# ROHINI COLLEGE OF ENGINEERING AND TECHNOLOGY

**Approved by AICTE and affiliated to Anna University**

**(An ISO Certified Institution)**

**INDEX**



PRINCIPAL
Rohini College of Engineering & Technology
Anjugramam Kanyakumari Main Road,
Palkulam, Variyoor (P.O.) - 629 401
Kanyakumari District, Tamil Nadu.

**Details of course related to Environment and Sustainability**

**List of courses**

1. Environmental Science and Engineering
2. Engineering Geology
3. Municipal Solid Waste
4. Environmental and Agriculture
5. Air Pollution and Control Engineering
6. Renewable Energy Systems
7. Green Computing
8. Water Supply Engineering
9. Wastewater Engineering
10. Water and Waste Water Analysis Laboratory
11. Irrigation and Environmental Engineering Drawing
12. Power Plant engineering.
13. Renewable Energy Systems Laboratory
14. Energy Resources
15. Soil and Water Conservation Engineering

**Course Name and code**

| Course Name | Course Code |
|---|---|
| 1.Environmental Science and Engineering | GE 8291 |
| 2. Engineering Geology | CE8392 |
| 3. Municipal Solid Waste Management | EN6501 |
| 4. Environmental and Agriculture | OA1551 |
| 5. Air Pollution and Control Engineering | CE8005 |
| 6. Renewable Energy Systems | EE8703 |
| 7.Green Computing | CS8078 |
| 8.Water SupplyEngineering | EN8491 |
| 9.Wastewater Engineering | EN8592 |
| 10.Water and Waste Water Analysis Laboratory | CE8512 |
| 11.Irrigation and Environmental Engineering Drawing | CE8612 |
| 12.Power Plant engineering | ME8792 |
| 13.Renewable Energy Systems Laboratory | EE8712 |
| 14. Energy Resources | TE4002 |
| 15.Soil and Water Conservation Engineering | AI3402 |

**COURSE OBJECTIVES**

**1.Environmental Science and Engineering**

- ✓ To study the nature and facts about environment.
- ✓ To finding and implementing scientific, technological, economic and political solutions toenvironmental problems.
- ✓ To study the interrelationship between living organism and environment.
- ✓ To appreciate the importance of environment by assessing its impact on the human world; envision the surrounding environment, its functions and its value.
- ✓ To study the dynamic processes and understand the features of the earth‟s interior and surface.
- ✓ To study the integrated themes and biodiversity, natural resources, pollution control and waste management

2. **Engineering Geology**

- ✓ At the end of this course the students will be able to understand the importance of geological knowledge such as earth, earthquake, volcanism and to apply this knowledge in projects such as dams, tunnels, bridges, roads, airport and harbor.

3. **Municipal Solid Waste**

- ✓ To make the students conversant with different aspects of the types, sources, generation, storage, collection, transport, processing and disposal of municipal solid waste.

**4. Environmental and Agriculture**

- ✓ To emphasize on the importance of environment and agriculture on changing globalscenario and the emerging issues connected to it.

**5.Air Pollution and Control Engineering**

- ✓ To impart knowledge on the principle and design of control of Indoor/ particulate/ gaseous air pollutant and its emerging trends.

**6. Renewable Energy Systems**

- ✓ Awareness about renewable Energy Sources and technologies.
- ✓ Adequate inputs on a variety of issues in harnessing renewable Energy.
- ✓ Recognize current and possible future role of renewable energy sources.

**7. Green Computing**

- ✓ To learn the fundamentals of Green Computing.
- ✓ To analyze the Green computing Grid Framework.

- ✓ To understand the issues related with Green compliance.
- ✓ To study and develop various case studies.

**8.Green Computing**

- ✓ To equip the students with the principles and design of water treatment units anddistribution system.

**9.Wastewater Engineering**

- ✓ The objectives of this course is to help students develop the ability to apply basicunderstanding of physical, chemical, and biological phenomena for successful design,operation and maintenance of sewage treatment plants.

**10.Water and Waste Water Analysis Laboratory**

- ✓ To analyse the physical, chemical and biological characteristics of water and wastewater.
- ✓ To quantify the dosage requirement for coagulation process
- ✓ To study the growth of micro-organism and its quantification
- ✓ To quantify the sludge

**11. Irrigation and Environmental Engineering Drawing**

- ✓ At the end of the semester, the student shall conceive, design and draw the irrigationand environmental engineering structures in detail showing the plan, elevation andSections.

**12. Power Plant engineering**

- ✓ Providing an overview of Power Plants and detailing the role of Mechanical Engineers in their operation and maintenance.

**13.Renewable Energy Systems Laboratory**

- ✓ To train the students in Renewable Energy Sources and technologies.
- ✓ To provide adequate inputs on a variety of issues in harnessing Renewable Energy.
- ✓ To recognize current and possible future role of Renewable energy sources.

**14. Energy Resources**

- ✓ To explain concept of various forms of Non-renewable and renewable energy.
- ✓ To outline division aspects and utilization of renewable energy sources for both domestics andindustrial applications.
- ✓ To study the environmental and cost economics of using renewable energy sources comparedto fossil fuels.

## DETAILED SYLLABUS OF EACH COURSE

**GE8291 ENVIRONMENTAL SCIENCE AND ENGINEERING L T P C**

3 0 0 3

**UNIT I ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY 12**

Definition, scope and importance of Risk and hazards; Chemical hazards, Physical hazards,Biological hazards in the environment – concept of an ecosystem – structure and function of anecosystem – producers, consumers and decomposers-Oxygen cycle and Nitrogen cycle – energy flowin the ecosystem – ecological succession processes – Introduction, types, characteristic features,structure and function of the (a) forest ecosystem (b) grassland ecosystem (c) desert ecosystem (d)aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) – Introduction to biodiversitydefinition: genetic, species and ecosystem diversity – biogeographical classification of India – value ofbiodiversity: consumptive use, productive use, social, ethical, aesthetic and option values – Biodiversity at global, national and local levels – India as a mega-diversity nation – hot-spots ofbiodiversity – threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – endangered and endemic species of India – conservation of biodiversity: In-situ and ex-situconservation of biodiversity. Field study of common plants, insects, birdsField study of simple ecosystems – pond, river, hill slopes, etc.

**UNIT II ENVIRONMENTAL POLLUTION 10**

Definition – causes, effects and control measures of: (a) Air pollution (Atmospheric chemistryChemical composition of the atmosphere; Chemical and photochemical reactions in the atmosphere -formation of smog, PAN, acid rain, oxygen and ozone chemistry;- Mitigation procedures- Control ofparticulate and gaseous emission, Control of SO2, NOX, CO and HC) (b) Water pollution : Physicaland chemical properties of terrestrial and marine water and their environmental significance; Waterquality parameters – physical, chemical and biological; absorption of heavy metals - Water treatmentprocesses. (c) Soil pollution - soil waste management: causes, effects and control measures ofmunicipal solid wastes – (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclearhazards–role of an individual in prevention of pollution – pollution case studies – Field study of local polluted site – Urban / Rural / Industrial / Agricultural.

**UNIT III NATURAL RESOURCES 10**

Forest resources: Use and over-exploitation, deforestation, case studies- timber extraction, mining,dams and their effects on forests and tribal people – Water resources: Use and overutilization ofsurface and ground water, dams-benefits and problems – Mineral resources: Use and exploitation,environmental effects of extracting and using mineral resources, case studies – Food resources:World food problems, changes caused by agriculture and overgrazing, effects of modern

agriculture,fertilizer-pesticide problems, water logging, salinity, case studies – Energy resources: Growing energyneeds, renewable and non renewable energy sources, use of alternate energy sources. EnergyConversion processes – Biogas – production and uses, anaerobic digestion; case studies – Landresources: Land as a resource, land degradation, man induced landslides, soil erosion anddesertification – role of an individual in conservation of natural resources – Equitable use of resourcesfor sustainable lifestyles. Introduction to Environmental Biochemistry: Proteins – Biochemicaldegradation of pollutants, Bioconversion of pollutants.Field study of local area to document environmental assets – river / forest / grassland / hill /mountain.

**UNIT IV SOCIAL ISSUES AND THE ENVIRONMENT 7**

From unsustainable to sustainable development – urban problems related to energy – waterconservation, rain water harvesting, watershed management – resettlement and rehabilitation ofpeople; its problems and concerns, case studies – role of non-governmental organization-environmental ethics: Issues and possible solutions – 12 Principles of green chemistry-nuclearaccidents and holocaust, case studies. – wasteland reclamation – consumerism and waste products –environment production act – Air act – Water act – Wildlife protection act – Forest conservation act – The Biomedical Waste (Management and Handling) Rules; 1998 and amendments-scheme oflabeling of environmentally friendly products (Ecomark). enforcement machinery involved inenvironmental legislation- central and state pollution control boards- disaster management: floods,earthquake, cyclone and landslides.Public awareness.

**UNIT V HUMAN POPULATION AND THE ENVIRONMENT 6**

Population growth, variation among nations – population explosion – family welfare programme – environment and human health – human rights – value education – HIV / AIDS – women and childwelfare –Environmental impact analysis (EIA)- -GIS-remote sensing-role of information technology inenvironment and human health – Case studies.

**TOTAL : 45 PERIODS**

**TEXT BOOKS:**


1. Benny Joseph, ‘Environmental Science and Engineering’, Tata McGraw-Hill, New Delhi, 2006.
2. Gilbert M.Masters, ‘Introduction to Environmental Engineering and Science’, 2nd edition, Pearson Education, 2004.


**REFERENCES :**


1. Dharmendra S. Sengar, ‘Environmental law’, Prentice hall of India Pvt Ltd, New Delhi, 2007.
2. ErachBharucha, “Textbook of Environmental Studies”, Universities Press(I) Pvt, Ltd, Hydrabad, 2015.

3. G. Tyler Miller and Scott E. Spoolman, “Environmental Science”, Cengage Learning India PVT, LTD, Delhi, 2014.
4. Rajagopalan, R, ‘Environmental Studies-From Crisis to Cure’, Oxford University Press, 2005.

**CE7392 ENGINEERING GEOLOGY L T P C**

**3 0 0 3**

**UNIT I PHYSICAL GEOLOGY 9**

Geology in civil engineering – branches of geology – structure of earth and its composition weathering of rocks – scale of weathering – soils - landforms and processes associated with river, wind, groundwater and sea – relevance to civil engineering. Plate tectonics – Earth quakes – Seismic zones in India.

**UNIT II MINEROLOGY 9**

Physical properties of minerals – Quartz group, Feldspar group, Pyroxene - hypersthene and augite, Amphibole – hornblende, Mica – muscovite and biotite, Calcite, Gypsum and Clay minerals.

**UNIT III PETROLOGY 9**

Classification of rocks, distinction between Igneous, Sedimentary and Metamorphic rocks. Engineering properties of rocks. Description, occurrence, engineering properties, distribution and uses of Granite, Dolerite, Basalt, Sandstone, Limestone, Laterite, Shale, Quartzite, Marble, Slate, Gneiss and Schist.

**UNIT IV STRUCTURAL GEOLOGY AND GEOPHYSICAL METHODS 9**

Geological maps – attitude of beds, study of structures – folds, faults and joints – relevance to civil engineering. Geophysical methods – Seismic and electrical methods for subsurface investigations.

**UNIT V APPLICATION OF GEOLOGICAL INVESTIGATIONS 9**

Remote sensing for civil engineering applications; Geological conditions necessary for design and construction of Dams, Reservoirs, Tunnels, and Road cuttings - Hydrogeological investigations and mining - Coastal protection structures. Investigation of Landslides, causes and mitigation.

TOTAL: 45 PERIODS

**TEXT BOOKS:**

1. Varghese, P.C., Engineering Geology for Civil Engineering Prentice Hall of India Learning Private Limited, New Delhi, 2012.
2. Venkat Reddy. D. Engineering Geology, Vikas Publishing House Pvt. Lt, 2010.
3. Gokhale KVGK, "Principles of Engineering Geology", B.S. Publications, Hyderabad 2011.

4. ChennaKesavulu N. "Textbook of Engineering Geology", Macmillan India Ltd., 2009.
5. Parbin Singh. A "Text book of Engineering and General Geology", Katson publishing house, Ludhiana 2009.

**REFERENCES:**

1. Blyth F.G.H. and de Freitas M.H., Geology for Engineers, Edward Arnold, London, 2010.
2. Bell .F.G.. "Fundamentals of Engineering Geology", B.S. Publications. Hyderabad 2011.
3. Dobrin, M.B "An introduction to geophysical prospecting", McGraw Hill, New Delhi, 1988.

**EN6501 MUNICIPAL SOLID WASTE MANAGEMENT L T P C**

3 0 0 3

**UNIT I SOURCES AND TYPES 8**

Sources and types of municipal solid wastes-waste generation rates-factors affecting generation, characteristics-methods of sampling and characterization; Effects of improper disposal of solid wastes-Public health and environmental effects. Elements of solid waste management –Social and Financial aspects – Municipal solid waste (M&H) rules – integrated management-Public awareness; Role of NGO's.

**UNIT II ON-SITE STORAGE AND PROCESSING 8**

On-site storage methods – Effect of storage, materials used for containers – segregation of solid wastes – Public health and economic aspects of open storage – waste segregation and storage – case studies under Indian conditions – source reduction of waste – Reduction, Reuse and Recycling.

**UNIT III COLLECTION AND TRANSFER 8**

Methods of Residential and commercial waste collection – Collection vehicles – ManpowerCollection routes – Analysis of collection systems; Transfer stations – Selection of location,operation & maintenance; options under Indian conditions – Field problems- solving.

**UNIT IV OFF-SITE PROCESSING 12**

Objectives of waste processing – Physical Processing techniques and Equipment; Resource recovery from solid waste composting and bio methanation; Thermal processing options – case studies under Indian conditions.

**UNIT V DISPOSAL 9**

Land disposal of solid waste; Sanitary landfills – site selection, design and operation ofsanitary landfills – Landfill liners – Management of leachate and landfill gas- Landfill bioreactor– Dumpsite Rehabilitation

TOTAL: 45 PERIODS

**TEXTBOOKS:**


1. Tchobanoglous, G., Theisen, H. M., and Eliassen, R. "Solid. Wastes: EngineeringPrinciples and Management Issues". McGraw Hill, New York, 1993.
2. Vesilind, P.A. and Rimer, A.E., "Unit Operations in Resource Recovery Engineering",Prentice Hall, Inc., 1981
3. Paul T Willams, "Waste Treatment and Disposal", John Wiley and Sons, 2000


**REFERENCES:**


1. Government of India, "Manual onMunicipalSolidWasteManagement",CPHEEO,Ministry ofUrbanDevelopment, New Delhi, 2000.
2. Bhide A.D. and Sundaresan, B.B. "Solid Waste Management Collection", Processing andDisposal, 2001.
3. Manser A.G.R. and Keeling A.A.," Practical Handbook of Processing and Recycling ofMunicipal solid Wastes", Lewis Publishers, CRC Press, 1996.
4. George Tchobanoglous and Frank Kreith"Handbook of Solidwaste Management",McGraw Hill, New York, 2002.


**OAI551 ENVIRONMENT AND AGRICULTURE L T P C**

3 0 0 3

**UNIT I ENVIRONMENTAL CONCERNS 8**

Environmental basis for agriculture and food – Land use and landscape changes – Water quality issues – Changing social structure and economic focus – Globalization and its impacts – Agro ecosystems.

**UNIT II ENVIRONMENTAL IMPACTS 9**

Irrigation development and watersheds – mechanized agriculture and soil cover impacts – Erosion and problems of deposition in irrigation systems – Agricultural drainage and downstream impacts – Agriculture versus urban impacts.

**UNIT III CLIMATE CHANGE 8**

Global warming and changing environment – Ecosystem changes – Changing blue-green-grey water cycles – Water scarcity and water shortages – Desertification.

**UNIT IV ECOLOGICAL DIVERSITY AND AGRICULTURE 10**

Ecological diversity, wild life and agriculture – GM crops and their impacts on the environment – Insets and agriculture – Pollination crisis – Ecological farming principles – Forest fragmentation and agriculture – Agricultural biotechnology concerns.

**UNIT V EMERGING ISSUES 10**

Global environmental governance – alternate culture systems – Mega farms and vertical farms – Virtual water trade and its impacts on local environment – Agricultural environment policies and its impacts – Sustainable agriculture.

**TOTAL: 45 PERIODS**

**TEXTBOOKS:**


1. M.LakshmiNarasaiah, Environment and Agriculture, Discovery Pub. House, 2006.
2. Arvind Kumar, Environment and Agriculture, ABH Publications, New Delhi, 2005.


**REFERENCES:**


1. T.C. Byerly, Environment and Agriculture, United States. Dept. of Agriculture. Economic Research Service, 2006.
2. Robert D. Havener, Steven A. Breth, Environment and agriculture: rethinking development issues for the 21st century : proceedings of a symposium, Winrock International Institute for Agricultural Development, 1994.
3. Environment and agriculture: environmental problems affecting agriculture in the Asia and Pacific region; World Food Day Symposium, Bangkok, Thailand. 1989


**CE8005 AIR POLLUTION AND CONTROL ENGINEERING L T P C** 3 0 0 3

**UNIT I INTRODUCTION 7**

Structure and composition of Atmosphere – Definition, Scope and Scales of Air Pollution – Sources and classification of air pollutants and their effect on human health, vegetation, animals, property, aesthetic value and visibility- Ambient Air Quality and Emission standards –Ambient and stack sampling and Analysis of Particulate and Gaseous Pollutants.

**UNIT II METEOROLOGY 6**

Effects of meteorology on Air Pollution - Fundamentals, Atmospheric stability, Inversion, Wind profiles and stack plume patterns- Atmospheric Diffusion Theories – Dispersion models, Plume rise.

**UNIT III CONTROL OF PARTICULATE CONTAMINANTS 11**

Factors affecting Selection of Control Equipment – Gas Particle Interaction – Working principle, Design and performance equations of Gravity Separators, Centrifugal separators Fabric filters, Particulate Scrubbers, Electrostatic Precipitators – Operational Considerations.

**UNIT IV CONTROL OF GASEOUS CONTAMINANTS 11**

Factors affecting Selection of Control Equipment – Working principle, Design and performance equations of absorption, Adsorption, condensation, Incineration, Bio scrubbers, Bio filters – Process control and Monitoring - Operational Considerations.

**UNIT V INDOOR AIR QUALITY MANAGEMENT 10**

Sources, types and control of indoor air pollutants, sick building syndrome and Building related illness- Sources and Effects of Noise Pollution – Measurement – Standards –Control and Preventive measures.

TOTAL: 45 PERIODS

**TEXTBOOKS:**


1. Lawrence K. Wang, Norman C. Pareira, Yung Tse Hung, "Air Pollution Control Engineering", Tokyo, springer science + science media LLC,2004.
2. Noel de Nevers, "Air Pollution Control Engineering", Waveland press,Inc 2017.
3. Anjaneyulu. Y, "Air Pollution and Control Technologies" , Allied Publishers (P) Ltd., India 2002.


**REFERENCES:**


1. David H.F. Liu, Bela G. Liptak, "Air Pollution", Lweis Publishers, 2000.
2. Arthur C. Stern, "Air Pollution (Vol.I – Vol.VIII)", Academic Press, 2006.
3. Wayne T.Davis, "Air Pollution Engineering Manual", John Wiley & Sons, Inc, 2000.
4. M.N Rao and HVN Rao, "Air Pollution",TataMcgraw Hill Publishing Company limited,2007.
5. C.S.Rao, "Environmental Pollution Control Engineering",New Age International(P) Limited Publishers,2006.


**EE8703 RENEWABLE ENERGY SYSTEMS L T P C**

**3 0 0 3**

**UNIT I RENEWABLE ENERGY (RE) SOURCES 9**

Environmental consequences of fossil fuel use, Importance of renewable sources of energy,Sustainable Design and development, Types of RE sources, Limitations of RE sources,Present Indian and international energy scenario of conventional and RE sources.

**UNIT II WIND ENERGY 9**

Power in the Wind – Types of Wind Power Plants(WPPs)–Components of WPPs-Workingof WPPs-Siting of WPPs-Grid integration issues of WPPs.

**UNIT III SOLAR PV AND THERMAL SYSTEMS 9**

Solar Radiation, Radiation Measurement, Solar Thermal Power Plant, Central ReceiverPower Plants, Solar Ponds.- Thermal Energy storage system with PCM- Solar Photovoltaicsystems : Basic Principle of SPV conversion – Types of PV Systems- Types of Solar Cells,Photovoltaic cell concepts: Cell, module, array ,PV Module I-V Characteristics, Efficiency &Quality of the Cell, series and parallel connections, maximum power point tracking,Applications.

**UNIT IV BIOMASS ENERGY 9**

Introduction-Bio mass resources –Energy from Bio mass: conversion processes-BiomassCogeneration-Environmental Benefits. Geothermal Energy: Basics, Direct Use, GeothermalElectricity. Mini/micro hydro power: Classification of hydropower schemes, Classification ofwater turbine, Turbine theory, Essential components of hydroelectric system.

**UNIT V OTHER ENERGY SOURCES 9**

Tidal Energy: Energy from the tides, Barrage and Non Barrage Tidal power systems. WaveEnergy: Energy from waves, wave power devices. Ocean Thermal Energy Conversion(OTEC)- Hydrogen Production and Storage- Fuel cell : Principle of working- various types -construction and applications. Energy Storage System- Hybrid Energy Systems.

**TOTAL : 45 PERIODS**

**CS8078 GREEN COMPUTING L T P C**

**3 0 0 3**

**UNIT I FUNDAMENTALS 9**

Green IT Fundamentals: Business, IT, and the Environment – Green computing: carbon foot print, scoop on power – Green IT Strategies: Drivers, Dimensions, and Goals – Environmentally Responsible Business: Policies, Practices, and Metrics.

**UNIT II GREEN ASSETS AND MODELING 9**

Green Assets: Buildings, Data Centers, Networks, and Devices – Green Business Process Management: Modeling, Optimization, and Collaboration – Green Enterprise Architecture – Environmental Intelligence – Green Supply Chains – Green Information Systems: Design and Development Models.

**UNIT III GRID FRAMEWORK** **9**

Virtualization of IT systems – Role of electric utilities, Telecommuting, teleconferencing and teleporting – Materials recycling – Best ways for Green PC – Green Data center – Green Grid framework.

**UNIT IV GREEN COMPLIANCE** **9**

Socio-cultural aspects of Green IT – Green Enterprise Transformation Roadmap – Green Compliance: Protocols, Standards, and Audits – Emergent Carbon Issues: Technologies and Future**.**

**UNIT V CASE STUDIES** **9**

The Environmentally Responsible Business Strategies (ERBS) – Case Study Scenarios for Trial Runs – Case Studies – Applying Green IT Strategies and Applications to a Home, Hospital, Packaging Industry and Telecom Sector.

**EN8491** **WATER SUPPLY ENGINEERING** **L T P C**

**3 0 0 3**

**UNIT I SOURCES OF WATER** **9**

Public water supply system – Planning, Objectives, Design period, Population forecasting; Waterdemand – Sources of water and their characteristics, Surface and Groundwater – ImpoundingReservoir – Development and selection of source – Source Water quality – Characterization – Significance – Drinking Water quality standards.

**UNIT II CONVEYANCE FROM THE SOURCE** **9**

Water supply – intake structures – Functions; Pipes and conduits for water – Pipe materials – Hydraulics of flow in pipes – Transmission main design – Laying, jointing and testing of pipes – appurtenances – Types and capacity of pumps – Selection of pumps and pipe materials.

**UNIT III WATER TREATMENT** **9**

Objectives – Unit operations and processes – Principles, functions, and design of water treatmentplant units, aerators of flash mixers, Coagulation and flocculation –Clarifloccuator-Plate and tubesettlers - Pulsator clarifier - sand filters - Disinfection - Residue Management –Construction,Operation and Maintenance aspects.

**UNIT IV ADVANCED WATER TREATMENT** **9**

Water softening – Desalination- R.O. Plant – demineralization – Adsorption - Ion exchange– Membrane Systems – RO Reject Management - Iron and Manganese removal - Defluoridation - Construction and Operation & Maintenance aspects – Recent advances - MBR process

**UNIT V WATER DISTRIBUTION AND SUPPLY** **9**

Requirements of water distribution – Components – Selection of pipe material – Service reservoirs – Functions – Network design – Economics – Analysis of distribution networks -Computerapplications – Appurtenances – Leak detection.Principles of design of water supply in buildings – House service connection – Fixtures andfittings, systems of plumbing and types of plumbing.

**TOTAL: 45 PERIODS**

**TEXTBOOKS:**


1. Garg, S.K. Environmental Engineering, Vol.IKhanna Publishers, New Delhi, 2010.
2. Modi, P.N., Water Supply Engineering, Vol.I Standard Book House, New Delhi, 2010.
3. Punmia, B.C.,Ashok Jain and Arun Jain, Water Supply Engineering, Laxmi Publications(P) Ltd., New Delhi, 2014.


**REFERENCES:**


1. Manual on Water Supply and Treatment, CPHEEO, Ministry of Urban Development,Government of India, New Delhi, 1999.
2. Syed R. Qasim and Edward M. Motley Guang Zhu, Water Works Engineering Planning,Design and Operation, Prentice Hall of India Learning Private Limited, New Delhi, 2009.


**EN8592 WASTEWATER ENGINEERING** **L T P C**

**3 0 0 3**

**UNIT I PLANNING AND DESIGN OF SEWERAGE SYSTEM** **9**

Characteristics and composition of sewage - population equivalent -Sanitary sewage flow estimation – Sewer materials – Hydraulics of flow in sanitary sewers – Sewer design – Storm drainage-Storm runoff estimation – sewer appurtenances – corrosion in sewers – prevention andcontrol – sewage pumping-drainage in buildings-plumbing systems for drainage - Rain Waterting.

**UNIT II PRIMARY TREATMENT OF SEWAGE** **9**

Objectives – Unit Operations and Processes – Selection of treatment processes –- Onsitesanitation - Septic tank- Grey water harvesting – Primary treatment – Principles, functions anddesign of sewage treatment units - screens - grit chamber-primary sedimentation tanks – Construction, Operation and Maintenance aspects.

**UNIT III SECONDARY TREATMENT OF SEWAGE** **9**

Objectives – Selection of Treatment Methods – Principles, Functions, - Activated Sludge Processand Extended aeration systems -Trickling filters– Sequencing Batch Reactor(SBR) – MembraneBioreactor

- UASB – Waste Stabilization Ponds – - Other treatment methods -Reclamation andReuse of sewage - Recent Advances in Sewage Treatment – Construction, Operation andMaintenance aspects.

**UNIT IV DISPOSAL OF SEWAGE 9**

Standards for– Disposal - Methods – dilution – Mass balance principle - Self purification of river- Oxygen sag curve – deoxygenation and reaeration - Streeter–Phelps model - Land disposal – Sewage farming – sodium hazards - Soil dispersion system.

**UNIT V SLUDGE TREATMENT AND DISPOSAL 9**

Objectives - Sludge characterization – Thickening - Design of gravity thickener- Sludge digestion Standard rate and High rate digester design- Biogas recovery – Sludge Conditioning and Dewatering – Sludge drying beds- ultimate residue disposal – recent advances.

**TOTAL: 45 PERIODS**

**TEXTBOOKS:**


1. Garg, S.K., Environmental Engineering Vol. II, Khanna Publishers,New Delhi, 2015.
2. Duggal K.N., "Elements of Environmental Engineering" S.Chand and Co. Ltd., New Delhi,2014.
3. Punmia, B.C., Jain, A.K., and Jain.A.K.., Environmental Engineering, Vol.II, LaxmiPublications, 2010.


**REFERENCES:**


1. Manual on Sewerage and Sewage Treatment Systems Part A,B and C, CPHEEO, Ministryof Urban Development, Government of India, New Delhi, 2013.
2. Metcalf and Eddy- Wastewater Engineering–Treatment and Reuse, Tata Mc.Graw-HillCompany, New Delhi, 2010.
3. Syed R. Qasim "Wastewater Treatment Plants", CRC Press, Washington D.C.,2010
4. Gray N.F, "Water Technology", Elsevier India Pvt. Ltd., New Delhi, 2006.


**CE8512 WATER AND WASTE WATER ANALYSIS LABORATORY L T P C**

**0 0 4 2**

**List of Experiments:**

**1.** Determination of pH, Turbidity and conductivity

2. Determination of Hardness

3. Determination of Alkalinity and Acidity

4. Determination of Chlorides

5. Determination of Phosphates and Sulphates

6. Determination of iron and fluoride

7. Determination of Optimum Coagulant dosage

8. Determination of residual chlorine and available chlorine in bleaching powder

9. Determination of Oil, and Grease

10. Determination of suspended, settleable, volatile and fixed solids

11. Determination Dissolved Oxygen and BOD for the given sample

12. Determination of COD for given sample

13. Determination of SVI of Biological sludge and microscopic examination

14. Determination of MPN index of given water sample

**TOTAL: 60 PERIODS**

**CE8612 IRRIGATION AND ENVIRONMENTAL ENGINEERING DRAWING L T P C**

**0 0 4 2**

**PART A: IRRIGATION ENGINEERING**

**1. TANK COMPONENTS** **9**

Fundamentals of design - Tank surplus weir – Tank sluice with tower head - Drawings showingfoundation details, plan and elevation

**2. IMPOUNDING STRUCTURES** **6**

Design principles - Earth dam – Profile of Gravity Dam

**3. CROSS DRAINAGE WORKS** **6**

General design principles - Aqueducts – Syphon aqueduct (Type III) – Canal drop (Notch Type) – Drawing showing plan, elevation and foundation details.

**4. CANAL REGULATION STRUCTURES** **9**

General Principles - Direct Sluice - Canal regulator - Drawing showing detailed plan, elevation andfoundation details.

**PART B: ENVIRONMENTAL ENGINEERING**

**1. WATER SUPPLY AND TREATMENT** **15**

Design and Drawing of flash mixer, flocculator, clarifier – Rapid sand filter – Service reservoirs – Pumping station – House service connection for water supply and drainage.

**2. SEWAGE TREATMENT & DISPOSAL** **15**

Design and Drawing of screen chamber - Grit channel - Primary clarifier - Activated sludgeprocess – Aeration tank – Trickling filter – Sludge digester – Sludge drying beds – Septic tanksand disposal arrangements.

**TOTAL: 60 PERIODS**

**TEXTBOOKS:**


1. Satya Narayana Murthy Challa, "Water Resources Engineering: Principles and Practice",
1. New Age International Publishers, New Delhi, 2002.
2. Garg, S.K., "Irrigation Engineering and Design of Structures", New Age International
3. Publishers, New Delhi, 1997.
4. Manual on Water Supply and Treatment, CPHEEO, Government of India, New Delhi, 1999.
5. Manual on "Sewerage and Sewage Treatment Systems- Part A, B and C" CPHEEO,
6. Ministry of Urban Development, Government of India, New Delhi, 2013.


**REFERENCES:**


1. Mohanakrishnan. A, "A few Novel and Interesting Innovative Irrigation Structures: Conceived, Designed and Executed in the Plan Projects in Tamil Nadu", Publ. No. 44 and Water Resources Development & Management Publ.No.43, IMTI Thuvakudy, Trichy, 2011.
2. Raghunath, H.M. "Irrigation Engineering", Wiley India Pvt. Ltd., New Delhi, 2011.
3. Sharma R.K.,"Irrigation Engineering and Hydraulic Structures", Oxford and IBH Publishing Co., New Delhi, 2002.
4. Peary, H.S., ROWE, D.R., Tchobanoglous, G., "Environmental Engineering", McGraw-HillBook Co., New Delhi, 1995.
5. Metcalf and Eddy, "Wastewater Engineering, Treatment and Reuse", Tata McGraw-Hill,New Delhi, 2010.
6. Qasim,S.R., Motley, E.M and Zhu.G. "Water works Engineering – Planning, Design and Operation", Prentice Hall, New Delhi, 2009.
7. Qasim, S. R. "Wastewater Treatment Plants, Planning, Design & Operation", CRCPress,New York, 2010


**ME8792** **POWER PLANT ENGINEERING** **L T P C**

**3 0 0 3**

**UNIT I COAL BASED THERMAL POWER PLANTS** **9**

Rankine cycle - improvisations, Layout of modern coal power plant, Super Critical Boilers,FBC Boilers, Turbines, Condensers, Steam & Heat rate, Subsystems of thermal power plants –Fuel and ash handling, Draught system, Feed water treatment. Binary Cycles and Cogenerationsystems.

**UNIT II DIESEL, GAS TURBINE AND COMBINED CYCLE POWER PLANTS 9**

Otto, Diesel, Dual & Brayton Cycle - Analysis & Optimisation. Components of Diesel and GasTurbine power plants. Combined Cycle Power Plants. Integrated Gasifier based Combined Cyclesystems.

**UNIT III NUCLEAR POWER PLANTS 9**

Basics of Nuclear Engineering, Layout and subsystems of Nuclear Power Plants, Working ofNuclear Reactors : Boiling Water Reactor (BWR), Pressurized Water Reactor (PWR), CANadaDeuterium-Uranium reactor (CANDU), Breeder, Gas Cooled and Liquid Metal Cooled Reactors.Safety measures for Nuclear Power plants.

**UNIT IV POWER FROM RENEWABLE ENERGY 9**

Hydro Electric Power Plants – Classification, Typical Layout and associated components includingTurbines. Principle, Construction and working of Wind, Tidal, Solar Photo Voltaic (SPV),Solar Thermal, Geo Thermal, Biogas and Fuel Cell power systems.

**UNIT V ENERGY, ECONOMIC AND ENVIRONMENTALISSUES OF POWER PLANTS 9**

Power tariff types, Load distribution parameters, load curve, Comparison of site selection criteria,relative merits & demerits, Capital & Operating Cost of different power plants. Pollutioncontrol technologies including Waste Disposal Options for Coal and Nuclear Power Plants.

**TEXT BOOK:**

1. Nag. P.K., "Power Plant Engineering", Third Edition, Tata McGraw – Hill Publishing CompanyLtd., 2008.

**REFERENCES:**

2. El-Wakil. M.M., "Power Plant Technology", Tata McGraw – Hill Publishing Company Ltd.,2010.
3. Godfrey Boyle, "Renewable energy", Open University, Oxford University Press in associationwith the Open University, 2004.
4. Thomas C. Elliott, Kao Chen and Robert C. Swanekamp, "Power Plant Engineering", SecondEdition, Standard Handbook of McGraw – Hill, 1998.

**EE8712 RENEWABLE ENERGY SYSTEMSLABORATORY L T P C**

**0 0 4 2**

**LIST OF EXPERIMENTS**

1. Simulation study on Solar PV Energy System.
2. Experiment on "VI-Characteristics and Efficiency of 1kWp Solar PV System".
3. Experiment on "Shadowing effect &diode based solution in 1kWp Solar PV System".
4. Experiment on Performance assessment of Grid connected and Standalone 1kWp SolarPower System.
5. Simulation study on Wind Energy Generator.
6. Experiment on Performance assessment of micro Wind Energy Generator.
7. Simulation study on Hybrid (Solar-Wind) Power System.
8. Experiment on Performance Assessment of Hybrid (Solar-Wind) Power System.
9. Simulation study on Hydel Power.
10. Experiment on Performance Assessment of 100W Fuel Cell.
11. Simulation study on Intelligent Controllers for Hybrid Systems**.**

**TOTAL: 60 PERIODS**

**TE4002 ENERGY RESOURCES L T P C**

**3 0 0 3**

**UNIT I COMMERCIAL ENERGY 9**

Coal, Oil, Natural gas, Nuclear power and Hydro - their utilization pattern in the past, present andfuture projections of consumption pattern - Sector-wise energy consumption – environmentalimpact of fossil fuels – Energy scenario in India – Growth of energy sector and its planning inIndia.

**UNIT II SOLAR ENERGY 9**

Solar radiation at the earth's surface – solar radiation measurements – estimation of averagesolar radiation - solar thermal flat plate collectors - concentrating collectors – solar thermalapplications - heating, cooling, desalination, drying, cooking, etc – solar thermal electric powerplant - principle of photovoltaic conversion of solar energy, types of solar cells – Photovoltaicapplications: battery charger, domestic lighting, street lighting, water pumping etc - solar PVpower plant – Net metering concept.

**UNIT III WIND ENERGY 9**

Nature of the wind – power in the wind – factors influencing wind – wind data and energyestimation - wind speed monitoring - wind resource assessment - Betz limit - site selection – windenergy conversion devices - classification, characteristics, applications – offshore wind energy -Hybrid systems - safety and environmental aspects – wind energy potential and installation inIndia - Repowering concept.

**UNIT IV BIO-ENERGY** **9**

Biomass resources and their classification - Biomass conversion processes - Thermo chemicalconversion - direct combustion – biomass gasification - pyrolysis and liquefaction – biochemicalconversion - anaerobic digestion - types of biogas Plant - applications - alcohol production frombiomass – bio diesel production – Urban waste to energy conversion - Biomass energyprogramme in India.

**UNIT V OTHER TYPES OF ENERGY** **9**

Ocean energy resources - principle of ocean thermal energy conversion (OTEC) - ocean thermalpower plant - ocean wave energy conversion - tidal energy conversion – small hydro -geothermal energy - geothermal power plant – hydrogen production and storage - Fuel cell –principle of working - various types - construction and applications

**TOTAL = 45 PERIODS**

**COURSE OUTCOMES**

| **ENVIRONMENTAL SCIENCE AND ENGINEERING** | |
|---|---|
| **CO1** | Illustrate the features of Ecosystem& biodiversity |
| **CO2** | Choose pollution control methods and waste management. |
| **CO3** | Apply the environmental concepts for conservation and protection of natural resources. |
| **CO4** | Demonstrate the impact of social issues on environment |
| **CO5** | Demonstrate the impact of human on environment. |

| **ENGINEERING GEOLOGY** | |
|---|---|
| **CO1** | Explain the geological featuresof the earth. |
| **CO2** | Demonstrate thephysical properties of minerals. |
| **CO3** | Identify common rocks based on their physical and engineering properties. |
| **CO4** | Illustrate the various geological structures and interpretation of geological data for subsurface investigations |
| **CO5** | Explain the application of geological investigation in projects such as dams, tunnels, bridges, roads, airport and harbor |

| **MUNICIPAL SOLID WASTE** |
|---|

| | |
|---|---|
| **CO1** | Explain the pollution from major industries including the sources and characteristics of pollutants |
| **CO2** | Explain to plan minimization of industrial wastes |
| **CO3** | Describe to design facilities for the processing and reclamation of industrial waste water |
| **CO4** | Describe the residue management |
| **CO5** | Explain the hazardous waste managenent |

| **AIR POLLUTION AND CONTROL ENGINEERING** | |
|---|---|
| **CO1** | Describe the major sources of air pollution and their effects. |
| **CO2** | Explain the atmospheric diffusion theories |
| **CO3** | Explain the various methods to control particulate contaminants. |
| **CO4** | Explain the various methods to control gaseous contaminants. |
| **CO5** | Outline the sources and effects of noise pollution. |

| **ENVIRONMENTAL AND AGRICULTURE** | |
|---|---|
| **CO1** | Explain about the water quality issues and its impacts. |
| **CO2** | Discuss the role of mechanization in agricultural sustainability. |
| **CO3** | List the various impacts of global warming on agriculture. |
| **CO4** | Describe the pollination crisis, types and the role of pollinators in agriculture. |
| **CO5** | Explain the agricultural environment policies and its impacts. |

| **RENEWABLE ENERGY SYSTEMS** | |
|---|---|
| **CO1** | Explain the renewable energy sources and types. |
| **CO2** | Explain the working of Wind power plant. |
| **CO3** | Describe the performance of solar PV and thermal system. |
| **CO4** | Discuss about Biomass energy. |
| **CO5** | Explain the working principle of Tidal energy and fuel cell. |

| GREEN COMPUTING | |
|---|---|
| **CO1** | Acquire knowledge to adopt green computing practices to minimize negative impacts on the environment |
| **CO2** | Enhance the skill in energy saving practices in their use of hardware. |
| **CO3** | Evaluate technology tools that can reduce paper waste and carbon footprint by the stakeholders. |
| **CO4** | Understand the ways to minimize equipment disposal requirements. |
| **CO5** | Summarize various case studies related to green computing. |

| WATER SUPPLY ENGINEERING | |
|---|---|
| **CO1** | Explain various parameters of water and source of water |
| **CO2** | Explain various parameters of conveyance of water. |
| **CO3** | Demonstrate and apply the design principles in designing the various functional units in water treatment |
| **CO4** | Summarize and design the various functional units in advanced water treatment techniques. |
| **CO5** | Explain basic structure of drinking water supply systems and design the component systems. |

| WASTEWATER ENGINEERING | |
|---|---|
| **CO1** | Explain the concepts of sewage systems and design of sewers |
| **CO2** | Explain primary design of the unit operations and processesthat are used insewage treatment |
| **CO3** | Explain secondary design of the unit operations and processes that are used in<br>sewage treatment |
| **CO4** | Interpret the standard methods for disposal of sewage. |
| **CO5** | Relate disposal of sludge and its management |

| CE8512- WATER AND WASTE WATER ANALYSIS |
|---|

| | |
|---|---|
| **CO1** | Analyse the physical characteristics viz. colour, turbidity, hardness and conductivity of a given water sample |
| **CO2** | Analyse the chemical characteristics of a given water sample viz. pH, acidity, alkalinity |
| **CO3** | Analyse the chemical characteristics of a given water sample viz. chlorides, Iron, Available Chlorine and sulphates content to assess its suitability for drinking purposes |
| **CO4** | Analyse the Dissolved oxygen content, Biological Oxygen Demand and Chemical Oxygen Demand in waste water |
| **CO5** | Estimate the optimum dosage of alum using Jar test |
| **CO6** | Exhibit ethical principles in engineering practices |
| **CO7** | Perform task as individual and /or team member to manage the task in time |
| **CO8** | Express the engineering activities with effective presentation and report |
| **CO9** | Interpret the finding with appropriate technological /research citation |

| **IRRIGATION AND ENVIRONMENTAL ENGINEERING DRAWING** | |
|---|---|
| **CO1** | State the general layout for water supply scheme |
| **CO2** | Compute and draw various units of water treatment plants |
| **CO3** | Choose the various irrigation structures |
| **CO4** | Implement the general layout for water supply scheme |
| **CO5** | Discuss the general layout of waste water treatment process |
| **CO6** | Exhibit ethical principles in engineering practices |
| **CO7** | Perform task as individual and /or team member to manage the task in time |
| **CO8** | Express the engineering activities with effective presentation and report |
| **CO9** | Interpret the finding with appropriate technological /research citation |

| **POWER PLANT ENGINEERING** |
|---|

| | |
|---|---|
| **CO1** | Demonstrate the construction and working of coal based thermal power plant. |
| **CO2** | Explain the layout, construction and working of diesel, gas and combined cycle power plant. |
| **CO3** | Describe the construction and working of Nuclear power plant. |
| **CO4** | Explain the construction and working of renewable energy sources. |
| **CO5** | Estimate energy calculation and environment related issues in power sectors. |

| **RENEWABLE ENERGY SYSTEMS LABORATORY** | |
|---|---|
| **CO1** | Analyze the Renewable Energy Systems. |
| **CO2** | Analyze the characteristics of Solar PV System |
| **CO3** | Design an experiment on Shadowing effect and diode-based solution for Solar PVSystem |
| **CO4** | Explain the basics of Intelligent Controllers for Hybrid Systems |
| **CO5** | Analyze the current and possible future role of Renewable Energy Sources. |
| **CO6** | Estimate the optimum dosage of alum using Jar test |
| **CO7** | Exhibit ethical principles in engineering practices |
| **CO8** | Perform task as individual and /or team member to manage the task in time |
| **CO9** | Express the engineering activities with effective presentation and report |

**Details of course related to Professional Ethics**

**List of courses**

1. Professional Ethics in Engineering
2. Contract Laws and Regulations
3. Project Safety Management
4. Construction Project Management
5. Research Methodology and IPR
6. Business Ethics

**Course Name and code**

| Course Name | Course Code |
|---|---|
| 1.Professional Ethics in Engineering | GE6075 |
| 2. Contract Laws and Regulations | CN4203 |
| 3.Project Safety Management | CN4005 |
| 4.Construction Project Management | CN4002 |
| 5.Research Methodology and IPR | RM4151 |
| 6.Business Ethics | BA4211 |

**COURSE OBJECTIVES**

**1. Professional Ethics in Engineering**

- ✓ To enable the students to create an awareness on Engineering Ethics and Human Values, to instill Moral and Social Values and Loyalty and to appreciate the rights of others.

**2.Contract Laws and Regulations**

- ✓ To study the various types of construction contract and their legal aspects and provisions.
- ✓ To learn concepts in Tenders.
- ✓ To learn concepts in Arbitration.
- ✓ To learn concepts in legal requirements
- ✓ To study the concepts in labour regulations.

**3.Project Safety Management**

- ✓ To study and understand the various safety concepts and requirements applied to construction projects.

**4. Construction Project Management**

- ✓ To study the various management techniques for successful completion of construction projects Project Management

**5. Research Methodology and IPR**

- ✓ Ability to manage Intellectual Property portfolio to enhance the value of the firm.

**6.Business Ethics**

- ✓ To enable the learners to have exposure on business ethics and ethical business perspectives.

**DETAILED SYLLABUS OF EACH COURSE**

**GE6075 PROFESSIONAL ETHICS IN ENGINEERING LT P C**

**3 0 0 3**

**UNIT I HUMAN VALUES 10**

Morals, values and Ethics – Integrity – Work ethic – Service learning – Civic virtue – Respect for others – Living peacefully – Caring – Sharing – Honesty – Courage – Valuing time – Cooperation – Commitment – Empathy – Self confidence – Character – Spirituality – Introduction to Yoga and meditation for professional excellence and stress management.

**UNIT II ENGINEERING ETHICS 9**

Senses of 'Engineering Ethics' – Variety of moral issues – Types of inquiry – Moral dilemmas – Moral Autonomy – Kohlberg's theory – Gilligan's theory – Consensus and Controversy – Models of professional roles - Theories about right action – Self-interest – Customs and Religion – Uses of Ethical Theories.

**UNIT III ENGINEERING AS SOCIAL EXPERIMENTATION 9**

Engineering as Experimentation – Engineers as responsible Experimenters – Codes of Ethics – A Balanced Outlook on Law.

**UNIT IV SAFETY, RESPONSIBILITIES AND RIGHTS 9**

Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis and Reducing Risk - Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Professional Rights – Employee Rights – Intellectual Property Rights (IPR) – Discrimination.

**UNIT V GLOBAL ISSUES 8**

Multinational Corporations – Environmental Ethics – Computer Ethics – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Moral Leadership –Code of Conduct – Corporate Social Responsibility.

**TOTAL: 45 PERIODS**

**TEXT BOOKS:**

1. Mike W. Martin and Roland Schinzinger, “Ethics in Engineering”, Tata McGraw Hill, New Delhi, 2003.
2. Govindarajan M, Natarajan S, Senthil Kumar V. S, “Engineering Ethics”, Prentice Hall of India, New Delhi, 2004.

**REFERENCES:**

1. Charles B. Fleddermann, “Engineering Ethics”, Pearson Prentice Hall, New Jersey, 2004.
2. Charles E. Harris, Michael S. Pritchard and Michael J. Rabins, “Engineering Ethics – Concepts and Cases”, Cengage Learning, 2009.
3. John R Boatright, “Ethics and the Conduct of Business”, Pearson Education, New Delhi, 2003
4. Edmund G Seebauer and Robert L Barry, “Fundamentals of Ethics for Scientists and Engineers”, Oxford University Press, Oxford, 2001.
5. Laura P. Hartman and Joe Desjardins, “Business Ethics: Decision Making for Personal Integrity and Social Responsibility” Mc Graw Hill education, India Pvt.Ltd.,New Delhi, 2013.
6. World Community Service Centre, ‘ Value Education’, Vethathiri publications, Erode, 2011.

**CN4203 CONTRACT LAWS AND REGULATIONS L T P C**

**3 0 0 3**

**UNIT I CONSTRUCTION CONTRACTS 9**

Indian Contracts Act – Elements of Contracts – Types of Contracts – Features – Suitability – Design of Contract Documents – International Contract Document – Standard Contract Document – Law of Torts.

**UNIT II TENDERS 9**

Prequalification – Bidding – Accepting – Evaluation of Tender from Technical, Contractual and Commercial Points of View – Contract Formation and Interpretation – Potential Contractual Problems – World Bank Procedures and Guidelines – Tamilnadu Transparency in Tenders Act.

**UNIT III ARBITRATION 9**

Comparison of Actions and Laws – Agreements – Subject Matter – Violations – Appointment of Arbitrators – Conditions of Arbitration – Powers and Duties of Arbitrator – Rules of Evidence – Enforcement of Award – Costs.

**UNIT IV LEGAL REQUIREMENTS 9**

Insurance and Bonding – Laws Governing Sale, Purchase and Use of Urban and Rural Land – Land Revenue Codes – Tax Laws – Income Tax, Sales Tax, Excise and Custom Duties and their Influence on Construction Costs – Legal Requirements for Planning – Property Law – Agency Law – Local Government Laws for Approval – Statutory Regulations.

**UNIT V LABOUR REGULATIONS** **9**

Social Security – Welfare Legislation – Laws relating to Wages, Bonus and Industrial Disputes, Labour Administration – Insurance and Safety Regulations – Workmen's Compensation Act – Indian Factory Act – Tamilnadu Factory Act – Child Labour Act - Other Labour Laws.

**REFERENCES:**


1. Gajaria G.T., Laws Relating to Building and Engineering Contracts in India, 2000.
2. Jimmie Hinze, Construction Contracts, McGraw Hill, 3rd Edition, 2013.
3. Ali D. Haidar, Handbook of Contract Management in Construction, Springer Cham, 1st Edition, 2021.
4. Patil. B.S, Civil Engineering Contracts and Estimates, Universities Press (India) Private Limited, 4th Edition 2015.
5. Dharmendra Rautray, Principles of Law of Arbitration in India, Wolters Kluwer, 2018.


**CN4005 PROJECT SAFETY MANAGEMENT LT P C**

**3 0 0 3**

**UNIT I CONSTRUCTION ACCIDENTS** **9**

Accidents and their Causes – Human Factors in Construction Safety – Costs of Construction Injuries – Occupational and Safety Hazard Assessment – Legal Implications.

**UNIT II SAFETY PROGRAMMES** **9**

Problem Areas in Construction Safety – Elements of an Effective Safety Programme – Job-Site Safety Assessment – Safety Meetings – Safety Incentives.

**UNIT III CONTRACTUAL OBLIGATIONS** **9**

Safety in Construction Contracts – Substance Abuse – Safety Record Keeping - Occupational Safety and Health Administration Manuals, Laws and Act - Indian and International Practices.

**UNIT IV DESIGNING FOR SAFETY** **9**

Safety Culture – Safe Workers – Safety and First Line Supervisors – Safety and Middle Managers – Top Management Practices, Company Activities and Safety – Safety Personnel – Sub contractual Obligation – Project Coordination and Safety Procedures – Workers Compensation.

**UNIT V OWNERS' AND DESIGNERS' OUTLOOK** **9**

Owners and Designers – Roles and responsibility in ensuring safety – Preparedness – Role of designer in ensuring safety – Safety clause in design document.

**TOTAL: 45 PERIODS**

**CN4002 CONSTRUCTION PROJECT MANAGEMENT LT P C**

**3 0 0 3**

**UNIT I FUNDAMENTALS OF CONSTRUCTION PROJECT MANAGEMENT 9**

Introduction of construction Project Management – Construction Scope – Construction Project Characteristics - Project development and Life Cycle – Construction Project Management Practice - Roles and Functions and Responsibility of Construction Managers and Major causes of Project failure.

**UNIT II PLANNING AND ORGANIZING CONSTRUCTION PROJECT 9**

Construction Project organization – Planning Project work Scope and integration Processes - Defining Project Activities - Scheduling Project - CPM, PERT, Precedence Network Analysis – Planning and organizing project resources such as manpower, material, equipment, Time and cost for construction site.

**UNIT III DESIGN AND CONSTRUCTION PROCESS 9**

Design and Construction as an Integrated System – Innovation, Economic and Technological Feasibility - Design Methodology - Functional Design - Construction Site Environment - Case Studies - Project Clearance requirement, Procedure and Necessary Documentation for Major Works Like Dams, Multistoried Structures, Ports, Tunnels.

**UNIT IV PROJECT RESOURCES UTILIZATION 9**

Labor productivity variations, productivity improvement - work study. Materials purchase & inventory control - Construction Equipment - Choice of Equipment and Standard Production Rates – Time management and Cost management - Measuring project progress & performance – Tools and Techniques

**UNIT V RISK MANAGEMENT AND PROJECT CONTROLLING 9**

Risks management at construction site - Controlling resource productivity – Schedule and Cost Controlling system – Earned value management system – Project Management Information systems.

**RM4151 RESEARCH METHODOLOGY AND IPR L T P C**

**2 0 0 2**

**UNIT I RESEARCH DESIGN 6**

Overview of research process and design, Use of Secondary and exploratory data to answer theresearch question, Qualitative research, Observation studies, Experiments and Surveys.

**UNIT II DATA COLLECTION AND SOURCES 6**

Measurements, Measurement Scales, Questionnaires and Instruments, Sampling and methods.Data - Preparing, Exploring, examining and displaying.

**UNIT III DATA ANALYSIS AND REPORTING** **6**

Overview of Multivariate analysis, Hypotheses testing and Measures of Association. PresentingInsights and findings using written reports and oral presentation.

**UNIT IV INTELLECTUAL PROPERTY RIGHTS** **6**

Intellectual Property – The concept of IPR, Evolution and development of concept of IPR, IPRdevelopment process, Trade secrets, utility Models, IPR & Bio diversity, Role of WIPO and WTO in IPR establishments, Right of Property, Common rules of IPR practices, Types and Features of IPRAgreement, Trademark, Functions of UNESCO in IPR maintenance.

**UNIT V PATENTS** **6**

Patents – objectives and benefits of patent, Concept, features of patent, Inventive step,Specification, Types of patent application, process E-filling, Examination of patent, Grant of patent,Revocation, Equitable Assignments, Licences, Licensing of related patents, patent agents,Registration of patent agents.

**TOTAL :30 PERIODS**

**REFERENCES**


1. Cooper Donald R, Schindler Pamela S and Sharma JK, "Business Research Methods", Tata McGraw Hill Education, 11e (2012).
2. Catherine J. Holland, "Intellectual property: Patents, Trademarks, Copyrights, Trade Secrets", Entrepreneur Press, 2007.
3. David Hunt, Long Nguyen, Matthew Rodgers, "Patent searching: tools & techniques", Wiley, 2007.
4. The Institute of Company Secretaries of India, Statutory body under an Act of parliament, "Professional Programme Intellectual Property Rights, Law and practice", September 2013.


**BA4211** **BUSINESS ETHICS (SEMINAR)** **L T P C**

**0 0 4 2**

- The following is the list of topics suggested for preparation and presentation by students twiceduring the semester.
- This will be evaluated by the faculty member(s) handling the course and the final marks areconsolidated at the end of the semester. No end semester examination is required for thiscourse.

1) Individual Culture and Ethics

2) Ethical codes of conduct and value Systems
3) Loyalty and Ethical Behaviour, Ethical decision making
4) Ethical business issues and solutions
5) Corporate Social Responsibilities of Business

**TOTAL: 60 PERIODS**

**COURSE OUTCOME**

| **PROFESSIONAL ETHICS IN ENGINEERING** | |
|---|---|
| **CO1** | Illustrate the core values that enrich the ethical behavior of an engineer. |
| **CO2** | Discuss the importance of moral issues and theories of the profession |
| **CO3** | Associate the code of ethics in real time application as responsible experimenters with various social issues. |
| **CO4** | Explain the concepts of Professional rights, Employee rights, Confidentiality, conflicts of interest and Intellectual Property Rights |
| **CO5** | Explain the global ethical issues related to various work place situation. |

| **CONTRACT LAWS AND REGULATIONS** | |
|---|---|
| **CO1** | Design the construction contracts |
| **CO2** | Develop a skill for the tendering process. |
| **CO3** | Explain the duties of the arbitrator. |
| **CO4** | Develop an idea on the various legal requirements to be met in relation to land and construction. |
| **CO5** | Identify and apply the provisions provided in the labour welfare schemes. |

| **PROJECT SAFETY MANAGEMENT** | |
|---|---|
| **CO1** | Develop the knowledge on accidents and their causes |
| **CO2** | Develop the knowledge about safety programmes safety programme job-site safety assessment. |
| **CO3** | Apply the knowledge contractual obligations |
| **CO4** | Explain about designing for safety and safety procedures |
| **CO5** | Develop the knowledge owners' and designers responsibility |

| **CONSTRUCTION PROJECT MANAGEMENT** |
|---|

| | |
|---|---|
| **CO1** | Explain the stages involved in a project and analyze the obligatory services to be taken up while performing a construction activity. |
| **CO2** | Apply the scheduling techniques for planning construction project |
| **CO3** | Develop the ability to integrate design and construction Process |
| **CO4** | Analyzing Resources utilization and resource productivity |
| **CO5** | Assess the risk and controlling systems using project management Information system. |

| **BUSINESS ETHICS** | |
|---|---|
| **CO1** | handle issues of business ethics and offer solutions ethical perspectives |
| **CO2** | able to apply the basic concepts of Indian ethos and value systems at work. |
| **CO3** | can handle issues of business ethics and offer solutions in ethical perspectives |
| **CO4** | are professionally efficient and skilful in value systems and culture |
| **CO5** | are capable in ethically manage business towards well being of the society |

**Details of course related to Human Values (R2013)**

**List of courses**

1. Human Rights
2. Indian Ethos

**Course Name and code**

| | |
|---|---|
| 1.Human Rights | GE6084 |
| 2.Indian Ethos | BA4111 |

**Course Objectives:**

**1.Human Rights**

- ✓ To sensitize the Engineering students to various aspects of Human Rights.

**2. Indian Ethos**

- ✓ To enable the learners in understanding of the basic concepts of Indian Ethos and familiariseabout ethical behaviour and value systems at work.

**Detailed Syllabus of each course**

**GE6084 HUMAN RIGHTS L T P C**

3 0 0 3

**UNIT I 9**

Human Rights – Meaning, origin and Development. Notion and classification of Rights – Natural, Moral and Legal Rights. Civil and Political Rights, Economic, Social and Cultural Rights; collective / Solidarity Rights.

**UNIT II 9**

Evolution of the concept of Human Rights Magana carta – Geneva convention of 1864. Universal Declaration of Human Rights, 1948. Theories of Human Rights.

**UNIT III 9**

Theories and perspectives of UN Laws – UN Agencies to monitor and compliance.

**UNIT IV 9**

Human Rights in India – Constitutional Provisions / Guarantees.

**UNIT V** **9**

Human Rights of Disadvantaged People – Women, Children, Displaced persons and Disabled persons, including Aged and HIV Infected People. Implementation of Human Rights – National and State Human Rights Commission – Judiciary – Role of NGO's, Media, Educational Institutions, Social Movements.

TOTAL : 45 PERIODS

**REFERENCES:**


1. Kapoor S.K., "Human Rights under International law and Indian Laws", Central Law Agency, Allahabad, 2014.
2. Chandra U., "Human Rights", Allahabad Law Agency, Allahabad, 2014.
3. Upendra Baxi, The Future of Human Rights, Oxford University Press, New Delhi.


**BA4111 INDIAN ETHOS (SEMINAR)** **L T P C**

**0 0 4 2**

- The following is the list of topics suggested for preparation and presentation by students twiceduring the semester.
- This will be evaluated by the faculty member(s) handling the course and the final marks areconsolidated at the end of the semester. No end semester examination is required for thiscourse.

1) Indian Ethos and Personality Development
2) Work ethos and ethics for Professional Managers
3) Indian Values, Value Systems and Wisdom for modern managers
4) Ethos in leadership development
5) Indian system of learning – Gurukul system of learning, Law of humility, Law of growth,Law of responsibility

**TOTAL: 60 PERIODS**

**COURSE OUTCOME**

| **HUMAN RIGHTS** | |
|---|---|
| **CO1** | Outline the basic rights, liberty, equality of Human and classification of rights. |
| **CO2** | Express the various concept of human rights Magana and Universal Declaration |
| **CO3** | Explain the theories and perspectives of UN Laws. |
| **CO4** | Outline the human rights in India and constitutional Provisions/ Guarantees. |

| | |
|---|---|
| **CO5** | Explain the various Implementation of Human Rights, National and State Human Rights Commission and Judiciary. |

| **INDIAN ETHOS (SEMINAR)** | |
|---|---|
| **CO1** | apply the basic concepts of Indian ethos and value systems at work. |
| **CO2** | handle issues of business ethics and offer solutions in ethical perspectives |
| **CO3** | professionally efficient and skilful in value systems and culture |
| **CO4** | capable in ethically manage business towards well being of the society |
| **CO5** | socially effective in undertaking business responsibilities |