

DR.BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY



CIRCULAR NO.SU/Sci.& Tech./B.Voc./33/2018

It is hereby inform to all concerned that, on the recommendation of the Dean, Faculty of Science & Technology, the Hon'ble Vice-Chancellor has accepted the **following curriculum under B.Voc. programme viz: Certificate, Diploma, Advanced Diploma and B.Voc. Degree** in his emergency powers under section 12(7) of the Maharashtra Public Universities Act, 2016 on behalf of the Academic Council as appended herewith:

1.	B.Voc. Industrial Automation,
2.	B.Voc. Automobile Technology,
3.	B.Voc. Farm Equipment and Machinery,
4.	B.Voc. I.T.Skills and Software Development,
5.	B.Voc. Architectural Planning and Interior Design,
6.	B.Voc. Dairy Products,
7.	B.Voc. Drill Technology,
8.	B.Voc. Plant Tissue Culture and Green House Technology,
9.	B.Voc. Renewable Energy Source,
10.	B.Voc. Computer Hardware & Networking Maintenance.
11.	B.Voc.Food Processing and Preservation.
12.	B.Voc. Sustainable Agriculture.
13.	B.Voc. Bioproducts technician

This is effective from the Academic Year 2018-2019 and onwards.

This curriculum are also available on the university website
www.bamu.ac.in

All concerned are requested to note the contents of this circular and bring notice to the students, teachers and staff for their information and necessary action.

University Campus,
Aurangabad-431 004.
Ref.No.
SU/B.Voc/2018/21709-22148
Date:- 12-12-2018

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Deputy Registrar,
Syllabus Section.

**DR. BABASAHEB AMBEDKAR
MARATHWADA UNIVERSITY,
AURANGABAD.**



**Curriculum of
B.Voc. Sustainable Agriculture**

UNDER THE FACULTY OF SCIENCE & TECHNOLOGY.

[Effective from 2018-19 & onwards]

Syllabus

Bachelor of Vocation Program B.Voc.- Sustainable Agriculture

Course Structure

Each Semester (Four semesters) : 18 Credits + 12 Credits = 30 Credits

(for Voc. Edn.) (for General Edn.)

01 Credit needs 15 hrs Study

Hence 15 X 30 = 450 hrs studies for each semester.

Year/Semester	Total Hours	NSQF Certification Level	Vocational Qualification	Title of Programme
First Year (Sem. I)	630	4	Certificate course (duration 3 months)	Certificate course in Gardening and Nursery Management
First Year (Sem.II)	630	5	Diploma (duration one year)	Diploma in Biofertiliser Technology and Production
Second Year (Sem. III & IV)	1260	6	Advanced Diploma (duration two years)	Advanced Diploma in Advanced Farming and Seed Technology
Third Year	1260	7	B. Voc. (duration three years)	B. Voc. In Sustainable Agriculture
TOTAL	3780	-	-	

Semester wise Syllabus

Paper No.	Subject Code	Paper	Credits (Theory + Practical)	Modules/ Units	Study hrs
SEMESTER – I					
I.	GE-101	Linguistic Proficiency - I	4+0	5	60
II.	GE-102	Environmental Science	4+0	5	60
III.	GE-103	Soil Fertility and Plant Nutrition	4+0	5	60
IV.	VE-104	VOC-1:Introduction to gardening	3+0	5	45
V.	GE-105	VOC-2: Nursery Management	3+0	5	45
VI.	VE-106	Practical based on Voc. –1	0+4	-	120
VII.	VE-107	Practical based on Voc. – 2	0+4	-	120
VIII.	VE-108	Dissertation/Project Report	0+4	-	120
Total Credits			18+12= 30	Total Hrs.	630 hrs
SEMESTER – II					
IX.	GE-201	Linguistic Proficiency – II	4+0	5	60
X.	GE-202	Computer Fundamentals	4+0	5	60
XI.	GE-203	Soil, Plant and Water relations	4+0	5	60
XII.	VE-204	VOC-3: Bio-fertilizer Technology	3+0	5	45
XIII.	VE-205	VOC-4: Bio-fertilizer Production	3+0	5	45
XIV.	VE-206	Practical based on Voc. – 3	0+4	-	120
XV.	VE-207	Practical based on Voc. –4	0+4	-	120
XVI.	VE-208	In plant Training / Report submission	0+4	-	120
Total Credits			18+12= 30	Total Hrs.	630 hrs

B.Voc. - Sustainable Agriculture						
Credits and Marking System						
Subject code	Name of the Subject	Credits		Marks		Total Marks
		Theory	Practical	IA	UA	
Semester-1						
GE-101	Linguistic Proficiency - I	4	0	20	80	100
GE-102	Environmental Science	4	0	20	80	100
GE-103	Soil Fertility and Plant Nutrition	4	0	20	80	100
VE-104	VOC-1:Introduction to gardening	3	0	15	60	75
GE-105	VOC-2: Nursery Management	3	0	15	60	75
VE-106	Practical based on Voc. –1	0	4	40	160	200
VE-107	Practical based on Voc. – 2	0	4	40	160	200
VE-108	Dissertation/Project Report	0	4	30	120	150
Total Credits/ Marks		18	12	200	800	1000
Semester- II						
GE-201	Linguistic Proficiency – II	4	0	20	80	100
GE-202	Computer Fundamentals	4	0	20	80	100
GE-203	Soil, Plant and Water relations	4	0	20	80	100
VE-204	VOC-3: Bio-fertilizer Technology	3	0	15	60	75
VE-205	VOC-4: Bio-fertilizer Production	3	0	15	60	75
VE-206	Practical based on Voc. – 3	0	4	40	160	200
VE-207	Practical based on Voc. –4	0	4	40	160	200
VE-208	In plant Training / Report submission	0	4	30	120	150
Total Credits/ Marks		18	12	200	800	1000

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SEMESTER- I
Paper No- I (Subject Code- GE-101)
LINGUISTIC PROFICIENCY- I

Course Objectives:

1. To facilitate the students to understand the fundamental of communicative English
2. To facilitate the students to develop skills of communication in English

BASIC STRUCTURE OF THE ENGLISH LANGUAGE

Module - I

Tenses:

- 1) Present tense (includes all four types of tenses each)
- 2) Past tense
- 3) Future tense

Module - II

Spoken English:

1. Basic of pronunciation : Vowels, diphthongs,
2. Certain basic sounds including th, dh, gh sounds, fricatives etc.
3. Differences in the sounds of the letters, especially , w/v, f/ph etc.
4. Phonetic transcriptions.

Module - III

1. Introducing yourself (The communicator)
2. Introducing people to others
3. Giving personal information

Module - IV

1. Getting people's attention and interrupting
2. Giving instructions and seeking clarifications
1. Making requests and responding to requests

Module – V

1. Pronunciations

Reference Books:

1. Business Communicator – V.K. Jain, O. P. Biyani, S. Chand, New Delhi.
2. The Communicator – Board of Editors , Orient Blackswan Pvt. Ltd
3. The Art of Powerful Communication – Dinesh K. Vohra, Are Maria Publications, Pune

Paper No-II
(Subject Code- GE-102)
ENVIRONMENTAL SCIENCE

Course Objectives:

1. To facilitate the students to understand the environmental related issues / problems and their strategies to minimize problems.
2. To facilitate the students to understand the impact of industries on environment and strategies to address these issues.

Module I:

Environment: Environment Science, Scope and importance. Components of environment - i) Atmosphere, composition of atmosphere, ii) lithosphere – structure of lithosphere, soil formation, soil composition and properties of soil. iii) Hydrosphere – distribution of water on earth, global water balance and hydrological cycle.

Module II

Environment problems:

- i. Air pollution – concept, source of air pollution, major atmospheric pollutants, air quality standards monitoring of major air pollutants.
- ii. Water pollution – sources of water pollution, river pollution, underground water pollution, oil pollution, thermal pollution, water pollution due to sewage, effects of water pollution, waste water treatment
- iii. Noise pollution – sources of noise, effects of noise pollution, noise pollution, noise pollution control equipment silencers and noise absorbing devices, noise standards and industrial noise control.
- iv. Soil pollution – causes of soil pollution major soil pollutants, industrial waste and their role in soil pollution.
- v. Radiation pollution – sources of radioactive pollution, effects of radioactive pollution on health.

Module: III

Impact of industries on Environment –

- Water pollution episodes due to industrial pollutants, effects of industrial pollutants on aquatic organisms, industrial effluents and underground water quality.
- Air pollution episodes due to industries – Bhopal gas tragedy, Photochemical smog, Acid rivers etc. Industrial noise pollution and workers health problems.

Module: IV

Water Conservation – water use pattern – water use in industry, water supply . . . water conservation – methods of water conservation, rain water harvesting, Reuse and recycle of water.

Conservation Natural resources and sustainable Development : - Renewable natural resources, non-renewable natural resources, use of non-renewable resource and degradation of environment, use of minerals in industries and environmental problems of mining, conservation of natural resources, recycling of metals etc.

Module: V:

Energy conservation :- Energy resources –

- i) Conventional energy resources of wood, fossil fuel etc.
- ii) non conventional energy etc.

Environmental problems due to conventional energy sources, conservations of energy resources

Pollution Control: Air pollution control equipments, air pollution control in industry ; water pollution control – sewage treatment plant, effluent treatment plant; noise pollution control in industry soil reclamation methods.

Reference Books:

- 1) Principles of Environmental Biology by PKG Nair Himalaya publishing house, New Delhi
- 2) Environmental Science by Enger, smith, WMC Brown company publishing.
- 3) Practical methods in ecology, by R. K. Trivedy, P.K. Goel and Trigal, Enviro publication, karad
- 4) Chemical methods for Environmental Analysis water and sediment By R. Ramesh and M. AnbuMackmillan India Limited, New Delhi.
- 5) Fundamental of Ecology – By M. C. Dash, Tata McGraw Hill pub., Co.ltd. New Delhi.
- 6) Environment, Energy, Health planning for conservation by V. Vidyanath, Gyam Publishing House, New Delhi.
- 7) Environmental Chemistry by G. S. Sodhi
- 8) Environmental Chemistry A. K. De.
- 9) Environmental pollution analysis by S. M. Khopkar
- 10) A Test nppl pf Environmental Chemistry and pollution control by S. S. Dara.
- 11) Environmental Science Earth as a living planet by Botkin D and keller E, John, Wiley and sons, New York.
- 12) A Manual of air quality monitoring by NEERI, Nagpur.
- 13) Fundamentals of Air Pollution by A. C. Stein, Academic press vol. I to X
- 14) Air pollution by M. N. Rao, McGraw Hill, 1993.
- 15) Air pollution by V. P. Kudesia, Pragati Prakashan, meerut.
- 16) Environment pollution and management by L. Mohan.
- 17) Pollution control in Process Industry by S. P. Mahajan

Paper No – III
(Subject Code- GE-103)
SOIL FERTILITY AND PLANT NUTRITION

Module I:

Soil fertility and productivity

Soil fertility-past and present. Soil fertility and plant growth, soil fertility based growth equations. **Soil productivity management.** Soil organic matter depletion, causes of organic matter depletion, organic matter replenishment- green manure, farm yard manure and animal manures, compost, crop residues and organic wastes.

Module III:

Nutrient dynamics and availability

Geochemical distribution- dynamics and availability of N, P, K, S, Mn, Cu, Zn, B and Mo in soil. **Soil fertility evaluation:** Chemical analysis-soil analysis, plant analysis; biological tests; fertilizer recommendation for crops and cropping patterns.

Module III:

Fertilizers use and management: Trends of fertilizer use in India, imbalanced use of fertilizers, nutrient mining. Concept of integrated plant nutrition system, integrated use of chemical and organic fertilizers. Fertilizer use efficiency.

Module IV:

Abundance and distribution of soil microflora and fauna; a brief classification of bacteria, fungi and algae: interactions among soil microorganisms. **Biogeochemical role of soil microorganisms:** Biochemical transformation of nitrogen: Proteolysis, ammonification, nitrification and denitrification. Biochemical transformation of phosphorus: Mineralization of organic phosphorus, oxidation-reductions reactions, solubilization of inorganic phosphates.

Module V:

Biological nitrogen fixation:

Symbiotic fixation-legume-Rhizobium symbiosis, Azolla-Anabaena symbiosis; Non-symbiotic fixation-Azotobacter, Cyanobacteria, Azospirillum; Rhizosphere fixation; Quantity of nitrogen fixed by different microorganisms; Factors influencing nitrogen fixation; Biochemistry of nitrogen fixation-nitrogenase enzyme, reaction mechanisms of nitrogenase, regulation of nitrogenase activity; Methods for measuring nitrogen fixation. **Mycorrhizae:** Type, host-endophytic interactions and contribution in nutrient uptake. Microbial inoculants Preparation of rhizobial, blue-green algal and azolla inoculants; their uses in improving soil fertility.

Books Recommended:

1. Brady N.C. 1990. The Nature and Properties of Soils. Macmillan Pub. Co. Inc., New York.
2. Tisdale. S.L., Nelson. W.L., Beaton, J.D. and Havlin, J.I. 1997. Soil Fertility and Fertilizers. Macmillan Pub. Co., New York.
3. Kanwar. N.C. 1976. Soil Fertility-Theory and Practice. ICAR. New Delhi.
4. Mengel. K. and Kirkby, L.A. 1987. Principles of Plant Nutrition. Int. Potash Inst. Pub. Switzerland.
5. Miller. R. W. and Donahue. R.L. 1990. Soil-An Introduction to Soils and Plant Growth. Prentice Hall Inc., USA. .
6. Stevenson, F.J. 1985. Cycles of Soils-Carbon, Nitrogen, Phosphorus. Sulphur, Micronutrients. John Wiley & Sons Inc.. New York.
7. Tamhane. R.U., Montiramani. D.P., Bali, Y.P. and Donahue, R.L. 1986. Soils Their Chemistry and Fertility in Tropical Asia. Prentice Hall of India Pvt. Ltd.. New Delhi.
8. Thomson. L.M. and Troeh. F.R. 1978. Soils and Soil Fertility. McGraw Hill, New York.
9. Alexander, M. 1977. Introduction to Soil Microbiology. John Wiley & Sons Inc., New York.
10. Gallon. J.R. and Chaplin, A.K. 1987. An Introduction to Nitrogen Fixation. Cassell Educational Ltd.. London.
11. Nutman. P.S. 1975. Symbiotic Nitrogen Fixation in Plants.
12. Pelczar, M.J., Chan, E.C.S. and Krieg. N.R. 1986. Microbiology. McGraw-Hill Book Co.. New York.
13. Quispel. A. 1971. The Biology of Nitrogen Fixation. North Holland.
14. Roger. L.J. and Gallon, J.R. 1988. Biochemistry of algae and cyanobacteria. Oxford University Press. London

Paper No. IV
(Subject Code- VE-104)
INTRODUCTION TO GARDENING

Module-1.

Introduction to Gardening, Garden Implements and Accessories, Area, Measurements, Volumes, Layout - Planning, Different Designs. Containers - Earthen containers, pots, polybags, cement pots, ceramic pots. Propagation - Seeds, cuttings, layering, budding and grafting.

Module-2.

Types of Gardening - Formal, informal, landscape, institutions, public gardens, parks, Hindu, Mughal, Japanese and English Gardens. Features of Gardens - Gate, lawn, shrubbery, flower beds, borders, paths, hedges, edges, steps, statues, fountains, bird paths, streams, pools, water falls, rockery, arches, pergolas, hanging pots, bird paths, tea house.

Module-3.

Principles and Practices of landscape design for home gardens and public parks. Ornamental Gardening - Scope; importance; nursery management; lawns, layout of lawn, grasses; lawn and its maintenance.

Module-4.

Design and layout of gardens for home, school, college, public buildings, parks, villages and kitchen garden. Identification of ornamental plants, seasonal annuals, egges, hedges, shrubs, creepers, trees, vines (commercial nursery)

Module-5.

Green Houses-shade houses, uses, application in horticulture. Pruning and training - objective and methods. Principles of making bonsai.

Paper No. V
(Subject Code- VE-105)
NURSERY MANAGEMENT (Voc Paper – 2)

Objectives: This course aims to develop a basic understanding of the principles of plant propagation, an overview of propagation techniques, a general knowledge of the methods of propagation of the more commonly cultivated plants and the basic knowledge on entrepreneurial skills required to run a small scale commercial nursery.

Module - 1. Basics of nursery management

1. Introduction to nursery
2. Plant propagation- methods and classification
3. Factors affecting plant growth
4. Plant growth regulators
5. Introduction to landscaping
6. Lawn making

Module - 2. Seed propagation

1. Seed as propagule
2. Germination of seeds
3. Seed dormancy and viability
4. Seed production- method of collection, processing, etc.
5. Hybrid seed production
6. Seed treatment
7. Classes of seed
8. Seed testing
9. Commercial vegetable seedling production
10. Artificial seeds

Module - 3. Vegetative propagation-I II

1. Asexual reproduction-importance, advantages
2. Propagation through stolons, runners, offsets, bulbs, corms, rooted crowns, division, cuttings layering
3. Grafting and budding
4. Root stock-scion relationship
5. Top working
6. Special practices in nursery management
7. Micro-propagation (tissue culture/in vitro culture)
8. Apomixis and poly embryony

Module - 4. Commercial nursery management

1. Nursery- site selection, lay out, records
2. Nursery structures
3. Potting, repotting
4. Nursery management of major crops
5. Progeny orchard
6. Problems in nursery management and its control
7. Nursery accreditation and certification

Module - 5. Entrepreneurship Development

1. Entrepreneurship – Concept, characteristics, approaches, need for entrepreneurship
2. Traits of an entrepreneur – Risk taking, leadership, decision making, planning, organising, coordinating and marketing; Types of entrepreneurs
3. Agri-Enterprises- Stages of establishing enterprise, Project Identification, Step to be considered in setting up an enterprise, Feasibility Report, Product selection
4. Project management and appraisal – market, technical, social, financial analysis
5. Market Management – concept planning for marketing target marketing and competitive strategy

Paper No. VI (V0C.:1)
(Subject Code- VE-106)
Practical Based on Introduction to Gardening – I

1. Study Garden tools and implements, Study of containers - earthen containers, pots, polybags, cement pots and ceramic pots.
2. Preparation of nursery beds and sowing of seeds.
3. Layout of land for lawn and Preparation of land for lawn.
4. Designing of home gardens
5. Planting of woody plants, bulbs and bedding plants.
6. Planting of shrubbery, hedges and edges.
7. Identification and growing of indoor plants of their basic requirements.
8. Practice in making bonsai.
9. Raising of root stocks for grafting and budding.
10. Propagation of plants through cuttings.
11. Practicing of layering and stooling (Guava)
12. Practicing of grafting (Mango)
13. Practicing budding in rose / citrus.
14. Visit to commercial nursery in the locality.
15. Preparation of potting mixture, potting and repotting.
16. Study of ring basin method in an mango / citrus orchard.
17. Study of check basin method in vegetables.
18. Study of sprinkler and drip irrigation method.
19. Layout of model kitchen garden.
20. Planning and designing of different of gardens

Paper No. VII (VOC.: 2)
(Subject Code- VE-107)
Practical Based on Nursery Management

1. Identification of fruit crops.
2. Digging and refilling of pits for planting of fruit crops.
3. Interculture operations in fruit trees.
4. Methods of training and pruning in grapes.
5. Application of manures and fertilizers for fruit crops.
6. Identification and control of insect pests for fruit crops.
7. Identification and control of diseases in important fruit crops.
8. Participation in harvesting of fruit crops.
9. Visit to orchards.
10. Identification of vegetable seeds.
11. Preparation of land beds for important vegetable crops.
12. Preparation of nursery beds for important vegetables.
13. Participation in transplanting of vegetable seedlings in main field.
14. Use of manures and fertilizers as basal application of important vegetable crops.
15. Inter-culture operations like hoeing, earthing and staking in tomato.
16. Identification of important insect pests of vegetables and their control.
17. Identification of important diseases of vegetables and their control.
18. Participation in harvesting of vegetable crops.
19. Identification of commercial flowers.
20. Training and pruning in rose.
21. Practicing garden operations such as staking, pinching, de-suckering in cut flowers.
22. Practicing of fertilizer application to cut flowers.
23. Practicing pruning in jasmine.
24. Identification of diseases and insects and their control in important flower crops.
25. Identification of annuals, bi-annuals and perennials, bulbs and pot plants.
26. Identification of landscape trees, shrubs / climbers and ground covers.
27. Visit to commercial nursery.

Semester – I
Paper- VIII
(Subject Code- VE-108)
(Project Work)

- Dissertation /Project work

SEMESTER II
Paper No. IX
(Subject Code- GE-201)
LINGUISTIC PROFICIENCY-II

Module –I: INTRODUCING WRITTEN COMMUNICATION

1. Writing Notices
2. Drafting Agendas (Synergy)
3. Writing minutes
4. Note taking
5. Basic of spoken English

Module: II : WRITING APPLICATIONS, LETTERS AND

1. Writing applications for various jobs, referring to the adds.
2. Writing letters:

Module: III : BUSINESS CORRESPONDENCE (Introducing Business Correspondence):

- a. Letters of inquiry
 - b. Letters of order
 - c. Letters of complaint
 - d. Letters of indent
 - e. Letters of credit
 - f. Bills of lading
- (Exercises from Synergy) orient Longman

Module- IV: INTRODUCING LISTENING SKILLS

1. Approaches to listening skills
2. Barriers to effective listening
3. Tips for effective listening

Module V: PREPARING FOR INTERVIEW:

FACING INTERVIEW: Techniques Speeches , Presentations, Meetings , Surveys , Report writing , Making Project reports , Preparing Proposals , Seeking financial assistance / loan for your proposal

Reference Books:

- 1) Synergy: Communication in English and study skills (Orient Blackswan) – (2008)
- 2) Macmillan foundation English – R. K. Dwivedi, A. Kumar: Macmillan India Ltd. 2001
- 3) Mastring Communication – Nicky Stanlon: Palgrave Macmillan (2009)
- 4) Scientists must write – Robert Barrass: Routledge Publication, London
- 5) Functional Grammar and Spoken and Communication in English – Bikram K. Das: Orient Longman Publication (2006)

Paper No. X
(Subject Code- GE-202)
COMPUTER FUNDAMENTALS

Basic Computer Hardware System

Module-I:

Computer Architecture, Mother Board and its all components, Computer Components (Input/ Output Devices, Primary and Secondary Memory, Power Supply, Monitor).

Module-II:

Observation of all parts of Floppy drives, HDD, CD, and SMPS. Identification of cables and computers. Mounting Motherboard in cabinet, Installation of cards, devices and then connecting cables. Fitting of cabinet. CMOS – Setup, Troubleshooting.

Module-III:

Computer Assembling, Make your own Computer, Operating System Installation, Windows Vista, Software Installation, Trouble Shooting, Bios Setups, Identifications of Components. Advanced Trouble Shooting and Maintenance.

Module-IV:

Types of printers and printing mechanism, How printer works, Inject printer, working of laser printer, Fonts/Type faces, Trouble shooting printers. Types of Scanners and its used.

Module-V

Introduction to Laptops, Portable System background, System Features, Processors, Mother Boards, Memory, Power, Expansion Bus, Hard Disk & Removable Storage Devices, Laptop Components, Laptop Maintenance & Assembling, Linux, Multimedia, Internet, Computer VIRUS, Wi-Fi Network Trouble Shooting.

Laboratory Work:

1. Handling of all Computer Peripherals
2. PC Troubleshooting
3. Windows Installation
4. PC Assembling
5. Fault finding in PC and recovering
6. Installation and use of Printers and Scanners
7. Fault Finding and Troubleshooting on Laptop

Text Books:

- (01) Hardware bible By : Winn L Rosch, Techmedia publications
(02) Trouble shooting, maintaining and repairing PCs By : Stephon J Bigelow Tata McGraw Hill Publication
(03) Modern All about printers By : Manohar Lotia, Pradeep Nair, BijalLotia BPB publications.

Module III: Word Processing

- Overview of Word Processing
- Creating and Editing a Document (Exercise 1 - Creating Notice)
- Revising and Refining a Document (Exercise 2 - Revise your notice)
- Using Additional Word Features (Exercise 3 – Creating notice for different classes)
- Changing the Display of the Document (Exercise 4 - Changing the display of your notice)
- Using Mail Merge (Exercise 5 – Sending notice using Mail Merge)
- Using Standard Templates (Exercise 6–Create notice using standard templates)
- Word Processing in Other Languages (Exercise 7 - Creating a notice in Marathi)

Module VI: Spreadsheet and Presentation Graphics

- Overview of Excel
- Creating and Editing (Exercise 1 – Creating attendance sheet)
- Using Charts (Exercise 2 – Creating a chart)
- Managing a Workbook (Exercise 3 – Managing Attendance Sheet)
- Overview of Presentation Graphics
- Creating a Presentation (Exercise 1 – Creating a Annual Day Presentation)
- Modifying and Refining a Presentation (Exercise 2 – Modifying and Refining Presentation)
- Using Advanced Presentation Features (Exercise 3 – Advanced Features for Presentation)

Module V: Internet

- Internet Basics

- Navigating the Web (Exercise 1 – Navigating the web site)
- Finding Information on the Web (Exercise 2 – Searching result on the web)
- Communication Using E-Mail (Exercise 3 – Communicate result to your friends)

REFERENCE BOOKS:

1. The complete PC upgrade and maintenance guide By : Mark Minasi, BPB Publications.
2. A First Course in Probability, Sheldon Ross, Prentice Hall; 6th edition (July 31, 2001).
3. Probability and Random Processes, Geoffrey R. Grimmett & David R. Stirzaker, Oxford University Press; 3rd edition (August 1, 2001).
4. An Introduction to Mathematical Statistics and Its Applications, Richard J. Larsen & Morris L. Marx, Prentice Hall; 3rd Edition (January 15, 2000).
5. The Cartoon Guide to Statistics, Larry Gonick, Woollcott Smith, HarperResource; 1st Harper Perennial edition (February 25, 1994).
6. Microsoft Office Word 2007 a Beginners Guide: A Training Book of Microsoft Word 2007, By W.R. Mills, United States of America, Bloomington, Indiana.
7. Microsoft Office Word 2007: Illustrated Co: Illustrated Complete, By Jennifer A. Duffy, Carol M. Cram
8. Sams Teach Yourself Microsoft Office 2007 All in One, By Greg Perry
9. Microsoft Office Excel 2007: Comprehensive Concepts and Techniques, By Greg B. Shelly, Thomas J. Cashman, Jeffrey J. Quasney.
10. Microsoft Office Power Point 2007: Illustrated Introductory: Introductory, By David Beskeen
11. Microsoft Office Power Point 2007: Top 100 Simplified Tips & Tricks, By Paul McFedries.
12. Microsoft Office Access 2007: Comprehensive Concepts and Techniques, By Thomas J. Cashman, Philip J. Pratt
13. New Perspectives on Microsoft Office Access 2007, Comprehensive, Joseph J. Adamski, Kathleen T. Finnegan
14. Basic Internet, By O.H.U. Heathcote

Paper No. XI
(Subject Code- GE-203)
SOIL, PLANT AND WATER RELATIONS

Module I: Principles of Analytical Methods

Volumetric, gravimetric, turbid metric, spectrophotometric, flame emission spectroscopy, atomic absorption spectroscopy and chromatography; Errors in analysis.

Module II: Soil Analysis

Purpose of soil analysis; collection, preparation and preservation of soil samples. Total nutrient analysis-acid digestion and fusion, fractionation of plant nutrients in soil. Available nutrient analysis-concepts of nutrient availability, selection of extracting for determining available nutrients, interpretation of soil analytical data, critical limit of plant nutrients in soils.

Module III: Principles for determination of soil pH, lime requirement, organic matter, redox potential, soluble salt and CHC. Microbiological tests: collection, isolation, selection of growth media and culturing and count of cyanobacteria, bacteria and fungi in soil.

Module IV: Plant Analysis

Purpose of plant analysis; sampling, processing and preservation of plant samples; principles of plant analysis, plant tissue test, leaf analysis, total analysis; critical level of nutrients in plant, interpretation of plant analysis data.

Module V: Water Analysis

Purposes of water analysis; collection, preservation and analysis of water samples' rating of water for irrigation, water quality and environment pollution.

Books Recommended:

1. Hesse. P.R. 1971 A. Text Book of Soil Chemical Analysis John Murray Pub. Ltd., London.
2. Jackson. M. L. 1962. Soil chemical Analysis. Prentice Hall, New York.
3. Klute. A. 1986. Methods of Soil Analysis, part 1. Amer. Soc. Agron., Madison.
4. Piper. C. S. 1950 Soil and plant Analysis. Adelaide Univ. Press, Australia.
5. Page. A.L., Miller. R. H. and Deeney, D. R. 19825 Methods of Soil Analysis, Part 2. Amer. Soc. Agron-Madison.
6. Seeley. H. W. and Van Demark. J. P. 1975 Microbes in Action. D. B. Taraporevala Sons Co., Bombay.
7. Tyler. M. E. and Milam, J.R. 1969. Basic Bacteriology; Laboratory Manual. Department of Bacteriology, Univ. Florida.

Paper No. XII (Voc. 3)
(Subject Code- VE-204)
BIOFERTILIZER TECHNOLOGY

Module I: Introduction to biofertilizers - Structure and characteristic features of the following biofertilizer organisms: Bacteria: Azospirillum, Azotobacter, Bacillus, Pseudomonas, Rhizobium and Frankia. Cyanobacteria: Anabaena, Nostoc, Hapalosiphon. Fungi: Glomus, Gigaspora, Sclerocystis, Amanita, Laccaria.

Module II: Biofertilization processes - Decomposition of organic matter and soil fertility and vermicomposting. Mechanism of phosphate solubilization and phosphate mobilization. Nitrogen fixation - Free living and symbiotic nitrogen fixation. Biotechnological application in nitrogen fixation.

Module III: Nitrogenous Biofertilizers I: Bacteria - Isolation and purification of Azospirillum and Azotobacter, mass multiplication of Azospirillum and Azotobacter, formulation of inoculum of Azospirillum and Azotobacter, application of inoculants of Azospirillum and Azotobacter. Isolation and purification of Rhizobium, mass multiplication and inoculum production of Rhizobium, Methods of application of Rhizobium inoculants.

Module IV: Isolation and purification of Cyanobacteria. Mass multiplication of cyanobacterial bioinoculants - Trough or Tank method, Pit method, Field method; methods of application of cyanobacterial inoculum. Azolla - mass cultivation and application in rice fields.

Module V: Mycorrhizae - Ecto and endomycorrhizae and their importance in agriculture. Isolation of AM fungi - Wet sieving method and sucrose gradient method. Mass production of AM inoculants and field applications. Isolation and Purification of phosphate solubilizers. Mass multiplication and field applications of phosphate solubilizer (*Pseudomonas striata*). Biofertilizers - Storage, shelf life, quality control and marketing.

Reference Books

1. Bagyaraj, D.J. and A. Manjunath. 1990. Mycorrhizal symbiosis and plant growth, Univ. of Agricultural Sciences, Bangalore, India.
2. Purohit, S.S., P.R. Kothari and S.K. Mathur, 1993. Basic and Agricultural Biotechnology, Agro Botanical Pub. India.
3. Subba Rao, N. S. 1988. Biological nitrogen fixation: recent developments, Mohan Pramlani for Oxford and IBH Pub. Co. (P) Ltd., India.
4. Subba Rao, N.S., G.S. Venkataraman and S. Kannaiyan 1993. Biological nitrogen fixation, ICAR Pub., New Delhi.
5. Somani, L.L., S.C. Bhandari, K.K. Vyas and S.N. Saxena. 1990. Biofertilizers, Scientific Publishers - Jodhpur.

Paper No. XIII (Voc. 4)
(Subject Code- VE-205)
BIOFERTILIZER PRODUCTION

Module I: Production technology: Strain selection, sterilization, growth and fermentation,

Module II: Mass production of various biofertilizers.

Module III: Application technology: Standards and quality control,

Module IV: Application for field and tree crops, nursery plants and seedlings

Module V: Extension, promotion and marketing: Extension strategies, diagnosis for the effectiveness of inoculation, improvement in distribution

Paper – XIV
(Subject Code- VE-206)
Practical Based on Bio-fertilizer Technology (Voc. – 3)

- **Lab work :**Practicals based on Bio-fertilizer Technology

Paper – XV
(Subject Code- VE-207)
Practical Based on Bio-fertilizer Production (Voc. –4)

- **Lab work :**Bio-fertilizer Production

Paper – XVI
(Subject Code- VE-208)
(In plant Training)

- In plant Training.
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