

“ Education through self-help is our motto.”- Karmaveer
Rayat Shikshan Sanstha's

Sadguru Gadage Maharaj College, Karad
Accrediated By NAAC with 'A+' Grade

Department of Chemistry
Dual Programme

Final Syllabus

Career Oriented Course – Soil and Water Analysis

First Year – Certificate Course in Soil and Water Analysis

Second Year – Diploma in Soil and Water Analysis

Third Year – Advanced Diploma in Soil and Water Analysis

(Syllabus to be implemented from June, 2019 onwards.)

Rayat Shikshan Sanstha's
Sadguru Gadage Maharaj College, Karad
Department of Chemistry
Certificate Course in Soil and Water Analysis

Structure of the Course

Duration of the course - One Year

Eligibility for admission - XIIth Std. Pass

Medium of course - English

Examination - The theory and practical examination will be held in the month of March/April .

Total Marks - 100

Sr.No.	Paper	Marks
1	Paper I (Theory)	50
2	Paper II practical/work experience/field work	50
	Total =	100

Details regarding practical Exam.

- | | |
|-------------------------------|------------------|
| 1) Practical | 30 marks |
| 2) Work experience/field work | 15 marks |
| 3) Journal | <u>05 marks</u> |
| | Total = 50 marks |

The nature theory Question Paper will be as follows:

- | | |
|--|------------------|
| Q.1 Multiple choice 10 items | 20 marks |
| Q.2 Essay type Question with internal option | 20 marks |
| Q.4 Short notes (any two out of four) | <u>10 marks</u> |
| | Total = 50 marks |

Standard of Passing -

The student will have to obtain at least 35% marks for passing .

Award of Certificate -

A certificate will be issued to the student on successful completion of the course.

Rayat Shikshan Sanstha's
Sadguru Gadage Maharaj College, Karad
Department of Chemistry
Certificate Course in Soil and Water Analysis

Syllabus

Paper I (Theory) Marks :50

Unit –I Study of Water (15)

- a. Hydrosphere- Water resources.
- b. Properties of water- color, odor, turbidity, total salt content, total suspended water.
- c. Water pollution- Definition of water pollution, types of water pollutants ,sources of water pollutants, trace element in water, water quality parameters and standards
- d. Purification of water- Treatment of domestic and industrial water.

Unit –II Study of Soil (15)

- a. The structure of earth, Elemental composition of earth crust, Definition of soil.
- b. Nature and classification of soil, important soil forming minerals, soil as eco system. soil fertility and productivity
- c. Properties of soil – Colour, temperature, pH, electrical conductance (EC), water holding capacity, organic carbon, soil salinity, soil density.
- d. Soil erosion- Definition, Control of erosion, Soil conservation practices, Soil pollution causes and remedies.

Paper II (practical/work experience/field work) Marks :50

1. Collection of water samples (Field work)
2. Determination of total hardness of water
3. Determination of alkalinity of water
4. Determination of pH of water
5. Determination of conductivity of water
6. Determination of TDS in water
7. Collection of soil samples from fields and study of soil sampling tools. (Field work)
8. Soil sample preparation
9. Determination of maximum water holding capacity of soil
10. Determination of bulk density of soil
11. Determination of pH of soil
12. Determination of conductivity of soil

References –

1. Laboratory Manual of Water and Wastewater Analysis, D.R. Khanna, R. Bhutiani, Daya Publishing House, Delhi, 2008
2. Chemical and Biological Methods for Water Pollution Studies, R.K. Trivedy, P.K.Goel, Oriental Printing Press, Aligarh, 1986
3. Practical Methods in Ecology and Environmental Science, R.K.Trivedy, P.K.Goel, C.L.Trishal, Environmental Publications, Karad (India) 1987
4. Analytical Chemistry-Alka Gupta (PragatiPrakashan)
5. Soil chemicals Analysis - P.R. Hesse
6. Soil testing manual by department of agriculture and cooperation, India

Rayat Shikshan Sanstha's
Sadguru Gadage Maharaj College, Karad
Department of Chemistry
Diploma in Soil and Water Analysis

Structure of the Course

Duration of the course - One Year

Eligibility for admission - Students who completed Certificate course in
Soil and Water Analysis

Medium of course - English

Examination - The theory and practical examination will be held in the month of March/April .

Total Marks – 100

Sr.No.	Paper	Marks
1	Paper III (Theory)	50
2	Paper IV practical/ Laboratory Visit	50
	Total =	100

Details regarding practical Exam.

- | | |
|----------------------------|-----------------|
| 1) Practical | 30 marks |
| 2) Laboratory Visit Report | 15 marks |
| 3) Journal | <u>05 marks</u> |
| Total = 50 marks | |

The nature theory Question Paper will be as follows:

- | | |
|--|-----------------|
| Q.1 Multiple choice 10 items | 20 marks |
| Q.2 Essay type Question with internal option | 20 marks |
| Q.4 Short notes (any two out of four) | <u>10 marks</u> |
| Total = 50 marks | |

Standard of Passing –

The student will have to obtain at least 35% marks for passing .

Award of Certificate –

A certificate will be issued to the student on successful completion of the course

Sadguru Gadage Maharaj College, Karad
Department of Chemistry
Diploma in Soil and Water Analysis

Syllabus

Paper III (Theory) Marks :50

Unit –I Chemistry of Water (15)

- a. Water Quality Parameters and Standards- Quality of drinking water, Quality of irrigation water, COD, BOD,
- b. Water Microbiology - TOC E-coli and total bacteria.
- c. Sewage analysis

Unit –II Chemistry of Soil (15)

- a. Soil health - Concept of nutrients, Micro and macro nutrients and it's relation to Plant health and productivity.
- b. Soil moisture- Maximum water holding capacity, field capacity, wetting point, available water capacity, soil water movement under saturated and unsaturated condition.
- c. Problematic soils- Types of problematic soils, Classification, Management of problematic soils and reclamation of problematic soils, saline soils-Alkaline soils, acid soils and water logged soils.

Paper IV (practical/ Laboratory Visit) Marks :50

1. Collection of water samples
2. Determination of salinity of water
3. Determination of Dissolved Oxygen (DO) in water
4. Determination of BOD of water
5. Determination of COD of water
6. Collection of soil samples and sample preparation
7. Determination of moisture content in soil
8. Determination of Organic Carbon in soil
9. Determination of sulphate contents in soil
10. Determination of total plate count in soil
11. Determination of chloride contents in soil
12. Determination of Gypsum requirement of soil
13. Laboratory Visit

References –

1. Laboratory Manual of Water and Wastewater Analysis, D.R. Khanna, R. Bhutiani, Daya Publishing House, Delhi, 2008
2. Chemical and Biological Methods for Water Pollution Studies, R.K. Trivedy, P.K.Goel, Oriental Printing Press, Aligarh, 1986
3. Practical Methods in Ecology and Environmental Science, R.K.Trivedy, P.K.Goel, C.L.Trishal, Environmental Publications, Karad (India) 1987
4. Practical Manual on Soil Physics– A method manual, Kadam, J. R., Shinde P. B., 2005, Department of Agricultural Chemistry and Soil Science
5. Soil testing manual by department of agriculture and cooperation, India

Rayat Shikshan Sanstha's
Sadguru Gadage Maharaj College, Karad
Department of Chemistry
Advanced Diploma in Soil and Water Analysis

Structure of the Course

Duration of the course - One Year

Eligibility for admission - Students who completed Diploma course in
Soil and Water Analysis

Medium of course - English

Examination - The theory and practical examination will be held in the month of March/April .

Total Marks – 100

Sr.No.	Paper	Marks
1	Paper V (Theory)	50
2	Paper VI practical/ Project	50
	Total =	100

Details regarding practical Exam.

1) Practical	25 marks
2) Project Report	15 marks
3) Oral	05 marks
4) Journal	<u>05 marks</u>
	Total = 50 marks

The nature theory Question Paper will be as follows:

Q.1 Multiple choice 10 items	20 marks
Q.2 Essay type Question with internal option	20 marks
Q.4 Short notes (any two out of four)	<u>10 marks</u>
	Total = 50 marks

Standard of Passing –

The student will have to obtain at least 35% marks for passing .

Award of Certificate –

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Advanced Diploma in Soil and Water Analysis

Syllabus

Paper V (Theory) Marks :50

Unit –I Study of Analytical Processes (15)

- a. Analytical processes, methods of analysis
- b. Errors, types of errors (determinate and indeterminate), methods of expressing accuracy (Absolute and relative error)
- c. Significant figures, mean, median, standard deviation , Numerical problems

Unit –II General Instrumentation in Soil and Water analysis (15)

- a. Kjeldahl's method for estimation of nitrogen.
- b. Flame photometer, UV-Visible Spectrophotometer, Atomic Absorption Spectrophotometer
- principle, Instrumentation and applications.

Paper VI (practical/Project work) Marks :50

1. Collection of water samples
2. Determination of phosphorous in water by spectrophotometer
3. Determination of Na, K, in water by Flame photometer
4. Collection of soil samples and sample preparation
5. Determination of Nitrogen by Kjeldahl's method
6. Determination of phosphorous in soil by spectrophotometer
7. Determination of Na, K in soil by Flame photometer
8. Determination of zn, Cu, Fe and Mn in soil by Atomic Absorption Spectrophotometer
9. Project work

References –

1. Laboratory Manual of Water and Wastewater Analysis, D.R. Khanna, R. Bhutiani, Daya Publishing House, Delhi, 2008
2. Chemical and Biological Methods for Water Pollution Studies, R.K. Trivedy, P.K.Goel, Oriental Printing Press, Aligarh, 1986
3. Practical Methods in Ecology and Environmental Science, R.K.Trivedy, P.K.Goel, C.L.Trishal, Environmental Publications, Karad (India) 1987
4. Practical Manual on Soil Physics– A method manual, Kadam, J. R., Shinde P. B., 2005, Department of Agricultural Chemistry and Soil Science
5. Soil testing manual by department of agriculture and cooperation, India