

**Course Curriculum of Second Semester**  
**as per the ICAR-Sixth Deans' Committee Report for**  
**the Academic Programmes in**  
**HORTICULTURE**

- ❖ **UG-Certificate in Horticulture**
- ❖ **UG-Diploma in Horticulture**
- ❖ **UG-Degree: B.Sc. (Hons.) Horticulture**



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*Submitted to the*

**Directors of Instruction Coordination Committee**

~ w.e.f. AY, 2024-25 ~

**Course Curriculum of Second Semester as per the**  
**ICAR-Sixth Deans' Committee Report for Academic Programme in**  
**HORTICULTURE**

**Course Layout**

**B.Sc. (Hons.) Horticulture**

**Semester: II (New)**

**w.e.f. Academic Year: 2024-25**

Sr. No.	Course No.	Course Title	Credits Hrs.	Remark (if any)
1.	<b>AEC-123</b>	National Services Scheme (NSS-II)/ National Cadet Corps (NCC-II)	1(0+1)	--
2.	<b>AEC-124</b>	Personality Development	2(1+1)	--
3.	<b>MDC-122</b>	Entrepreneurship Development and Business Management	3(2+1)	--
4.	<b>VAC-121</b>	Environmental Studies and Disaster Management	3(2+1)	--
5.	<b>AGRO-121</b>	Introduction to Major Field Crops	3(2+1)	--
6.	<b>PSMA-121</b>	Commercial Production of Spices and Plantation Crops	3(2+1)	--
7.	<b>VS-121</b>	Plant Propagation and Nursery Management in Vegetables, Flowers and Medicinal crops	3(1+2)	--
8.	<b>SEC-123</b>	Skill Enhancement Course-III (To be offered from the list of SEC Courses)	2(0+2)	--
9.	<b>SEC-124</b>	Skill Enhancement Course-IV (To be offered from the list of SEC Courses)	2(0+2)	--
<b>Total Credits Hrs.</b>			<b>22(10+12)</b>	<b>G</b>
<b>AEC:</b> Ability Enhancement Course, <b>MDC:</b> Multidisciplinary Course, <b>SEC:</b> Skill Enhancement Course, <b>VAC-</b> Value-Added Course, <b>G:</b> Gradiual				
<b>Post II Semester (Only for Exit option for award of UG-Certificate)</b>				

10.	<b>INT-121</b>	Internship (10 Weeks)	10(0+10)	--
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**B.Sc. (Hons.) Horticulture : Second Semester**  
**Course-wise Syllabus with Teaching Schedules**

<b>Semester : II</b>		
<b>Course No. : AEC-123</b>		<b>Credit Hrs. : 1(0+1)</b>
<b>Course Title : National Service Scheme-II (NSS-II)/ National Cadet Corps-II (NCC-II)</b>		
Gradial Common Course across all UG Degrees		

  

<b>Course No. : AEC-123</b>	<b>Course Title : National Service Scheme-II (NSS-II)</b>	<b>Credit Hrs.:1(0+1)</b>
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**SYLLABUS**

- Objectives :**
- (i) To evoke social consciousness among students through various activities viz., working together, constructive and creative social work,
  - (ii) To be skilful in executing democratic leadership and developing skill in program,
  - (iii) To be able to seek self-employment, reducing gap between educated and uneducated, increasing awareness and desire to help sections of society.

**PRACTICAL**

Importance and role of youth leadership. Meaning, types and traits of leadership, qualities of good leaders; Importance and roles of youth leadership, Life competencies. Definition and importance of life competencies, Problem-solving and Decision-making, Interpersonal communication. Youth development programs Development of youth programs and policy at the national level, state level and voluntary sector; Youth-focused and youth-led organizations Health, hygiene and sanitation. Definition Needs and Scope of health education; Role of food, nutrition, safe drinking water, water borne diseases and sanitation (Swachh Bharat Abhiyan) for health; National health programs and reproductive health. Youth health, lifestyle, HIV-AIDS and first aid. Healthy lifestyles, HIV-AIDS,

drugs and substance abuse, home nursing and first aid. Youth and yoga. History, philosophy, concept, myths and misconceptions about yoga; Yoga traditions and its impacts, Yoga as a tool for healthy lifestyle, preventive and curative method.

### **TEACHING SCHEDULE**

#### **PRACTICAL [AEC-123 / NSS-II]**

<b>Exercise No.</b>	<b>Topic</b>	<b>Exercise Title/ Sub-topics</b>
<b>1</b>	<b>Orientation on NSS</b>	Introduction to NSS, its Objectives, History and Role in community service.
<b>2</b>	<b>Youth Leadership</b>	Discuss the importance and role of youth leadership, types and traits of leadership and qualities of good leaders.
<b>3</b>	<b>Life Competencies</b>	Understanding life competencies, their importance and Practical exercises in problem-solving and decision-making.
<b>4</b>	<b>Interpersonal Communication</b>	Practice exercises to improve interpersonal communication skills, Focusing on active listening and effective communication.
<b>5</b>	<b>Youth Development Programs</b>	Overview of youth development programs, Policies at national and state levels and Understanding youth-led organizations.
<b>6</b>	<b>Health, Hygiene, and Sanitation</b>	Practical activities on the importance of hygiene and sanitation, including Swachh Bharat Abhiyan tasks.
<b>7</b>	<b>Nutrition and Health Education</b>	Discuss the role of food, nutrition, and safe drinking water in health; Explore the impact of waterborne diseases.
<b>8</b>	<b>National Health Programs</b>	Introduction to key national health programs and their roles in promoting public health and awareness on reproductive health.
<b>9</b>	<b>Youth Health and Lifestyle</b>	Sessions on healthy lifestyle choices including exercise, balanced diet and stress management.
<b>10</b>	<b>HIV/AIDS Awareness</b>	Educational activities on HIV/AIDS, its prevention, and reducing stigma; Awareness on reproductive health.
<b>11</b>	<b>Substance Abuse Awareness</b>	Discussing the dangers of drug and substance abuse, its impact on health and practical ways to prevent addiction.
<b>12</b>	<b>First Aid and Home Nursing</b>	Hands-on training in first aid techniques including handling injuries, CPR basics and home nursing care.
<b>13</b>	<b>Introduction to Yoga</b>	Introduction to the History, Philosophy and various Traditions of Yoga as a Holistic health practice.

14	<b>Yoga Practice</b>	Practical Yoga Sessions focusing on Asanas, Pranayama and Meditation for a healthy lifestyle.
15	<b>Yoga as Preventive and Curative Tool</b>	Understanding and Practicing Yoga as a preventive and curative approach for physical and mental health.
16	<b>Reflection on NSS and Youth Development</b>	Group Discussion and Reflection on the role of NSS in community building and personal growth, Focusing on youth leadership.

<b>Course No. : AEC-123</b>	<b>Course Title : National Cadet Corps-II (NCC-II)</b>	<b>Credit Hrs.:1(0+1)</b>
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### **SYLLABUS**

- Objectives:** (i) To develop qualities of character, courage, comradeship, discipline, leadership, secular outlook, spirit of adventure and sportsmanship and the ideals of selfless service among the youth to make them useful citizen,
- (ii) To create a human resource of organized trained and motivated youth to provide leadership in all walks of life including the Armed Forces and be always available for the service of the nation.

### **PRACTICAL**

Arms Drill- Attention, stand at ease, stand easy. Getting on parade. Dismissing and falling out. Ground/take up arms, examine arms. Shoulder from the order and vice-versa, present from the order and vice-versa. Saluting at the shoulder at the halt and on the march. Short/long trail from the order and vice-versa. Guard mounting, Guard of honor, Platoon/Coy Drill. Characteristics of rifle (.22/.303/SLR), ammunition, fire power, stripping, assembling, care, cleaning, and sight setting. Loading, cocking, and unloading. The lying position and holding. Trigger control and firing a shot. Range Procedure and safety precautions. Aiming and alteration of sight. Theory of groups and snap shooting. Firing at moving targets. Miniature range firing. Characteristics of Carbine and LMG. Introduction to map, scales, and conventional signs. Topographical forms and technical terms. The grid system. Relief, contours, and gradients. Cardinal points and finding north. Types of bearings and use of service protractor. Prismatic compass and its use. Setting a map, finding north and own position. Map to ground and ground to map. Knots and lashings, Camouflage and concealment, Explosives and IEDs. Field defenses obstacles, mines and mine lying. Bridging, waterman ship. Field water supplies, tracks and their construction. Judging distance. Description of ground and indication of landmarks. Recognition and description of target. Observation and concealment. Field signals.

Section formations. Fire control orders. Fire and movement. Movement with/without arms. Section battle drill. Types of communication, media, latest trends and developments.

### **TEACHING SCHEDULE**

#### **PRACTICAL (AEC-123/ NCC-II)**

<b>Exercise No.</b>	<b>Topic</b>	<b>Exercise Title/ Sub-topics</b>
<b>1</b>	<b>Basic Arms Drill</b>	Attention, stand at ease, stand easy, getting on parade, dismissing and falling out.
<b>2</b>	<b>Advanced Arms Drill</b>	Ground/take up arms, examine arms, shoulder from the order and vice versa.
<b>3</b>	<b>Saluting with Arms</b>	Saluting at the shoulder both at a halt and while on the march.
<b>4</b>	<b>Rifle Handling Techniques</b>	Short/long trail from the order and vice-versa, guard mounting and guard of honor procedures.
<b>5</b>	<b>Platoon and Company Drill</b>	Practice and demonstration of platoon and company drill formations.
<b>6</b>	<b>Rifle Characteristics and Handling</b>	Characteristics of rifles (.22/.303/SLR), ammunition, firepower, and basic care, cleaning and sight setting.
<b>7</b>	<b>Rifle Operations and Safety</b>	Loading, cocking, unloading, safety procedures; lying position, trigger control and firing a shot.
<b>8</b>	<b>Range Procedures and Target Practice</b>	Range procedures, aiming, sight alteration, theory of groups, snap shooting and firing at moving targets.
<b>9</b>	<b>Map Reading Basics</b>	Introduction to maps, scales, conventional signs, topographical forms and the grid system.
<b>10</b>	<b>Advanced Map Skills</b>	Relief, contours, gradients, cardinal points, bearings, and use of the service protractor.
<b>11</b>	<b>Field Navigation with Compass</b>	Use of prismatic compass, setting a map, finding north, positioning, map-to-ground and ground-to-map.
<b>12</b>	<b>Field Engineering Skills</b>	Knots and lashings, camouflage, handling explosives, IEDs, field defenses, obstacles and mines.
<b>13</b>	<b>Watermanship and Field Water Supplies</b>	Bridging techniques, field water supplies, track construction and distance judgment.
<b>14</b>	<b>Target Recognition and Indication</b>	Identifying and describing targets, observing, concealment, field signals and indication of landmarks.



<b>15</b>	<b>Section Battle Drills and Movement</b>	Section formations, fire control orders, fire and movement, movement with/without arms, section battle drill.
<b>16</b>	<b>Communication Skills and Modern Trends</b>	Types of communication, media and latest trends in NCC communication.

<b>Semester</b>	<b>: II</b>	
<b>Course No.</b>	<b>: AEC-124</b>	<b>Credit Hrs. : 2(1+1)</b>
<b>Course Title</b>	<b>: Personality Development</b>	
Gradual Common Course across all UG Degrees		

### **SYLLABUS**

**Objectives:** To make students realize their potential strengths and cultivate their inter-personal skills and improve employability.

#### **THEORY**

Personality: Definition, Nature of personality, Theories of personality and its types. The humanistic approach - Maslow's self-actualization theory, Shaping of personality, Determinants of personality, Myers-Briggs Typology Indicator, Locus of control and performance, Type A and Type B Behaviours, Personality and Organizational Behaviour. Foundations of individual behavior and Factors influencing individual behavior, Models of individual behavior, Perception and Attributes; Factors affecting perception, Attribution theory and Case studies on Perception and Attribution. Learning: Meaning and Definition, Theories and Principles of Learning, Learning and Organizational behavior, Learning and Training, Learning feedback. Attitude and Values, Intelligence- Types of Intelligence, Theories of intelligence, Measurements of intelligence, Factors influencing intelligence, Intelligence and Organizational behavior, Emotional intelligence. Motivation- Theories and Principles, Teamwork and Group dynamics.

## PRACTICAL

MBTI Personality Analysis, Learning Styles and Strategies, Motivational Needs, Firo-B, Interpersonal Communication, Teamwork and Team Building, Group Dynamics, Win-Win Game, Conflict Management, Leadership Styles, Case Studies on Personality and Organizational Behavior.

### TEACHING SCHEDULE

#### THEORY [AEC-124]

Lecture No.	Topic	Sub-topics / Key Points	Weightage (%)
1	Personality	Definition, Nature of Personality	5
2	Theories of Personality and its Types	The Humanistic Approach- Maslow's self-actualization theory; Types-Extroversion, Introversion, Conscientiousness, Agreeableness	10
3		Shaping of Personality - improving communication skills, stepping out of comfort zone, learning to say no, tapping into creativity, getting curious, giving yourself a daily affirmation, practicing self-care. Determinants of Personality- Physical, Intellectual, Social and Psychological	10
4		Myers- Briggs Typology indicator Four Indicators Introvert/Extrovert, Thinking/ Feeling, Sensing/ Intuiting, Judging/ Perception, Locus of Control and Performance	10
5		Type A and Type B Behaviours Theory	5
6	Personality and Organizational Behaviours	Difference between Personality and Organizational Behaviours	5
7		Foundations of individual behaviours, Factors influencing individual behaviour- Personality, Values, Motivation, Perspectives and Social impacts	5
8		Models of Individual Behaviour- Rational Economic man, Social man, The Self Actuating man, Complex man	5
9	Perception	Attributes and Factors affecting perception; Attribution theory and Case studies on Perception and Attribution	10
10	Learning	Meaning, Definition; Theories and Principles of Learning	10
11		Difference between Learning and Organizational behavior; Difference between Learning and Training; Feedback of Learning	5



12	Attitude and Values	Meaning, Definitions, Concept	5
13	Intelligence	Types of Intelligence, Theories of intelligence	
14		Measurement of intelligence Factors affecting intelligence Difference between intelligence and organizational behaviour, Emotional intelligence	5
15	Motivation	Meaning, Theories and Principles	5
16	Team & Group Dynamics	Meaning, Definitions, Concept	5
<b>Total =</b>			<b>100</b>

### TEACHING SCHEDULE

#### PRACTICAL [AEC-124]

Exercise No.	Exercise Topic
1	Myers- Briggs Type Indicator (MBTI) analysis- Extroversion/ Introversion
2	Myers- Briggs Type Indicator (MBTI) analysis- Sensing/ Intuition
3	Myers- Briggs Type Indicator (MBTI) analysis- Thinking/Feeling
4	Myers- Briggs Type Indicator (MBTI) analysis- Judging/ Perception
5	Learning Styles and Strategies
6	Motivational Needs
7	Fundamental Interpersonal Relations Orientation Behaviour (FIRO-B)
8	Interpersonal Communication
9	Team Work
10	Team Building
11	Group Dynamics
12	Win-Win Game
13	Conflict Management
14	Leadership Styles
15	Case Studies on Personality
16	Case Studies on Organizational Behaviour

### **Suggested Readings [AEC-124]:**

1. **Andrews, Sudhir, 1988**, How to Succeed at Interviews. 21<sup>st</sup>(rep.) New Delhi. Tata -McGraw Hill.
  2. **Heller, Robert, 2002**, Effective Leadership. Essential Manager Series. DK Publishing.
  3. **Hindle, Tim, 2003**, Reducing Stress. Essential Manager Series. DK Publishing.
  4. **Kumar, Pravesh, 2005**, All about Self- Motivation. New Delhi. Goodwill Publishing House.
  5. **Lucas, Stephen, 2001**, Art of Public Speaking. New Delhi. Tata - McGraw Hill.
  6. **Mile, D.J., 2004**, Power of Positive Thinking. Delhi. Rohan Book Company.
  7. **Smith, B., 2004**, Body Language. Delhi: Rohan Book Company.
  8. **Shaffer, D. R., 2009**, Social and Personality Development (6<sup>th</sup> Edn). Belmont, CA: Wadsw.
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<b>Semester</b>	<b>: II</b>	
<b>Course No.</b>	<b>: MDC-122</b>	<b>Credit Hrs. : 3(2+1)</b>
<b>Course Title</b>	<b>: Entrepreneurship Development and Business Management</b>	

### **SYLLABUS**

#### **Objectives:**

- (i) To provide an insight into the concept and scope of entrepreneurship.
- (ii) To expose the student to various aspects of establishment and management of a small business unit.
- (iii) To enable the student to develop financially viable agribusiness proposal.

### **THEORY**

Development of entrepreneurship, motivational factors, social factors, environmental factors, characteristics of entrepreneurs, entrepreneurial attributes/competencies. Concept, need for and importance of entrepreneurial development. Evolution of entrepreneurship, objectives of entrepreneurial activities, types of entrepreneurs, functions of entrepreneurs, importance of entrepreneurial development and process of entrepreneurship development. Environment scanning and opportunity identification need for scanning–spotting of opportunity-scanning of environment– identification of product/ service – starting a project; factors influencing sensing the opportunities. Infrastructure and support systems- good policies, schemes for entrepreneurship development; role of financial institutions and other agencies in entrepreneurship development. Steps involved in functioning of an enterprise. Selection of the product / services, selection of form of ownership; registration, selection of site, capital sources, acquisition of manufacturing know how, packaging and distribution. Planning of an enterprise, project identification, selection and formulation of project; project report preparation, Enterprise management. Production management – product, levels of products, product mix, quality control, cost of production, production controls, Material management. Production management – raw material costing, inventory control. Personal management – manpower planning, labour turn over, wages / salaries. Financial management / Accounting – funds, fixed capital and working capital, costing and pricing, long term planning and short-term planning, book keeping, journal, ledger, subsidiary books, annual financial statement and taxation. Marketing management- market, types, marketing assistance, market strategies. Crisis management- raw material, production, leadership, market, finance, natural etc.

### **PRACTICAL**

Visit to small scale industries/agro-industries, Interaction with successful entrepreneurs/ agric-entrepreneurs. Visit to financial institutions and support agencies. Preparation of project proposal for funding by different agencies.

## TEACHING SCHEDULE

### THEORY [MDC-122]

Lecture No.	Topic	Sub-topics/ Key Points	Weightage (%)
1	Introduction to Entrepreneurship	Meaning and Definitions of an Entrepreneur, Entrepreneurship; Concept & Scope of Entrepreneurship	6
2	Importance of Entrepreneurship	Importance of Entrepreneurship in Agribusiness	
3	Entrepreneurship Development	Need for and objectives of Entrepreneurial development	4
4	Motivational Factors	Types of motivational factors, Role of social and environmental factors in entrepreneurship	4
5	Characteristics of Entrepreneurs	Characteristics, Entrepreneurial attributes and Competencies	4
6	Types of Entrepreneurs	Various types and their significance	4
7	Functions of Entrepreneurs	Key roles and Responsibilities	2
8	Evolution of Entrepreneurship	Historical perspective and Growth	3
9	Process of Entrepreneurship Development	Stages and Approaches in developing entrepreneurship	4
10	Environmental Scanning	Need for scanning, Techniques	2
11	Opportunity Identification	Spotting and Analysing opportunities	2
12	Infrastructure and Support Systems	Policies, Schemes and Role of financial and other agencies in entrepreneurship development	4
13	Enterprise Functioning Steps	Steps to establish an enterprise	4
14	Selection of Products/Services	Choosing products, Services and Business forms	3
15	Enterprise Location and Capital Sources	Registration, Site selection, Capital sources / Acquisition	3
16	Manufacturing and Distribution	Acquiring manufacturing know-how, Packaging and Distribution essentials	3
17	Planning of an Enterprise	Short term and Long-term planning of an enterprise	3
18-19	Project Formulation	Project identification, Selection, Steps in project formulation and Report preparation, etc.	8

20	Enterprise Management	Basics and Importance of managing an enterprise	3
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**MDC-122...**

21	Production Management	Product types, Levels of products, Product mix, Quality control, Cost of production, Production control	4
22	Material Management	Raw material costing and Inventory control strategies	4
23	Personnel Management / Human Resource Management	Manpower planning, Labour turnover, Wages / Salaries	4
24	Financial Management	Funds, Fixed and Working capital, Costing, Pricing, Book-keeping basics	4
25-26	Accounting and Taxation	Journals, Ledgers, Subsidiary books, Annual financial statements, Taxation basics	4
27	Marketing Management	Market, Types of markets, Marketing assistance	4
28-29	Market Strategies and Pricing	Marketing strategies, Pricing strategies and Market penetration	4
30	Crisis Management	Crisis types, Strategies for managing raw material, etc.	2
31	Leadership in Crisis Situations	Role of leadership in handling crises	2
32	Financial Crises and Solutions	Strategies for financial crisis management	2
<b>Total=</b>			<b>100</b>

**TEACHING SCHEDULE**

**PRACTICAL [MDC-122]**

Exercise No.	Exercise Topic/Title
1	Visit to Small-Scale Industries/ Agro-Industries. (Objective: To understand setup and operations of small-scale units)
2	Interaction with Successful Entrepreneurs. (Objective: To gain insights from real-life entrepreneurial experiences)
3	Case Study on Agro-Entrepreneurs. (Objective: To analyse successful agribusiness ventures)

4	Visit to Financial Institutions. (Objective: To learn about funding options and financial support)
5	Identification of Agribusiness Ideas. (Objective: To identify viable agribusiness ideas based on demand)
6	Analysing Project Proposals. (Objective: To study structure and elements of project proposals)

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#### MDC-122...

7	Preparing a Project Proposal. (Objective: To develop a basic proposal for an agribusiness venture)
8	Project Report Writing Techniques. (Objective: To practice format and structure for project reports)
9	Marketing Strategies Case Study. (Objective: To analyse effective marketing strategies in agribusiness)
10	Production and Cost Control Analysis (Objective: To study basic cost control measures in production)
11	Inventory Control Simulation (Objective: To apply inventory management methods in a hypothetical setup)
12	Basic Bookkeeping (Objective: To practice fundamental bookkeeping for small businesses)
13	Market Research Techniques (Objective: To use surveys and questionnaires for market insights)
14	Project Proposal Presentation (Objective: To present project ideas for feedback)
15	Review of Project Proposal (Objective: To refine project proposals based on feedback)
16	Final Evaluation of Proposals (Objective: To assess and finalize projects)

#### Suggested Readings [MDC-122]:

1. **Charantimath P.M. 2009.** Entrepreneurship Development and Small Business Enterprises. Pearson Publications, New Delhi.
2. **Desai V. 2015.** Entrepreneurship: Development and Management, Himalaya Publishing House.
3. **Desai Vasant. 1997.** Small Scale Industries and Entrepreneurship. Himalaya Publ. House.
4. **Gupta C.B. 2001.** Management Theory and Practice. Sultan Chand and Sons.



5. **Indu Grover. 2008.** Handbook on Empowerment and Entrepreneurship. Agrotech Public Academy.
6. **Khanka S.S. 1999.** Entrepreneurial Development. S. Chand and Co.
7. **Mehra P. 2016.** Business Communication for Managers. Pearson India, New Delhi.
8. **Pandey M. and Tewari D. 2010.** The Agribusiness Book. IBDC Publishers, Lucknow.
9. **Singh D. 1995.** Effective Managerial Leadership. Deep and Deep Publ.
10. **Singhal R.K. 2013.** Entrepreneurship Development and Management, Katson Books.
11. **Tripathi P.C and Reddy P.N. 1991.** Principles of Management. Tata McGraw Hill.

<b>Semester</b>	<b>:</b>	<b>II</b>
<b>Course No.</b>	<b>:</b>	<b>VAC-121</b>
	<b>Credit Hrs.</b>	<b>: 3(2+1)</b>
<b>Course Title</b>	<b>:</b>	<b>Environmental Studies and Disaster Management</b>
Gradual Common Course across all UG Degrees		

### **SYLLABUS**

- Objectives :**
- (i) To expose and acquire the knowledge on the environment,
  - (ii) To gain the state-of-the-art skill and expertise on management of disasters.

### **THEORY**

Introduction to Environment - Environmental studies - Definition, scope and importance - Multidisciplinary nature of Environmental Studies - Segments of Environment - Spheres of Earth - Lithosphere - Hydrosphere - Atmosphere - Different layers of atmosphere. Natural Resources: Classification - Forest resources. Water resources. Mineral resources, Food resources. Energy resources. Land resources. Soil resources. Ecosystems - Concept of an ecosystem - Structure and function of an ecosystem - Energy flow in the ecosystem. Types of Ecosystems. Biodiversity and its conservation: Introduction, Definition, Types. Biogeographical Classification of India. Importance and Value of Biodiversity. Biodiversity Hotspots. Threats and Conservation of Biodiversity.

Environmental Pollution: Definition, Cause, Effects and Control measures of: (a) Air pollution. (b) Water pollution. (c) Soil pollution. (d) Marine pollution. (e) Noise pollution. (f) Thermal pollution. (g) Light pollution. Solid Waste Management: Classification of solid wastes and management methods, Composting, Incineration, Pyrolysis, Biogas production, Causes, Effects and Control measures of urban and industrial wastes. Social Issues and the Environment: Urban problems related to energy. Water conservation, Rain water harvesting, Watershed management. Environmental Ethics: Issues and possible solutions, Climate change, Global warming,

Acid rain, Ozone layer depletion, Nuclear accidents and Holocaust. Environment Protection Act. Air (Prevention and Control of Pollution) Act. Water (Prevention and control of Pollution) Act. Wildlife Protection Act. Forest Conservation Act. Human Population and the Environment: Environment and Human Health: Human Rights, Value Education. Women and Child Welfare. Role of Information Technology in Environment and Human health.

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## VAC-121.....

Disaster Management– Disaster: Definition - Types - Natural Disasters: Floods, drought, cyclone, earthquakes, landslides, avalanches, volcanic eruptions, heat and cold waves. Man-made Disasters: Nuclear disasters, chemical disasters, biological disasters, building fire, coal fire, forest fire, oil fire, road accidents, rail accidents, air accidents, sea accidents. International and National strategy for disaster reduction. Concept of disaster management, National disaster management framework; Financial arrangements; Role of NGOs, Community-based organizations and media in disaster management. Central, state, district and local administration in disaster control; Armed Forces in disaster response; Police and other organizations in disaster management.

### PRACTICAL

Visit to a local area to document environmental assets river/forest/grassland/hill/mountain. Energy: Biogas production from organic wastes. Visit to wind mill/hydro power/solar power generation units. Biodiversity assessment in farming system. Floral and faunal diversity assessment in polluted and un polluted system. Visit to local polluted site-

Urban/Rural/Industrial/Agricultural to study of common plants, insects and birds. Environmental sampling and preservation. Water quality analysis: pH, EC and TDS. Estimation of Acidity, Alkalinity. Estimation of water hardness. Estimation of DO and BOD in water samples.

Estimation of COD in water samples. Enumeration of *E. coli* in water sample. Assessment of Suspended Particulate Matter (SPM). Study of simple ecosystems – Visit to pond /river / hills.

Visit to areas affected by natural disaster.

### TEACHING SCHEDULE

#### THEORY [VAC-121]

Lecture No.	Topic	Sub-topics/ Key Points	Weightage (%)
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<b>1</b>	Introduction to Environmental Studies	Definition, Scope and Importance; Multidisciplinary nature	4
<b>2</b>	Segments of Environment	Spheres of Earth – Lithosphere, Hydrosphere, Atmosphere and Different Layers of Atmosphere.	4
<b>3-5</b>	Natural Resources	Classification of resources; Forest, water, mineral, food, energy, land, and soil resources	10
<b>6-7</b>	Concept of an Ecosystem	Concept, Structure, Function and Energy flow in ecosystems	5
<b>8-9</b>	Types of Ecosystems	Terrestrial, Aquatic, Agro-ecosystems, Forest ecosystems and Human-modified ecosystems	5
<b>10-12</b>	Biodiversity and its Conservation	Importance, Value, Types, Bio-geographical classification, Hotspots, Threats, Conservation strategies	8
<b>13-16</b>	Environmental Pollution	Definition, Causes, Effects, Control measures: Air, Water, Soil, Marine, Noise, Thermal and Light pollution	12
<b>17-18</b>	Solid Waste Management	Classification of solid wastes; Management methods like, Composting, Incineration, Pyrolysis, Biogas production	6
<b>19</b>	Urban and Industrial waste	Causes, Effects and Control measures of Urban and Industrial waste	4
<b>20</b>	Social Issues Related to the Environment	Urban energy problems, Water conservation, Rainwater harvesting, Watershed management	4
<b>21-22</b>	Environmental Ethics	Issues, Possible solutions, Climate change, Global warming, Acid rain, Ozone layer depletion, Nuclear accidents and Holocaust.	6
<b>23</b>	Environment Protection Laws	Environment Protection Act, Air and Water (Pollution) Acts, Wildlife Protection Act, Forest Conservation Act	4

Continued....

**VAC-121...**

<b>24-25</b>	Human Population and Environment	Environment and human health, Human rights, Value education, Women and child welfare, Role of IT in environment and health	5
<b>26-28</b>	Introduction to Disaster Management	Definition, Types of natural and man-made disasters; Floods, Droughts, Cyclones, Earthquakes, Landslides, Fires	10
<b>29-30</b>	Disaster Management Framework	National and International strategies, disaster response framework, Financial arrangements, Role of NGOs and media	5
<b>31</b>	Central and Local Administration in Disasters	Role of Central, State, District and Local Administrations; Coordination in disaster response	4
<b>32</b>	Disaster Response Organizations	Central, State, District and Local Administrations in Disaster Control; Role of Armed Forces, Police and Other organizations in disaster response & control	4
<b>Total =</b>			<b>100</b>

**TEACHING SCHEDULE****PRACTICAL [VAC-121]**

<b>Exercise No.</b>	<b>Exercise Title</b>
<b>1</b>	Visit to a local area to document environmental assets: River /Forest / Grassland / Hill / Mountain.
<b>2</b>	Visit to Biogas production, Windmill, Hydro/Solar power generation units
<b>3</b>	To assess floral and faunal diversity in farming systems.
<b>4</b>	Assessment of biodiversity in farming system.
<b>5</b>	Floral and faunal diversity assessment in polluted and unpolluted system.
<b>6</b>	Visit to Local Polluted Site - Urban/Rural/Industrial/Agricultural to study the common plants, insects and birds. Environmental sampling and preservation.

7	Water quality analysis: pH and electrical conductivity (EC) in water samples.
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Continued...

**VAC-121...**

8	Estimation of total dissolved solids (TDS) in water samples
9	Estimation of acidity and alkalinity in water samples.
10	Estimation of water hardness in water samples.
11	Determination of dissolved oxygen (DO) and biological oxygen demand (BOD) in water samples.
12	Performing COD estimation on water samples.
13	Enumeration of <i>E. coli</i> in water samples to check for contamination.
14	Assessment of Suspended Particulate Matter (SPM) in an environmental sample.
15	Study of simple ecosystem – Visit to Pond/River/Hills.
16	Visit to areas affected by natural disaster.

**Suggested Readings (VAC-121):**

1. **De, A.K. 2010.** Environmental Chemistry. Published by New Age International Publishers, New Delhi. ISBN:139788122426175.384 pp.
2. **Dhar Chakrabarti, P.G. 2011.** Disaster Management - India's Risk Management Policy Frameworks and Key Challenges. Published by Centre for Social Markets (India), Bangaluru. 36 pp.
3. **Erach Bharucha,** Text Book for Environmental Studies. University Grants Commission, New Delhi.
4. **Parthiban, K.T., Vennila, S., Prasanthrajan, M. and Umesh Kanna, S. 2023.** Forest, Environment, Biodiversity and Sustainable development. Narendra Publishing House, New Delhi, India.
5. **Prasanthrajan, M. and Mahendran, P.P. 2008.** A Text Book on Ecology and Environmental Science.1<sup>st</sup> Edn. ISBN 8183211046. Agrotech Publishing Academy, Udaipur - 313 002.
6. **Prasanthrajan, M. 2018.** Objective Environmental Studies and Disaster Management, ISBN 9789387893825. Scientific Publishers, Jodhpur, India. 146 pp.
7. **Sharma, P.D. 2009.** Ecology and Environment, Rastogi Publications, Meerut, India.
8. **Tyler Miller and Scot Spoolman. 2009.** Living in the Environment (Concepts, Connections, and Solutions). Brooks/Cole, Cengage Learning Publication, Belmont, USA.



<b>Semester</b>	<b>: II</b>	
<b>Course No.</b>	<b>: AGRO-121</b>	<b>Credit Hrs. : 3(2+1)</b>
<b>Course Title</b>	<b>: Introduction to Major Field Crops</b>	

### **SYLLABUS**

#### **Objectives:**

- (i) To provide in-depth understanding about crop response to variable agronomic factors.
- (ii) To inculcate the skill of raising field crops with appropriate agronomic practices for higher productivity.

### **THEORY**

Classification and Distribution of field crops, Definition, Concept and Principles of Multiple cropping, Mixed cropping, Intercropping, Relay and Alley cropping, Crop rotation. Economic importance, Soil and Climatic requirement, Varieties, Cultural practices for raising major cereals (Rice, Wheat, Maize), Pulses (Gram, Soybean, Arhar, Moong), Oilseeds (Rapeseed and Mustard, Sunflower, Groundnut), Cash crops (Cotton, Sugarcane) and Fodder crops (Sorghum, Bajra, Berseem, Oats). Principles and Practices of green manuring.

### **PRACTICAL**

Identification of crop plants, seeds, weeds. Preparation of cropping schemes. Methods of sowing, fertilizer and herbicide applications in field crops. Calculation of fertilizer and herbicide doses.

## TEACHING SCHEDULE

### THEORY [AGRO-121]

Lecture No.	Topic	Sub-topics/ Key Points	Weightage (%)
1	Definition of Agronomy, Scope and Importance of Agronomy	Definitions of Agriculture and Agronomy, Brief historical sketch of Agriculture and Scope and Importance of Agronomy	4
2	Agro-climatic Zones of India and Maharashtra	Agro-climatic zones of India, Agro-climatic zones of Maharashtra.	2
3-4	Classification and Distribution of Field Crops	Based on ontogeny (Life cycle), Based economic use (Agronomic), Scientific or Botanical classification, Based on season, Based on climatic condition, Classification based on photosynthesis, Classification based on length of photoperiod required for floral initiation.	4
5	Tillage	Definition of Tillage, Tillage and Classification of Tillage	2
6	Methods of Sowing	Broadcasting, Dibbling, Sowing behind the country plough or putting seed behind plough furrow, Seed drilling/line sowing, Planting, Nursery transplanting	2
7-8	Cropping System	Definition of Cropping system, Cropping pattern, Cropping scheme, Classification of cropping system- Monoculture, Multiple cropping, Fallow in rotation, Parallel and Sequential multiple cropping.	4
9	Crop Rotation	Definition, Principles of Crop rotation, Characteristics of good rotation, Advantages and Disadvantages	2
10-11	Manures and Fertilizers	Classification of manures, Bulky and Concentrated organic manures	2
		Classification of fertilizers, Nitrogenous, Phosphatic and Potassic fertilizer	2
12	Methods of Fertilizer Application	Broadcasting, Placement, Band placement, Pellet application, Fertigation etc.	2
13	Principles and Practices of Green Manuring	Characteristic of green manuring crop, Classification of green manuring	4

*Continued...*

**AGRO-121....**

<b>14-18</b>	Cultivation of Cereals	Rice, Maize, Sorghum, Pearl millet and Minor millets	20
<b>19-23</b>	Cultivation of Pulses	Pigeon pea, Greengram, Blackgram, Chickpea, Horsegram and Cowpea	20
<b>24-28</b>	Cultivation of Oilseeds	Groundnut, Sunflower, Rapeseed, Mustard and Soybean	10
<b>29-30</b>	Cultivation of Cash Crops	Cotton and Sugarcane	10
<b>31-32</b>	Cultivation of Fodder Crops	Sorghum, Bajra, Berseem and Oats	10
<b>Total=</b>			<b>100</b>

**TEACHING SCHEDULE****PRACTICAL [AGRO-121]**

<b>Exercise No.</b>	<b>Exercise Title</b>
<b>1</b>	Acquaintance of College Farm
<b>2</b>	Identification of seeds of field crops and preparation of Crop Herbarium.
<b>3</b>	Study of tillage implements: Primary and secondary tillage implements.
<b>4</b>	Preparation of cropping scheme.
<b>5</b>	Practice of puddling and paddy transplanting <b>or</b> other intercultural operation(s) in relevant major regional field crop(s).
<b>6</b>	Study of different methods of sowing, seeding implements and working with them.
<b>7</b>	Determination of purity and germination percentage of seed.
<b>8</b>	Calculation of plant population for different field crops.
<b>9</b>	Identification and classification of manures and fertilizers.
<b>10</b>	Calculation of fertilizer doses for different field crops.
<b>11</b>	Methods of fertilizer application.
<b>12</b>	Identification of weeds and preparation of Weed Herbarium.
<b>13</b>	Preparations of herbicide spray solutions.
<b>14</b>	Participation in ongoing field operations and actual working in field for raising crops.
<b>15</b>	Preparation of compost and FYM.
<b>16</b>	Preparation of calendar of operations of different field crops.

**Suggested Readings [AGRO-121]:**

1. **Anonymous, 2023.** Package of Practices for *Kharif* Crops.

2. **Anonymous, 2023.** Package of Practices for *Rabi* Crops.
3. **Reddy, T.Y. and Reddy, G.H.S. 2020.** Principles of Agronomy, Kalyani Publishers, Ludhiana.
4. **Singh Chidda, 2020.** Modern Techniques of Raising Field Crops, Oxford and IBH Publication.

<b>Semester</b>	<b>:</b>	<b>II</b>
<b>Course No.</b>	<b>:</b>	<b>PSMA-121</b>
	<b>Credit Hrs.</b>	<b>: 3(2+1)</b>
<b>Course Title</b>	<b>:</b>	<b>Commercial Production of Spices and Plantation Crops</b>

### **SYLLABUS**

**Objectives:** To inculcate the skill of raising spices and plantation crops with appropriate knowledge of agronomic practices for higher productivity.

#### **THEORY**

Present status and Importance of Spice crops, Soil and Climate requirements, Commercial varieties, Site selection, Layout, Sowing time and Methods, Nutritional and Irrigation requirements, Intercropping, Weed control, Physiological disorders, Harvesting, Post-harvest management and Plant protection measures of the following crops: Black pepper, Turmeric, Ginger, Garlic, Clove, Cinnamon, Fenugreek, Cumin, Ajowain, Coriander, Fennel, Cardamom, Vanilla, Betelvine and Celery. Area, Production and Export potential of plantation crops, Varietal wealth, Cultivation systems, Multitier cropping, High density planting, Nutritional and Irrigation requirements, Weed management, Training and Pruning, Physiological disorders, Maturity indices, Harvesting, Post-harvest management and Plant protection measures of the following crops: Coffee, Tea, Cashew, Rubber, Coconut, Arecanut, Cocoa and Oil palm. State-level Recommendations, National Varieties and Recommendations.

#### **PRACTICAL**

Identification of seeds and plants, Propagation, Nursery raising, Field layout, Planting methods, Cultural practices, Harvesting and Handling, Visit to fields and marketing centers.

## **TEACHING SCHEDULE**

### **THEORY [PSMA-121]**

<b>Lecture No.</b>	<b>Topic</b>	<b>Sub-topics/ Key Points</b>	<b>Weightage (%)</b>
<b>1-2</b>	Present status and Importance of Spices and Plantation crops	Introduction, Brief history, Scope and Importance, Present status of Spice and Plantation industry, Constraint faced in production of Spice and Plantation	5
<b>3-4</b>	Black pepper	Soil and Climate requirements, Commercial varieties, Site selection, Layout, Sowing time and Methods, Nutritional and Irrigation requirements, Intercropping, Weed control, Physiological disorders, Harvesting, Post-harvest management and Plant protection measures	10
<b>5-6</b>	Turmeric	Soil and Climate requirements, Commercial varieties, Site selection, Layout, Sowing time and Methods, Nutritional and Irrigation requirements, Intercropping, Weed control, Physiological disorders, Harvesting, Post-harvest management and Plant protection measures	10
<b>7-8</b>	Ginger, Garlic	Soil and Climate requirements, Commercial varieties, Site selection, Layout, Sowing time and Methods, Nutritional and Irrigation requirements, Intercropping, Weed control, Physiological disorders, Harvesting, Post-harvest management and Plant protection measures	7.5
<b>9-10</b>	Clove and Cinnamon	Soil and Climate requirements, Commercial varieties, Site selection, Layout, Sowing time and Methods, Nutritional and Irrigation requirements, Intercropping, Weed control, Physiological disorders, Harvesting, Post-harvest management and Plant protection measures	7.5

<b>11-14</b>	Fenugreek, Cumin Ajwain, Coriander Fennel, Celery	Soil and Climate requirements, Commercial varieties, Site selection, Layout, Sowing time and Methods, Nutritional and Irrigation requirements, Intercropping, Weed control, Physiological disorders, Harvesting, Post-harvest management and Plant protection measures (Tabular Format Information)	7.5
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**PSMA-121...**

<b>15-16</b>	Cardamom (Small and Large)	Soil and Climate requirements, Commercial varieties, Site selection, Layout, Sowing time and Methods, Nutritional and Irrigation requirements, Intercropping, Weed control, Physiological disorders, Harvesting, Post-harvest management and Plant protection measures	5
<b>17-18</b>	Vanilla, Betelvine	Soil and Climate requirements, Commercial varieties, Site selection, Layout, Sowing time and Methods, Nutritional and Irrigation requirements, Intercropping, Weed control, Physiological disorders, Harvesting, Post-harvest management and Plant protection measures	5
<b>19-22</b>	Tea, Coffee, Rubber	Area, Production and Export, Soil and Climate, Commercial varieties, Cultivation systems, High density planting, Nutritional and Irrigation requirements, Weed management, Training and Pruning, Physiological disorders, Maturity indices, Harvesting, Post-harvest management and Plant protection measures	7.5
<b>23-25</b>	Cashew	Area, Production and Export, Soil and Climate, Commercial varieties, Cultivation systems, High density planting, Nutritional and Irrigation requirements, Weed management, Training and Pruning, Physiological disorders, Maturity indices, Harvesting, Post-harvest management and Plant protection crops.	10
<b>26-28</b>	Coconut	Area, Production and Export, Soil and Climate, Commercial varieties, Cultivation systems, High density planting, Nutritional and Irrigation requirements, Weed management, Training and Pruning, Physiological disorders, Maturity indices, Harvesting, Post-harvest management and Plant protection crops.	10



29-31	Cocoa, Oil palm, Arecanut	Area, Production and Export, Soil and Climate, Commercial varieties, Cultivation systems, High density planting, Nutritional and Irrigation requirements, Weed management, Training and Pruning, Physiological disorders, Maturity indices, Harvesting, Post-harvest management and Plant protection crops.	10
32	JOINT AGRESCO Recommendations, National Varieties and Recommendations		05
Total =			100

### **TEACHING SCHEDULE**

#### **PRACTICAL [PSMA-121]**

<b>Exercise No.</b>	<b>Exercise Title</b>
<b>1</b>	Identification of plantation crops.
<b>2</b>	Identification of spice crops.
<b>3</b>	Propagation techniques in plantation crops.
<b>4</b>	Propagation techniques in spice crops.
<b>5</b>	Nursery techniques in plantation crops.
<b>6</b>	Nursery techniques in spice crops.
<b>7</b>	Field layout for spices and plantation crops.
<b>8</b>	Planting methods for spices and plantation crops.
<b>9</b>	Cultural practices in plantation crops.
<b>10</b>	Cultural practices in spice crops.
<b>11</b>	Maturity standards and harvesting of spice and plantation crops.
<b>12</b>	Post-harvest management of spices.
<b>13</b>	Post-harvest management of plantation.
<b>14</b>	Study of methods of extraction of oils and oleoresins.
<b>15</b>	Visit to market (Market study).
<b>16</b>	Visit to commercial spice and plantation farms.

### Suggested Readings [PSMA-121]:

1. **Kumar, N. 2018.** Introduction to Spices, Plantation Crops, Medicinal and Aromatic Plants, Oxford and IBH Publishing Co. Pvt. Ltd, New Delhi.
2. **Peter, K.V. 2002.** Plantation Crops, National Book Trust, India, New Delhi.
3. **Pruthi, J.S. 1998.** Major Spices of India Crop Management and Post Harvest Technology, ICAR, Krishi Anusandhan Bhavan, Pusa, New Delhi.

<b>Semester</b>	<b>: II</b>		
<b>Course No.</b>	<b>: VS-121</b>	<b>Credit Hrs.</b>	<b>: 3(1+2)</b>
<b>Course Title</b>	<b>: Plant Propagation and Nursery Management in Vegetables, Flowers and Medicinal crops</b>		

### **SYLLABUS**

#### **Objectives:**

- (i) To study the biology and types of propagation, tissue culture and physiology of seed, seed storage and dormancy.
- (ii) To gain knowledge of nursery management, nursery establishment and nursery techniques for plant propagation.
- (iii) To study propagation from specialized structures in major vegetable crops, flower crops, medicinal and aromatic plants.

### **THEORY**

Nursery management practices for vegetables, flowers and medicinal crops, Biology of plant propagation, Sexual and Asexual plant propagation, physiology of seed, seed storage and dormancy, physiology of cutting, layering, grafting, budding. Tissue culture, Maintenance of elite germplasm and mother stock. Propagation from specialized modified plant parts, crop specific plant propagation practices in commercial vegetables and flowers. Nursery techniques and crop specific propagation methods of medicinal crops.

### **PRACTICAL**

Identification of planting material, commercial varieties of vegetable, flowers and medicinal crops. Propagation and multiplication, seed production. Potting, repotting and maintenance of houseplants. Practices in manuring, drip and fertigation, foliar nutrition, growth regulator application, pinching, disbudding, staking. Harvesting techniques. Crop-specific plant propagation practices. Visit to local nurseries and florist centers. Marketing requirements and strategies for sale of important crops.

### **TEACHING SCHEDULE**

#### **THEORY [VS-121]**

<b>Lecture No.</b>	<b>Topic</b>	<b>Sub-topics/ Key Points</b>	<b>Weightage (%)</b>
<b>1</b>	Plant propagation: Vegetables, Flowers and Medicinal crops	Definition- Plant propagation, Need of Plant propagation, its significance, Generating uniformity in production of genetically pure and biotic stress-free plant propagating material.	10
<b>2</b>	Sexual and Asexual Methods of Plant propagation	Definitions, Aim of propagation, Methods of propagation: Sexual and Asexual, its merits and demerits.	10
<b>3</b>	Physiology of Seed and Seed Storage	Definitions; Seed germination, Seedling emergence, Environmental factors: Temperature, Moisture, Oxygen and Light. Seed storage, Types of seed storage, Factors affecting seed storage.	05
<b>4</b>	Seed Dormancy	Definition of Seed dormancy, Types of Seed dormancy: Exogenous (due to the external factors) Endogenous (physiological factors). Factors affecting seed dormancy	10
<b>5</b>	Treatments to overcome Seed Dormancy in Vegetables, Flowers and Medicinal crops	Seed treatments/ Methods of breaking Seed dormancy: Scarification methods: Mechanical scarification, Acid scarification, Hot water treatment; Stratification method: Chilling treatment	

6	Nursery Management Practices and Components of Nursery for Vegetables, Flowers and Medicinal crops	Definition of Nursery, Importance and Role, Site selection and Layout of nursery, Types of Nursery: On the basis of duration, plant produced and structure used	05
7	Propagation Structures in Nursery Production	Detail information of propagation structures in nursery production: Mist chamber, Humidifiers, Greenhouses, Glasshouses, Cold frames, Hot beds and Polyhouses	05

Continued...

VS-121...

8	Growing Medium used for Nursery Plants and Containers used	Objectives and Features of growing media, Different propagating media, Soil and Soilless media. Features of ideal containers, Types of plant containers: Clay pots, Pro-trays, Micro-bags, Polythene bags, etc.	05
9	Biology of Plant Propagation	Relating to life cycles in plants, Genes impact on propagation, Cell division: Mitosis and Meiosis, etc.	05
10	Vegetative Propagation Method: Propagation from Specialized Modified Plant Parts and Cuttings	Separation and Division of plant parts. Def'n- Bulbs, Corms, Tuber, Runners, Suckers, Offset, Rhizomes, etc. Def'n- Cutting, Types of cuttings: Stem cutting (hardwood, semi-hard wood, softwood, herbaceous), Leaf cutting, Root cutting.	10
11	Vegetative Propagation Method: Layering	Def'n- Layering, Types of Layering, Merits and Demerits, Limitations	05
12	Vegetative Propagation Method: Grafting and Budding	Definitions, Types of grafting and budding, Use of rootstock for vegetable grafting	05
13	Plant Tissue Culture Techniques	Role of Tissue Culture Techniques, its Methods viz., Micropropagation, Micro-grafting and Meristem culture, Embryo culture, etc.	05
14	Maintenance of Elite Germplasm and Mother Stock	Evaluation, Maintenance and Conservation of elite germplasm and mother stock for further use in propagation of Vegetable, Flower and Medicinal plants	05

15	Use of Growth Regulators in Plant Propagation, Plant Protection Measures in Nursery	Def'n- Plant growth regulators and their role in sexual and asexual propagation (in brief)	05
		Insect-pest and disease control and Precautionary measures in nursery	05
16	JOINT AGRESCO - State Recommendations, National Varieties and Recommendations		05
Total=			100

### **TEACHING SCHEDULE**

#### **PRACTICAL [VS-121]**

Exercise No.	Exercise Title
1	Identification of planting material used in vegetable, flower and medicinal crops.
2	Identification of different garden tools and implements used for propagation.
3	Location and site selection for layout of nursery.
4	Study of various soil and soilless media for plant propagation.
5-6	Preparation of nursery beds and sowing of seeds.
7	Study of seed germination, raising of rootstock/ seedlings.
8	Study of different propagation structures in nursery production.
9	Potting, reporting and preparation of plant material for potting
10-11	Seed treatments for breaking seed dormancy, including germination and growth of seedlings.
12	Methods of irrigation.
13	Methods of propagation: sexual and asexual, its merits and demerits.
14	Practicing different cutting methods in vegetables, flowers and medicinal plants.
15	Practicing different grafting methods in vegetables, flowers and medicinal plants.
16	Practicing different budding methods in vegetables, flowers and medicinal plants.
17	Practicing different layering methods in vegetables, flowers and medicinal plants.
18	Practicing different types of runners, offsets and other specialized plant organs for propagation.
19	Preparation of growth regulators for seed germination and vegetative propagation
20	Use of mist chamber in plant propagation and hardening of plants.
21	Digging/uprooting, labeling and packing of nursery plant.
22	Use of plant protection measures in nursery.
23	Crop-specific plant propagation practices.

24	Study of drenching, foliar application of nutrients and fertigation.
25	Application of manures and fertilizer mixtures.
26	Raising, maintenance and cost of different nursery structures.
27	Maintenance of nursery record.
28	Marketing requirements and strategies for sale of important crops.
29	Visit to Local Nurseries and Florist Centres.
30	Visit to Plant Tissue Culture Laboratory.
31	Cost of establishment of propagation structures.
32	Accreditation of Nursery.

#### Suggested Readings [VS-121]:

1. **Hartmann and Kester.** Plant Propagation: Principles and Practices.
2. **Tarai Ranjan Kumar.** Plant Propagation and Nursery Management.

### B.Sc. (Hons.) Horticulture

#### #List/ Bouquet of Skill Enhancement Courses (SECs)

Sr. No.	Course No.	Course Title	Credit Hrs.
1.	SEC-xxx	Mushroom Cultivation	2(0+2)
2.	SEC-xxx	Orchard Floor Management	2(0+2)
3.	SEC-xxx	Apiculture	2(0+2)
4.	SEC-xxx	Landscape Gardening	2(0+2)
5.	SEC-xxx	Packing and Packaging of Horticultural Crops	2(0+2)
6.	SEC-xxx	Farm Machinery	2(0+2)
7.	SEC-xxx	Introduction to Forestry	2(0+2)
8.	SEC-xxx	Installation, Operation and Maintenance of Microirrigation System	2(0+2)
9.	SEC-xxx	Computer Programming and Data Structures	2(0+2)
10.	SEC-xxx	Turf and Turf Management	2(0+2)
11.	SEC-xxx	Post-harvest Management of Horticulture Crops	2(0+2)
12.	SEC-xxx	Nursery Production in Horticulture Crops	2(0+2)
13.	SEC-xxx	Seed production Techniques in Vegetables Crops	2(0+2)
14.	SEC-xxx	Sericulture	2(0+2)
15.	SEC-xxx	Dairy Management	2(0+2)



16.	<b>SEC-xxx</b>	Ornamental Fishery	2(0+2)
17.	<b>SEC-xxx</b>	Poultry Management	2(0+2)
18.	<b>SEC-xxx</b>	Biofertilizers and Biopesticides	2(0+2)

**Note: (i) Skill Enhancement Courses can be added/offered as per the facilities and resources available at the respective universities/colleges based on the relevance to the region and the UG degree subject.**

**(ii) The host University/ College may also choose suitable SEC courses from those listed under other UG degree programs.**

**(iii) Above list/ bouquet of SEC courses is an indicative list and subject to modification as applicable therein.**

**(iv) In case of unavailability of the detailed course-wise syllabus/ teaching schedules of any of above SEC courses, the same can be primarily developed and followed at College/ University level in the academic year, 2024-25. However, the same can be obtained from the respective UG Degree Coordinator/ Discipline Coordinators and can be followed w.e.f. AY, 2025-26.**

### **Skill Enhancement Courses (SECs): Detailed Syllabi**

*[in continuation of the SECs syllabi given under I semester curriculum]*

<b>Semester</b>	<b>:</b>	<b>II</b>
<b>Course No.</b>	<b>:</b>	<b>SEC-xxx</b>
	<b>Credit Hrs.</b>	<b>: 2(0+2)</b>
<b>Course Title</b>	<b>:</b>	<b>Landscape Gardening</b>

### **SYLLABUS**

#### **Objectives:**

- To impart skill in identification of ornamental plants,
- To impart skills in preparation of garden designs.

### **TEACHING SCHEDULE**

#### **PRACTICAL [SEC-xxx]**

<b>Exercise No.</b>	<b>Exercise Title</b>
<b>1-2</b>	Identification and use of garden tools and equipments.

<b>3</b>	Study of growth characters, identification and classification of ornamental trees.
<b>4</b>	Study of growth characters, identification and classification of ornamental shrubs.
<b>5</b>	Study of growth characters, identification and classification of ornamental climbers.
<b>6</b>	Study of growth characters, identification and classification of ground covers.
<b>7</b>	Study of growth characters, identification and classification of indoor plants.
<b>8-10</b>	Making and maintenance of edge and hedge.
<b>11-13</b>	Making and maintenance of topiary.
<b>14-15</b>	Establishment and maintenance of a lawn.
<b>16-17</b>	Bonsai making.
<b>18</b>	Art principles of landscaping.
<b>19-20</b>	Planning, designing and layout of Formal gardens.

*Continued...*

### ***Landscape Gardening...***

<b>21-22</b>	Planning, designing and layout of Informal gardens.
<b>23-24</b>	Planning, designing and establishment of garden features.
<b>25-26</b>	Landscape design process: Landscape drafting tools and dimensioning, graphic symbols and notations.
<b>27</b>	Site analysis and landscape designing of Residential building.
<b>28</b>	Site analysis and landscape designing of Public buildings.
<b>29</b>	Site analysis and landscape designing of Religious places.
<b>30</b>	Landscape planning of Roads and Roundabouts.
<b>31</b>	Visit to Community Parks.
<b>32</b>	Visit to Institutional Gardens.

**Suggested Readings [SEC-xxx]:**

1. **G.S. Randhawa and A.K. Mukhopadhyay.** Floriculture in India. Allied Publisher Pvt. Ltd.
2. **J.S. Arora.** Introductory Ornamental Horticulture. Kalyani Publishers.
3. **A.K. Tiwari.** Fundamentals of Ornamental Horticulture and Landscape Gardening. NIPA.
4. **J.E. Ingels.** Landscaping Principles and Practices. Delmer Cengage Learning. \_\_\_\_\_

Semester : II	
Course No. : SEC- <b>xxx</b>	Credit Hrs. : 2(0+2)
Course Title : Turf and Turf Management	

**SYLLABUS****Objectives:**

- (i) To impart hands-on training on practical aspects of turf management practices.
- (ii) To impart entrepreneurial skills in turf establishment.

**TEACHING SCHEDULE****PRACTICAL [SEC-xxx]**

<b>Exercise No.</b>	<b>Exercise Title</b>
<b>1-2</b>	Site analysis for turf establishment.
<b>3-4</b>	Field preparation and layout for turf making.
<b>5-6</b>	Identification and classification of turf grasses.
<b>7-9</b>	Turf establishment methods.

10	Sod production.
11	Turf irrigation management.
12	Nutrient management in turf grasses.
13-14	Special practices in turf management.
15	Rejuvenation of old and withered turf.
16	Equipments for turf management.
17-18	Selection and maintenance of grasses for Golf course.
19-20	Selection and maintenance of grasses for Cricket ground.
21-22	Turfing for Roof top gardens.
23	Applications and use of Turf growth regulators (TGRs).
24	Identification of seasonal turf grass weeds.
25	Integrated approaches for turf weed management.

Continued...

### *Turf and Turf Management ...*

26	Identification and management of turf grass diseases.
27	Identification and management of turf grass insect-pests.
28	Identification and management of turf grass abiotic stress and disorders.
29	Identification and management of turf grass nutrient deficiencies.
30-32	Visits to Commercial/ Institutional/ School/ Religious gardens and Golf court.

### **Suggested Readings [SEC-xxx]:**

1. **G.S. Randhawa and A.K. Mukhopadhyay.** Floriculture in India. Allied Publisher Pvt. Ltd.
2. **J.S. Arora.** Introductory Ornamental Horticulture. Kalyani Publishers.
3. **A.K. Tiwari.** Fundamentals of Ornamental Horticulture and Landscape Gardening. NIPA.
4. **J.E. Ingels.** Landscaping Principles and Practices. Delmer Cengage Learning. \_\_\_\_\_

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