GUJARAT TECHNOLOGICAL UNIVERSITY

DIPLOMA IN ENVIRONMENTAL ENGINEERING

Semester – V

Subject Code : **2351301**

Subject Name : **Estimating & Costing of Environmental Structures**

Sr. No.	Subject Content	Hrs.
1.	**Introduction:** 1.1 Introduction of drawings of various Environmental engineering structures 1.2 Recall methods of taking out quantities (i) Centerline method (ii) Long wall and short wall method 1.3 Standard format of measurement sheet, abstract sheet and its use.13	
2.	**Detailed Estimate:** 2.1 Grit chamber 2.2 Primary settling tank 2.3 Sludge drying be 2.4 Aeration tank 2.5 Septic Tank with soak pit 2.6 Chimney 2.7 Surface Drain 2.8 Sewer Line	
3	**Tender:** 3.1 Types of Tender 3.2 Security of tenders 3.3 Procedure for acceptance of tender. 3.4 Tender notice and contract agreement 3.5 Powers of accepting tenders 3.6 various types of bills 3.6.1 Running bill 3.4.2 Final bill 3.6.3 First and final bill.	
4	**Contract:** 4.1 Advantages & disadvantages of carrying-out works by department & on contract. 4.2Factors governing the selection of work to be done under contract or on departmental work basis. 4.3 Types of contract, 4.4 Conditions of contract 4.5 Termination of contract 4.6 Define, Tender, Earnest Money, Security Deposits	

5	**Rate Analysis :** 5.1Rate analysis of important items e.g. Canal, Stone masonry, Acid resisting tile flooring, Sewer pipe line (effluent pipe line). 5.2 Special item related to environment structures.	
6	**Valuation:** 6.1 Define terms: Cost, Price, Value, Real estate, Personal estate. 6.2 Objects of valuation. 6.3 Mortgage, freehold property, leasehold property. 6.4 Property income, gross income, net income, outgoing. 6.5 Depreciation and obsolescence. 6.6 Types of Value 6.7 Factors affecting the value of a property. 6.8 Characteristics of good valuer. 6.9 Sinking fund : its computation and application. 6.10 Valuation methods for property. 6.11 Installments for repayment of loan.	
	Total	

Term Work:

1. Detailed estimate of Septic Tank with soak pit
2. Detailed estimate of Grit chamber
3. Detailed estimate of Primary settling tank
4. Detailed estimate of Sludge drying bed
5. Detailed estimate of Aeration tank
6. Detailed estimate of Surface Drain
7. Detailed estimate of Chimney
8. Detailed estimate of Sewer Line
9. Tutorial based on Tender
10. Tutorial based on Contract
11. Rate Analysis
12. Problems on Valuation

Note:
Use Computer Software for Rate analysis and Valuation examples.

Reference Books:

1. Estimating & Costing in Civil Engg. - Theory and practice, B. N. Datta.
2. I.S. code. 1200 (Part I to XXX), B.I.S., Delhi.
3. Estimating & Costing, S. C. Rangwala.
4. Estimating & Costing, G.S.Birdie.
5. Estimating & Costing, N. A. Shah.
6. Theory & Practice of Valuation, Roshan H. Namavati.
7. Valuation of Real properties, S. C. Rangwala.
8. Estimating & Costing, M. C. Chakraborthy.
9. Estimating & Costing, Vazirani & Chandola.
10. Civil Estimating, Costing &Valuation, Amarjit Aggarwal, A K Upadhyay.

GUJARAT TECHNOLOGICAL UNIVERSITY

DIPLOMA IN ENVIRONMENTAL ENGINEERING
Semester – V

Subject Code **: 2351302**
Subject Name **: Physico Chemical Treatment of Water & Waste Water**

Sr. No.	Subject Content	Hrs.
1.	**Quality of Water & Wastewater:** 1.1 Quality of water and wastewater 1.2 Wholesome water 1.3 Impurity of water 1.4 Characteristics of water 1.5 Examination of water 1.6 Standards of potable water quality 1.7 Characteristics of sewage 1.8 Examination of sewage 1.9 Standards of quality of treated water and wastewater	
2.	**Quantity of Water & Waste Water:** 2.1 Quantity of water and waste water 2.2 Waste water and gas flow 2.3 Water requirement for domestic and industrial purposes 2.4 Waste water formation and estimation 2.5 Spectrum of particulate size distribution 2.6 Variation of flows	
3.	**Screening and Skimming:** 3.1 Purpose of screenings 3.2 Flow equalization 3.3 Types of bar racks and screens 3.4 Disposal of screenings 3.5 Removal of oil, grease etc. 3.6 Floatation 3.7 Skimming tank 3.8 Disposal of skimming	
4.	**Contract:** SEDIMENTATION 4.1 Introduction 4.2 Principles of Sedimentation and Stokes' law applied to fluids 4.3 Characteristics of the settleable solids 4.4 Classification of sedimentation tanks for water and waste water 4.5 Factors influencing sedimentation 4.6 Deciding size of sedimentation tank for water and wastewater 4.7 Standard design loading 4.8 Detention period 4.9 Coagulation – Purpose, Principle	

	4.10 Types of coagulants and its suitability 4.11Determination of optimum coagulation dose. 4.12 Feeding of Coagulant and feeding devices 4.13 Flocculation and flocculation tanks and design criteria of Flocculator 4.14 Clarifiers, its types and design criteria. 4.15 Settling efficiency of particles 4.16 Grit removal	
5.	**Filtration:** 5.1 Theory of filtration 5.2 Mechanism for particle size 5.3 Hydraulics of filters 5.4 Types of filters and their flow direction 5.5 Filter clogging 5.6 Filter washing 5.7 Break through 5.8 Deciding size of filter unit 5.9 Advances in filtration	
6.	**Softening:** 6.1 Chemical precipitation 6.2 Water and wastewater softening 6.3 Estimation of dose of chemical 6.4 Methods of softening - Lime-soda method, Ion-exchange method etc.	
7.	**Desalination:** 7.1 Methods of removal of dissolved solids 7.2 Solar distillation gadgets and plants, Direct freezing, Reverse Osmosis, Electrolysis	
8.	**Disinfection:** 8.1 Introduction 8.2 Methods of disinfection 8.3 Chlorination – Chlorine dose, Chlorine demand, Application of chlorine 8.4 Use of various forms of chlorine, Break through chlorination 8.5 Removal of colour	
9.	**Sludge Dewatering and Disposal:** 9.1 Sources of sludge 9.2 Estimation of bulk density of sludge 9.3 Estimation of rate of filtration 9.4 Principles of dewatering 9.5 Methods of dewatering and suitability 9.6 Thickening of sludge 9.7 Chemical conditioning 9.8 Elutriation of sludge 9.9 Vacuum and pressure filtration 9.10 Sludge lagging	
	Total	

Laboratory Experiences / Tutorials:

1. Quality of Water & Wastewater - Demonstration of various tests related with physical properties of water and wastewater.
2. Quantity of Water & Wastewater - Tutorials based on estimation of quantity of water and waste water.
3. Screening And Skimming Study of different types of screens, their sketches and tutorials based on design.
4. Tutorial on Sedimentation.
5. Filtration Study of various types of filters for water and wastewater. Tutorial based on design of filters.
6. Softening Study of various methods of water softening.
7. Desalination Study of process of desalination.
8. Disinfection Study of various method of disinfections of water and wastewater.
9. Sludge Dewatering And Disposal - Tutorials based on estimation of generation of sludge and study of method of sludge disposal.

Note:
Arrange Technical Site Visit and prepare report Reference Books.

Reference Books:

1. Text book of Water supply and Sanitary Engg., S K Hussain.
2. Water Supply and Sanitary Engg.,G S Birdi.
3. A text book of Water Supply, V N Gharpure.
4. A text book of Sanitary Engg, V N Gharpure.
5. Water supply and Sanitary Engg.,Vazirani and Chandola.
6. Wastewater Engineering, Treatment, Disposal, Reuse Metcalf and Eddy.
7. Water supply and Sewerage, E W Steel and Terence J McGhee.

GUJARAT TECHNOLOGICAL UNIVERSITY

DIPLOMA IN ENVIRONMENTAL ENGINEERING

Semester – V

Subject Code **: 2351303**
Subject Name **: Industrial Water Pollution**

Sr. No.	Subject Content	Hrs.
1.	**Relevant Indian Standards for Discharge of Wastewater in to Various Sinks:** 1.1 Criteria and standards. 1.2 Effluent standards and stream standards. 1.3 Standards for discharge of wastewater in to river, sea, for irrigation & important considerations for it, etc. a. Cost of pollution control.	
2.	**Quality and Quantity of Waters for Industries:** 2.1 Quality of water for boiler feed, cooling water system, different manufacturing processes.	
3.	**Principles of Water Pollution Control:** 3.1 Reduction of strength and volume 3.2 Neutralization and Equalization	
4.	**Removal of Heavy Metals and Radioactive Materials:** Introduction and methods	
5.	**Major Industrial Wastes:** Manufacturing process, Sources of wastewater from process, Characteristics of wastewater of each stream and Treatment of wastewater for following industries: • Textile Industry • Dairy Industry • Pharmaceutical Industry • Chemical Industry – Dye &Dye intermediates • Food- processing Industry • Fertilizer Industry • Sugar industries • Petrochemical industries	
	Total	

Laboratory Experiences:

1. Tutorials based on wastewater discharge into various sinks
2. Tutorials based on Quality and quantity of waters. for different industries
3. Tutorials based on principles of Water Pollution Control
4. Tutorials based on different Industrial waste like, Pharmaceutical industry, Dairy industry with their sources & treatment.
5. Industrial visit - Dairy industry/Fertilizer industry, Textile industry, etc.

Reference Books:

1. Hand book of industrial pollution and control VOl-& II, S.C. Bhatia
2. Industrial water pollution: Origin, characteristics and treatment, Nelson Nemerow.

GUJARAT TECHNOLOGICAL UNIVERSITY

DIPLOMA IN ENVIRONMENTAL ENGINEERING
Semester – V

Subject Code **: 2351304**
Subject Name **: Solid Waste Management**

Sr. No.	Subject Content	Hrs.
1.	**Introduction:** 1.1 Introduction 1.2 Definition and Sources of Solid Waste generation 1.3 Types of Solid Wastes 1.4 Composition of Solid waste and its determination. 1.5 Solid waste management and Urbanization 1.6 Impact of Solid Waste on Environment 1.7 Importance of Municipal Solid Waste (MSW) rules, 2000 in SWM	
2.	**Solid Waste Management Techniques:** 2.1 Waste management hierarchy 2.2 Waste prevention 2.3 Waste reduction – Source reduction programme 2.4 Waste audit	
3.	**Properties of Municipal Solid Waste:** 3.1 Physical Properties of Municipal Solid Waste 3.1 Chemical Properties of Municipal Solid Waste 3.3 Biological Properties of Municipal Solid Waste 3.4 Transformation of Municipal Solid Waste	
4.	**Solid Waste Generations and Collection:** 4.1 Quantities of solid waste 4.2 Measurements and methods to measure solid waste quantities 4.3 Solid waste generation and collection. 4.4 Factors affecting solid waste generation rate. 4.5 Quantities of materials recovered from Municipal Solid Waste	
5.	**Handling, Separation, Transportation and Storage of Solid Waste Management:** 5.1Handling and separation of solid waste at site. Material separation by pick in, screens, float, and separatores magnets and electromechanical separator and other latest devices 5.2 Waste Handling and Separation at commercial and industrial facilities 5.3 Storage of solid waste at the sources.	
6.	**Processing of Solid Waste**: 6.1Processing of solid waste at residence. E.g. storage, conveying, compacting, shredding, pulping, granulating, etc. 6.2 Processing of Solid Waste at Commercial and Industrial site. 6.3 Processing of Plastic Waste	

7.	**Solid Waste Disposal Techniques:** 7.1 Combustion and energy recovery of Municipal Solid Waste, effects of combustion, undesirable effects of combustion. 7.2 Landfill: classification, planning, sitting, permitting, landfill processes, landfill design, landfill operations, use of old landfills etc. 7.3 Biochemical Processes: Methane generation by anaerobic digestion, composting and otherbiochemical processes.	
8.	**Hazardous Solid Waste:** 8.1 Definition, identification and classification of hazardous solid waste. Hazardous waste toxicity, reactivity, infectiousness, flammability, radio activity, corrosiveness, irritation, bio-concentration, genetic activity, explosiveness. 8.2 Biomedical waste, its sources, generation, storage, transportation, and disposal with rwference to Biomedical waste rules, 1996. 8.3 e-waste – introduction, health hazard, e-waste management.	
9.	**Public Involvement and Participation in SWM:** Significance, Meaning, Role of Public Education and Public involvement, Technique of Public Involvement.	
	Total	

Laboratory Experiences:

1. Sources and Composition of Municipal Solid Waste
2. Properties of Municipal Solid Wastes
3. Solid Waste Generations and methods of Collection
4. Handling, Separation, Storage of Solid Waste Management
5. Processing of Solid Waste.
6. Disposal of Municipal Solid Waste Arrange Site visit
7. Hazardous Solid Wastes and its disposal
8. Report preparation on case studies of any one small area of village/ town/ city

Reference Books:

1. Integrated Solid Waste Management, George Tchobanoglous and Hilary Theisen, Samuel Vigil.
2. Disposal and Recovery of Municipal Solid Waste Michael E Henstock Butterworths, Ann Arbor.
3. Solid Waste Management, P Aarne Vesilig.
4. Environmental Engineering, Mackenzie L Davis and David A. Cornwell.
5. Solid Waste Management, K. Sasikumar and others.

GUJARAT TECHNOLOGICAL UNIVERSITY

DIPLOMA IN ENVIRONMENTAL ENGINEERING

Semester – V

Subject Code **: 2351305**
Subject Name **: Environmental Project Management**

Sr. No.	Subject Content	Hrs.
1.	**Introduction:** 1.1 Importance of E P M 1.2 Role of Environmental Engineer in management 1.3 Quality of good manager 1.4 Skills required for ideal manager	
2.	**Planning of Project:** 2.1 Principles, Requirements, Methods and Parameters effecting Project planning 2.2 Project scheduling & controlling 2.3 Bar chart and CPM (Importance and preparation) 2.4 Examples on Barchart and CPM	
3.	**Site Layout:** 3.1 Necessity of site layout 3.2 Parameters to be considered while preparing site layout 3.3 Preparation of site layout for environment project.	
4.	**Labour Management:** 4.1 Labour Characteristics 4.2 Incentive & Motivation 4.3 Labour laws – Legislation Act, Wages and Payment Act, Compensation Act.	
5.	**Quality Management:** 5.1 Quality of materials 5.2 Inspection & testing methods – Objectives, Types and Relevant laboratory tests. 5.3 Quality in observation	
6.	**Safety Management - Introduction to Safety:** 6.1 Preliminary knowledge regarding environmental related safety codes (BIS) for 6.1.1 Fire Hazards & its prevention 6.1.2 Chemical hazards and its prevention 6.1.3 Mechanical, Electrical & radiation hazards. 6.1.4 Control of Hazards 6.1.5 Occupational safety. 6.1.6 Safety Equipment & Compaign.	

	6.1.7 Storage of Chemicals.	
7.	**Management Information System:** 7.1 Function, Purpose & needs and Characteristics 7.2 Physical element 7.3 Classification 7.4 Implementation & Application to EPM.	
8.	**Disaster Management:** 8.1 Introduction 8.2 Kinds of Disaster 8.3 Effects of various kinds of disaster 8.4 Socio-economic & culture effects 8.5 Pre disaster management 8.6 Management during and after disaster	
9.	**Environmental Standards:** 9.1 Introduction regarding ISO 9.2 Utility of ISO to the Society 9.3 Introduction to IS- 14000 series 9.4 Environmental Management system (ISO-14000) 9.4.1 Benefits, Key element	
	Total	

Reference Books:

1. A management Guide to PERT, Jerome D. Weist.
2. Construction planning & Management, P. S. Gahlot & B. M. Dhir.
3. Construction Planning Equipment & methods, R.L. Parifoy.
4. Construction structure Management & wrong, S. C. Rangwala.
5. Project Planning by CPM & PERT, B.C. Purnima & Khandwal.
6. Statistical Quality Control methods.
7. Relevant IS and ISO codes.
8. Construction Management and PWD Accounts, B.Lal.
9. Industrial Safety and Environment, Anupama Prashar & Pratibha Bansal.

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DIPLOMA IN ENVIRONMENTAL ENGINEERING

Semester – V

Subject Code **: 2351306**
Subject Name **: Project - I**