SHIVAJI UNIVERSITY, KOLHAPUR
STRUCTURE OF THE B.E. (ENVIRONMENTAL ENGINEERING) COURSE

T.E. (ENVIRONMENTAL ENGINEERING) - I

Sr. No.	Subject	Teaching Scheme					Paper marks	Examination Scheme			Total marks
		L	T	P	Dr.	Total		TW	POE	OE	
1	Wastewater Engg.	3	1	2	-	6	100	50	-	25	175
2	Urban & Rural Planning	4	1	-	-	5	100	50	-	-	150
3	Water Resources Engineering	3	-	2	-	5	100	25	-	-	125
4	Environmental Geotechnology	3	-	2	-	5	100	50	-	25	175
5	Green building	3	1	-	-	4	100	25	-	-	125
6	Environmental Instrumentation	2	-	2	-	4	-	50	-	-	050
	Total (Part I)	18	3	8	-	29	500	250	-	50	800

T.E. (ENVIRONMENTAL ENGINEERING)-II

Sr. No.	Subject	Teaching Scheme					Paper marks	Examination Scheme			Total marks
		L	T	P	Dr.	Total		TW	POE	OE	
1	Air pollution- I	4	-	2	-	6	100	25	-	25	150
2	Solid waste management	3	-	2	-	5	100	50	-	-	150
3	Environmental Management	3	-	2	-	5	100	25	-	25	150
4	Noise Pollution & Control.	3	-	2	-	5	100	25	-	-	125
5	Quantity Surveying & valuation	3	-	2	-	5	100	50	-	25	175
6	O & M of Env. Facilities	2	1	-	-	3	-	50	-	-	050
	Total (Part II)	18	1	10	-	29	500	225	-	75	800
	Grand Total										1600

T.E. (Environmental Engg.)-Part-I
1. WASTEWATER ENGINEERING

Teaching scheme:	**Examination Scheme**
Lecture: 3 Hrs/ week	Theory : 100 marks
Practical: 2 Hrs/ week	Term Work: 50 marks
Tutorial : 1 Hr / week	Oral: 25 marks

SECTION I

Unit – 1 (7)
Components of wastewater flows, wastewater sources and flow rate, Variations in flow rates and strength, wastewater constituents, Characteristic of Municipal waste water.
Quantity of storm water, Ground water infiltration, Sewerage system, Layout Types of sewers, Collection system, Appurtenances, Design of sanitary and storm water sewers.

Unit – 2 (3)
Sewage and Sludge pumping, Location, Capacity, Types of pumps, Pumping station design.

Unit – 3 (4)
Treatment of wastewater: Physical unit operations- Screening, Flow equalization, Grit removal, Primary sedimentation, Oil and Grease trap, Chemical Precipitation.

Unit – 4 (6)
Biological treatment of wastewater: fundamentals of biological treatment, microbial metabolism, bacterial growth and energies, kinetics of biological growth, suspended growth and attached growth process, Activated sludge process and its modifications, Trickling filters, Biotowers, RBC.

SECTION II

Unit –5 (2)
Anaerobic suspended and attached growth processes. Factors affecting anaerobic digestion

Unit – 6 (5)
Low cost waste treatments: waste stabilization ponds, Design and operation of oxidation pond, aerobic & anaerobic Lagoons, Aerated Lagoon, Oxidation ditch, Septic tank.

Unit – 7 (6)
Sludge Treatment: Solids sources, characteristics and quantities, Preliminary operations, Thickening, Stabilization, Composting, Conditioning, Dewatering, Drying, Disposal.

Unit – 8 (6)
Disposal of waste water-stream pollution, Self Purification, DO sag curve, Streeter Phelp's Equation, Stream classification, disposal on land, effluents standards for stream and land disposals.

Term work

Term work shall consist of the following:
A) A Journal containing experiments carried on characterization of Municipal Waste water for pH, BOD, COD, Solids, Acidity & Alkalinity.
B) Design of sewerage system and treatment units based on above theory.
C) Visit to sewage treatment plant & preparation of report.

References:

1. Peavey, H.S.Rowe, D.R., and Tchobanoglous, Environmental Engineering,
2. McGraw-Hill Book Company.
3. Viessman W. and Hammer M.J. Water supply and pollution Control, Harper
4. Collins College publishers.
5. Hammer M.J. Water and Waste water Technology, Prentice-Hall of India P.Ltd.
7. Manual on sewerage and sewage Treatment-Government of India Publication.
8. Masters. G.M. Introduction to Environmental Engineering and Science.
9. Metcalf & Eddy, Waste Water Engg. Treatment & Disposal, Tata McGraw Hill

T.E. (Environmental Engg) Part I

2. URBAN & RURAL PLANNING

Teaching scheme:	**Examination Scheme**
Lecture: 4 Hrs/ week	Theory : 100 marks
Tutorial: 1 Hr./ week	Term Work : 50 marks

SECTION I

UNIT-1 (4)

Human Settlement: Definition & characteristics of urban & rural settlements- Census definition- classification of Towns/ Cities according to function, Administrative status & physical development characteristic features. Concepts- town, city, metropolis. Megalopolis their interaction & interdependence.

UNIT-2

(6)

Urbanisation process- definition-character-function-growth, size, migration, contemporary arrangements, system of water supply, refuse & drainage, accessibility & interrelation to urban growth. Increase in complexities of urban growth areas , influence on surrounding peri-urban(peripheral areas) areas. The need for regional approach- Role of demographic, social, economic aspects of urbanisation- major components of settlements, major urban development problems. Emergence of concepts of New township & Special Economic Zones- salient features of understanding, necessity of guidelines for urban & rural land use regulation & control.

Unit -3

(6)

Planning process : Definition, need & importance, functional role played by urban & rural settlements in the national, state & rural economic growth necessitating macro & micro level (sect oral & spatial) planning – Hierarchy of planning (National, State, Regional, Block level, local level & intra local level planning). Need for inter & intra urban development planning approach-concepts of "master plan" (Development plan) " Town planning scheme" within regional planning framework. Planning laws & the laws governing statutory function of urban & local authorities in the country & the state with special reference to 43^{rd} & 44^{th} amendments to Indian constitution (Power to people & local participation in plan preparation) Role of physical, natural, environmental & ecological factors like natural condition, topography climate, biological factors, social, economic, political, cultural & demographic aspects of urban & rural developments.

Unit -4

(6)

Basic surveys- Physical, social economic needed for spatial & relevant non special aspects of urban & rural areas planning. Introduction to data requirements.
Data types & resources: census types, town directory & village directory & data classification of census, gazetteers, statistical abstracts primary & secondary surveys & sources of data-demographic studies, population projections.

SECTION II

Unit -5

(6)

Contents of spatial planning for a settlement planning of residential areas as social unit, site planning, cluster level planning, neighbourhood planning, city (master) planning, traffic & transportation planning including fencing requirements. Intra structure planning including utility services & community facilities, landscape planning. Urban heritage conservation measures, energy conservation measures,
Planning standards of different souses(central & state Govt.,TCPO,NBO,UPPFI, Dev. Authorities, National Building Code) Land use standards according to function. City size, classification types, standards for commercial & industrial area requirements, requirements of open spaces-passive & active (parks, gardens, play grounds stadiums etc.), other amenity area requirements like education, health, marketing & essential Environmental Engg. Services etc. Need for development of control regulations & building byelaws – zoning regulations, regulations for environmental protection.

Unit -6

(6)

Traditional surveys for planning & its Limitations; Role of remote sensing & GIS in Urban and Regional Planning; Geographic Information Systems, Limitations of GIS; Application of GIS in transportation network, urban water supply and drainage projects & Planning

Unit -7

(5)

Rural settlements pattern- Rural growth scenario- Role played by agricultural sector in the national economy & impact on rural development.
Size of agriculture holdings- small & marginal farmers
Role of ancillary agricultural development sector like poultry & dairy developments, Horticulture & Flower culture growth potential. Scope for developments of agro based industrial & commercial activities- Agro & horticulture

processing activities, identification of rural developments problems, planning strategy for rural development planning, Block level planning in the regional context, infrastructural requirements.

Unit -8

(5)

Identification of rural growth centers & peri urban areas(areas on the urban periphery) potential transitional growth areas – infrastructural requirements of agricultural development & rural settlement development- role of physical, social, economical, environmental, cultural, administrative, political aspects of rural development planning- possible alternatives of rural developments.

Term work

Eight assignments based on above theory & a visit report on any urban / rural planning project, agency.

References

1. Bandyopadhyay, A, 2000, The text Book of Town Planning, Books and Allied (P) Ltd., Calcutta
2. Canter, Larry W, 1977, Environmental Impact Assessment, Mc Graw Hill Pub. New York.
3. Baldwin, John H, 1985, Environmental Planning and Management, International Book Distributors, Dehra Dun
4. KeebJe; Lewis (1976); "Principles & Practice of Town and Country Planning": The Estate Gazette Limited, London (Copyright 1969).
5. Delhi Development Authority; " Master Plan for Delhi"; 1962.
6. Chattopadhya; B.C.: "History of Human Settlements:": Institute of Town Planners, India; New Delhi.
7. Gallion; A.B. and Eisner; S.; (1969), " The Urban Pattern — Citv Planning and Design": Affiliated East-west Press Pvt. Ltd.: New Delhi (Copyright 1963).
8. Conyers; D. and Hills; P.; (1984). "An Introduction to Development Planning in the Third World": John Wiley and Sons, Bath; pp. 3-9.
9. Keeble; Lewis (1983); "Town Planning Made Plain": Construction Press, London; pp. 1-9.
10. Chatterjee; M.N.;(1987); "Introduction to Planning — Synopsis of Lecture": School of Planning and Architecture, New Delhi (Un-published).
11. Indian Road Congress; (1983); "Geometric Design Standards for Urban Roads in Plains.— (IRC: 86-1983V: New Delhi.
12. Shukla; D.N.; (1993); "Vastu Shastra. Volume-I. Hindu Science of Architecture": Munsiram Manoharlal Publishers Pvt. Ltd.; New Delhi.
13. Bacon; Edmund N; (1967); "Design of Cities": Thames and Hudson, London.
14. CPHEEO, Manual of Water Supply and Treatment, 1997 (Chap. II), Ministry of H&UD.
15. CPHEEO Manual of Sewage and Sewage Treatment, 1997.
16. Rakesh Mohan, India Infrastructure Report (pp. 217-259), 1997.
17. Terence J. McGhee, Water Supply and Sewage (6th Edition), McGraw Hill.
18. Metcaff & Eddy, Waste Water Engineering.
19. Haan, Coad and Lardipois, Municipal Solid Waste Management – Guidelines for Municipal Managers, 1998.
20. Santosh Kumar Garg, Water Supply Engineering (Vol. I) and Waste Water Supply (Vol. II).
21. Expert Group's Report to Hon'ble Supreme Court on Solid Waste Management Status in India, March, 1999
22. Centre for Science and Environment (CSE), Citizens Fifth Report.
23. Justoo & Khanna, Highway Engineering.
24. Soli J. Arciwala, Waste Water Treatment for Pollution Control.
25. Benarde, M.A., 1989, Our Precious Habitat, 15 Years Later, John Wiley & Sons, Inc. NY.
26. Caldwell, L.K., 1990, International Environmental Policy, Duke University Press, Affiliated EW Press Pvt. Ltd., New Delhi.l Mechanisms for Conserving Species and Ecosystems, IUCN, E'tal Policy and Law paper 29, IUCN, Gland, Switzerland.
27. Edington, John, Ecology and Environmental Planning

28. Global Warming, Colloborative Study on Strategies to limit CO2 Emissions in Asia and Brazil, Asian Energy Institute, tata McGraw-Hill Publishing Company Limited, New Delhi, 1992
29. McCormick, J., 1989, The Global Environmental Movement, Belhaven Press London
30. Ramchandran, R., 1991, Urbanization and Urban Systems in India, OUP, Delhi.
31. Saksena, K.D., 1993, Environmental Planning Policies and Programmesin India, Shipra Publications, New Delhi.
32. IGIDR 97 : India Development Report, OUP.

T.E. (Environmental Engg.) Part I
3. WATER RESOURCES ENGINEERING

Teaching Scheme

Examination Scheme

Lectures – 3 Hrs/Week — Theory :100 Marks
Practical--2 Hrs / Week — Term Work:25 Marks

SECTION-I:

Unit 1: Introduction to Hydrology

Scope and Importance of Hydrology; Hydrological Cycle;
Precipitation and its measurements: Precipitation, forms and types, different methods of measurement, Rain Gauge Network, Determination of average precipitation over the catchments.
Abstraction Losses:
Evapo–Transpiration – definition, measurements and factors affecting evapo-transpiration,
Infiltration – Process of infiltration, factors affecting infiltration, infiltration indices.

6

Unit 2: Runoff and its Measurements

a. Runoff**: -** Factors Affecting Runoff, Rainfall Runoff relationship, Catchments Yield Calculations.
b. Stream Gauging**: -** Selection of Site, Common Methods of Discharge Measurement, Area-Velocity Method, Area Slop Method, S.W.F.; Other Modern Methods.
c. Hydrograph**: -** Base Flow, Separation of Base Flow, Unit Hydrograph – Theory, Assumptions and Limitations, Derivation and use of Unit Hydrograph, S – Curve Hydrograph. 5

Unit 3- Water and Watershed Management

a)National & state level policies on water management roles & responsibilities of govt. agencies/farmers, equitable water distribution, co-operative water user's organization, warabandi, assessment of canal revenue, water tariffs, land use & water mgt. practices in arid/semiarid zones of India, urban water mgt.
b)watershed concept, need of watershed development, factors affecting, effects & controlling soil erosion, role of forests in soil conservation, rainwater mgt, techniques for rainwater & GW

harvesting, conjunctive use of surface & ground water ,Role of NGOs
6

Unit 4 - River Basin Development
River basins of India, concept of basin development, types of rivers, meandering phenomenon, river training works, geomorphological characteristics of basin, Interlinking of rivers & interbasin water transfer, water quality & river pollution, Ganga Action Plan, river flood management. 4

SECTION-II

Unit 5 -
Occurrence of groundwater, Groundwater flow concepts, Aquifers and types, Darcy's Law and Hydraulic Potential, Steady state one-dimensional flow,
4

Unit 6 –
Well hydraulics, Steady state well hydraulics for confined and unconfined aquifers, Well loss and specific capacity, Yield of open well, Groundwater recharge, Effect of recharge well.
4

Unit 7 –
Sources of contaminants in groundwater, Contamination of groundwater, Contaminant plumes in aquifer, Transport of reactive and non reactive contaminants in groundwater, Advection and dispersion, Sorption and diffusive mass transfer, Control of groundwater pollution, Pump and treat system, In-situ methods, Physical, Chemical and Biological parameters for organic & inorganic contaminants polluting groundwater.
6

Unit 8 -
a) Water logging & Salinity: Causes (Natural & artificial), effects, remedial measures, soil efflorescence, drainage arrangement, Mgt.of Saline & alkaline soils.
b) Wetland: Concept, types, wetland ecosystem, planning & pollution abatement, and conservation. 6

At least eight assignments from following based on above theory

1. Plotting of mass curve & rainfall hyetograph.
2. Determination average annual rainfall
3. Determination of abstraction losses.
4. Derivation of Unit hydrograph.
5. Derivation of storm hydrograph.
6. Hydraulic design of an earthen dam/ bandhara.
7. Design of rain water harvesting for residential building system.
8. Field visit to wetland & preparation of report.
9. Field visit to watershed & preparation of report.

10 Study of urban water management.

11 Well hydraulics.

12 GW contaminants study.

Reference Books

1. Applied Hydrology – V. T. Chaw
2. Engineering Hydrology – Jay rami Reddy
3. Engineering Hydrology – K. Subramanya
4. Engineering Hydrology – H. M . Raghunath
5. Water Resources Engg. – Dr. P.N.Modi (Standard Book House)
6. Watershed Management in India – J.V.S.R. Murthy (New Age International)
7. Hydrology and Soil Conservation – Ghanshyam Das , (PHI)
8. Water resources systems – R. S. Varshney.
9. Hydrology – K. Subramanya.
10. Ground water – Freeze and Cherry.
11. Water Resources Engineering – Larry Mays.
12. Groundwater Engineering – Todd
13. Environmental Science and Engineering - Masters
14. Watershed processes, assessment and management – Paul, DeBarry.
15. Groundwater Engineering – H.M. Raghunath.

T.E. (Environmental Engg.) Part-I
4. ENVIRONMENTAL GEOTECHNOLOGY

Teaching scheme :
Lectures : 3 Hrs./week
Practical : 2 Hrs./week

Examination scheme :
Theory : 100 marks
Term work : 50 marks
Oral Exam : 25 marks

SECTION I

Unit 1 :

Basics of soil formation, definition & Introduction to Environmental Geotechnology, Application areas of geotechnology, soil skeleton, phase systems, basic weight- volume relationships

6

Unit 2 :

Definitions and Properties of soil - Index and Engineering properties and Determination of index properties & their significance.

5

Unit 3 :

Soil classification - Necessity and methods, Soil structure , Clay mineralogy and composite soils Soil water – modes of occurrence, capillarity , flow of water through soil, Permeability, factors affecting permeability, methods of determination 5

Unit 4:
Compaction of soil: Theory of compaction, laboratory compaction methods-standard & modified proctor compaction test, field compaction control, factors affecting compaction.
4

SECTION II

Unit 5 :

Problematic soils and rocks, guidelines and care to be exercised for such soils, Ground improvement: techniques, Environmental geotechnical problems.
5

Unit 6 :

Pollution process and soil pollution interaction, Disposal of solid and liquid waste in soil, stability of refuse landfill, problems of land fill sites, compaction of landfill, slope stability of landfills, stability of garbage in decomposed stage
7

Unit 7 :

Design of waste control systems, their components, structures of control system components5

Unit 8 :

Geosynthetics / geotextile applications in Environmental Engineering and pollution control 3

Term work :

A journal consisting of experiments & write-ups of following practicals

1. Determination of specific gravity
2. Determination of water content
3. Determination of particle size Distribution
4. Determination of field density
5. Determination of Liquid limits
6. Determination of Plastic limits
7. Determination of Shrinkage limits
8. Determination of permeability (laboratory methods)
9. Determination of MDD & OMC by Standard proctor compaction.
10. Visit to polluted sites, investigations and preparation of report

Reference books :

1. Soil Mechanics and Foundation Engineering by B.C. Punmia
2. Introduction to Environmental Geotechnology by Hsai Pang Fang, CRC press, Boca Raton, New York
3. Geotechnical Engg. by Venkatramaiha
4. Geotechnical Engg. by Purshottamraj.
5. Geotechnical Engg. by Kasmalkar
6. Soil Mechanics and Foundation Engineering by S.K.Garg.
7. Geo Environmental Engineering by Sharma & Reddy.

T.E. (Environmental Engg.) Part I

5. GREEN BUILDING DESIGN

Teaching Scheme:
Lectures: 3Hrs/Week
Tutorials: 1Hr/Week

Examination Scheme:
Theory : 100Marks
Term Work : 25 Marks

SECTION- I

Unit-1

Sustainable Site Selection

Orientation, Building envelop, Building plan layout, Design of Doors and windows, Natural ventilation, Solar energy, Use of solar energy for water heating, Solar concentrators, Solar photovoltaic panels, Direct and indirect lighting, comparison of various lighting devices- electric tubes, incandescent lamps, CFL and LED lamps, Indirect lighting devices -Light Tubes, Fibre optic, Fresnel lense

10

Unit – 2

Passive and Active Architecture, Natural ventilation and air conditioning, Hybrid system of active and passive refrigeration and air conditioning. Concept of Embodied Energy,

Embodied energy of various common building materials, Thermal properties of building components, Thermal storage, emmissivity, reflectivity, Selection of materials and surface treatment for improvement in thermal comfort with minimum energy input. Energy audit of building,

5

Unit – 3

Green Rating of building, LEED criteria, USGBS, CIII-Godrej Green rating, CDM and Carbon trading, Environmental clearance of buildings.

5

SECTION – II

Unit – 4

Water Efficiency

Water Efficient Landscaping –Rain water harvesting, potable water and borewell recharging methods, Minimisation of water use, Dual flush, waterless urinals, smart controlled water taps, Segregation and treatment of wastewater, Various treatment technologies like septic tank, Anaerobic filter, CWTS, biogas plants advanced treatment options like carbon bed, reverse osmosis, electrodialysis, ion exchanger, recycling of treated wastewater for different non potable purpose,

Domestic solid waste – Segregation, earthworm composting other options.

6

Unit – 5

Indoor Environmental Quality

Low- VOC Emitting Materials - Adhesives & Sealants, Paints & Coatings, Carpet Systems, Composite Wood & Agro-fiber Products like coconut, jute, bamboo and their use as interiors

7

Unit-6

Recycling of Building materials, Existing Walls, Floors & Roof, Interior Non-Structural Elements. Construction Waste Management, Materials Reuse, Recycled Content,, Use of fly ash, foundry sand and other inert solid wastes in buildings

Life cycle analysis, Construction phase, operation phase, demolition, Impact on environment and land use.

7

Term Work

Term work submission shall consist of the following :

1) Green and energy audit of one building
2) Suggested modifications for improving green rating and energy conservation in building studied.

T.E. (Environmental Engg.) Part-I

6. ENVIRONMENTAL INSTRUMENTATION

Teaching Scheme
Lectures- 2 Hrs / week
Practical- 2 Hrs / week

Examination Scheme
Term Work-- 50 marks

Unit 1

Introduction and Scope of the subject, pressure measurements: Mechanical devices, manometer, piezometers, vacuum gauges and differential pressure measurements.

3

Unit 2

Liquid level measurements: Point gauge, hook gauge, float gauge, sounding rod, Automatic recording devices.
Velocity measurements: Pitot tube, current meter hot wire and hot film anemometers.

3

Unit 3

Rain gauges : Recording and Non recording type.
Flow measurements: Volumetric, venturimeters, venture flumes, different methods using Dyes, radioisotope.

3

Unit 4

Temperature measurements: Thermometer, bimetal thermometer, dry bulb and wet bulb thermometer, pyrometers, thermocouples, humidity and temperature regulation.
Errors of measurements: Classification reason corrective measures.

4

Unit 5

Concentration measurement: Different method 1) Gravimetric 2) Volumetric conductometers absorptiometry, use of photoelectric colorimeters, spectro photo meters for measuring absorption by organic substances in low and high frequency range.
Measurement of turbidity: Emission spectrophotometry, flame photometer, UV & V absorption meters, automatic analyzer for the determination of potassium and alkaline earth metals.

5

Unit 6

Polarimetry for the measurement of different metals in industrial waste.
Extraction analysis for measurement of fats, lipids and toxic metals in waste water: Atomic absorption spectrophotometer for toxic metal analysis.

4

Unit 7

Potentiometry for the measurement of hydrogen ion concentration, redox potential and D.O.techniques for measurement based on rotation of polarized light. Biogas analysis, Gas chromatography. Instumentation for Air monitoring continuous monitors such as T.G.A. etc.

3

Unit 8

Application for process control in:

A) Water filtration disinfections, softening demineralization boiler feed water cooling water.
B) Neutralization cum equalization tank, aeration sludge digetion tank, vacuum filters, sewage & sludge pumping station.

3

Term Work

A journal consisting of study of at least six instruments, their Principle, working, calibration & applications based on above theory.

Reference Books

1. A course manual: Insrumentation in Env. Engg. NEERI Publications, Nagpur.
2. Industrial Instrumentation Fandamentals- A.E.Fribance-TMH Edition.
3. Instrumentation Manuals & Catalouge For different Instruments.
4. Instrumental methods of analysis by Hobart Willard, Lynne Merrit, John Dean

T. E. (Environmental Engg.) Part-II
1.AIR POLLUTION I

Teaching Scheme	**Examination Scheme**
Lectures: 4 Hrs/week	Theory : 100 Marks
Practical: 2 Hrs/week	Termwork: 25 Marks
	Oral Exam: 25 Marks

SECTION I: Atmospheric Science

Unit 1: Introduction to the Atmosphere
Basic Definitions of atmosphere, weather, climate, Atmospheric Composition, Important Trace Elements like greenhouse gases and ozone, Vertical Structure like pressure, density, temperature, Spheres, Newton's Second Law of Motion, Ideal Gas Law, Energy Balance of the Earth-Atmosphere System

4

Unit 2: Heat, Temperature, Humidity, Precipitation and stability
Differences between Heat and Temperature, Factors Affecting Temperature (latitude, time of year, cloud cover, differential heating, proximity to water, altitude), Lapse rate, Atmospheric stability, MMD, Percent by Volume, Moisture Variables, dew point, wet-bulb temperature, vapor pressure, mixing ratio, absolute humidity, relative humidity, Cloud Formation Processes and Cloud Characteristics/Types, Precipitation Processes, Precipitation Types

7

Unit 3: Atmospheric Pressure, Wind, and Circulation
Atmospheric Pressure, Measurement of Pressure, mercurial and aneroid barometers, Visualizing Pressure (isobars), Pressure and Wind Relationships and Coriolis Effect, Wind Measurements, sea and land breeze circulations, Local wind systems, Fronts and Characteristics (Stationary, Cold, Warm, and Occluded), Atmosphere/Ocean, Currents, El Nino

7

Unit 4: Hurricanes and tropical weather
Tropical disturbances, Tropical Systems (depressions, storms, hurricanes), Structure of a hurricane, Factors necessary for hurricane formation, Location of hurricane formation, Destruction sources from a hurricane

4

SECTION II: Air Quality

Unit 5: Introduction to Air Pollution
Definition of Air Pollution, The History of Air Pollution, The Natural versus Polluted Atmosphere, Ambient Air, Criteria Pollutants and Trace Gases, Air Pollution Management and

Data Analysis, Air Quality Criteria and Standards, EPA Clean Air Act, Air Pollution Control Act 1981, NAAQS, Air Quality Index/Indices, Air Quality Status in India and Abroad, Urban Air Pollution Management

6

Unit 6: Scales, Sources and Effects of Air Pollution
Scales of Air Pollution, Local, Urban, Regional, Continental, Global, Sources of Air Pollution, Natural and Anthropogenic Combustion, Stationary Sources, Mobile Sources, Emission Inventory, Effects of Air Pollution on Man, Materials, Animals, Property, Vegetation

6

Unit 7: Atmospheric Chemistry
Atmospheric Chemistry, Types of Chemical Transformations, Photochemistry, Scavenging and Removal from the Atmosphere, Chemical Processes in the Atmosphere, Air Toxics, The Meteorological Bases of Atmospheric Pollution, Meteorological Conditions during Pollution Episodes, Removal Mechanisms 5

Unit 8: Global Phenomenon and Climate Change
Micro and Macro Air Pollution, Indoor Air Pollution, Acid Precipitation, Greenhouse Effect, Ozone Problem, Global Warming, Asia Brown Cloud, Climate Change, Work of EPA, UNEP, UNFCCC, Kyoto Protocol 5

Term Work- A Journal consisting of any ten of the following Practicals.

1. Determination of Ambient temperature and conversion to F,C, K
2. Determination of Relative Humidity and Saturated Humidity
3. Determination of Dew Point
4. Determination of Cloud Cover
5. Determination of Pressure in Millibar, Pascal, mm of Hg
6. Determination of UTC, ITCZ from Latitude and Longitude
7. Determination of Wind velocity and construction of Wind rose
8. Study of Cyclones and Anticyclones
9. Study of Hurricanes, Tornado
10. Preparation of Air Quality Index/Indices
11. Determination of Traffic density, emission rates for Urban Air Pollution
12. Determination of pH and CO_2 of rain
13. Determination of rain with rain gauge
14. Study of Area, point and mobile source

Reference Book

1. The weather Book by Williams, Jack, USA
2. Introduction to Atmospheric Chemistry by Hoobs, Peter V
3. The Handy Weather Answer book by Lyons, Walter A

4. Weather for Dummies by Cox , John D
5. Dynamic Meteorology by Gordon, Adrian
6. Meterology by Anthes, Richard A
7. Atmospheric Processes and Systems by Thompson, Russell D
8. Climate and Global Environmental Change by Harvey, danny
9. Air Pollution by Wark and Warner
10. Air Pollution by Stern Vol I, II, III
11. Air Pollution by D. Nevers
12. Air Pollution by Ross

T.E.(Environmental Engg.) Part – II
2.SOLID WASTE MANAGEMENT

Teaching scheme:
Lecture: 3 Hrs/ week
Practical: 2 Hrs/ week

Examination Scheme
Theory : 100 marks
Term Work: 50 marks

SECTION – I

Unit 1 : Introduction: Functional outlines of municipal solid waste, sources, types, refuse analysis, composition and quantity of refuse, Agricultural & animal waste, quality and quantity, farmyard manure.

(8)

Unit 2 : Waste Collection, Storage and Transport: Storage, transportation of refuse, House to house and community bin collection, economic aspects of refuse collection & transport.

(6)

Unit 3 : Solid waste handling & processing methods: Source Reduction, segregation and salvage, recovery of bye – products, use of solid waste as raw materials in industry, Recycling of solid waste.

(6)

SECTION – II

Unit 4 : Design, operation & management of landfill sites: Sanitary landfill site selection, Disposal site classification, Landfill site selection, Landfill site design, Landfill operation, maintenance and

precautions, leachate and its control, control of contamination of ground water, Water quality monitoring, Operation monitoring. Rehabilitation, Closure & end-use.
(5)

Unit 5 :

Composting: Theory of composting, types of composting, factors governing composting, processing before composting, mechanical composting plant, recovery of Bio – gas energy from organic solid waste. (8)

Unit 6 :

Incineration, theory and types of incinerators, location planning, aspect, effect of feed, composition, rate and temperature, Air supply, Design of incineration plant, Pyrolysis and its by-products, Energy recovery, Air pollution and its control. (4)

Unit 7 :

Solid waste management rules, Status of solid waste management in India. Cost economics of solid waste management. (3)

Term Work:

A. Analysis of solid waste- Physical properties
B. Project on Design of Refuse collection & Disposal System for medium size town/ part of a city.

Reference Books:

i) Solid Waste Management – Dr. A. D. Bhide
ii) Solid Waste Management Hand Book – Pavoni
iii) Composting – Gottas
iv) Handbook and Solid Waste Disposal – George Tchobanoglous
v) Manual on Municipal Solid Waste Management by Ministry of Urban Development, Govt. of India.

T. E. (Environmental Engg.) II
3. ENVIRONMENTAL MANAGEMENT

Teaching Scheme	**Examination Scheme**
Lectures: 3 Hrs/week	Theory: 100 Marks
Practical: 2 Hrs/week	Termwork: 25 Marks
	Oral Exam: 25 Marks

SECTION I

Unit 1:
Definition of Environmental Management, Principles of Environmental Management, Nature, Scope and Components of Environmental Management, Policies and Legal Aspect of Environmental Management 6

Unit 2:

Overview of Environmental Impact Assessment (EIA), Need and Importance, Steps involved, Methods of EIA, Public Participation and Communication, Preparation and Review of Environmental Impact Assessment Report, Life Cycle Assessment as Environmental Management Tool 8

Unit 3:
Environmental Policy Analysis- Macro level and Micro level, Methods of Policy Analysis, steps involved, Environmental Management Plan (EMP), Components of EMP, Preparation of EMP, Case Study. 6

SECTION II

Unit 4:
Environmental Economics, Estimation of Costs and Benefits, Cost-Benefit Analysis. Interest Calculations, Present and future worth of Projects, Financial Aspects of Project, DPR and other feasibility Reports, Environmental Audit, Components of Audit, Preparation of Audit Report, Case Study 8

Unit 5:

Organization for Environmental Management, Example, Organizational Design, Institutionalization of Environmental management in India, Ministry of Environment and Forest, Central Pollution Control Boards, State Pollution Control Boards, Local Bodies, their scopes,

Organizational and Functional issues, Related Issues in Environmental Management. 6

Unit 6:

Environmental Information Systems, Global, National, Unit level Systems, Applications, Geographic Information System (GIS) and Remote Sensing in Environmental Management 6

Term work

Term work in the form of Journal consists of assignment on each unit and at least one visit based on syllabus topics

Reference Books

1. Environmental Management By Bala Krishnamoorthy
2. ISO 14000 Answer Book: Environmental Management For The World Market By Dennis R. Sasseville, W. Gary Wilson, Robert W. Lawson
3. Andersen, Mikael Skou and Rolf-Ulrich Sprenger. 2000. Market-Based Instruments For Environmental Management. Northampton, Ma: E. Elgar.
4. Burke, Gwendolyn, Ben Ramnarine Singh and Louis Theodore. 2000. Handbook of Environmental Management and Technology. New York: John Wiley.
5. Friedman, Frank. 2000. Practical Guide to Environmental Management. Washington, D.C.: Environmental Law Institute
6. Mackenthun, Kenneth M. 1999. Basic Concepts in Environmental Management. Boca Raton, Fl: Lewis
7. Paruccini, M. (Ed.). 1994. Applying Multiple Criteria Aid for Decision to Environmental Management. Boston: Kluwer Academic Publishers.
8. Rietbergen-Mccracken, Jennifer and Hussein Abaza (Eds.). 2000. Economic Instruments for Environmental Management: A Worldwide Compendium of Case Studies. London: Earthscan.
9. Environmental Science For Environmental Management by Timothy O'riordan
10. Environmental Management For Sustainable Development, Second Edition By C.J. Barrow
11. Environmental Management: Principles And Practice By C.J.Barrow (Kindle Edition - Mar 14, 2007) - Kindle Book
12. Environmental Management In Practice: Vol 3 By Luc Hens, Paul Compton Edited By Bhaskar Nath (Kindle Edition - Dec 7, 2002) - Kindle Book
13. GIS For Environmental Management By Robert Scally
14. Environmental Management Readings And Case Studies By Lewis Owen
15. Applied Ecology And Environmental Management Second Edition By: Edward I Newman (University Of Bristol)
16. Corporate Environmental Management By John Darabaris
17. Environmental Management by Virginia H. Dale

T.E.(Environmental Engg.) Part II
4. NOISE POLLUTION & CONTROL

Teaching scheme:		**Examination scheme :**	
Lectures	: 3 hrs. /week	Theory	: 100 marks
Practical	: 2 hrs./week	Term work	: 25 marks

SECTION I

Unit 1 :

The menace of noise pollution in India, Engineering definition of noise and sound, Mechanization of hearing, hearing principle, Noise characteristics, decibel levels, sound pressure, power, intensity, frequency band analysis, measurement of noise. 5

Unit 2 :

Sources of noise, noise propagation and transmission, noise survey and noise monitoring, environmental monitoring, health monitoring 5

Unit 3 :

Sources of noise, neighborhood noise, traffic noise, occupational noise, community noise, common noise levels and permissible noise levels 5

Unit 4:

Effects of noise, effects on health, effects on wild life, effects on plants, hazards of noise – physiological and psychological hazards 5

SECTION II

Unit 5 :

Industrial noise- types, sources, frequency, distribution, characteristics / range of industrial noise generated in various industrial operations, measurement of industrial noise 4

Unit 6 :

Engineering control of community noise – Basic control approach, regulatory control, simplified estimation procedures

4

Unit 7 :

Control of noise: Types, isolation, suppression, shielding, noise measuring equipments, sound level meter, octave band analyzer, magnetic tape recorder, audiometer.

Methods of reducing industrial noise: location, lay out, source, enclosure, barrier, acoustical absorbance devices 7

Unit 8 :

Legal aspects : Legislation in India and other countries, Case studies in India and abroad 5

Term work :

The Journals consist of:

1. Study of noise measuring equipments & their use.
2. Study of Noise pollution problems in following & its repot.
    a) Industry.
    b) Traffic.
    c) Public places.

3. Assignments based on above theory.

Reference books :

1. Handbook of Environmental management and technology by Gwendolyn Holmes, Ben Ramnasiue singh and Louis Theodore (A Wiley – Enter science publication)
2. Standard Hand book of Environmental Engineering by Robert A. Corbett (McGraw Hill Inc.)
3. Industrial Pollution by N. Irving Sax (Van Nostrand Reinhold Company)
4. Environmental issues and programme by I. Mohan (Ashish publishing house)
5. Environmental Engineering by G.N.Pandey and G.C. Carney (Tata McGraw Hill)
6. Some thought on Environmental and law by C.S. Mehta (RBSA Publisher)
7. Environmental health criteria 12: NOISE, WHO & ONEP Publication.
8. IS code for practice for noise reduction in industrial buildings IS: 3483, 1965
9. Noise Pollution – S.K.Agrawal- APH Publishing carporation, New Delhi.
10. Soil & Noise pollution: Dr B.K.Sharma & Dr. H.Kaur, Goel Publishing House, Krishana Prakashan mandir, Meerut.

T. E. (Environmental Engg.) Part-II
5. QUANTITY SURVEYING AND VALUATION

Teaching Scheme:
Lectures: 3 Hrs / Week
Practicals: 2 Hrs / Week
Oral exam: 25 Marks

Examination Scheme:
Theory : 100 Marks
Term work: 50 Marks

SECTION – I

Unit 1:

a)General Introduction to Quantity surveying, purpose of estimates types of estimates,various items to be included in estimate. Principles in selecting units of measurement for different trades. Administrative approval and Technical sanction to estimates, I S 1200.

b) Specifications: Purpose and basic principles of general and detailed specifications, specifications for different items of work for water supply and sewerage works 6

Unit 2:

a) Prime cost, Provisional sums and provisional quantities, taking out Quantities.: P. W. D. method, Measurement and Abstract sheets and Recording. M. E. S. Method: Dimensioning, abstracting, bills of quantities use of Performa,

b) Analysis of Rates: Factors affecting the cost. Materials, Labour, task work schedule as basis of labour cost, plants and equipment, hour costs based on total costs and output. Transports, overhead charges. Rates for various items of construction of civil Engineering works, standard schedule of Rates. Price escalation. DSR and use of DSR for estimating 4

Unit3:

a) Estimate of residential building ; Estimate of basic items of buildings
b) Detailed estimates of water supply scheme: Estimate of intake works, estimates of water supply line and ESR. Detailed estimate of water treatment plant and distribution system.
c) Estimate of sewerage system and sewage treatment plant: Detailed estimate of various components like sewerage line, various appurtenances like manholes, flushing systems. Detailed estimate of sewage treatment plant
d) Estimate of mechanical equipments and accessories
e) Estimates of various electrical equipments
f) Use of various software for estimating
g) Approximate Estimates: Purpose, various methods used for building and other Civil Engg. works like Bridge, water supply, Drainage, irrigation and Road projects. 10

Unit4:

a) Different methods for executing work like contract method, Departmental,

b) Organizational set-up of various govt. bodies like PWD, Water Supply Departments and general idea about its working and delegation of power, classification of works, Methods for carrying out work . Two Envelop method,, measurement books, mode of payment, bill forms, Global contractors, local competitive bidding 4

SECTION – II

Unit5:

a) Contracts: Essentials of legally valid contract, Appointment and Authority of Agents for execution
contract between government and contract for various water supply and sewage projects. Competitive bidding contracts: Item rate, percentage Rate, Lump sum,

b) Tender Procedure: Various types of tenders, preparing tender papers, invitation of tenders, tender notice, submission, scrutiny and Acceptance of tenders, conditions of contracts, right and responsibilities of the parties to contract.

b) Negotiated contacts: Cost plus percentage, cost plus fixed fees, cost plus sliding scale of fees, targe costs as based on sharing risks and profits, Turnkey contracts. 4

Unit 6:

a) Principles of valuation: Definition of 'value' unit price and cost Attributes of values. Different types of value. Books value, salvage & scrap value. Replacement value. Reproduction Value. Earning value. Market value. Potential value, distress value, speculation values, sentimental value, Accommodation values, Essential characteristics of market value.

b) Valuer and his duties, purpose of valuation and its function.
Factors affecting the valuation of properties, Tangibles and intangibles, Landed properties, freehold and lease hold properties.
Different type of Lease. 6

Unit 7:

a) Depreciation: Different methods of calculating depreciation: declining balance method, sinking fund method, depreciated cost, factors for obsolescence

b) Sinking Fund: Definition, purpose, calculation of sinking fund, Sinking fund calculations for various equipments and machinery used in water supply and sewerage schemes.

c) Cost benefit analysis for various water supply and sewage systems

d) BOT, BOOT: Concepts of execution of works by the methods like BOT, BOOT

4

Unit 8:

a) Various methods of valuation: Methods of Valuation applicable for residential and commercial buildings, methods of valuation for public buildings, valuation for water supply and sewerage schemes, valuation of different components of the scheme

c) Introduction to Arbitration.

8

Term Work I – Tutorials:

a) Writing specifications for at least 10 items of work for various items in water supply and sewerage system.

b) Rate Analysis for at least ten items of work.

Term Work II – Reports:

a) Detailed Estimate of a water treatment plant or sewage treatment plant.

b) Preparing detailed estimate for any one of the following-
   1. Water supply line
   2. Sewerage line
   3. A small culvert
   4. A stretch of road about 1 km long including earthwork
   5. A reach of canal about 1 km long
   6. A percolation tank

c) Valuation Report for any two of the following-
   1. Water supply/ sewage treatment plant.
   2. Water resource project

The report must include a 'Valuation Certificate' also.

Reference Books:

1. Quantity Surveying – P. L. Bhasin
2. Elements of estimating and costing – S. C. Rangawala.
3. Civil Engg. Contracts and Estimates – B. S. Patil
4. Professional Practice – Roshan Namavati (Estimating and Valuation)
5. Estimating and Costing - Datta
6. Estimating, costing and specifications in civil engineering – Chakraborty M.
7. Estimating and Costing - Birdi
8. Bombay P. W. D. volumes I and II
9. Valuation of real properties – S. C. Rangawala
10. District Schedule of Rates for PWD, MJP

T. E. (Environmental Engg.) Part II
6. OPERATION AND MAINTENANCE OF ENVIRONMENTAL FACILITIES

Teaching Scheme
Lectures -2 Hrs/ Week
Tutorial- 1 Hr / Week

Examination Scheme
Term Work- 50 Marks

Unit 1

Introduction: Need of O and M, Basic principles, corrective and preventive maintenance, Data: detailed plans, drawings, operation manuals, computer usage in O and M. 4

Unit 2

O & M of water supply: Intakes, pumps, transmission pipes, water treatment process control, Quantity and quality monitoring. 4

Unit3

Water distribution system: loss of carrying capacity of pipes, pipe breaks and leakages, leak detection, record keeping, O and M of Appurtances, Use of network models in O and M. 4

Unit 4

O & M of wastewater facilities: Sewerage system, Inspection methods, Manual and television, Cleaning and rehabilitation, Safety in sewer inspection, O and M of wastewater treatment plant, Monitoring and operational problems, Corrective measures. 7

Unit 5

Air pollution control facilities: Regular inspection of devices, SPM control equipment, Gravity settlers, Cyclone separators, Bag filters, Scrubbers, Electrostatic precipitator, Gaseous control devices, incinerators and their trouble shooting. 7

Unit 6

O and M planning: Organizational structure, work planning, preparation and scheduling, cost estimates. 3

Term work :

A) Visit to Treatment plants , industries & preparation of report.

B) Case study of Water / Waste water Treatment plant & assignments based on above units /facilities.

C) Study of organizational structure of O & M in municipal corporation.

References

1. CPHEEO manual on water supply and treatment
2. CPHEEO manual on sewerage and sewage treatment
3. Industrial air pollution control systems – Neumann
4. O & M of Water treatment plant –Charles R Cox