TEACHING PLAN: FUNDAMENTALS OF SOIL SCIENCE

SCHOOL: SOHSS	ACADEMIC SESSION: 2023 – 2024	FOR STUDENT'S BATCH: 2023-2027

1	**Course Code**	**ASS-101**
2	**Course Title**	**FUNDAMENTALS OF SOIL SCIENCE**
3	**Credits**	**2 (1+1)**
4	**Learning Hours**	**Contact Hours: 48** **Assessment: 24** **Guided Study: 28** **Total hours: 100**
5	**Course Objective**	1. To impart knowledge to the students on the Fundamentals of Soil Science. 2. Impart skills in collecting and analyzing soils for basic physical, physico-chemical and chemical properties for using it as a medium for plant growth.
6	**Course Outcomes**	After the completion of this course the student will be able to understand the following points: 1. Understand the fundamentals and principles of Soil Science. 2. Explain how different soils are formed and how does soils act as a medium for plant growth. 3. Explain soils of India and Land use capability, soil pollution and its effect on crop and mitigation of soil pollution. 4. Analyze the soils for basic physical, physico-chemical &chemical properties.
7	**Outline Syllabus:**	

7.01	Paper Code	Unit		Reference Number	Teaching Methods
7.02	**ASS-101**	UNIT-I	a) Soil as a natural body, Pedological and Edaphological concepts of soil. b) Soil genesis: soil forming rocks and minerals. c) Weathering, processes and factors of soil formation. d) Soil Profile, components of soil.	ICAR Course PP:3-28	Lecture and ppt
		UNIT-II	a) Soil physical properties: soil-texture, structure, density and porosity, soil colour, consistence and plasticity. b) Elementary knowledge of soil taxonomy classification and soils of India. c) Soil water retention, movement and availability. d) Soil air, composition, gaseous exchange, problem and plant growth.	ICAR Course, New Delhi PP:29-53	Lecture and ppt

		UNIT-III	a) Soil temperature; source, amount and flow of heat in soil; effect on plant growth. b) Soil reaction-pH, soil acidity and alkalinity, buffering, effect of pH on nutrient availability. c) Soil colloids- inorganic and organic. d) Silicate clays: constitution and properties.	ICAR Course, New Delhi PP:54-80	Lecture and ppt
7.03	**ASS-101**	UNIT-IV	a) Sources of charge; ion exchange, cation exchange capacity, base saturation. b) Soil organic matter: composition, properties and its influence on soil properties; humic substances - nature and properties. c) Soil organisms: macro and micro organisms, their beneficial and harmful effects. d) Soil pollution - behaviour of pesticides and inorganic contaminants, prevention and mitigation of soil pollution.	ICAR Course, New Delhi PP:81-125	Lecture and ppt

8	**Course Evaluation**	
8.1	**COURSE ASSESEMENT: 30%**	
8.1.1	**Attendance**	**5 %**
8.1.2	**Homework**	**5 %**
8.1.3	**ClassTest**	**5 %**
8.1.5	**Presentation**	**5%**
8.1.6	**Any other**	**20%**
8.2	**MTE**	**10%**
8.3	**End-term examination: 50%**	
9	**Text Books & References**	
9.1	**Text book**	1. E-Course of ICAR, New Delhi
9.2	**Reference**	1. Singh, B. And Goswami, A. (2020). Fundamentals of horticulture. S.K. Jain Aman Publishing, Meerut, U.P. 2. Hui, Y.H. (2008). Handbook of fruit and vegetable processing. Wiley India Pvt. Ltd., New Delhi. 3. Sharma, S.K. (2010). Postharvest management and processing of fruits and vegetables. New India Publishing Agency, New Delhi. 4. Sharma, S.K. and Nautiyal, M.C. (2009). Postharvest technology of horticultural crops. New India Publishing Agency, New Delhi. 1. Wills, R.B.H, McGlasson, W.S, Graham, D. and Joyce, D.C. (2009). Postharvest: An introduction to the physiology and handling of fruits, vegetables and ornamentals. CABI International, Cambridge, USA.
9.3	**Video References**	Subscribe the channelhttps://www.youtube.com/channel/UCBWSYpP57pe_z9cXz25Qj7g https://youtu.be/BMIUAVhzRuc

Mapping of Outcomes v. Topics

Outcome no. → Syllabus topic↓	1	2	3	4
Paper Code.Unit I (a)	✓			
Paper Code. Unit I (b)		✓		
Paper Code. Unit I (c)		✓		
Paper Code.Unit II (a)			✓	
Paper Code. Unit II(b)	✓	✓		
Paper Code. Unit II(c)		✓		
Paper Code.Unit III (a)			✓	
Paper Code. Unit III(b)	✓			
Paper Code. Unit III(c)	✓			
Paper Code.Unit IV (a)	✓		✓	✓
Paper Code. Unit IV(b)	✓		✓	✓
Paper Code. Unit IV(c)	✓		✓	✓

QUESTION BANK

DESCREPTIVE QUESTION

1. What is the weathering in rocks formation explain about different rocks and minerals?
2. Define soil and explain about Pedagogical and edaphological concepts of soil?
3. Briefly explain about classification of soils?
4. What are the different factors affecting soil formation?
5. Explain Physical, chemical ,biological weathering and how those influence on soil formation?
6. Explain the importance of Igneous, Sedimentary and Metamorphic rocks in soil formation?
7. Explain the stepwise procedure for formation and composition of soil?

8. Give a brief note about how soil science is important in agricultural engineering? Give one example?
9. What type of weathering causes the formation of soil?
10. How can classify the soil? What are the methods we are generally used for determination of soil texture write a procedure for any one of method?
11. Define the texture, structure in soil? Briefly, explain about the soil water relationship?
12. What Is Soil Water Retention and soil water movement? how those are affected by physical properties?
13. What is gaseous exchange in soil, how it effects on the plant growth. What are the factors influence on gaseous exchange?
14. Define the fallowing soil heat, soil resistivity, heat conductance in soil?
15. How bulk density, porosity, moisture content, soil texture and structure effects on thermal properties of soil?
16. Briefly explain about the soil, plant and water relationship and list out the physical properties of soil?
17. Explain how the primary and secondary tillage influence on crop performance?
18. What is tillage? Define the primary and secondary tillage? List out the advantages and disadvantages of tillage?
19. Explain how tillage influences on soil physical properties?
20. What are the different tillage practices are there ad their advantages?
21. What is meant by ion exchange and explain their significance?
22. What are the factors influencing the ion exchange?
23. What is the buffering capacity of the soil? What affects buffering capacity? What is a good pH level for soil? How can buffer capacity be increased?
24. What is EC in soil science?? Why is soil EC important? How does EC affect plant growth?
25. How do you calculate EC? Explain the procedure for calculating EC of soil?
26. Define soil colloids and explain their significance? List out types of colloids?

27. What are the properties of soil colloids? write about origin of charge on colloids?
28. What is ion exchange in soil? Why is it important for soil to exchange ions? How we can calculate ion exchange?
29. What is base saturation in soil? What is a good CEC in soil? How can I improve soil CEC?
30. What is CEC and AEC in soil and how it is important in agricultural engineering?
31. What is meant by acid soils how it format? Write about the characteristics of acid soils?
32. What is reclamation of acid soils? write a procedure for reclamation of acid soils?
33. What is meant by saline soils how it format? Write about the characteristics of saline soils?
34. Explain about requirement for reclamation of sodic/alkali soils?
35. What is meant by reclamation of soil? when it is require in soil? at what purpose?
36. How the sodic soils are forming what are the characteristics of those soils?
37. How the Acid soils are forming what are the characteristics of those soils?
38. Write a note on nutrient availability in acid and saline soils?
39. Write a note on how the acidic soils are influences on physical properties?
40. Differentiate between the acid soils and saline soils?
41. Define Soil fertility, what are the factors influencing to increase fertility?
42. Define the nutrients? What area the nutrients-deficiency symptoms in plants?
43. What is meant by liquid fertilizer? How it is beneficiary to formers?
44. What is meant by chemical fertilizer? list out the classification of fertilizers?
45. Explain about Liquid fertilizer solubility and compatibility?
46. What is meant by bio fertilizer and liquid fertilizer? Explain their advantages?
47. Explain about organic and inorganic fertilizers?
48. Write a note on Chemical fertilizers reactions in soil with examples?
49. What are the differences between organic and Bio fertilizers? Write their advantages in the point of plant growth?
50. Explain the different types of nutrients and their classification?

PROJECTS/ASSIGNMENT (To be given to group of students)

1. Assignment
2. Field Visit
3. MOOC Courses