

- SSAC New Syllabus
- Course No: AS-SS 111
- Semester: I (New)

Title: Principles of Soil Science
Credits: 2 (1+1)

Teaching Schedule – Theory with weightages %

Lecture No.	Topics	Weightage marks
1	Nature and origin of soil, soil forming rocks, minerals and their classification and composition	05
2-3	Soil forming factors and processes, Soil classification, soil taxonomy orders and soils of Maharashtra	10
4	Soil physical properties, importance, soil particle distribution soil structure, bulk density, particle density, porosity soil consistency, soil colour, COLE value, infiltration rate, hydraulic conductivity, permeability, soil strength.	15
5	Soil inorganic colloids, properties of soil colloids, soil their composition, properties and origin of charge	06
6	Ion exchange in soil and nutrient availability	08
7-8	Soil organic matter, its composition, decomposition and their effect on soil properties	10
9	Soil reaction and its significance	05
10-11	Salt affected soil, Acid Soil and their characteristics and reclamation	10
12	Quality of irrigation water, characteristics and suitability	07
13	Essential plant nutrients and their function, Importance of soil testing	08
14	Deficiency symptoms of nutrients in crop plants.	06
15-16	Types and importance of inorganic fertilizer and their reaction in soil, types of organic manures and their composition	10
Total		100

Practical Exercises

Exercises No.	Topic
1.	Preparation of standard solutions and reagents
2.	Identification of rocks and minerals
3.	Study of soil profile
4.	Determination of bulk density, particle density and porosity of soil
5.	Determination of pH and EC of the soil
6.	Determination of soil texture
7.	Determination of water holding capacity of soil (1/3 and 15 bar)
8.	Determination of calcium carbonate and organic carbon content of soil
9.	Determination of available nitrogen and potassium from soil
10.	Determination of available phosphorus from soil
11.	Analysis of irrigation water for pH, EC, cations and anions
12.	Determination of aggregate stability by Yoders apparatus
13.	Determination of organic carbon from soil
14.	Determination of gypsum/ lime requirement of soil
15.	Determination of soil strength, COLE value, soil compaction
16.	Interpretation of soil and water analytical data

Course No. : REE 111 **Course Title : Engineering Chemistry**
Semester : I(NEW) **Credits : 2(1+1)**

Teaching Schedule

Lect No	Topics to be covered	Book No	Chapter No	Article no	Page no
1	Fuels: classification. Calorific value. Fuel –definition Classification of fuels Calorific value Characteristics of a good fuel Comparison between solid, liquid and gaseous fuels. Solid fuels: wood , coal	1	2	2.1 2.2 2.3 2.4 2.5 2.9 -2.10	73 73 74 75 75-76 81
2-3	Classification of coal by rank Peat, Lignite , Bituminous, Anthracite Analysis of coal Solved ProblemNo.9 Unsolved problems No. 24 &25 Gross and Net calorific Value	1	2	2.11 2.13 2.6 2.6	81-82 84-86 118-119 131 78-80

	Determination of CV by Bomb Calorimeter Theoretical calculations of CV of a fuel Solved problems No. 1-5 Un-solved Problems No.1,3,4,7,22,23			2.8	76-79 80 128 128-130
4	Liquid fuels Petroleum Classification of Petroleum Origin of Petroleum(modern theory only) Refining of crude oil Cracking-thermal cracking.	1	2	2.18 2.18	91 91 92 92 93-95
5-6	Gaseous fuel(Definition, composition and uses only) Natural gas Coal gas Oil gas Producer gas Water gas Bio gas Determination of CV of gas by Junkers gas Calorimeter Flue gas analysis by Orsat's apparatus	1	2	2.28 2.28 2.29 2.30 2.31 2.32 2.33 2.36	106 106 106 107 108 109 110 113 113-115

7-9	Corrosion: causes, types and method of prevention. Introduction: Definition Gravity of corrosion problems Dry or chemical corrosion (Definition only) Wet or electrochemical corrosion Galvanic corrosion Concentration cell corrosion Passivity	1	6	6.1 6.2 6.3 6.5 6.6 6.7	351 351-352 352 353 357 358 360
10-11	Underground or soil corrosion Pitting corrosion Inter granular corrosion Waterline corrosion Stress corrosion Microbiological corrosion	1	6	6.8 6.9 6.10 6.11 6.12 6.13	360 361 361 362 363 364

	Erosion corrosion Corrosion control(protection against corrosion) methods in short			6.14 6.17	365 369- 374
12	Water: temporary and permanent hardness. disadvantages of hard water, scale and sludge formation in boilers, boiler corrosion. Hardness of water: temporary & permanent Disadvantages of hard water	1	1	1.5 1.6	4-5 5
	Scale and sludge formation in boilers Disadvantages of sludge formation Disadvantages of scale formation Boiler corrosion			1.7 1.7 1.7 1.9	6 6 7 10-11
13- 14	Lubricants: properties. mechanism. classification and tests. Lubricants Functions of lubricants Mechanism of lubrication Classification of lubricants Lubricating oils	1	18	18.2 18.3 18.4 18.5	721 721 721- 723 723 723
15- 16	Greases or semi –solid lubricants Solid lubricants Properties of lubricating oils Viscosity, Viscosity Index , Flash & Fire point, Oiliness Cloud and pour point, Emulsion, Volatility, Carbon residue etc. Solved examples(1,2 &3) Unsolved examples(1,2&3)	1	18	18.6 18.7 18.10 18.10	726 727 729- 733 733- 737 741 742

Practical Exercise:

- 1) Determination of viscosity of oil:

- 2) Estimation of alkalinity of water sample:
- 3) Determination of carbonate and non- carbonate hardness by soda reagent:
- 4) Determination of coagulation of water and chloride ion content:
- 5) Determination of specific rotation of an optically active compound:
- 6) Determination of X_{max} and verification of Beer Lambert Law:
- 7) Determination of calorific value of gaseous fuel:
- 8) Determination of various properties of water: Hardness/TDS,Na,Cl.MgCO₃,Ph
- 9) Ultimate analysis of selected biomass
- 10) Proximate analysis of selected biomass
- 11) Determination of Fire point and Flash point of liquid fuel

12)

13) Teaching Schedule – Theory with weightages %

Lecture No.	Topic to be covered	Weightages (%)
1-2	Scope of agronomy in relation to agricultural engineering. Classification of crops	09
3-4	Effect of different weather parameters on crop growth and development.	06
5-6	Principles of tillage, tilth and its characteristics.	06
7-10	Crop seasons. Methods, time and depth of sowing of major field crops (Cereals: paddy, sorghum, maize, pearl millet, wheat, Pulses: green gram, black gram, pigeonpea, chickpea Oilseeds: groundnut, soybean, sunflower, safflower Cash crop: cotton, sugarcane).	48
11-12	Methods and time of application of manures and fertilizers.	09
13-14	Organic farming; principle, concept.	13
15-16	Sustainable agriculture; definition, principle, concept, components.	09
Total		100

14)

15) Practical Exercises

Ex. No.	Topic
1	Identification of crops plant and seed at different growth stages
2	Identification of important varieties of cereal and pulses crops
3	Identification of important varieties of oil seeds and cash crops

4	Study of manures, fertilizers and Fertilizer application methods
5	Practices of fertilizer application to different field crops
6	Calculations of plant population, seed rate and fertilizers doses.
7	Identification of weeds; Different weed control methods; calculation doses of different herbicides.
8	Study of primary tillage implements,.
9	Study of Practice of ploughing
10	Study of puddling implements and practices of puddling in rice
11	Study of different methods of sowing of field crops.
12	Study of different inter cultural implements and working with them.
13	Practice of interculture operation in different field crops
14	Signs of maturity of important field crops
15	Harvesting and threshing of cereals, pulses, oil seeds and cash crops.

16)

17)

18) Course No. : (SSAC -122)

Course Title :Soil, Water and Plant

Analysis

19) Credit : 1+1=2

Semester : II(NEW)

20)

21)

22) Teaching Schedule- Theory with weightages (%):

Lecture No.	Topic	Weightage%
1 & 2	Importance and objectives of soil, water and plant analysis Principles of instrumentation in soil, water and plant analysis	10
3	Methods of soil, water and plant sampling and processing for analysis	7.5
4	Nutrient mobility, diffusion and mass flow	7.5
5	Renewal of gases in soil and their abundance	5
6	Principles and methods of measurement of oxygen diffusion rate and redox potential	7.5
7 & 8	Radio tracer technology application in plant nutrient studies and fertility evaluation	10
9	Soil micro-organisms and their importance	5
10	Saline and alkali appraisal and management	5
11	Acid soil appraisal and management	5
12	Waterlogged soil appraisal and management	5
13	Sandy soil appraisal and management	5
14	Chemical and mineral composition of horticultural crops	7.5

15	Leaf analysis standards , index tissue, interpretation of leaf analysis values Rapid tissue test for plant	10
16	Management of poor quality irrigation water in crop management Soil pollution and water pollution	10

23)

24) **Practical Exercises:**

Exercise No.	Title
1	Collection and preparation of soil, water and plant samples for analysis
2	Preparation of standard solutions
3	Determination of pH and EC of soil
4	Determination of SAR and ESP of soil
5	Estimation of moisture content in soils and plants
6	Determination of available nitrogen in soil
7	Determination of available phosphorus in soil
8	Determination of available potassium in soil
8	Determination of DTPA extractable micronutrients in soil
10	Determination of boron
11	Determination of pH and EC in irrigation water samples
12	Determination of Carbonates , bicarbonates sulphates and chlorides in irrigation water
13	Determination of calcium, magnesium , sodium , potassium and Boron in irrigation water
14	Determination of NPK calcium , magnesium and sulphur in plant sample
15	Determination of micronutrients in plant sample
16	Preparation of plant nutrient deficiency symptoms album

25)

26) **OLD SYLLABUS**

27) **Course no: AG-124**

Title: Soil Science

28) **Sem: II (OLD)**

Credit: 2 (1+1)

29) **Theory:**

30) Definition of Soil. Rocks and minerals Soil formation, and classification. Soil survey methods. Land use capability and mapping. Major soil types of India, soil texture, classification of soil partials and their properties, bulk density, particle density and porosity, soil structure, types of soil structure and management farms of soil water, retention and movement, saturated and unsaturated flow, soil moisture constants. Soil temperature and soil air. Soil colloids, cation and anion exchange in soils, soil reactions and buffering capacity. Soil humus and its formation, C:N ratio. Acid, Saline and alkali

soils and their reclamation. Significance of macro and micro nutrients Soil and Water testing. Important fertilizer and fertilizer recommendations.

31) Practicals

32) Study of soil profiles. Identification of different soil types. Mechanical analysis of soil. Determination of bulk density and particle density of soil. Determination of cation exchange capacity of soil. Chemical analysis of soil i.e. EC. pH. ESP. Determination of soil moisture constants. Determination of NPK in the soils Analysis of irrigation water for SAR, EC, carbonate and bicarbonate Determination of soil organic matter. Determination of liquid and plastic limits. Determination of gypsum requirement of soil., Interpretation of soil and water test data.

33)

Title: Engineering Chemistry	Semester: I (OLD)
Course No: EOES 111	Credits: 2(1+1)

34)

35) Theory:

36) Phase rule and its application to one and two component systems. Fuels: classification, calorific value. Colloids: classification, properties. Corrosion: Definition of all type of causes corrosion, types and method of prevention. Corrosion control, Water: temporary and permanent hardness, disadvantages of hard water, scale and sludge formation in boilers, boiler corrosion. Lubricants: properties, mechanism, classification and tests. Polymers. Types of polymerization, properties, uses and methods for the determination of molecular weight of polymers.

37)

38)

39) Practicals:

40) Determination of temporary and permanent hardness of water by EDTA method, Estimation of chloride in water ,Estimation of dissolved oxygen in water , Determination of BOD in water sample ,Determination of COD in water sample ; Estimation of available chlorine in bleaching powder, Determination of viscosity of oil, Estimation of alkalinity of water sample, Determination of calorific value of solid fuel, Determination of calorific value of gaseous fuel.

