Principles of Soil Science and Agronomy		Semester	I/II
Course Code	1BSSA105/205	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	(3:0:0:0)	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	3	Exam Hours	3
Examination type (SEE)	**Theory**		

Course outcome (Course Skill Set)

At the end of the course, the student will be able to:

1. Understand crops based on origin, agronomic, ontogeny, season and special purpose
2. Demonstrate tillage, types of tillage, Methods of sowing, weed management, and problems of dryland farming
3. Describe the mode of formation of rocks, minerals and processes of weathering and soil forming
4. Explain about importance of soil structure, soil air, soil temperature and soil colour.
5. Understand the role of beneficial organisms in enriching the soil, availability of plant nutrients and problematic soils.

Module-1

Fundamentals of Agronomy: Agriculture: definition, meaning and its branches, Introduction and scope of agronomy- National and International Agricultural Research Institutes in India, Classification of crops, According to Origin, Botanical, Commercial, Economical, Ontogeny, Agronomic, Leaf Morphology and Special Purpose crops.

Agro-Climatic Classification: Definition of climate and weather, Definition of meteorology, Climatology, Agro-meteorology, composition and structure of atmosphere, Influence of weather on crop growth and development. Agro climatic zones of Karnataka and India.

Number of Hours:08

Module-2

Agronomic Practices: Tillage-Objective of tillage, characteristics of good seed bed, Types of Tillage. Sowing- Methods of sowing, time and depth of sowing of major crops, Methods and time of application of manure and fertilizers.

Farming Approaches: Critical growth stages and water requirements of various field crops. Weeds- Importance, classification of weeds, principles and practices of weed management. Dryland farming, organic farming and Integrated farming system.

Number of Hours:08

Module-3

Fundamentals of Soil Science: Soil, Definition -branches of Soil science, Rocks: Definition – classification-igneous, sedimentary and metamorphic rocks, Minerals- Definition, classification,

Soil Formation Processes: Weathering- Definition, types of weathering- physical weathering, Chemical weathering, and Biological weathering. Soil forming processes: Eluviations, illuviation, humification, calcification, laterization, podzolozation, salinization, alkalization and gleization.

Number of Hours:08

Module-4

Physical Properties of Soil and Their Management: Soil Profile, Soil structure-Definition- types and Importance of soil structure. Soil texture, Soil air- Composition of soil air, management of soil air. Soil temperature- influence of soil temperature on plant growth-factors influencing soil temperature-management of soil temperature. Soil colour determination and importance.

Number of Hours:08

Module-5

Chemical Properties of Soil and Plant Nutrition: Ion exchange- Cation and anion exchange –factors influencing ion exchange capacity of soils importance of ion exchange,

Soil organic matter: importance of organic matter, CN ratio of organic matter and its importance. Soil fertility and soil productivity. Essential plant nutrients- N, P, K functions and deficiency symptoms in

plants. Classification of problematic soils- acid, saline, saline-sodic characteristics and their reclamation.

Number of Hours:08

Suggested Learning Resources: (Textbook/ Reference Book/ Manuals):

Textbooks:

1. A Text book of Agronomy. Chandrasekaran, B.,Annadurai, K. and Somasundaram, E. New Age International Publishers. 2010.
2. Introduction to Soil Science. Mahendra Sharma. Agrotech Publishing Academy. 2018.
3. Principles of Agronomy, Yellamanda Reddy, T. and Shankar Reddy, Kalyani Publishers, 2010.
4. Principles of Agronomy, S R Reddy, Kalyani Publishers, 2011.
5. Fundamentals of Soil Science. Indian Society of Soil Science, IARI. Jain publications New Delhi, 1998.

Reference books / Manuals:

1. Meteorology. William, L.D. McGraw-Hill Book. Co. New York, 1965.
2. Crop Production in Dry Regions. Arnon, L. Leonard Hill Publishing Co., London, 1972.
3. Manures and Fertilizers, Yawalkar, K.S and Agarwal, J.P. Agricultural Horticultural Publishing House, Nagpur, 1977.
4. Introduction to Soil Physics, Hillel, D. Academic Press, London, 1982.

Web links and Video Lectures (e-Resources):

- https://nptel.ac.in/courses/126105016
- https://nptel.ac.in/courses/126105024

Teaching-Learning Process (Innovative Delivery Methods):

The following are sample strategies that educators may adopt to enhance the effectiveness of the teaching-learning process and facilitate the achievement of course outcomes.

- Video demonstration of latest trends in soil science and agronomy
- Field-Based Learning- Organize field visits to farms, agricultural research stations, or soil testing labs.
- Invite professionals from agricultural industry
- Case Study Approach- Use real-life agronomic problems
- Problem-Based Learning

Assessment Structure:

The assessment in each course is divided equally between Continuous Internal Evaluation (CIE) and the Semester End Examination (SEE), with each carrying 50% weightage.

- To qualify and become eligible to appear for SEE, in the **CIE**, a student must score at least **40% of 50 marks**, i.e., **20 marks**.
- To pass the **SEE**, a student must score at least **35% of 50 marks**, i.e., **18 marks**.
- Notwithstanding the above, a student is considered to have **passed the course,** provided the combined total of **CIE and SEE is at least 40 out of 100 marks**.

Continuous Comprehensive Assessments (CCA):

CCA will be conducted for a total of 25 marks. It is evaluated through the learning activities which are aimed at enhancing the holistic development of students. These activities should align with course objectives and promote higher-order thinking and application-based learning.

Learning Activity -1: Case Study Presentation (Marks - 15)

Learning Activity -2: Field-Based Learning (Marks - 10)

Rubrics for Learning Activity 1:

Case Study Presentation (15 Marks)

(To be conducted for 30 marks and the marks obtained shall be reduced to 15)

Case Study topic should relate to key learning area from the syllabus and allow exploration of practical applications, challenges, and innovations relevant to engineering education and industry.

Performance Indicators	Excellent	Good	Satisfactory	Needs Improvement	Poor
Understanding of Case (5 Marks) (PO 1)	Demonstrates deep understanding **(5)**	Good understanding **(4)**	Adequate understanding. **(3)**	Limited understanding **(2)**	No clear understanding. **(0-1)**
Analysis & Critical Thinking (10 Marks) (PO 2)	Thorough, logical analysis with strong reasoning and innovative insights. **(9-10)**	Clear analysis with mostly logical reasoning. **(7-8)**	Basic analysis with some reasoning gaps. **(5-6)**	Weak analysis; mostly descriptive without reasoning. **(3-4)**	No clear analysis or reasoning. **(0-2)**
Documentation & Presentation Skills (10 Marks) (PO 9)	Documentation is complete, accurate, well-structured, follows all formatting guidelines. Well-structured, clear, confident delivery; excellent visuals. **(9-10)**	Documentation is mostly complete and accurate, well-organized, follows formatting guidelines with minor deviations. Good structure, clear delivery; visuals mostly effective. **(7-8)**	Documentation covers most required elements but has some inaccuracies or omissions. Average structure; delivery clear but lacks engagement. **(5-6)**	Documentation is incomplete with noticeable inaccuracies. Poor organization; visuals unclear. **(3-4)**	Documentation is largely missing or irrelevant, lacks structure. Unclear, disorganized presentation. **(0-2)**
Q&A Handling (5 Marks) (PO 9)	Confident, accurate, and concise responses. **(5)**	Good responses with minor gaps. **(4)**	Adequate responses; some uncertainty. **(3)**	Weak or hesitant responses. **(2)**	Unable to answer questions. **(0-1)**

Rubrics for Learning Activity 2:

Field-Based Learning (10 Marks)

(To be conducted for 20 marks and the marks obtained shall be reduced to 10)

Criteria	Excellent	Good	Satisfactory	Needs Improvement	Poor
Preparation & Planning (5 Marks) (PO1)	Demonstrates thorough preparation with well-defined objectives, detailed checklists, and comprehensive background research. (5 marks)	Adequate preparation with clear objectives and partial background research. (4 marks)	Minimal preparation; objectives vague or incomplete. (3 marks)	Little evidence of preparation or planning. (2 marks)	No clear understanding or planning. (0–1 marks)

Data Collection, Analysis & Interpretation (5 Marks) (PO2)	Collects accurate, relevant data. Insightful and accurate analysis, effectively linking field data/observations to theoretical concepts. (5 marks)	Data collection is mostly accurate. Good analysis with some relevant connections to theory. (4 marks)	Some relevant data collected. Limited analysis with weak or partial connections to concepts. (3 marks)	Inadequate data collection. Incomplete or incorrect interpretation; minimal analytical effort. (2 marks)	No data collected or no attempt at interpretation. (0–1 marks)
Participation & Teamwork (5 Marks) (PO8)	Fully engaged; actively participates, asks relevant questions, and interacts meaningfully. Works very effectively with the team (5 marks)	Actively participates and asks some relevant questions. Works well with team; minor coordination issues. (4 marks)	Limited participation; mostly passive involvement. Some cooperation and occasional coordination issues. (3 marks)	Very minimal participation with little meaningful input. Rarely cooperates or shows disruptive behavior (2 marks)	No participation or engagement. No cooperation or consistently disruptive behavior. (0–1 marks)
Documentation & Viva-voce (5 Marks) (PO9)	Documentation is clear, well-organized, and reports are professional and comprehensive. Answers all questions confidently, showing deep conceptual and practical understanding. (5 marks)	Documentation and reports are clear with minor gaps. Answers most correctly; minor conceptual gaps. (4 marks)	Documentation incomplete or lacking clarity. Answers some but lacks depth. (3 marks)	Poorly organized documentation. Gives vague or incomplete answers. (2 marks)	No report submitted. Unable to answer. (0–1 marks)