.)
Semester VI
Landscape Designing and Indoor Gardening

Objectives

- To get awareness on designing and laying out of a landscape.
- To familiarise with different types and features of garden.

UNIT 1

Designing of landscape: Principle of landscape design. Selection and use of plants in the landscape. Preparation of landscape plan. Various software used in garden designing. Digitalization in designing. Computer aided landscape designing - GIS. Maintenance of plants in landscape: Planting and maintenance of plants in the landscape. Methods of irrigation – sprinkler and drip irrigation-pot irrigation, wick irrigation etc. Methods of application of fertilizers to garden plants.

UNIT 2

Garden tools: Use of tools and implements. Use of different types of sprayers, lawn mowers, hedge cutters, tree cutters, leveling methods.

UNIT 3

Garden structures and garden types: Garden structures, roads and paths, enclosures, paving, garden lights, furniture. Different types of garden and features. Establishment and maintenance of lawn.

UNIT 4

Indoor gardening: Selection of indoor plants. Layout and designs of indoor gardens types of containers used, media composition, preparation of media, planting and placement of plants. Models for interior plant scaping - vertical garden, miniature garden and terrariums. Manuring, irrigation, illumination, grooming and holiday care of indoor plants.

References:

1. Edmond, JB., Sen, TD, Andrews, TS and Halfacre, RG. 1977. Fundamentals of Horticulture. Tata McGraw Hill, New Delhi.
2. Janick, J. 1963.Horticultural Science. W.H. Freeman, Sanfrancisco.
3. Kumar, N. 1990.Introduction to Horticulture, Rajalekshmi Publication, Nagercoil.

4. Carpenter, P.L., Walker, T.D and Lanphear, F.O. 1975.Plants in the Landscape.W.H. Feeman and Co., San Francisco.
5. Desai, B.L. 1979. Planning and Planting of Home Gardens. Indian Council of Agricultural Research, New Delhi.
6. Joiner, J.N. 1981.Foliage Plant Production. Prentice Hall Inc. London.

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B. Voc. Part – III (Sustainable Agriculture.)
Semester VI
Paper – XXXXXI
Practical
Agro Meteorology- Practical

Objectives:

. To study the practical meteorological aspects in relation with crop production.

1. Selection of site and layout of agro meteorological stations and meteorological instruments.
2. Installation of soil thermometers and measurement and recording of soil temperature.
3. Measurement of Relative humidity and vapour pressure and Measurement of Air temperature.
4. Dew point temperature and dew fall.
5. Measurement of rainfall and measurement of wind speed and direction.
6. Measurement of open pan evaporation.
7. Sunshine Recorder and measurement of sunshine.
8. Recording of weather data - tabulation- Processing and presentation Meteorological data.
9. Preparation of crop weather calendars.

References:

1. Das. P.K. 1968.The Monsoons. NBT, New Delhi
2. Khadekar, S.R. 2001.Meteorology.Agromet publishers, Nagpur
3. Mavi, H.S. 1986. Introduction of Agrometeorolgy. Oxford & IBH Publishing Co. New Delhi
4. Menon, P.A. and Rajan, C.K. 1989. Climate of Maharashtra. Classic publishing house, Kochi
5. Prasada Rao, G.S.L.H.V. 2005.Agricultural Meteorology. Second Edition. Maharashtra agricultural University, Thrissur.
6. Sachati, A.K. 1985. Agricultural Meteorology - Instruction-cum-practical manual, NCERT, New Delhi

Shivaji University, Kolhapur
B. Voc. Part – III (Sustainable Agriculture.)
Semester VI
Paper – XXXXXII
Practical
Farming System Approach for Sustainable Crop Production

1. Preparation of cropping scheme for irrigated situations.
2. Preparation of cropping scheme for dry land situations.
3. Study of existing farming systems in nearby villages.
4. Preparation of integrated farming system models for wet lands.
5. Preparation of integrated farming system models for dry lands.
6. Visit to research station and farmers field to familiarize with various cropping and farming systems.

Shivaji University, Kolhapur
B. Voc. Part – III Sustainable Agriculture.)
Semester VI
Paper – XXXXIII
Practical
Landscape Designing and Indoor Gardening

Objectives

- To develop skill in planning and planting of garden lawn.
- To develop skill in preparation of different types of gardens.

1. Preparation of landscape plan, identification of plants.
2. Use of software in landscape designing, computer aided landscape designs.
3. Planting of lawn.
4. Rolling and mowing of lawn - use of different types of lawn mowers.
5. Planting of trees and shrubs, preparation of flower beds, pruning of shrubs, hedges and trees.
6. Application of manures and fertilizers to garden plants. Practice in different methods of irrigation in landscapes.
7. Practice in application of plant protection chemicals, use of different types of sprayers.
8. Selection and establishment of enclosures and paving.
9. Layout of roads, paths and walks.
10. Preparation of rock garden.
11. Designing indoor garden.
12. Preparation of miniature garden and vertical garden. Preparation of terrarium

Eligibility for Admission: 10 + 2 from any faculty or equivalent Diploma /Advanced Diploma in any related stream.

Eligibility for Faculty: 1. M. Sc. (Agri./ Horticulture / Food Processing / Food Science and Technology / Post Harvest Management / Technology, Food Science and Quality Control) / Ph.D.
2. B.Sc. (Agri/Horti), M.B.A. in (Agricultural Business Management)
3. M.Sc. (Environmental Science)

Eligibility for Laboratory Assistant: Any Graduate / Diploma .

Staffing pattern for Teaching- 1.One full time Assistant Professor for 3 years
2.Existing/ Visiting/ Guest/ Adjunct faculty as per requirement

Supporting staff : 1.Lab. assistant/ Lab. attendant as per requirement

Shivaji University, Kolhapur
B. Voc. Part – III (Sust. Agri.)
Semester VI
Paper – XXXXXIV
Skill Development Internship/ Training Student Ready Programme
(Rural & Entrepreneurship Awareness Development Programme)

RAW E & AIA

Programme

Rural Agricultural Work Experience and Agro-Industrial Attachment

Details of Project & Dissertation Work General orientation and on campus training by different faculties Village attachment / Unit attachment / KVK / Research Station Agro-Industrial Attachment : In this programme, a group of students (5-6 number) will be allotted to work with host farmers and related agro-industrial premises. A project report of the RAWE Programme shall be submitted at the end of sixth semester and a viva-voce will be conducted by a panel of subject experts

NOTE: In addition to practical hours, for certain time bound operations; the students will complete the work after the regular class hours.