



First Year Curriculum

Admission Year 2026-27

**Bachelor of Technology
Agricultural Engineering**

Faculty of Agriculture

Parul University

Vadodara, Gujarat, India

Semester 1

- a. **Course Name:** Deeksharambh
- b. **Course Code:** 20103165
- c. **Prerequisite:** Openness to participate in orientation activities and willingness to integrate into the university environment.
- d. **Rationale:** This course is designed to introduce first-year students to the academic, cultural, and social environment of the university. It aims to build confidence, promote interpersonal interaction, and foster values such as discipline, teamwork, and respect for diversity. Through interactive sessions, field visits, and group activities, students become familiar with institutional processes and develop essential life skills for their academic journey.
- e. **Course Learning Objective:**

CLOBJ 1	Help students integrate culturally and socially in the academic environment.
CLOBJ 2	Familiarize students with the operational framework of university academics.
CLOBJ 3	Develop leadership, teamwork, and interpersonal skills.
CLOBJ 4	Encourage appreciation of traditional values and indigenous cultures.

- f. **Course Learning Outcomes:**

CLO 1	Demonstrate understanding of university functioning and academic systems.
CLO 2	Participate effectively in group activities and collaborative learning.
CLO 3	Exhibit leadership qualities and teamwork in academic and social settings.
CLO 4	Show awareness and respect for diverse cultures and values.

- g. **Teaching & Examination Scheme:**

Teaching Scheme				Evaluation Scheme				
Lecture	Tutorial	Lab	Credit	Theory Marks		Practical Marks		Total Marks
				T	T	P	P	
-	-	-	0.00	-	-	-	100	100

h. Course Content:

Sr. No.	Content	Weightage (%)	Teaching Hours
1	<p>Deeksharambh</p> <p>The activities to be taken under Deeksharambh, in addition to giving a broad view and application areas of the subject of study, also will aim at creating a platform for</p> <ul style="list-style-type: none"> • Helping students from different backgrounds for cultural integration • Knowing about the operational framework of academic process in university • Instilling life and social skills, leadership qualities, team working spirit • Developing social awareness, ethics and values, creativity • Helping students to identify the traditional values and indigenous cultures along with diverse potentialities both in indigenous and developed scenario. <p>The details of activities/ schedules will be decided by the parent universities. The structure shall include, but not restricted to:</p> <ul style="list-style-type: none"> • Discussions on operational framework of academic process in university, as well as interactions with academic and research managers of the University • Creating awareness on the subject of study, and the traditional values and indigenous cultures along with diverse potentialities both in indigenous and developed scenario • Interaction with alumni, business leaders, perspective employers, outstanding achievers in related fields, and people with inspiring life experiences; • Group activities to identify the strength and weakness of students (with expert advice for their improvement) as well as to create a platform for students to learn from each other's life experiences; • Field visits to related fields/ establishments; and • Sessions on personality development (instilling life and social skills, social awareness, ethics and values, team work, leadership, etc.) and communication skills. 	100	32

	Total	100	32
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- a. **Course Name:** Crop Production and Protection Technologies
- b. **Course Code:** 20103166
- c. **Prerequisite:** Zeal to learn about crop production, crop protection methods, and sustainable farming systems.
- d. **Rationale:** This course imparts knowledge of crop cultivation practices and protection measures against pests, diseases, and weeds. It emphasizes integrating traditional wisdom with modern technologies to ensure higher productivity, resource efficiency, and environmental sustainability.
- e. **Course Learning Objective:**

CLOBJ 1	Understand the principles and practices of crop production.
CLOBJ 2	Learn techniques for crop protection against pests, diseases, and weeds.
CLOBJ 3	Apply modern agricultural technologies for sustainable farming.
CLOBJ 4	Integrate ecological and economic factors in crop management.

f. **Course Learning Outcomes:**

CLO 1	Identify major crop production practices for different crops.
CLO 2	Recommend pest, disease, and weed control measures.
CLO 3	Utilize modern tools and technology for efficient crop management.
CLO 4	Apply sustainable approaches to maximize productivity.

g. **Teaching & Examination Scheme:**

Teaching Scheme				Evaluation Scheme				
Lecture	Tutorial	Lab	Credit	Theory Marks		Practical Marks		Total Marks
				T	T	P	P	
3	-	2	4.00	40	40	-	20	100

h. **Course Content:**

Sr. No.	Content	Weightage (%)	Teaching Hours
1	Introduction to Agronomy and Sustainable Agriculture: Introduction and scope of agronomy; Classification of crops; Effect of different weather parameters on crop growth and development; Principles of tillage, tith and its characteristics; Crop seasons; Time and method of sowing of major field crops, seed rate for important crops; Methods and time of application of manures	25	12

	and fertilizers, fertigation; Basic principles of natural farming, organic farming and sustainable agriculture.		
2	Soil-Water-Plant Dynamics and Cropping Systems: Soil-water-plant relationship, crop coefficients water requirement of crops and critical stages for irrigation; Weeds and their management in crops; Crop rotation, cropping systems, cropping scheme, relay cropping, mixed cropping and intercropping.	20	10
3	Soil Science Fundamentals and Fertility Management: Soil forming processes; Classification and composition of soil, soil taxonomy orders; Important soil physical properties and their importance; soil particle distribution; soil inorganic colloids- their composition, properties and origin of charge; ion exchange in soil and nutrient availability; soil organic matter- its composition and decomposition, effect on soil fertility; Soil reaction - acidic, saline and sodic soils; Quality of irrigation water.	20	10
4	Plant Nutrition and Fertilizer Management: plants nutrients- their functions and deficiency symptoms in plants; Important inorganic fertilizers and their reactions in soils; Gypsum requirement for reclamation of sodic soils and neutralizing RSC; Liquid fertilizers and their solubility and compatibility.	15	7
5	Horticultural Practices and Crop Protection: Types of horticultural crops; Sowing and planting times and methods; Seed rate and seed treatment for vegetable crops; Macro and micro propagation methods; Types of plant growing structures; Pruning and training; Water requirements and critical stages; Management of orchard; Major pests and diseases of horticultural crops and their management.	20	9
	Total	100	48

i. Text Book and Reference Book:

1. The Nature and Properties of Soil, by N.C. Brady and R.R. Weil; Pearson Education
2. Introduction to Soil Physics by Hillel D; Academic Press, London
3. Principles of Agronomy by T. Y. Reddy and G. H. Shankara Reddy; Kalyani Publishers

j. Experiment List

Sr. No.	Experient List
1.	Identification of crops and their varieties, seeds and weeds
2.	Study of different fertilizer application methods and weed control methods
3.	Judging the maturity time for harvesting of crop
4.	Study of seed viability and germination test
5.	Identification of rocks and minerals
6.	Examination of soil profile in the field
7.	Determination of bulk density; particle density and porosity of soil
8.	Determination of organic carbon of soil
9.	Identification of nutrient deficiency symptoms of crops in the field
10.	Determination of gypsum requirement of sodic soils
11.	Identification and description of important fruits, flowers and vegetables crops
12.	Study of different garden tools
13.	Preparation of nursery bed
14.	Practices of pruning and training in some important fruit crops
15.	Study of cultural operations for vegetable crops (sowing, fertilizer application, mulching, irrigation and weed control)
16.	Seed extraction techniques
17.	Visit to commercial greenhouse/ polyhouse

- a. **Course Name:** Introduction to Agricultural Engineering
- b. **Course Code:** 20103167
- c. **Prerequisite:** Basic understanding of agriculture and a willingness to explore engineering applications in farming.
- d. **Rationale:** This course introduces students to the scope and importance of agricultural engineering, covering mechanization, irrigation, post-harvest technology, and environmental considerations. It prepares students to apply engineering principles to improve agricultural systems.
- e. **Course Learning Objective:**

CLOBJ 1	Understand the scope and significance of agricultural engineering in modern farming.
CLOBJ 2	Learn about different branches and applications of agricultural engineering.
CLOBJ 3	Study the role of mechanization, irrigation, and post-harvest technologies in agriculture.
CLOBJ 4	Familiarize with safety measures and environmental considerations in agricultural engineering.

f. **Course Learning Outcomes:**

CLO 1	Explain the role and importance of agricultural engineering in sustainable farming.
CLO 2	Identify different agricultural engineering tools, machines, and systems.
CLO 3	Apply engineering concepts to solve basic agricultural problems.
CLO 4	Demonstrate awareness of safety practices and environmental impacts.

g. **Teaching & Examination Scheme:**

Teaching Scheme				Evaluation Scheme				
Lecture	Tutorial	Lab	Credit	Theory Marks		Practical Marks		Total Marks
				T	T	P	P	
3	-	2	4.00	40	40	-	20	100

h. Course Content:

Sr. No.	Content	Weightage (%)	Teaching Hours
1	Agricultural Engineering: Scope and Opportunities: Agricultural Engineering as a discipline; Major divisions of Agricultural Engineering; Importance of Agricultural Engineering for today's agriculture; Different sectors of employment for Agricultural Engineers; Scope of research and higher studies in Agricultural Engineering in India and abroad.	10	5
2	Farm Machinery and Power Engineering: Farm mechanization needs and strategy; Classification of farm machinery on the basis of unit operations; Principles of selection of machinery for different sizes of land and matching power sources; Different types of equipment for tillage, sowing, planting and transplanting, fertilizer application, weed control, plant protection; Harvesting and threshing equipment for rice, wheat, maize, cotton, sugarcane, fruits, tuber crops and other locally important crops; Functions and capabilities of tractor and power tillers; Introduction to the IC engine systems, fuel and air supply systems, cooling and lubricating systems, and electrical systems in a tractor; Basic parts of a power tiller; Hitching system.	25	12
3	Renewable Energy Engineering: Introduction to renewable energy systems; Types of biogas plants, Types of solar energy collectors; Solar water heating systems, solar dryers, solar photovoltaic systems; Wind mills and their different parts.	10	5
4	Soil and Water Conservation Engineering: Importance of soil and water conservation; Different agronomic measures for control of water erosion, mixed cropping, crop rotation, tillage practices, mulching; Different engineering measures; gully control measures; Use of topographical survey and contour maps; Different types of water harvesting structures.	10	5

5	Irrigation and Drainage Engineering: Introduction to soil-plant-water relationship; Equipment for measurement of irrigation water, viz. weirs, notches, orifices and mouth pieces; Introduction to different surface irrigation methods as border, furrow and check basin, sprinkler, drip irrigation and their different components; Underground water conveyance methods in pipes; Introduction to planning of drainage systems; Introduction to centrifugal pumps and different components.	15	7
6	Agricultural Structures: Different types of agricultural structures; Introduction to planning and layout of farmsteads, animal houses, poultry houses; Different types of grain storage structures; Greenhouse and its different parts; Low cost protected structures.	10	5
7	Processing and Food Engineering: Classification of different types of agricultural commodities as durables, perishables, etc.; Moisture content and its importance in grain storage; Common reasons of food spoilage, food preservation methods; Different primary processing operations and their necessity; Methods and equipment used for cleaning, washing, sorting, grading,	20	9
	peeling, size reduction; Different types of traditional and modern storage structures; Storage of perishable commodities; Different types of packaging materials and their suitability for various food products; Basic principles of value addition of food as drying and dehydration, evaporation, thermal processing, refrigerated and frozen storage, chemical preservation and other novel methods.		
		100	48

i. Text Book and Reference Book:

1. Rice Processing and Allied Operations by Dash, S.K., Bebartta, J.P. and Kar, A.; Kalyani Publishers, New Delhi
2. Introduction to Soil and Water Conservation Engineering by Mal, B.C; Kalyani Publishers
3. Principles of Agricultural Engineering, Vol. I by Ojha, T.P and Michael, A.M.; Jain Brothers, Karol Bag, New Delhi.
4. Irrigation Theory and Practice by A M Michael
5. Farm Machines and Equipment by C.P. Nakra; Dhanpat Rai Publications, New Delhi
6. Non-Conventional Energy Sources by G D Rai; Khanna Publishers

7. Unit operations of Agricultural Processing by Sahay, K. M. & K.K. Singh
8. Soil and water Conservation Engineering by R Suresh

j. Experiment List

Sr. No.	Experient List
1.	Study of various implements (tillage, sowing, planting, weeding, fertilizer application)
2.	Study of farm implements (pesticide application, harvesting and threshing)
3.	Study of various components of tractor and matching implements
4.	Study of various components of power tiller and matching implements
5.	Study of various types of biogas plants and operational parameters
6.	Study of various types of biogas plants and operational parameters
7.	Study on various components of sprinkler and drip irrigation
8.	Study on various components centrifugal pump
9.	Study of various post-harvest operations
10.	Study of different food processing equipment
11.	Value addition of common crops
12.	Visit to a greenhouse with modern irrigation system
13.	Visit to implement manufacturing unit
14.	Visit to a mechanized farm
15.	Visit to a watershed
16.	Visit to a food processing industry

- a. **Course Name:** Surveying and Levelling
 b. **Course Code:** 20103168
 c. **Prerequisite:** Zeal to learn surveying methods and basic geometry concepts.
 d. **Rationale:** The course develops students' skills in land measurement, mapping, and levelling techniques used in farm development, irrigation, and drainage projects. It prepares students for accurate field data collection and interpretation for agricultural engineering applications.
 e. **Course Learning Objective:**

CLOBJ 1	Learn basic principles of surveying and levelling used in agricultural engineering projects.
CLOBJ 2	Understand the use of various surveying instruments.
CLOBJ 3	Develop skills in measurement, data recording, and mapping.
CLOBJ 4	Apply surveying techniques for farm development and irrigation planning.

f. **Course Learning Outcomes:**

CLO 1	Operate and handle surveying and levelling instruments correctly.
CLO 2	Conduct field measurements and prepare survey maps.
CLO 3	Interpret survey data for agricultural land planning.
CLO 4	Apply levelling techniques for irrigation and drainage system design.

g. **Teaching & Examination Scheme:**

Teaching Scheme				Evaluation Scheme				
Lecture	Tutorial	Lab	Credit	Theory Marks		Practical Marks		Total Marks
				T	T	P	P	
1	-	4	3.00	40	40	-	20	100

h. **Course Content:**

Sr. No.	Content	Weightage (%)	Teaching Hours
1	Surveying: Introduction, classification and basic principles; Linear measurements, chain surveying, cross staff survey, compass survey, planimeter; Errors in measurements, their elimination and correction; Plane table surveying, methods, advantages and disadvantages.	40	6

2	Levelling: levelling difficulties and error in levelling, contouring, computation of area and volume.	35	6
3	Theodolite and Modern Surveying Techniques: Theodolite traversing, introduction to setting of curves; Total station, electronic theodolite; Introduction to GPS survey.	25	4
	Total	100	16

i. Text Book and Reference Book:

1. Surveying and Levelling Vol. I by Arora K. R; Standard Publications, Delhi
2. T. P. Kanetkar & S. V. Kulkarni by Surveying and levelling Vol-I; Puna Vidyarthi Griha Prakashan
3. Dr. B. C. Punmia by Surveying and Levelling Vol-I; Laxmi Publications Pvt. Ltd.

j. Experiment List

Sr. No.	Experient List
1.	Linear measurements using different instruments
2.	Reconnaissance survey in the field & Use of field book
3.	Study on various types of chain used in chain survey and its components; Study of errors in chain surveying
4.	Use of ranging rods and ranging in the field
5.	Obstacles during chaining; Offsets in chain survey; Cross Staff
6.	Survey of an area & Preparation of map
7.	Study on various types of compass; Compass survey of an area; Plotting of compass survey
8.	Plane table surveying and different methods
9.	Study on various types of levels and its components; Setting up of dumpy level in the field
10.	Computation of various methods for RL
11.	Study on Levelling, L section and X sections and its plotting; Measurement of slope in the field
12.	Study on contour and its characteristics; Contour survey of an area and preparation of contour map; Introduction of software in drawing contour
13.	Theodolite surveying; Ranging by Theodolite; Height of object by using Theodolite; Setting out curves by Theodolite
14.	Use of minor instruments; Use of total station, EDM in the field; Use of modern computers for surveying

- a. **Course Name:** Workshop Technology and Practice
- b. **Course Code:** 20103169
- c. **Prerequisite:** Willingness to work with tools and machines safely.
- d. **Rationale:** This course trains students in basic workshop operations such as fitting, welding, carpentry, and sheet metal work. It enhances their fabrication skills, material handling abilities, and adherence to safety standards in practical engineering tasks.
- e. **Course Learning Objective:**

CLOBJ 1	Introduce workshop tools, machines, and manufacturing processes.
CLOBJ 2	Provide practical training in fitting, welding, carpentry, and sheet metal work.
CLOBJ 3	Develop understanding of material properties and fabrication techniques.
CLOBJ 4	Emphasize safety and precision in workshop operations.

f. **Course Learning Outcomes:**

CLO 1	Identify workshop tools, machines, and their uses.
CLO 2	Perform basic workshop operations such as fitting, welding, and carpentry.
CLO 3	Apply correct material handling and fabrication techniques.
CLO 4	Follow safety procedures during workshop activities.

g. **Teaching & Examination Scheme:**

Teaching Scheme				Evaluation Scheme				
Lecture	Tutorial	Lab	Credit	Theory Marks		Practical Marks		Total Marks
				T	T	P	P	
0	-	4	2.00	-	-	-	100	100

h. **Text Book and Reference Book:**

1. Workshop Technology (Part I and II) by Chapman W A J; Arnold Publishers (India) Pvt. Ltd., AB/9 Safdarjung Enclave, New Delhi., 1989
2. Elements of Workshop Technology (Vol I & Vol II) by Hajra Choudhary; Media Promoters and Publishers Pvt ltd
3. A Course in Workshop Technology by Raghuwamsi B S; Dhanpat Rai and Sons, 1682 Nai Darak, New Delhi., 1982

i. **Experiment List**

Sr. No.	Experient List
1.	Introduction about different shops in the workshop; Safety and precautions to be taken in the workshop
2.	Study of different tools used for fitting and different fitting operations

3.	Study of various measuring instruments used for fitting
4.	Exercise in fitting: sawing, filing and right angle fitting of MS flat
5.	Working with complex fitting jobs: operations of drilling, reaming, and threading and with tap dies
6.	Preparation of a paper weight
7.	Study of various carpentry tools, types of wood and their characteristics and working with carpentry tools
8.	Preparation of simple joints in carpentry: cross half lap joint or T-half joint, Mortise and Tenon joint in carpentry
9.	Preparation of dovetail joint in carpentry
10.	Study of welding, types of welding, oxyacetylene gas welding, types of flames, welding techniques and equipment used for gas welding, working with welding equipment
11.	Working with electric arc welding; Equipment and tools, safety and precautions taken in arc welding
12.	Preparation of Butt joint and lap joint with ARC welding and gas welding
13.	Working on a lathe machine and study of different tools used in lathe machine
14.	Exercise on simple turning, step turning in lathe machine
15.	Preparation of job on taper turning, drilling, knurling and threading in lathe machine
16.	Working with different machines in machine shop such as shaper, milling machine, etc. and with different tools used in machine shop
17.	Exercise on bending, shaping etc.; Exercise on Drawing, Punching, Riveting
18.	Making different types of sheet metal joints using G.I. sheets
19.	Practice job on shaper; changing a round MS rod into square section with a shaper
20.	Exercise on a milling machine such as making a slot, gear tooth forming and indexing

- a. **Course Name:** Basic Electrical Gadgets and Instruments
- b. **Course Code:** 20103170
- c. **Prerequisite:** Basic knowledge of science and interest in electrical systems.
- d. **Rationale:** This course imparts knowledge about electrical principles, gadgets, and measuring instruments used in agriculture. It emphasizes safe operation, maintenance, and troubleshooting of electrical devices in farm and rural applications.
- e. **Course Learning Objective:**

CLOBJ 1	Understand the basic principles of electricity and its applications in agriculture.
CLOBJ 2	Learn about various electrical gadgets and measuring instruments.
CLOBJ 3	Develop skills to operate and maintain electrical devices used on farms.
CLOBJ 4	Ensure safe handling and troubleshooting of electrical systems.

f. **Course Learning Outcomes:**

CLO 1	Identify common electrical gadgets and instruments used in agricultural operations.
CLO 2	Operate measuring instruments for voltage, current, and resistance.
CLO 3	Maintain and troubleshoot basic electrical devices.
CLO 4	Apply electrical safety measures during installation and repair work.

g. **Teaching & Examination Scheme:**

Teaching Scheme				Evaluation Scheme				
Lecture	Tutorial	Lab	Credit	Theory Marks		Practical Marks		Total Marks
				T	T	P	P	
2	-	2	3.00	40	40	-	20	100

h. **Course Content:**

Sr. No.	Content	Weightage (%)	Teaching Hours
1	Introduction: different electrical appliances used in agricultural buildings, structures and farm operations; Difference between AC and DC supply system; Introduction to AC fundamentals; AC through series RL, RC, and RLC circuits, parallel AC circuit, series and parallel resonance; Q-factor and bandwidth.	20	6

2	Three- phase AC circuit: Concept of balanced three-phase AC circuits, line and phase quantity in star and delta network, power in three-phase circuit, various methods of three phase power measurement like (one wattmeter and two –wattmeter method).	15	5
3	Diode and its applications: Rectifier, Clipper, Clamper, voltage multiplier and capacitive filter zener diode as voltage regulator	15	5
4	Transistor and its applications: Bipolar junction transistor, operating point. Various biasing methods, fixed, self-biasing and potential divider biasing method; OP-AMP, Ideal OP-AMP characteristics, Linear and non-linear applications of OP-AMP (adder, subtractor, integrator, active rectifier, comparator).	20	6
5	Introduction to digital electronics and logic gates: Basic theorem of boolean algebra, combinational logic circuits (basic gates, SOP rule and K-map), binary adder.	15	5
6	Principles of general instruments: Measurement of displacement, temperature, velocity, force and pressure using different instruments like strain gauges, load cell, thermistors, thermocouples, pyrometer, linear variable differential transformer (LVDT), capacitive transducers, RTD, instruments for measurement of speed, wind velocity, solar radiation, anemometer, multimeter, etc.	15	5
	Total	100	32

i. Text Book and Reference Book:

1. Electronic Devices and Circuit Theory by Robert Boylestad and Louis Nashelsky; Prentice Hall, New Jersey & Ohio; VII
2. Principle of Electronics by V.K.Mehta; S.Chand & Co., latest edition
3. A text book of Electrical technology by B.L.Theraja; S. Chand Publication

j. Experiment List

Sr. No.	Experient List
1.	To prepare an electrical switch board to control two light points, one plug point, one fan point and fuse (House wiring)
2.	To prepare an electrical switch board to control two light points using two two-way switch (staircase wiring)
3.	To connect and test a fluorescent lamp
4.	To find faults and repair home appliances such as heater, electric iron, fans and mixer-grinder, etc.
5.	To find faults and repair UPS
6.	To measure the power requirement and power factor in a AC single phase series RLC circuit
7.	To measure energy of a single-phase AC circuit with the help of ammeter, voltmeter and power factor meter and energy meter
8.	To measure the power consumption in a three-phase circuit using two-wattmeter method
9.	To prepare a DC power supply unit using diode and filter circuit
10.	To study Zener diode as voltage regulator circuit
11.	To study transistor characteristics in CE configurations
12.	To verify different logic gates
13.	To measure unknown resistance using Wheatstone bridge
14.	To measure the displacement and to determine the characteristics of LVDT
15.	To measure the displacement using LVDT and potentiometer
16.	To measure the pressure using strain gauge and Bourden tube
17.	To measure the temperature using RTD, thermistors and thermocouple and study their characteristics
18.	To measure the speed, wind velocity, solar radiation etc, using different measuring tools like tachometer, anemometer, pyranometer, multimeter etc.
19.	To acquaint with different types of instruments used in agriculture & food processing application

- a. **Course Name:** Agricultural Informatics and Artificial Intelligence
- b. **Course Code:** 20103171
- c. **Prerequisite:** Basic computer literacy and interest in digital technologies for agriculture.
- d. **Rationale:** This course introduces the role of ICT, database management, AI, and IoT in agriculture. It prepares students to apply data-driven tools, decision support systems, and precision farming techniques for efficient and sustainable farm management.
- e. **Course Learning Objective:**

CLOBJ 1	Introduce the role of information technology in agricultural systems.
CLOBJ 2	Learn applications of artificial intelligence in precision farming.
CLOBJ 3	Understand database management, decision support systems, and IoT in agriculture.
CLOBJ 4	Develop skills to integrate ICT tools for farm planning and management.

f. **Course Learning Outcomes:**

CLO 1	Use ICT tools to store, process, and analyze agricultural data.
CLO 2	Apply AI techniques for crop monitoring and decision making.
CLO 3	Operate IoT-based devices for smart farming applications.
CLO 4	Integrate informatics and AI to improve agricultural productivity.

g. **Teaching & Examination Scheme:**

Teaching Scheme				Evaluation Scheme				
Lecture	Tutorial	Lab	Credit	Theory Marks		Practical Marks		Total Marks
				T	T	P	P	
2	-	2	3.00	40	40	-	20	100

h. **Course Content:**

Sr. No.	Content	Weightage (%)	Teaching Hours
1	Introduction to Computers and Basic Applications: Anatomy of Computers, Memory Concepts, Units of Memory, Operating System: Definition and types, Applications of MS- Office for creating, Editing and Formatting a document, Data presentation, Tabulation and graph creation, Statistical analysis, Mathematical expressions, Database, concepts and types, creating database, Uses of DBMS in Agriculture, Internet and	25	8

	World Wide Web (www): Concepts and components.		
2	Computer Programming Basics: General concepts, Introduction to Visual Basic, Java, Fortran, C/ C++, etc. concepts and standard input/output operations.	15	5
3	e-Agriculture, Concepts, design and development; Application of innovative ways to use information and communication technologies (IT) in Agriculture; Computer Models in Agriculture: Statistical, weather analysis and crop simulation models, concepts, structure, inputs-outputs files, limitation, advantages and application of models for understanding plant processes, sensitivity, verification, calibration and validation; IT applications for computation of water and nutrient requirement of crops; Computer-controlled devices (automated systems) for Agri- input management; Smartphone mobile apps in agriculture for farm advice: Market price, postharvest management etc.; Geospatial technology: Concepts, techniques, components and uses for generating valuable agri-information; Decision support systems: Concepts components and applications in agriculture; Agriculture Expert System; Soil Information Systems etc. for supporting farm decisions. Preparation of contingent crop-planning and crop calendars using IT tools; Digital India and schemes to promote digitalization of agriculture in India.	35	11

4	Introduction to artificial intelligence and Smart Agriculture: background and applications, Turing test. Control strategies, Breadth-first search, Depth-first search;Heuristics search techniques: Best-first search, A* algorithm, IoT and Big Data; Use of AI in agriculture for autonomous crop management, and health, monitoring livestock health, intelligent pesticide application, yield mapping and predictive analysis, automatic weeding and harvesting, sorting of produce, and other food processing applications; Concepts of smart agriculture, use of AI in food and nutrition science etc.	25	8
	Total	100	32

i. Experiment List

Sr. No.	Experient List
1.	Study of computer components, accessories, practice of important DoS Commands
2.	Introduction of different operating systems such as Windows, Unix/ Linux, creating files and folders, File Management
3.	Use of MS-WORD and MS Power-point for creating, editing and presenting a scientific document
4.	MS- EXCEL - Creating a spreadsheet, Use of statistical tools, writing expressions, Creating graphs, Analysis of scientific data, Handling macros
5.	MS-ACCESS: Creating Database, preparing queries and reports, Demonstration of Agri- information system
6.	Introduction to World Wide Web (WWW) and its components
7.	Introduction of programming languages such as Visual Basic, Java, Fortran, C, C++
8.	Hands on practice on Crop Simulation Models (CSM), DSSAT/Crop-Info/Crop Syst/ Wofost, Preparation of inputs file for CSM and study of model outputs
9.	Computation of water and nutrient requirements of crop using CSM and IT tools
10.	Use of smart phones and other devices in agro-advisory and dissemination of market information
11.	Introduction of Geospatial Technology
12.	Hands on practice on preparation of Decision Support System
13.	Preparation of contingent crop planning, India Digital Ecosystem of Agriculture (IDEA)

- a. **Course Name:** NSS- I/ NCC- I
- b. **Course Code:** 20103172
- c. **Prerequisite:** Interest in community service, leadership, and discipline-oriented activities.
- d. **Rationale:** This course builds social responsibility, teamwork, and leadership qualities through participation in community service, physical training, and national integration programs, shaping students into disciplined and socially conscious citizens.
- e. **Course Learning Objective:**

CLOBJ 1	Instill values of social responsibility, discipline, and leadership.
CLOBJ 2	Engage students in community service and nation-building activities.
CLOBJ 3	Develop teamwork, time management, and problem-solving skills.
CLOBJ 4	Promote physical fitness and disaster preparedness.

f. **Course Learning Outcomes:**

CLO 1	Participate in social service and community development programs.
CLO 2	Demonstrate leadership and teamwork in NCC/NSS activities.
CLO 3	Apply discipline and organizational skills in assigned tasks.
CLO 4	Exhibit awareness of social and national issues.

g. **Teaching & Examination Scheme:**

Teaching Scheme				Evaluation Scheme				
Lecture	Tutorial	Lab	Credit	Theory Marks		Practical Marks		Total Marks
				T	T	P	P	
0	-	2	1.00	-	-	-	100	100

h. Course Content:

Sr. No.	Content	Weightage (%)	Teaching Hours
1	<p>NSS-I</p> <ul style="list-style-type: none"> • Practical/ Awareness activities: • Orientation: history, objectives, principles, symbol, badge; regular programs under NSS. • Organizational structure of NSS, Code of conduct for NSS volunteers, points to be considered by NSS volunteers' awareness about health. <p>NSS programme activities. Concept of regular activities, special camping, day camps, basis of adoption of village/slums, conducting survey, analysing guiding financial patterns of scheme, youth programs/ schemes of GOI, coordination with different agencies and maintenance of diary. Understanding youth. Definition, profile, categories, issues and challenges of youth; and opportunities for youth who is agent of the social change.</p> <ul style="list-style-type: none"> • Community mobilization. Mapping of community stakeholders, designing the message as per problems and their culture; identifying methods of mobilization involving youth-adult partnership. Social harmony and national integration. • Indian history and culture, role of youth in nation building, conflict resolution and peace-building. Volunteerism and shramdaan. Indian tradition of volunteerism, its need, importance, motivation, and constraints; shaman as part of volunteerism. • Citizenship, constitution, and human rights. Basic features of constitution of India, fundamental rights and duties, human rights, consumer awareness and rights and rights to information. Family and society. Concept of family, community (PRIs and other community-based organizations) and society. <p>NCC-I</p> <ul style="list-style-type: none"> • Practical/ Awareness activities: • Aims, objectives, organization of NCC and NCC song. DG's cardinals of discipline. • Drill- aim, general words of command, attention, stands at ease, stand easy and turning. • Sizing, numbering, forming in three ranks, open and close order march, and dressing. 	100	16

	<ul style="list-style-type: none"> • Saluting at the halt, getting on parade, dismissing, and falling out. • Marching, length of pace, and time of marching in quick/slow time and halt. Side pace, pace forward and to the rear. Turning on the march and wheeling. Saluting on the march. • Marking time, forward march, and halt. Changing step, formation of squad and squad drill. • Command and control, organization, badges of rank, honours, and award. • Nation Building- cultural heritage, religions, traditions, and customs of India. National integration. Values and ethics, perception, communication, motivation, decision making, discipline and duties of good citizens. Leadership traits, types of leadership. Character/ personality development. Civil defence organization, types of emergencies, firefighting, protection. Maintenance of essential services, disaster management, aid during development projects. • Basics of social service, weaker sections of society and their needs, NGO's and their contribution, contribution of youth towards social welfare and family planning. • Structure and function of human body, diet and exercise, hygiene and sanitation. Preventable diseases including AIDS, safe blood donation, first aid, physical and mental health. Adventure activities. Basic • principles of ecology, environmental conservation, pollution and its control. 		
	Total	100	16

Semester 2

- a. **Course Name:** Skill Enhancement
- b. **Course Code:** 20103175
- c. **Prerequisite:** Basic knowledge of agricultural science, engineering principles, and computer skills.
- d. **Rationale:** This course equips students with skills in sustainable farming technologies, renewable energy, and post-harvest management, addressing the challenges of modern agriculture.
- e. **Course Learning Objective:**

CLOBJ 1	To Equip Students with Skills in Farm Machinery Maintenance.
CLOBJ 2	To Provide Knowledge of Renewable Energy Technologies in Agriculture
CLOBJ 3	To Foster Expertise in Water Management for Agriculture.
CLOBJ 4	To Develop Competence in Post-Harvest Handling and Value Addition

- f. **Course Learning Outcomes:**

CLO 1	Understanding and Practical Application of Agricultural Machinery
CLO 2	Design and Implementation of Renewable Energy Systems
CLO 3	Management and Optimization of Agricultural Water Systems
CLO 4	Value Addition and Post-Harvest Management

- g. **Teaching & Examination Scheme:**

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				Theory	CE	P	Theory	P	
-	-	16	8	30	20	50	-	-	100

L- Lectures; **T-** Tutorial; **P-** Practical; **C-** Credit; **MSE-** Mid-Semester Evaluation, **CE-** Continuous Evaluation, **ESE-** End Semester Examination

h. Experiment List:

Sr. NO.	Experiment List
1	Operation and maintenance of farm machinery
2	Repair and maintenance of tractors and power tillers
3	Management of agricultural machinery custom hiring and maintenance facilities
4	Fabrication, operation and maintenance of renewable energy devices
5	Operation and maintenance of drones used for agricultural applications
6	Machine vision, sensors and sensors architecture
7	Design of solar PV system using softwares
8	Installation and maintenance of on-grid and off- grid solar systems
9	Design and maintenance of agri-voltaic systems
10	Valorization of agri-biomass and organic waste
11	Energy audit, energy conservation and energy efficiency
12	Repair and maintenance of pumps and irrigation systems
13	Installation and maintenance of micro-irrigation systems
14	Application of remote sensing and GIS for agricultural water management
15	Operation and maintenance of hydro- meteorological instruments
16	Geophysical survey and investigations for groundwater exploration and installation of tube well/ bore well
17	Installation and maintenance of roof top rain water harvesting systems
18	Operation and maintenance of soil conservation structures
19	Construction, management and maintenance of protected cultivation structures

20	Agro processing methods, equipment operation and maintenance
21	Operation and management of multi-commodity agro-processing centre
22	Primary processing and value addition and cold chain logistics
23	Food grain godown and warehouse management
24	Post-harvest value chain management including logistics

- a. **Course Name:** Engineering Drawing
- b. **Course Code:** 20103176
- c. **Prerequisite:** Basic understanding of geometry and visualization skills.
- d. **Rationale:** To Equip students with the ability to visualize, interpret, and effectively communicate technical ideas and designs through standardized graphical representation.
- e. **Course Learning Objective:**

CLOBJ 1	Enable students to effectively use drawing instruments, understand line types, lettering styles, and dimensioning techniques in engineering drawings.
CLOBJ 2	Train students to create orthographic projections, isometric views, and sectional drawings of geometric shapes, planes, and solids to visualize three-dimensional objects on two-dimensional planes.
CLOBJ 3	Familiarize students with the representation and drawing of mechanical components such as threads, fasteners, rivets, and welded joints, focusing on their nomenclature and practical applications.
CLOBJ 4	Equip students to apply representative fractions, draw to scale, and develop the surfaces of geometrical solids for accurate design and fabrication insights.

f. Course Learning Outcomes:

CLO 1	Demonstrate proficiency in engineering drawing tools and standards.
CLO 2	Create accurate projections and visualizations of geometrical shapes, planes, and solids.
CLO 3	Represent engineering components like threads, fasteners, rivets, and welded joints.
CLO 4	Apply scales and surface development techniques for geometrical solids.

g. Teaching & Examination Scheme:

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				Theory	CE	P	Theory	P	
0	-	2	3	30	20	50	-	-	100

L- Lectures; **T-** Tutorial; **P-** Practical; **C-** Credit; **MSE-** Mid-Semester Evaluation, **CE-** Continuous Evaluation, **ESE-** End Semester Examination

h. Text Book and Reference Book:

- a. Bhatt, N. D. 2010. Elementary Engineering Drawing. Charotar Publishing House Pvt. Ltd., Anand.
- b. Bhatt, N. D. and Panchal, V. M. 2013. Machine Drawing. Charotar Publishing House Pvt. Ltd.,
- c. Narayana, K. L. and Kannaiah, P. 2010. Machine Drawing. Scitech Publications (India) Pvt. Ltd, Chennai.

i. Experiment List:

Sr. NO.	Experiment List
1	Introduction to Drawing Instruments.
2	Drawing Conventions
3	Understanding and Applying Dimensioning Techniques
4	Application of Drawing Scales
5	Creating Orthographic Projections of Points
6	Developing Orthographic Projections of Planes
7	Projection of prisms and pyramids.
8	Understand the development of surfaces of solids.
9	Create isometric views of simple solids.
10	Understand sectional views of solids.
11	Study of thread profiles and fasteners.
12	Study of the representation of joints.

a. Course Name: Computer Programming and Data Structures

b. Course Code: 20103177

c. Prerequisite: Basic knowledge of fundamentals of programming.

d. Rationale: This subject provides basic knowledge of performance analysis and measurements and implementation of different data structure using programming language.

e. Course Learning Objective:

CLOBJ 1	Acquire proficiency in computer programming languages and concepts.
CLOBJ 2	Develop skills in algorithm design and analysis.
CLOBJ 3	Understand the fundamentals of data structures and their applications.
CLOBJ 4	Demonstrate the ability to write and debug programs for real-world problem-solving.

f. Course Learning Outcomes:

CLO 1	Interpret the computer programming language concepts.
CLO 2	Develop programming skills which require to solve given problem.
CLO 3	Design programs connecting decision structures, loops and functions.
CLO 4	Understand the fundamentals of data structures

g. Teaching & Examination Scheme:

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				Theory	CE	P	Theory	P	
-	-	4	2	30	20	50	-	-	100

L- Lectures; **T-** Tutorial; **P-** Practical; **C-** Credit; **MSE-** Mid-Semester Evaluation, **CE-** Continuous Evaluation, **ESE-** End Semester Examination

h. Text Book and Reference Book:

- Augenstein, L. and Tanenbaum. 2003. Data structures using C and C++. PHI/Pearson Education.
- Balagurusamy, E. 1990. Programming in 'C'. Tata McGraw Hill Publishing Co. Ltd., 12/4 Asaf Ali Road, New Delhi.
- Bronson, G. and Menconi, S. 1995. A First Book of 'C' Fundamentals of 'C' Programming. Jaico Publishing House, New Delhi.
- Drozdek, A. 2012. Data Structures and Algorithms in C++. Vikas Publishing House / Thomson International Student Edition.

- e. Goodrich, M T, Tamassia, R and Mount, D. 2011. Data structures and Algorithms in C++. Wiley Student Edition, John Wiley and Sons.
- f. Rajaraman, V. 1985. Computer Oriented Numerical Methods. Prentice Hall of India. Pvt. Ltd, New Delhi.
- g. Rajaraman, V. 1995. Computer Programming in 'C'. Prentice Hall of India Pvt. Ltd., New Delhi.
- h. Sahni, S. 2006. Data Structures, Algorithms and Applications in C++. University Press (India) Pvt. Ltd / Orient Longman Pvt. Ltd.
- i. Weiss, M. A. 2007. Data Structures and Algorithm Analysis in C++. Pearson Education.
- j. Agarwal, A. 2005. The Complete Reference Guide: Data Structure through C. ISBN: 8178840448; Publisher: Cyber Tech Publications.

i. Experiment List:

Sr. NO.	Experiment List
1	Introduction to high level languages, Structure programming, C programming, a simple C programming, execution of a C program, program and instruction
2	Familiarizing with Turbo C IDE
3	Building an executable version of C program
4	Study of different operators such as arithmetic, relational, logical, assignment, increment and decrement, conditional, bitwise and special operators, precedence of arithmetic operators
5	Debugging a C program; Developing and executing simple programs
6	Creating programs using decision making statements such as if, go to and switch
7	Developing program using loop statements while, do and for; Using nested control structures
8	Familiarizing with one and two dimensional arrays
9	Using string functions; Creating user defined functions
10	Developing structures and union
11	Using local, global and external variables; Using pointers
12	Developing linked lists in C language; Inserting an item in Linked List; Deleting an item in Linked List; Implementing Stacks; Implementing push/pop functions; Creating queues, Insertion/ Deletion in queues.

a. Course Name: Farming based Livelihood Systems

b. Course Code: 20103178

c. Prerequisite: Basic understanding of agriculture, farming systems, and rural development principles.

d. Rationale: This course equips students to implement integrated farming systems that boost farmers' incomes, promote sustainability, and address challenges like climate change and digitalization for rural development.

e. Course Learning Objective:

CLOBJ 1	To make students aware of the status of agriculture in India and how different farming systems contribute to rural livelihoods.
CLOBJ 2	To provide an understanding of the concept of livelihood and how farming-based systems can be an effective strategy for enhancing rural income.
CLOBJ 3	To analyze and evaluate the feasibility, profitability, and risk factors associated with different farming systems and livelihood models in various agro-climatic zones.
CLOBJ 4	To introduce students to the concepts of project formulation, cost-benefit analysis, and the role of start-ups in the agricultural sector, with a focus on agri-based value chain models.

f. Course Learning Outcomes:

CLO 1	Students will be able to describe the status of agriculture in India, the income sources of farmers, and how different states contribute to agricultural productivity and rural livelihoods.
CLO 2	Students will demonstrate an understanding of the concept of livelihood, livelihood patterns, and the role of farming-based systems in improving rural livelihood outcomes.
CLO 3	Students will critically assess and evaluate the production, profitability, and risks associated with various farming systems, including integrated farming systems and value chains.
CLO 4	Students will be able to formulate and evaluate projects on farming-based livelihood systems, including cost-benefit analysis, and understand the role of agri-business start-ups in the farming ecosystem.

g. Teaching & Examination Scheme:

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				Theory	CE	P	Theory	P	
-	2	2	3	20	20	20	40	-	100

L- Lectures; **T-** Tutorial; **P-** Practical; **C-** Credit; **MSE-** Mid-Semester Evaluation, **CE-** Continuous Evaluation, **ESE-** End Semester Examination

h. Course Content:

Sr. No.	Content	Weightage	Teaching Hours
1	Status of Agriculture in India -Status of agriculture in different states - Income of farmers and rural people	10%	4
2	Livelihood: Definition, Concept, and Patterns -Definition and concept - Livelihood patterns in urban and rural areas Indicators to study livelihood systems	15%	4
3	Agricultural Livelihood Systems (ALS) - Meaning and approaches - Definition of farming systems and farming-based livelihood systems - Prevalent farming systems in India	15%	6

4	<p>Farming Systems</p> <ul style="list-style-type: none"> -Types of traditional and modern farming systems. - Components of farming system/ farming-based livelihood systems- Crops and cropping systems, Livestock (Dairy, Piggery, Goatry, Poultry, Duckry etc.), Horticultural crops, Agro--forestry systems, Aqua culture Duck/Poultry cum Fish, Dairy cum Fish, Piggery cum Fish etc., Small-, medium- and large- enterprises including value chains and secondary enterprises as livelihood components for farmers, - Factors affecting integration of various enterprises of farming for livelihood. 	15%	6
5	<p>Feasibility and Commercial Models</p> <ul style="list-style-type: none"> -Feasibility of different farming systems for different agro-climatic zones, -Commercial farming-based livelihood models by NABARD, ICAR and other organizations across the country, -Case studies on different livelihood enterprises associated with the farming. 	15%	4
6	<p>Risk and Success Factors</p> <ul style="list-style-type: none"> - Factors affecting farming-based livelihood systems - Schemes and programs by Central and State Governments -Public and Private organizations involved in promotion of farming-based livelihood opportunities. 	15%	4
7	<p>Farming-Based Livelihood in the 21st Century</p> <p>Role of farming-based livelihood enterprises in 21st Century in view of circular economy, green economy, climate change, digitalization and changing life style.</p>	15%	4
Total		100	32

j. Text Book and Reference Book:

1. Agarwal, A. and Narain, S. 1989. Towards Green Villages: A strategy for Environmentally, Sound and Participatory Rural Development, Center for Science and Environment, New Delhi, India.
2. Ashley, C. and Carney, D. 1999. Sustainable Livelihoods: Lessons from Early Experience; Department for International Development: London, UK; Volume 7. [Google Scholar].
3. Carloni, A. 2001. Global Farming Systems Study: Challenges and Priorities to 2030 – Regional Analysis: Sub-Saharan Africa, Consultation Document, FAO, Rome, Italy.
4. Dixon, J. and Gulliver, A. with Gibbon, D. 2001. Farming Systems and Poverty: Improving Farmers' Livelihoods in a Changing World. FAO & World Bank, Rome
5. Evenson, R.E. 2000. Agricultural Productivity and Production in Developing Countries'. In FAO, The State of Food and Agriculture, FAO, Rome, Italy
6. Livelihood Improvement of Underprivileged Farming Community: Some Experiences from Vaishali, Samastipur, Darbhanga and Munger Districts of Bihar by B. P. Bhatt, Abhay Kumar, P.K. Thakur, Amitava Dey Ujjwal Kumar, Sanjeev Kumar, B.K. Jha, Lokendra Kumar, K. N. Pathak, A. Hassan, S. K. Singh, K. K. Singh and K. M. Singh ICAR Research Complex for Eastern Region ICAR Parisar, P.O. Bihar Veterinary College, Patna - 800 014, Bihar
7. Panwar et al. 2020. Integrated Farming System models for Agricultural Diversification, Enhanced Income and employment, Indian Council of Agricultural Research, New Delhi.
8. Reddy, S.R. 2016. Farming System and Sustainable Agriculture, Kalyani Publishers, New Delhi.
9. Singh, J.P., et al. 2015. Region Specific Integrated Farming System Models, ICAR-Indian Institute of Farming Systems Research, Modipuram.
10. Walia, S. S. and Walia, U. S. 2020. Farming System and Sustainable Agriculture, Scientific Publishers, Jodhpur, Rajasthan.

k. Experiment List:

Sr. NO.	Experiment List
1	Survey of farming systems and agriculture- based livelihood enterprises
2	Study of components of important farming-based livelihood models/ systems in different agro-climatic zones
3	Study of production and profitability of crop based, livestock based, processing based and integrated farming- based livelihood models
4	Field visit of innovative farming system models.
5	Visit of Agri-based enterprises and their functional aspects for integration of production, processing and distribution sectors and Study of agri-enterprises involved in industry and service sectors (Value Chain Models),
6	Learning about concept of project formulation on farming based livelihood systems along with cost and profit analysis,
7	Case study of Start-Ups in agri-sectors.

- a. **Course Name:** Environmental Studies and Disaster Management
- b. **Course Code:** 20103179
- c. **Prerequisite:** To expose and acquire knowledge on the environment
- d. **Rationale:** To gain the state-of-the-art - skill and expertise on management of disasters
- e. **Course Learning Objective:**

CLOBJ 1	Develop a comprehensive understanding of environmental science concepts such as ecosystems, biodiversity, pollution, and climate change, and their impact on human society and the natural world.
CLOBJ 2	Acquire knowledge and skills in disaster management including hazard identification, risk assessment, emergency response planning, and community resilience building.
CLOBJ 3	Analyse environmental issues and disasters from a multidisciplinary perspective, considering social, economic, and ethical factors.
CLOBJ 4	Apply critical thinking and problem-solving skills to develop sustainable solutions for environmental challenges and disaster mitigation

f. **Course Learning Outcomes:**

CLO 1	Develop an understanding of environmental systems, resources, and conservation principles.
CLO 2	Analyse the causes and effects of air, water, and soil pollution on ecosystems and human health.
CLO 3	Gain insights into disaster management, including types, causes, and mitigation strategies.
CLO 4	Explore environmental ethics, sustainable development, and climate change mitigation solutions.
CLO 5	Understand the role of laws and policies in environmental protection and disaster risk reduction.
CLO 6	Enhance skills to assess environmental impacts and propose sustainable management solutions.
CLO 7	Engage in practical learning by studying local ecosystems and assessing disaster-affected regions.

g. **Teaching & Examination Scheme:**

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				Theory	CE	P	Theory	P	
2	-	2	3	30	-	20	50	-	100

L- Lectures; T- Tutorial; P- Practical; C- Credit; MSE- Mid-Semester Evaluation, CE- Continuous Evaluation, ESE- End Semester Examination

h. Course Content:

Sr. No.	Content	Weightage	Teaching Hours
1	<p>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.</p>	6%	2
2	<p>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 hot spots. Threats and Conservation of biodiversity</p>	18%	6
3	<p>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. h. light pollution.</p>	20%	6
4	<p>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.</p>	12%	4
5	<p>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.</p>	12%	4
6	<p>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.</p>	12%	4

7	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.	20%	6
Total		100	32

i. Text Book and Reference Book:

1. De, A.K. 2010. Environmental chemistry. Published by New Age International Publishers, New Delhi. ISBN:13-978 81 224 2617 5. 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), Bangalore. 36 pp.
3. Erach Bharucha, Text book for Environmental studies. University Grants Commission, New Delhi
4. Parthiban, K.T., Vennila, S., Prasanthrajan, M. Umesh and Kanna, S. 2023. Forest, Environment, Biodiversity and Sustainable development. Narendra Publishing House, New Delhi
5. Prasanthrajan, M. and Mahendran, P.P. 2008. A text book on Ecology and Environmental Science. ISBN 81-8321-104-6. Agrotech Publishing Academy, Udaipur
6. Sharma, P.D. 2009. Ecology and Environment, Rastogi Publications, Meerat, India
7. Tyler Miller and Scot Spoolman. 2009. Living in the Environment (Concepts, Connections, and Solutions). Brooks/cole, Cengage learning publication, Belmont, USA

j. Experiment List:

Sr. NO.	Experiment List
1	Visit to a local area to document environmental assets river/ forest/ grassland/ hill/ mountain.
2	Energy: Biogas production from organic wastes.
3	Visit to wind mill / hydro power / solar power generation units.
4	Biodiversity assessment in farming system.
5	Floral and faunal diversity assessment in polluted and un polluted system.
6	Visit to local polluted site - Urban/Rural/ Industrial/Agricultural to study of

	common plants, insects and birds.
7	Environmental sampling and preservation.
8	Water quality analysis: pH, EC and TDS.
9	Estimation of Acidity, Alkalinity. Estimation of water hardness.
10	Estimation of DO and BOD in water samples. Estimation of COD in water samples. Enumeration of E. coli in water sample.
11	Assessment of Suspended Particulate Matter (SPM).
12	Study of simple ecosystem – Visit to pond/river/hills. Visit to areas affected by natural disaster.

- a. **Course Name:** Communication Skills
 b. **Course Code:** 20103180
 c. **Prerequisite:** Basic knowledge of English grammar and communication skills.
 d. **Rationale:** This course helps students improve speaking, writing, and non-verbal communication skills. It builds confidence for personal and group communication in professional settings.
 e. **Course Learning Objective:**

CLOBJ 1	Understand the fundamentals of communication and its processes.
CLOBJ 2	Develop basic communication skills for professional and academic purposes.
CLOBJ 3	Understand and apply principles of non-verbal communication.
CLOBJ 4	Apply communication skills in real-life scenarios, such as interviews, presentations, and group discussions.

f. **Course Learning Outcomes:**

CLO 1	Demonstrate an understanding of communication processes and overcome barriers to effective communication.
CLO 2	Exhibit proficiency in reading, writing, listening, and speaking skills.
CLO 3	Construct grammatically correct and effective sentences for professional and academic communication.
CLO 4	Apply communication techniques in practical scenarios, including presentations and group discussions.

g. **Teaching & Examination Scheme:**

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				Theory	CE	P	Theory	P	
-	1	2	2	20	20	20	40	-	100

L- Lectures; T- Tutorial; P- Practical; C- Credit; MSE- Mid-Semester Evaluation, CE- Continuous Evaluation, ESE- End Semester Examination

h. **Course Content:**

Sr. No.	Content	Weightage	Teaching Hours
1	Communication Process: The magic of effective communication; Building self-esteem and overcoming fears; Concept, nature and significance of communication process; Meaning, types and models of communication; Verbal and non-verbal communication; Linguistic and non-linguistic barriers to communication and reasons behind communication gap/	33%	10

	miscommunication.		
2	Basic Communication Skills: Listening, Speaking, Reading and Writing Skills; Precis writing/Abstracting/Summarizing; Style of technical communication Curriculum vitae/resume writing; Innovative methods to enhance vocabulary, analogy questions.	33%	10
3	Structural and Functional Grammar: Sentence structure, modifiers, connecting words and verbals; phrases and clauses; Case: subjective case, possessive case; objective case; Correct usage of nouns, pronouns and antecedents, adjectives, adverbs and articles; Agreement of verb with the subject: tense, mood, voice; Writing effective sentences; Basic sentence faults.	34%	12

i. Text Book and Reference Book:

1. Allport, G. W. 1937. Personality: A Psychological Interpretation. Holt, New York.
2. Brown Michele and Gyles Brandreth. 1994. How to Interview and be Interviewed. Sheldon Press, London.
3. Dale, Carnegie. 1997. The Quick and Easy Way to Effective Speaking. Pocket Books, New York.
4. Francis Peter, S. J. 2012. Soft Skills and Professional Communication. Tata McGraw Hill, New Delhi.
5. Kumar, S and Pushpa Lata. 2011. Communication Skills. Oxford University Press.
6. Neuliep James, W. 2003. Intercultural Communication A Contextual Approach. Houghton Mifflin Co Boston.
7. Pease, Allan. 1998, Body Language. Sudha Publications, Delhi.
8. Raman, M. and Singh, P. 2000. Business Communication. Oxford University Press.
9. Seely, J. 2013. Oxford Guide to Effective Writing and Speaking. Oxford University Press.
10. Thomson, A. J. and Martinet, A. V. 1977. A Practical English Grammar. Oxford University

j. Experiment List:

Sr. NO.	Experiment List
1	Listening and note taking;
2	Writing skills: precis writing, summarizing and abstracting;
3	Reading and comprehension (written and oral) of general and technical articles;
4	Micro-presentations and Impromptu Presentations: Feedback on presentations; Stage manners: grooming, body language, voice modulation, speed; Group discussions;

5	Public speaking exercises;
6	vocabulary building exercises;
7	Interview Techniques; organization of events.

a. **Course Name:** NSS- II/ NCC- II

b. **Course Code:** 20103181

c. **Prerequisite:** Interest in community service, leadership, and discipline-oriented activities.

d. **Rationale:** This course builds social responsibility, teamwork, and leadership qualities through participation in community service, physical training, and national integration programs, shaping students into disciplined and socially conscious citizens.

e. **Course Learning Objective:**

CLOBJ 1	Instill values of social responsibility, discipline, and leadership.
CLOBJ 2	Engage students in community service and nation-building activities.
CLOBJ 3	Develop teamwork, time management, and problem-solving skills.
CLOBJ 4	Promote physical fitness and disaster preparedness.

f. **Course Learning Outcomes:**

CLO 1	Participate in social service and community development programs.
CLO 2	Demonstrate leadership and teamwork in NCC/NSS activities.
CLO 3	Apply discipline and organizational skills in assigned tasks.
CLO 4	Exhibit awareness of social and national issues.

g. **Teaching & Examination Scheme:**

Teaching Scheme				Evaluation Scheme				
Lecture	Tutorial	Lab	Credit	Theory Marks		Practical Marks		Total Marks
				T	T	P	P	
0	-	2	1.00	-	-	-	100	100

h. Course Content:

Sr. No.	Content	Weightage (%)	Teaching Hours
1	<p>NCC-II 1 (0+1)</p> <p>Objective</p> <p>1. 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.</p> <p>2. 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.</p> <p>Practical/ Awareness activities</p> <ul style="list-style-type: none"> • 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. 	100	16

	<p>NSS- II 1 (0+1)</p> <p>Objective To evoke social consciousness among students through various activities viz., working together, constructive, and creative social work, to be skilful in executing democratic leadership, developing skill in programme, to be able to seek self-employment, reducing gap between educated and uneducated, increasing awareness and desire to help sections of society.</p> <p>Practical/ Awareness activities</p> <ul style="list-style-type: none"> • 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. 		
	Total	100	16