

PG. DIPLOMA IN WATER AND WASTEWATER TREATMENT TECHNOLOGY

ELIGIBILITY- B.Sc chemistry/biology/MPC/ITI civil/Mechanical/M.Sc

(1Year Course)

9months teaching course work

3 months Field work-Report

Exam 3 hours-100 marks (70+30)

For admission in 2016-2017

Fee Rs. 10,000

Intake-30

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After successful completion the candidates will be placed in wider social economic and environmental arena of urbanization and municipal water and waste water boards. The training aims at employability in the water and sewage treatment plants as supervisors and managers. The training aims at providing opportunity to clean municipal water and maintain waste water treatment plants.

OPPORTUNITIES: Municipalities, sewage treatment plants, Industrial waste water treatment units, rural water supply boards, and metropolitan sewage plants. Urbanization and development in infrastructure has lead to establishment of water and waste water treatment units but the educational institutions are not training the students specifically to manage and supervise the maintenance of the plants

Paper Code	Title of the Paper	No of hrs/week	Core/ Elective	External marks	Internal marks	No. of Credits
SEMESTER I						
I	GENERAL INTRODUCTION TO WATER AND SEWAGE	3	Core	70	30	5
II	WATER RESOURCES AND TREATMENT	3	Core	70	30	5
SEMESTER II						
III	SEWAGE TREATMENT PLANTS AND DISPOSAL	4	Core	70	30	5
	----- Field work-	2				2
IV	Project work			125	25	15
	Project Seminar			25	--	2
	Project Viva voce			25	--	2
Practical's						
	Water analyses	4	Core	30	20	4
	Designing drinking water and STP treatment plants	4	Core	30	20	4
	TOTAL	20		500 marks		44

COURSE STRUCTURE AND SYLLABUS

PAPER I - GENERAL INTRODUCTION TO WATER AND SEWAGE

Module I

- 1.1 Water and water formation, Importance of water, water requirements (Domestic, Institutional, Industrial, Public and Agriculture).
- 1.2 Water availability, water quantification, Water supply scheme: Importance & necessity of water supply scheme.
- 1.3 Types of water demands: (Domestic Water Demand, Industrial Demand, Institution and Commercial Demand, Water demand for Public Use and percapita demand). Population Studies, Population Forecasting Studies.
- 1.4 Factors affecting per capita demand (Habit of inhabitants, Public services, Climate, System of supply, Metering of water supply, System of drainage, Industrialization).

Module II

- 2.1 Water and water quality standards:, Desirable limits, Permissible limit, PPM, PPB.
- 2.2 Drinking Water Specifications: Physical parameters (Color, taste-odor, Turbidity, suspended solids, Temperature
- 2.3 Chemical parameters (TDS Alkalinity, Hardness, salts, acids and alkalis, chlorides, fluorides, proteins, carbohydrates, organics, fats oil & grease, Hazen units, NTU,BOD, COD, DO, TDS, Trace metals, Heavy metals, tests on quality parameters

Module III

- 3.1 Drinking Water Standards of BIS, International water quality standards, BIS (Bureau of Indian Standards)
- 3.2 Safe limits for Electrical Conductivity for Irrigation Water,
- 3.3 Guidelines for Evaluation of Quality of Irrigation Water, Effects of water quality parameters of water being used in industries

Module IV

- 4.1 Introduction of sewage-Systems of sewerage, Physical and chemical characteristics of sewage, Sewer materials, Importance of sewage,
- 4.2 Generation of sewage, Sanitary works: Definitions, sanitary works, Types of sanitary systems, septic tanks, community systems, objectives of sewage disposal,
- 4.3 Methods of collection, conservancy systems, collection system, water carriage system, sewerage system.

Module V

- 5.1 Quality and Analysis of Water: Characteristics of water – Physical, Chemical and Biological,
- 5.2 Kinds of Microorganisms, Pathogenic microbes, indicator microbes, enumeration of microbes, Coliform bacteria as indicator organisms, Tests for the coliform group (MPN Method).
- 5.3 Water borne diseases, Importance of public health perspectives, socioeconomic impacts, Types of waterborne diseases (Protozoan, Algal, Fungal, Bacterial, and Viral diseases), prophylactic measures.

PAPER II – WATER RESOURCES AND TREATMENT

Module I

- 1.1 Hydrological Concepts: Hydrological Cycle,
- 1.2 Types of Precipitation, Measurement of Rainfall. Surface sources of water: Lakes, Rivers,
- 1.3 Impounding Reservoirs, Capacity of storage reservoirs, Mass curve analysis. Groundwater sources of water: Types of water bearing formations, Springs, Wells and Infiltration galleries, Yields from wells and infiltration galleries

Module II

- 2.1 Pumps and Pumping stations: Need of pumping,
- 2.2 Classification of pumps, different type of pumps used in water supply,
- 2.3 Power of pumping, total lift of pump, H.P. of pump, location of pumping station, site selection.

Module III

- 1.1 Collection and conveyance of Water: Factors governing the selection of the intake structure, Types of Intakes.
- 1.2 Conveyance of Water: Gravity and Pressure conduits,
- 1.3 Types of Pipes, Pipe Materials, Pipe joints, Design aspects of pipe lines, Laying of pipe lines, hydrostatic test.

Module IV

- 4.1 Distribution system: Distribution of Water: Type of distribution system,
- 4.2 Methods of Distribution system, Components of Distribution system, different layout of distribution system, methods of supplying water, pressures in distribution system, distribution resources and its capacity, type of reservoirs & accessories,
- 4.3 Design of distribution system, design of pipelines and analysis of complex pipe networks, Analysis of Distribution networks, Water connection to the houses.

Module V

- 5.1 Treatment of Water: Flowchart of water treatment plant, Treatment methods (Theory and Design)-
- 5.2 Physico-Chemical treatments: Sedimentation, Coagulation-Flocculation, Settling Tanks, Disinfection Systems: Chemicals- Chlorination and other Disinfection methods, UV, Ozonation, Aeration and Gas transfer; Precipitation;
- 5.3 Softening; Adsorption and Ion exchange; Reverse Osmosis Technologies Membrane processes, Ultra Filtration,

PAPER III- SEWAGE TREATMENT PLANTS AND DISPOSAL

Module I

- 1.1 Domestic Wastewater Treatment,
- 1.2 Wastewater characteristics; Primary, secondary and tertiary treatment;
- 1.3 Physical Unit Processes: Screening; Commutation; Grit Removal; Equalization; Sedimentation;

Module II

- 2.1 Introduction to Microbiology: Microbial ecology and Growth kinetics; Types of microorganisms; aerobic vs. anaerobic processes
- 2.2 Biological Unit Processes: Aerobic treatment; Suspended growth aerobic treatment processes; Activated sludge process and its modifications; Attached growth aerobic processes; Tricking filters and Rotating biological contactors;
- 2.3 Anaerobic treatment; suspended growth, attached growth, fluidized bed and sludge blanket systems; nitrification, denitrification; Phosphorus removal

Module III

- 3.1 Sludge Treatment: The quantity and characteristics of sewage sludge,
- 3.2 Sludge thickening, sludge digestion, dewatering, drying, Aerobic sludge stabilization,
- 3.3 Anaerobic stabilization of sludge and Composting

Module IV

- 4.1 Natural Wastewater Treatment Systems: Ponds and Lagoons;
- 4.2 Wetlands and Root-zone systems, Surface and Ground Water Treatment for Potable Water Supply,
- 4.3 Water Characteristics; Sequencing of unit operations and processes;

Module V:

- 5.1 Water Treatment Plant Characteristics, Plant layout; Operations and maintenance of Treatment plants, Trouble Shooting,
- 5.2 Filtration, Softening of Water, Defluoridation, Removal of Odors,
- 5.3 Treated Municipal Wastewater Discharge Systems, Post treatment techniques, recycled water for green belts, Groundwater Quality Protection

PRACTICAL COURSE-I

1. Study of laboratory equipments and instruments.
2. Study of compound microscope.
3. Cleaning and sterilization of glass wares.
4. Determination of physical parameters of waste water
 - I. Temperature
 - II. Colour
 - III. Odour
 - IV. pH
5. Determination of total solids , volatile solids and fixed solids of waste water
6. Determination of nitrogen from waste water
7. Determination of phosphorus from wastewater
8. Determination of E.C. of wastewater
9. Determination of turbidity of wastewater
10. Determination of chlorides of wastewater

PRACTICAL COURSE-II

1. Determination of alkalinity of waste water
2. Determination of dissolved oxygen from waste.
3. Determination of biological oxygen demand (BOD) of wastewater
4. Determination of chemical oxygen demand (COD) of wastewater
5. Determination of oil and grease from wastewater
6. Preparation of microbial culture media and its sterilization.
7. Techniques of microbial culture cultivation
8. Determination of fecal contamination of water- qualitative and quantitative Estimation.
9. Determination of SPC of different wastes.
10. Determination of quality of lime
11. Determination of flow rate.

FIELD VISITS:

1. Visit to Composting sites.
2. Visit to sewage treatment plants.
3. Visit to STP/ STP Unis
4. Visit to WTP/WTP units
5. Visit to AP Pollution control board

1. Environmental Engineering – Peavy, Rowe, Tchenobolus
2. Elements of Environmental Engineering – K.N. Duggal
3. Water Supply and Sanitary Engineering – G.S.Birdie and J.S.Birdie
4. Water Supply Engineering – Dr. P.N.Modi
5. Water Supply and Wastewater Engineering – Dr. B.S.N.Raju
6. Water Supply Engineering – B.C. Punmia
7. Water Supply Engineering – Hussain
8. Water Supply Engineering – Chatterjee
9. Environmental Biotechnology- T Srinivas (New Age Publications)

1. APHA (American Public Health Association) Handbook, 1998
2. Soil, Plant and Water Analysis - P. C. Jaiswal
3. Chemical and Biological Analysis of Water - Dr. R. K. Trivedy and P. K. Goel.
4. Practical Biochemistry - J. Jayaraman

