

Devrukh Shikshan Prasarak Mandal's
**Nya.Tatyasaheb Athalye Arts, Ved. S. R. Sapre Commerce & Vid.
Dadasaheb Pitre Science College Devrukh.**
[Autonomous College]

SYLLABUS

Sr. No.	Heading	Particulars
1	Title of Course	B.Voc. Sustainable Agriculture Second Year
2	Eligibility for Admission	10+2 (of recognized board)
3	Passing Marks	40%
4	Ordinances/Regulations (if any)	-
5	No. of Years/Semesters	Three years/ Six semester
6	Level	U.G.
7	Pattern	Semester
8	Status	New Syllabus
9	To be implemented from Academic year	2021-22

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Syllabus for S.Y. B.Voc.

Program: B. Voc. Sustainable Agriculture

Course: S.Y. B.Voc. Sustainable Agriculture

(Credit Based Grading and Semester System with effect from the academic year 2020-2021)

B.Voc Programme

The University Grants Commission (UGC) had launched a scheme for skills development based higher education as part of college/university education, leading to Bachelor of Vocation (B.Voc) degree with multiple entry and exit points. The B.Voc program is focused on providing undergraduate studies which would also incorporate specific job roles along with broad based general education. This would enable the graduates completing B.Voc to make a meaningful participation in accelerating India's economy by gaining appropriate employment, becoming entrepreneurs and creating appropriate knowledge. The duration of the B. Voc courses will be six semesters in three Academic Sessions. At the end of each Semester, the candidates shall be required to present themselves for examination. The student who completes first semester successfully and is opting out from further education in B.Voc program, will be conferred Certificate in respective subject/trade. The student who completes first year i.e. first two semesters successfully and is opting out from further education in B.Voc program, will be conferred Diploma in respective subject/trade. Similarly, the student who completes first two years i.e. four semesters successfully and is opting out from further education will be conferred Advanced Diploma. The degree of B.Voc shall be conferred on the candidate who pursues the prescribed course of study for six semesters. The B. Voc degree is equivalent to BA/B.Sc degree for higher studies and employment.

Objectives of the Course

Many factors like, available infrastructure, capital and power, availability of resources, transport network, climate favoring to the high potential of industrial growth in Kokan region. The consistent growth of several Pharmaceutical, Chemical, Agrochemical, Food and Petrochemical industries has created several job avenues to the skilled graduates. The major hurdles for these industries are lack of adequately skilled and Good Laboratory Practice (GLP) oriented workforces.

This course is designed to fulfill the skilled workforce requirement of Research & Development and testing laboratories in various industries.

The course covers following objectives:-

- To propagate the ideas, practices and policies that constitutes the concept of sustainable agriculture.
- To provide the skill of different processes for Sustainable Agriculture
- To impart knowledge and proficiency in Organic farming, Certification process and marketing of organically raised agricultural produces
- To empower the students with an economically viable, socially supportive and ecologically sound education for agricultural sustainability.
- To provide education that emphasizes topography, soil characteristics, climate, pests, local availability of inputs and the individual grower's goals.
- Develop communication and soft skills between farmers and suppliers.
- Promote self-employment and income generation.
- Develop awareness about environment, soil and resources conservation for sustainable development.

Course Outcomes

- To enable the students to acquire knowledge on importance of agriculture and various processes of farming.

- To study the fundamentals of agronomy and classification of field crops.
- To study fundamentals of horticulture, gardening
- To learn preparation of various organic manures and using it for sustainable agriculture
- To study various processes of integrated farming practices

PROGRAMME STRUCTURE

The BVoc Programme shall include General Education components and Skill Components.

The credit distribution for the programme is shown below.

Normal Calendar Duration	Skill Component Credits	General Education Credits	Total Credits
One semester	18	12	30
Two Semesters	36	24	60
Four Semesters	72	48	120
Six Semesters	108	72	180

Year/Semester	NSQF Certification Level	Vocational Qualification	Title of Programme
First Year (Sem. I)	4	Certificate Course (Duration 6 Months)	Certificate course in Sustainable Agriculture
First Year (Sem. II)	5	Diploma (Duration 1 Year)	Diploma in Sustainable Agriculture
Second Year (Sem. III and IV)	6	Advanced Diploma (Duration two years)	Advanced Diploma in Sustainable Agriculture
Third Year	7	B. Voc. (Sustainable Agriculture)	B. Voc. in Sustainable Agriculture

(Course Code details: SA-Sustainable Agriculture,
G-General Education,
S- Skill Component
1- Dr First Semester,
1S-First Skill Paper,
2S- Second Skill Paper,
1G- First General Paper
2G- Second General Paper

I- Internship/training/Project/Dissertation.

BACHELOR OF VOCATION

Sustainable Agriculture (to be implemented from 2021-22)

Semester-III

Code	Paper	Credits	Lectures	L/Wk
General Component				
BUSAT 31	Production Technology for fruit and Plantation Crops	3	45	3
BUSAT 32	Fundamentals Of Agronomy II	3	45	3
BUSAT 33	Bee keeping, Silkworm, Lac And Mushroom Production Technology	3	45	3
BUSAT 34	Environmental Science	3	45	3
Skill Component				
BUSAP 31	Production Technology for fruit and Plantation Crops (Practical)	4	120	8
BUSAP 32	Fundamentals Of Agronomy II (Practical)	4	120	8
BUSAP 33	Bee keeping, Silkworm, Lac And Mushroom Production (Practical)	4	120	8
BUSAP 34	Environmental Science (Practical)	4	120	8
BUSAP 35	NCC/Yoga/ Fine arts/Basics of Mathematics I	2	60	4

B. Voc. Sustainable Agriculture
SEMESTER III General Component

Paper I: Production Technology for Fruit and Plantation Crops

Code: BUSAT 31

Credits: 3

Lectures:45

Objectives

☐ To acquaint with production Technology of various fruit and plantation crops

Module 1

Importance and scope of fruit and plantation crop industry in India; High-density planting; Use of rootstocks;

Module 2

Production technologies for the cultivation of major fruits-mango, banana, citrus, grape, guava, papaya, pear

Module 3

Production technologies for the cultivation of minor fruits- cashew, pineapple, pomegranate, jackfruit, strawberry, nut crops

Module 4

Production technologies for the cultivation of plantation crops-coconut, areca nut, tea, coffee, rubber

Reference Books:

1. Handbook of Horticulture- ICAR publication
2. Tropical and Subtropical Fruit crops, T. K. Bose and others
3. Fruit Culture in India-Sham Singh and others
4. Fruits-Ranjit Singh
5. Physiology of Fruit Production-Amar Singh
6. Coconut-Thumpan
7. Advances in Horticulture. Ed by 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

Paper II: Fundamentals of Agronomy-II

Code: BUSAT 32

Credits: 3

Lectures: 45

Objectives:

☑ To enable the students to acquire knowledge of fundamentals of agronomy

Module 1

Water Resources of India and Maharashtra and Development Water Management - Role of water in plants. Irrigation scheduling criteria and methods. Quality of irrigation water.

Module 2

Crop water requirement. Water use efficiency, Soil - water–plant relationship. Classification of Soil Water, Soil Moisture Constants, Soil Moisture characteristic curve. Volume Mass Relationship, retention of soil water. Water absorption.

Module 3

Rooting characteristics of plants and moisture extraction patterns and SPAC. Water requirement of different Agronomic crops. Evaporation, Transpiration, Evapotranspiration, Potential-evapotranspiration, effective rainfall and consumptive use of water.

Module 4

Water Use efficiency, Irrigation Efficiencies. Waterlogging and Management of waterlogged soils. Crop water management techniques in problematic areas.

Reference Books:

- 1) Principles of Agronomy by S. R. Reddy
- 2) Crop production and Management by Y. B. Morachand
- 3) Principles of Agronomy by Sankaran S and V. T. SubbiahMudliyar
- 4) Principles of Agronomy by T. Yellamanda Reddy and G. H. Sankara Reddy
- 5) Irrigation Water Managemnt by Dilip Kumar Muzumdar
- 6) Principles and Practices of Water Management by A. M. Michel
- 7) Irrigation and Drainage by Lenka D.
- 8) Soil Management and organic farming By S.C. Panda Agrobios

Paper III: Bee Keeping, Silkworm, Lac and Mushroom Production Technology

Code: BUSAT 33

Credits: 3

Lectures: 45

Objectives

☐ To acquaint with Bee Keeping, Silkworm, Lac and Mushroom Production Technology

Module 1

Importance of beneficial insects.

Beekeeping, pollinating plants and their cycle, bee biology, commercial methods of rearing. Equipment used.

Seasonal management. Bee enemies and disease. Bee pasturage, bee foraging and communication. Insect pests

and diseases of honey bees.

Module 2

Types of the silkworm. Voltinism and biology of the silkworm. Mulberry cultivation, mulberry varieties and methods of harvesting and preservation of leaves. Rearing, mounting and harvesting of cocoons. Pests and diseases of the silkworm, their management, rearing appliances of mulberry silkworm, and disinfection methods.

Module 3

Species of Lac insect, morphology, biology, host plant, lac production – seed lac, button lac, shellac, lac-products.

Module 4

Mushrooms- edible and poisonous types, Culturing and production techniques of Mushrooms.

Reference Books:

- 1) Singh, S., 1975. Beekeeping in India – ICAR, New Delhi., 214p.
- 2) Sunita, N.D, Guled, M.B, Mulla, S.R and Jagginavar, 2003, Beekeeping, UAS Dharwad
- 3) Mishra, R.C. and Rajesh Gar. 2002. Prospective in Indian Apiculture. Agrobios, Jodhpur.
- 4) Singh, D. and Singh, D.P. 2006. A Hand-Book of Beekeeping, Agrobios (India).
- 6) Y.A. Shinde and BR Patel. Sericulture in India
- 7) Tribhuwan Singh. Principles and Techniques of Silkworm Seed Production, Discovery Publishing House
Pvt. Ltd
- 8) M.L. Narasaiah. Problems and Prospects of Sericulture. Discovery Publishing House Pvt. Ltd.
- 9) Ganga, G. and Sulochana Chetty, J. 1997. An Introduction to Sericulture (2nd Edn.). Oxford & IBH publishing Co. Pvt. Ltd., New Delhi.
- 10) Krishnaswamy, S. (Ed). 1978. Sericulture Manual - Silkworm Rearing. FAO Agril. Services bulletin, Rome.
- 11) Glover, P.M. 1937. Lac Cultivation in India. Indian Lac Research Institute, Ranchi.
- 12) Jolly, M.S. 1987. Appropriate Sericulture Techniques. International Centre for Training and Research in Tropical Sericulture, Mysore, 209.

Paper IV Environmental Science

Code: BUSAT34

Credits: 3

Lectures: 45

Objectives

To provide basic knowledge of Environmental Studies

Module 1

Environmental studies: - Nature, Definition, scope and importance ,Resources and their types, Sustainable use of resources, Natural Resources, Forest resources, Water resources,Mineral resources, Food resources, Energy resources, Land resources

Module 2

Ecosystems: -Concept of an ecosystem, Structure and function. Types of Ecosystem Introduction, characteristic features. Carbon Credit: Concept, Exchange of carbon credits. Carbon Sequestration, Importance, and ways of carbon sequestration

Module 3

Biodiversity: - Introduction, definition, genetic, species & ecosystem diversity and biogeographical classification of India, Value of biodiversity. Biodiversity at global, national and local levels, India as a mega-diversity nation.

Module 4

Environmental Pollution: - Types of pollution, definition, cause, effects and control measures of Air, Water, Soil, Marine, Noise, Thermal pollution and nuclear hazards. Solid Waste Management: causes, effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution. Environment (Protection) Act, Air (Prevention and Control of Pollution) Act

Textbooks:

1 Textbook of Environmental Studies for undergraduate courses by Erach Bharucha
University Grants

Commission, New Delhi.

2 A textbook on Ecology and Environmental Science by M. Prasanthrajan and P.P.
Mahendran., Agrotech

Publishing Academy, Udaipur-313002

Reference Book:

3 Ecology and Environment by P.D. Sharma, Rastogi Publication. Meerut.

4 Environmental Sciences by S.S. Purohit, Q.J. Shammi and A.K. Agrawal, Student Edition,
Jodhpur.

5 Laboratory Manual of Ecology and Environmental Studies by Amrit Kaur, Paragon
International

Publisher, New Delhi.

B. Voc. Sustainable Agriculture

SEMESTER III (Skill Component)

Paper I: Production Technology for Fruit and Plantation Crops (Practical)

Code: BUSAP 31

Credits: 4

Hours: 120

Objectives

☑ To get the skills of fruit and plantation crop cultivation and production

1. Seed propagation
2. Scarification and stratification of seeds
3. Propagation methods for fruit crops including Micro-propagation
4. Propagation methods for plantation crops including Micro-propagation
5. Description and identification of fruit
6. Description and identification of Plantation crops
7. Preparation of plant bioregulators and their uses
8. Establishment of the commercial nursery, Nursery Act
9. Establishment of model orchard and its economics
10. Intercropping and multistoried cropping
11. Rejuvenation of old senile orchards
12. Pests of the above fruit and plantation crops
13. Diseases of the above fruit and plantation crops
14. Physiological disorders of above fruit and plantation crops
15. Visit to the commercial orchard of fruits
16. Visit to the commercial orchard of plantation crop

Paper II: Fundamentals of Agronomy –II (Practical)

Code: BUSAP 32

Credits: 4

Hours: 120

Objectives

☑ To get the skills of various aspects of fundamentals of Agronomy

1. Estimation of soil moisture by different methods
2. Determination of Bulk and Particle Density.
3. Determination of Field Capacity by field method and by pressure plate membrane apparatus
4. Determination of PWP by sunflower method and by pressure plate membrane apparatus
5. Study of Soil moisture Measuring Devices and their installation.
6. Determination of Infiltration by Double Ring Infiltrometer.
7. Estimation of Gross water requirement, Net water requirement, Irrigation Interval, Available Soil Moisture.
8. Scheduling of Irrigation by different methods.
9. Methods of surface irrigation, Irrigation Layouts.
10. Study of Drip and Subsurface Irrigation Systems and their components.
11. Installation of drip irrigation system in the field.
12. Study of Drip System, Fertigation, Care and Maintenance of Drip system.
13. Study of Pressurized irrigation system, Sprinkler, Rain gun.
14. Installation of various measuring devices and Measurement of Irrigation Water.
15. Visit to Atomized Irrigation Units.
16. Visit to ill-drained fields and study of Drainage systems.

Paper III: Bee Keeping and Silkworm, Lac, Mushroom Production Technology (Practical)

Code: BUSAP33

Credits: 4

Hours: 120

Objectives

☐ To get practical skills of Bee Keeping and Silkworm, Lac, Mushroom Production Technology

1. Studies on honey bee colony: Bee species and castes of bees
- 2 & 3. Beekeeping appliances and seasonal management
4. Bee enemies and diseases
- 5 & 6. Bee pasturage, bee foraging and communication
- 7 & 8. Types of silkworms, voltinism and biology of the mulberry silkworm
9. Mulberry cultivation, mulberry varieties and methods of harvesting of leaves
10. Rearing of mulberry silkworm on artificial diet / natural mulberry leaves
11. Studies on strains/species of lac insect, host plant and their identification
12. Culturing and production of Mushrooms
13. Visit to research and training Institution/Unit of Beekeeping, Sericulture, Lac culture, Mushroom

Production

Paper IV Environmental Science (Practical)

Code: BUSAP 34 Credits: 4 Hours: 120

Objectives: To acquaint with Environmental Studies

- 1 Study of collection, processing and storage of effluent samples.
- 2 To estimate solids in water samples.
- 3 Study of community structure.
- 4 Study of pond / River/ hill slopes ecosystem-abiotic and biotic components.
- 5 Study of grassland and agro-ecosystem and measurement of their productivity.
- 6 Crop adaptation to different ecosystems. A. Hydrophytes
- 7 Crop adaptation to different ecosystems. B. Mesophytes
- 8 Crop adaptation to different ecosystems. C. Xerophytes
- 9 Crop adaptation to different ecosystems. D. Halophytes
- 10 Collection, identification, herbarium, maintenance and study of plants grown in various ecosystems.

Paper V: Basics of Mathematics: Numerical Aptitude-I

Code: BUSAP35

Credits: 2

Hours: 60

Module 1 Measure of Central Tendency and Variation

- Definition of Average, Arithmetic Mean, Median, and Mode
- Quartiles, Deciles and Percentiles.
- Combined and Weighted mean.
- Concept and idea of dispersion
- Range, Quartile Deviation, Mean Deviation
- Standard Deviation, Variance, Combined Variance.

Module 2 Correlation and Regression

- Meaning and Types of Correlation, And Determination of Correlation: Scatter diagram.
- Karl Pearson's method of Correlation Coefficient
- Spearman's Rank Correlation Coefficient.
- Meaning and Concept of Regression equations, Slope of the Regression Line and its interpretation.
- Regression Coefficients Relationship between Coefficient of Correlation and Regression Coefficients
- Finding the equations of Regression lines by method of Least Squares.

Module 3 Basics of Probability

- Concept of random experiment/trial and possible outcomes; Sample Space
- Events, their types, Algebra of Events, Mutually Exclusive and Exhaustive Events, and Complimentary events.
- Classical definition of Probability, Addition theorem (without proof).
- Conditional probability, Independence of Events: $P(A \cap B) = P(A) P(B)$

Module 4 Linear Programming (15L)

- Sketching of graphs of i) linear equation $Ax + By + C = 0$ (ii) Linear inequalities.
- Mathematical Formulation of Linear Programming Problems up to 3 variables.

- Solution of Linear Programming Problems using graphical method up to two variables.

Reference Books

1. Quantitative Aptitude, Board of Studies, the Institute of Chartered Accounts of India.
2. A textbook of Business Mathematics, S Chand Publications by Padmalochan Hazarika.
3. Quantitative Techniques S Chand Publications, by C Satyadevi.
4. A textbook of Business Statistics, S Chand Publications by Padmalochan Hazarika
5. Mathematical and Statistical analysis by R.J. Shah, Sheth Publication.
6. Mathematical and Statistical analysis by Welling, Saraph and Diwanji, Manan Publication.
7. Mathematics for Economics and Finance Methods and Modelling by Martin Anthony and Norman Biggs, Cambridge University Press, Cambridge low priced edition, 2000.
8. Business Mathematics by D. C. Sancheti and V. K. Kapoor, Sultan Chand & Sons, 2006.
9. Mathematics for Business Economics: By J. D. Gupta, P. K. Gupta and Man Mohan, Tata Mc Graw Hill Publishing Co. Ltd., 1987, Chapters 9 to 11 &16.
10. Quantitative Methods Part I By S. Saha and S. Mukerji, New Central Book Agency, 1996.
11. Mathematical Basis of Life Insurance by S.P. Dixit, C.S. Modi and R.V. Joshi, Insurance Institute of India