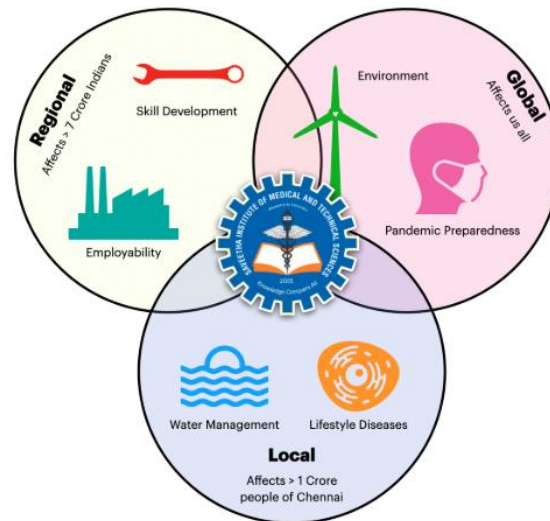
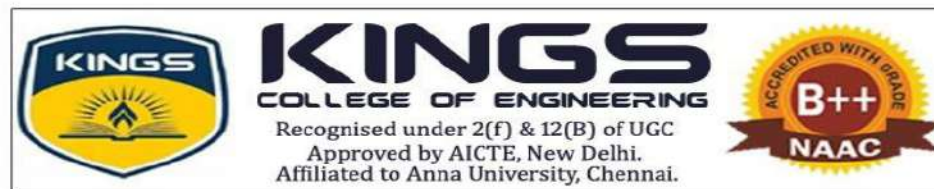




ACADEMIC YEAR 2023-2024



INSTITUTION INTEGRATES CROSSCUTTING ISSUES RELEVANT TO PROFESSIONAL ETHICS, GENDER, HUMAN VALUES, ENVIRONMENT AND SUSTAINABILITY INTO THE CURRICULUM



### ACADEMIC YEAR 2023-2024

#### 1.3.1 Institution Integrates Crosscutting Issues Relevant to Professional Ethics, Gender, Human Values, Environment and Sustainability into the Curriculum

S. No	AU Regulation	Course	Semester Offered	Course Code	Course Name
1.	2017	B.E Civil Engineering	07	EN8591	Municipal solid waste Management
2.	2017	B.E Civil Engineering	07	OEN751	Green Building design
3.	2017	B.E Civil Engineering	08	CE8016	Groundwater Engineering
4.	2021	B.E Civil Engineering	04	GE3451	Environmental Sciences and Sustainability
5.	2021	B.E Civil Engineering	05	CE3005	Rehabilitation / Heritage Restoration
6.	2021	B.E Civil Engineering	05	CCE331	Air and Noise Pollution Control Engineering
7.	2021	B.E Civil Engineering	05	MX3084	Disaster Risk Reduction and Management
8.	2021	B.E Civil Engineering	06	CCE334	Industrial Wastewater Management
9.	2017	B.E Computer Science and Engineering	08	GE8076	Professional Ethics in Engineering
10.	2017	B.E Computer Science and Engineering	07	GE8071	Disaster Management

11.	2017	B.E Computer Science and Engineering	07	MG8591	Principles of Management
12.	2021	B.E Computer Science and Engineering	04	GE3451	Environmental Sciences and Sustainability
13.	2021	B.E Computer Science and Engineering	05	MX3084	Disaster Risk Reduction and Management
14.	2021	B.E Computer Science and Engineering	06	MX3089	Industrial Safety
15.	2021	B.E Electronics and Communication Engineering	04	GE3451	Environmental Sciences and Sustainability
16.	2021	B.E Electronics and Communication Engineering	05	MX3084	Disaster Risk Reduction and Management
17.	2021	B.E Electronics and Communication Engineering	06	MX3089	Industrial Safety
18.	2017	B.E Electrical and Electronics Engineering	07	GE8071	Disaster Management
19.	2021	B.E Electrical and Electronics Engineering	04	GE3451	Environmental Sciences and Sustainability
20.	2021	B.E Electrical and Electronics Engineering	05	MX3084	Disaster Risk Reduction and Management
21.	2021	B.E Electrical and Electronics Engineering	06	MX3089	Industrial Safety
22.	2017	B.E Mechanical Engineering	07	MG8591	Principles of Management
23.	2021	B.E Mechanical Engineering	04	GE3451	Environmental Sciences and Sustainability

24.	2021	B.E Mechanical Engineering	05	MX3084	Disaster Risk Reduction and Management
25.	2021	B.E Mechanical Engineering	06	MX3089	Industrial Safety

*K. Abhirami*  
14/8/24

**IQAC Coordinator**

**Dr. K. Abhirami**  
IQAC Coordinator  
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*J. M. Muthu*  
14/8/24

**Principal**

**Principal**  
Kings College of Engineering  
(Autonomous)  
Punalkulam - 613 303



**ANNA UNIVERSITY, CHENNAI AFFILIATED  
INSTITUTIONS REGULATIONS – 2017 (UG) &  
REGULATIONS – 2021 (UG) CHOICE BASED  
CREDIT SYSTEM**

**SYLLABUS FOR COURSES WITH CROSSCUTTING  
ISSUES RELEVANT TO PROFESSIONAL ETHICS,  
GENDER, HUMAN VALUES, ENVIRONMENT AND  
SUSTAINABILITY INTO THE CURRICULUM**

**REFERENCES:**

1. Chris Hendrickson and Tung Au, "Project Management for Construction – Fundamentals Concepts for Owners", Engineers, Architects and Builders, Prentice Hall, Pittsburgh, 2000.
2. Moder.J., Phillips. C. and Davis E, "Project Management with CPM", PERT and Precedence Diagramming, Van Nostrand Reinhold Co., 3<sup>rd</sup> Edition, 1985.
3. Willis., E.M., "Scheduling Construction projects", John Wiley and Sons, 1986.
4. Halpin,D.W., "Financial and Cost Concepts for Construction Management", John Wiley and Sons, New York, 1985.

**EN8591****MUNICIPAL SOLID WASTE MANAGEMENT****L T P C  
3 0 0 3****OBJECTIVE:**

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

**UNIT I SOURCES AND CHARACTERISTICS 9**

Sources and types of municipal solid wastes- Public health and environmental impacts of improper disposal of solid wastes- sampling and characterization of wastes - factors affecting waste generation rate and characteristics - Elements of integrated solid waste management – Requirements and salient features of Solid waste management rules (2016) – Role of public and NGO"s- Public Private participation – Elements of Municipal Solid Waste Management Plan.

**UNIT II SOURCE REDUCTION , WASTE STORAGE AND RECYCLING 8**

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

**UNIT III COLLECTION AND TRANSFER OF WASTES 8**

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

**UNIT IV PROCESSING OF WASTES 12**

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

**UNIT V WASTE DISPOSAL 8**

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

**TOTAL: 45 PERIODS****OUTCOMES:**

The students completing the course will demonstrate

- understanding of the nature and characteristics of municipal solid wastes and the regulatory requirements regarding municipal solid waste management.
- Reduction, reuse and recycling of waste.

- ability to plan and design systems for storage, collection, transport, processing and disposal of municipal solid waste.
- knowledge on the issues on solid waste management from an integrated and holistic perspective, as well as in the local and international context.
- Design and operation of sanitary landfill.

**TEXTBOOKS:**

1. William A. Worrell, P. Aarne Vesilind (2012) Solid Waste Engineering, Cengage Learning, 2012.
2. John Pitchel (2014), Waste Management Practices-Municipal, Hazardous and industrial – CRC Press, Taylor and Francis, New York.

**REFERENCES:**

1. CPHEEO (2014), "Manual on Municipal Solid waste management, Central Public Health and Environmental Engineering Organisation , Government of India, New Delhi.
2. George Tchobanoglous and Frank Kreith (2002). Handbook of Solid waste management, McGraw Hill, New York.

**GE8077**

**TOTAL QUALITY MANAGEMENT**

**L T P C  
3 0 0 3**

**OBJECTIVE:**

- To facilitate the understanding of Quality Management principles and process.

**UNIT I INTRODUCTION 9**

Introduction - Need for quality - Evolution of quality - Definitions of quality - Dimensions of product and service quality - Basic concepts of TQM - TQM Framework - Contributions of Deming, Juran and Crosby - Barriers to TQM - Customer focus - Customer orientation, Customer satisfaction, Customer complaints, Customer retention.

**UNIT II TQM PRINCIPLES 9**

Leadership - Quality Statements, Strategic quality planning, Quality Councils - Employee involvement - Motivation, Empowerment, Team and Teamwork, Recognition and Reward, Performance appraisal - Continuous process improvement - PDCA cycle, 5S, Kaizen - Supplier partnership - Partnering, Supplier selection, Supplier Rating.

**UNIT III TQM TOOLS AND TECHNIQUES I 9**

The seven traditional tools of quality - New management tools - Six sigma: Concepts, Methodology, applications to manufacturing, service sector including IT - Bench marking - Reason to bench mark, Bench marking process - FMEA - Stages, Types.

**UNIT IV TQM TOOLS AND TECHNIQUES II 9**

Quality Circles - Cost of Quality - Quality Function Deployment (QFD) - Taguchi quality loss function - TPM - Concepts, improvement needs - Performance measures.

**UNIT V QUALITY MANAGEMENT SYSTEM 9**

Introduction—Benefits of ISO Registration—ISO 9000 Series of Standards—Sector-Specific Standards—AS 9100, TS16949 and TL 9000-- ISO 9001 Requirements—Implementation—Documentation—Internal Audits—Registration--**ENVIRONMENTAL MANAGEMENT SYSTEM:** Introduction—ISO 14000 Series Standards—Concepts of ISO 14001—Requirements of ISO 14001—Benefits of EMS.

**TOTAL: 45 PERIODS**





**UNIT III COMFORTS IN BUILDING 9**  
Thermal Comfort in Buildings- Issues; Heat Transfer Characteristic of Building Materials and Building Techniques. Incidence of Solar Heat on Buildings-Implications of Geographical Locations.

**UNIT IV UTILITY OF SOLAR ENERGY IN BUILDINGS 9**  
Utility of Solar energy in buildings concepts of Solar Passive Cooling and Heating of Buildings. Low Energy Cooling. Case studies of Solar Passive Cooled and Heated Buildings.

**UNIT V GREEN COMPOSITES FOR BUILDINGS 9**  
Concepts of Green Composites. Water Utilisation in Buildings, Low Energy Approaches to Water Management. Management of Solid Wastes. Management of Sullage Water and Sewage. Urban Environment and Green Buildings. Green Cover and Built Environment.

**TOTAL: 45 PERIODS**

**TEXT BOOKS:**

1. K.S.Jagadish, B. U. Venkataramareddy and K. S. Nanjundarao. Alternative Building Materials and Technologies. New Age International, 2007.
2. Low Energy Cooling For Sustainable Buildings. John Wiley and Sons Ltd, 2009.
3. Sustainable Building Design Manual. Vol 1 and 2, Teri, New Delhi, 2004.

**REFERENCES:**

1. Osman Attmann Green Architecture Advanced Technologies and Materials. McGraw Hill, 2010.
2. Jerry Yudelson Green building Through Integrated Design. McGraw Hill, 2009.
3. Fundamentals of Integrated Design for Sustainable Building By Marian Keeler, Bill Burke

**OAI752 INTEGRATED WATER RESOURCES MANAGEMENT L T P C**  
**3 0 0 3**

**OBJECTIVE:**

- To introduce the students to the interdisciplinary analysis of water and conceptual design of intervention strategies.
- To develop a knowledge-base on capacity building on IWRM.

**UNIT I IWRM FRAMEWORK 9**  
Definition – Objectives – Principles - Evolution of IWRM - IWRM relevance in water resources management – Paradigm shift : Processes and prospective outcomes

**UNIT II CONTEXTUALIZING IWRM 9**  
UN formulations - SDG goals - IWRM in Global, Regional and Local water partnership – Institutional transformation - Bureaucratic reforms - Inclusive development

**UNIT III EMERGING ISSUES IN WATER MANAGEMENT 9**  
Emerging Issues — Drinking water management in the context of climate change - IWRM and irrigation - Flood – Drought – Pollution – Linkages between water, health and poverty

**UNIT IV IWRM AND WATER RESOURCES DEVELOPMENT IN INDIA 9**  
Rural Development - Ecological sustainability- -Watershed development and conservation - Ecosystem regeneration – Wastewater reuse - Sustainable livelihood - Food security

**UNIT V ASPECTS OF INTEGRATED DEVELOPMENT 9**  
Capacity building - Conceptual framework of IWRM – Problems and policy issues - Solutions for effective integrated water management - Case studies

**TOTAL: 45 PERIODS**

**OUTCOMES:**

The students will be able to

<b>UNIT II</b>	<b>CONTEXTUALIZING IWRM</b>	<b>9</b>
UN formulations - SDG goals - IWRM in Global, Regional and Local water partnership – Institutional transformation - Bureaucratic reforms - Inclusive development		
<b>UNIT III</b>	<b>EMERGING ISSUES IN WATER MANAGEMENT</b>	<b>9</b>
Emerging Issues — Drinking water management in the context of climate change - IWRM and irrigation - Flood – Drought – Pollution – Linkages between water, health and poverty		
<b>UNIT IV</b>	<b>IWRM AND WATER RESOURCES DEVELOPMENT IN INDIA</b>	<b>9</b>
Rural Development - Ecological sustainability- -Watershed development and conservation - Ecosystem regeneration – Wastewater reuse - Sustainable livelihood - Food security		
<b>UNIT V</b>	<b>ASPECTS OF INTEGRATED DEVELOPMENT</b>	<b>9</b>
Capacity building - Conceptual framework of IWRM – Problems and policy issues - Solutions for effective integrated water management - Case studies		

**TOTAL: 45 PERIODS**

**OUTCOMES:**

The students will be able to

- Understand objectives, principles and evolution of integrated water resources management.
- Have an idea of contextualizing IWRM
- Gain knowledge in emerging issues in water management, flood, drought, pollution and poverty.
- Understand the water resources development in India and wastewater reuse.
- Gain knowledge on integrated development of water management.

**TEXTBOOKS:**

1. Mollinga P. *et al.* "Integrated Water Resources Management", Water in South Asia Volume I, Sage Publications, 2006.
2. Sithamparamanathan, Rangasamy, A., and Arunachalam, N., "Ecosystem Principles and Sustainable Agriculture", Scitech Publications (India) Pvt.Lt, Chennai, 1999.

**REFERENCES:**

1. Cech Thomas V., Principles of Water Resources: History, Development, Management and Policy. John Wiley and Sons Inc., New York. 2003.
2. Murthy, J.V.S., "Watershed Management in India", Wiley Eastern Ltd., New York, 1995.
3. Dalte, S.J.C., "Soil Conservation and Land Management", International Book Distribution, India, 1986.

**CE8016**

**GROUNDWATER ENGINEERING**

**L T P C**  
**3 0 0 3**

**OBJECTIVES:**

- To introduce the student to the principles of Groundwater governing Equations and Characteristics of different aquifers,
- To understand the techniques of development and management of groundwater.

<b>UNIT I</b>	<b>HYDROGEOLOGICAL PARAMETERS</b>	<b>9</b>
Introduction – Water bearing Properties of Rock – Type of aquifers - Aquifer properties – permeability, specific yield, transmissivity and storage coefficient – Methods of Estimation – GEC		

norms - Steady state flow - Darcy's Law - Groundwater Velocity — Dupuit Forchheimer assumption – Steady Radial Flow into a Well

**UNIT II WELL HYDRAULICS 9**

Unsteady state flow - Theis method - Jacob method – Chow's method – Law of Times – Theis Recovery – Bailer method – Slug method - tests - Image well theory – Partial penetrations of wells – Well losses – Specific Capacity and Safe yield - Collector well and Infiltration gallery

**UNIT III GROUNDWATER MANAGEMENT 9**

Need for Management Model – Database for Groundwater Management – Groundwater balance study – Introduction to Mathematical model – Model Conceptualization – Initial and Boundary Condition – Calibration – Validation – Future Prediction – Sensitivity Analysis – Uncertainty – Development of a model

**UNIT IV GROUNDWATER QUALITY 9**

Ground water chemistry - Origin, movement and quality - Water quality standards – Drinking water – Industrial water – Irrigation water - Ground water Pollution and legislation - Environmental Regulatory requirements

**UNIT V GROUNDWATER CONSERVATION 9**

Artificial recharge techniques – Reclaimed wastewater recharge – Soil aquifer treatment (SAT) – Aquifer Storage and Recovery (ASR) Seawater Intrusion and Remediation – Ground water Basin management and Conjunctive use – Protection zone delineation, Contamination source inventory and remediation schemes

**TOTAL: 45 PERIODS**

**OUTCOMES:**

The students will be able to

- Understand aquifer properties and its dynamics
- Get an exposure towards well design and practical problems
- Develop a model for groundwater management.
- Students will be able to understand the importance of artificial recharge and groundwater quality concepts
- Gain knowledge on conservation of groundwater.

**TEXTBOOKS:**

1. Raghunath H.M., "Ground Water Hydrology", New Age International (P) Limited, New Delhi, 2010.
2. Todd D.K., "Ground Water Hydrology", John Wiley and Sons, New York, 2000.

**REFERENCES:**

1. Fitts R Charles, "Groundwater Science". Elsevier, Academic Press, 2002.
2. Ramakrishnan, S, Ground Water, K.J. Graph arts, Chennai, 1998.

**CE8017**

**WATER RESOURCES SYSTEMS ENGINEERING**

**L T P C  
3 0 0 3**

**OBJECTIVES:**

- To introduce the student to the concept of Mathematical approaches for managing the water resources system.
- To make the students apply an appropriate system approach to optimally operate a water resource system.

9. IRC 58-2012. The Indian Road Congress, Guideline for the Design of Rigid Pavements for Highways, New Delhi
10. Saxena Subhash, C. and Satyapal Arora, A Course in Railway Engineering, Dhanapat Rai and Sons, Delhi, 1998.

#### COs- PO's & PSO's MAPPING

PO/PSO		Course Outcome					Over all Correlation of Cos to POs
		CO1	CO2	CO3	CO4	CO5	
<b>PROGRAM OUTCOMES (PO)</b>							
PO1	Knowledge of Engineering Sciences	3	2	2	3		2
PO2	Problem analysis		3	3			3
PO3	Design / development of solutions		3	2		3	3
PO4	Investigation	2	2	2			2
PO5	Modern Tool Usage		2	2		2	2
PO6	Engineer and Society	3		3	3		3
PO7	Environment and sustainability	1	2	3			2
PO8	Ethics	3	3	3	3		3
PO9	Individual and Team work		2			2	2
PO10	Communication				1		1
PO11	Project Management and Finance		2	3			3
PO12	Life Long Learning		3	3		2	3
<b>PROGRAM SPECIFIC OUTCOMES (PSO)</b>							
PSO1	Knowledge of Civil Engineering discipline	3	3	3	3	3	3
PSO2	Critical analysis of Civil Engineering problems and Innovation	2	3	3	2	3	3
PSO3	Conceptualization and evaluation of engineering solutions to Civil Engineering Issues				2	3	2

**GE3451**

**ENVIRONMENTAL SCIENCES AND SUSTAINABILITY**

**L T P C  
2 0 0 2**

#### **COURSE OBJECTIVES:**

- To introduce the basic concepts of environment, ecosystems and biodiversity and emphasize on the biodiversity of India and its conservation.
- To impart knowledge on the causes, effects and control or prevention measures of environmental pollution and natural disasters.
- To facilitate the understanding of global and Indian scenario of renewable and nonrenewable resources, causes of their degradation and measures to preserve them.
- To familiarize the concept of sustainable development goals and appreciate the interdependence of economic and social aspects of sustainability, recognize and analyze climate changes, concept of carbon credit and the challenges of environmental management.
- To inculcate and embrace sustainability practices and develop a broader understanding on green materials, energy cycles and analyze the role of sustainable urbanization.

#### **UNIT I ENVIRONMENT AND BIODIVERSITY**

**6**

Definition, scope and importance of environment – need for public awareness. Eco-system and Energy flow– ecological succession. Types of biodiversity: genetic, species and ecosystem diversity– values of biodiversity, India as a mega-diversity nation – hot-spots of biodiversity – threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – endangered and endemic species of India – conservation of biodiversity: In-situ and ex-situ.

**UNIT II ENVIRONMENTAL POLLUTION 6**  
Causes, Effects and Preventive measures of Water, Soil, Air and Noise Pollutions. Solid, Hazardous and E-Waste management. Case studies on Occupational Health and Safety Management system (OHSMS). Environmental protection, Environmental protection acts .

**UNIT III RENEWABLE SOURCES OF ENERGY 6**  
Energy management and conservation, New Energy Sources: Need of new sources. Different types new energy sources. Applications of- Hydrogen energy, Ocean energy resources, Tidal energy conversion. Concept, origin and power plants of geothermal energy.

**UNIT IV SUSTAINABILITY AND MANAGEMENT 6**  
Development , GDP ,Sustainability- concept, needs and challenges-economic, social and aspects of sustainability-from unsustainability to sustainability-millennium development goals, and protocols-Sustainable Development Goals-targets, indicators and intervention areas Climate change- Global, Regional and local environmental issues and possible solutions-case studies. Concept of Carbon Credit, Carbon Footprint. Environmental management in industry-A case study.

**UNIT V SUSTAINABILITY PRACTICES 6**  
Zero waste and R concept, Circular economy, ISO 14000 Series, Material Life cycle assessment, Environmental Impact Assessment. Sustainable habitat: Green buildings, Green materials, Energy efficiency, Sustainable transports. Sustainable energy: Non-conventional Sources, Energy Cycles-carbon cycle, emission and sequestration, Green Engineering: Sustainable urbanization- Socio-economical and technological change.

**TOTAL : 30 PERIODS**

**COURSE OUTCOMES:**

- CO1** To recognize and understand the functions of environment, ecosystems and biodiversity and their conservation.
- CO2** To identify the causes, effects of environmental pollution and natural disasters and contribute to the preventive measures in the society.
- CO3** To identify and apply the understanding of renewable and non-renewable resources and contribute to the sustainable measures to preserve them for future generations.
- CO4** To recognize the different goals of sustainable development and apply them for suitable technological advancement and societal development.
- CO5** To demonstrate the knowledge of sustainability practices and identify green materials, energy cycles and the role of sustainable urbanization.

**TEXTBOOKS:**

1. Anubha Kaushik and C. P. Kaushik's "Perspectives in Environmental Studies", 6th Edition, New Age International Publishers ,2018.
2. Benny Joseph, 'Environmental Science and Engineering', Tata McGraw-Hill, New Delhi, 2016.
3. Gilbert M.Masters, 'Introduction to Environmental Engineering and Science', 2nd edition, Pearson Education, 2004.
4. Allen, D. T. and Shonnard, D. R., Sustainability Engineering: Concepts, Design and Case Studies, Prentice Hall.
5. Bradley. A.S; Adebayo, A.O., Maria, P. Engineering applications in sustainable design and development, Cengage learning.
6. Environment Impact Assessment Guidelines, Notification of Government of India, 2006.
7. Mackenthun, K.M., Basic Concepts in Environmental Management, Lewis Publication, London, 1998.

**REFERENCES :**

1. R.K. Trivedi, 'Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards', Vol. I and II, Enviro Media. 38 . Edition 2010.
2. Cunningham, W.P. Cooper, T.H. Gorhani, 'Environmental Encyclopedia', Jaico Publ., House, Mumbai, 2001.
3. Dharmendra S. Sengar, 'Environmental law', Prentice hall of India PVT. LTD, New Delhi, 2007.

### COs- PO's & PSO's MAPPING

PO/PSO		Course Outcome					Overall Correlation of CO s to POs
		CO1	CO2	CO3	CO4	CO5	
PO1	Knowledge of Engineering Sciences	3	3	3	2	2	3
PO2	Problem analysis	3	2	2	2	2	2
PO3	Design / development of solutions	3	3	3	3	3	3
PO4	Investigation	1	1	1	1	1	1
PO5	Modern Tool Usage	1	1	1	1	1	1
PO6	Individual and Team work	1	1	1	1	1	1
PO7	Communication	1	1	1	1	1	1
PO8	Engineer and Society	2	2	2	2	2	2
PO9	Ethics	1	1	1	1	1	1
PO10	Environment and Sustainability	1	1	1	1	1	1
PO11	Project Management and Finance	1	1	1	1	1	1
PO12	Life Long Learning	2	2	2	2	2	2
PSO1	Knowledge of Civil Engineering discipline	3	3	3	3	3	3
PSO2	Critical analysis of Civil Engineering problems and innovation	1	3	3	2	3	1
PSO3	Conceptualization and evaluation of engineering solutions to Civil Engineering Issues	1	2	2	2	2	2

**CE3005**

**REHABILITATION/HERITAGE RESTORATION**

**L T P C**  
**3 0 0 3**

**COURSE OBJECTIVE:**

- To acquire the knowledge on quality of concrete, durability aspects, causes of deterioration, assessment of distressed structures, repairing of structures, Restoration of Heritage structures and demolition procedures.

**UNIT I MAINTENANCE AND REPAIR STRATIGES 9**  
Maintenance, Repair and Rehabilitation - Facets of Maintenance - Importance of Maintenance - Various aspects of Inspection - Assessment procedure for evaluating a damaged structure - causes of deterioration.

**UNIT II STRENGTH AND DURABILITY OF CONCRETE 9**  
Quality assurance for concrete – Strength and Durability of concrete - Cracks, different types, causes-Effects due to climate, temperature, Sustained elevated Temperature, Corrosion –

**UNIT III SPECIAL CONCRETES 9**  
Polymer concrete - Sulphur infiltrated concrete - Fibre reinforced concrete - High strength concrete- High performance concrete - Self compacting concrete - Geopolymer concrete - Concrete made with industrial wastes.

**UNIT IV TESTING TECHNIQUES AND PROTECTION METHODS 9**  
Non-destructive Testing Techniques, Epoxy injection, Shoring, Underpinning, Corrosion protection techniques – Corrosion inhibitors, Corrosion resistant steels, Coatings to reinforcement, cathodic protection.

**UNIT V STRENGTHENING, REPAIR, REHABILITATION AND RESTORATION OF STRUCTURES 9**  
Strengthening of Structural elements, Repair of structures distressed due to corrosion, fire, leakage and earthquake - Restoration of Heritage structures- Case studies.

**TOTAL: 45 PERIODS**

**COURSE OUTCOMES:**

Students will be able to

- CO1** Know the importance of inspection and maintenance.
- CO2** Study the Impacts of cracks, corrosion and climate on structures.
- CO3** Know about various special concretes
- CO4** Understand the testing techniques and various protection measures
- CO5** Know the Repair of structures and Restoration of Heritage structures

**TEXT BOOKS:**

1. Shetty.M.S. Jain A K., Concrete Technology - Theory and Practice, S.Chand and Company, Eighth Edition, 2019.
2. B.Vidivelli, Rehabilitation of Concrete Structures Standard Publishes Distribution.1<sup>st</sup> edition 2009.

**REFERENCES:**

1. Hand book on Seismic Retrofit of Buildings, CPWD and Indian Buildings Congress, Narosa Publishers, 2008.
2. Hand Book on "Repair and Rehabilitation of RCC Buildings" – Director General works CPWD ,Govt of India , New Delhi – 2002
3. P.C.Varghese, Maintenance Repair and Rehabilitation & Minor works of building, Prentice Hall India Pvt Ltd 2014.
4. Dodge Woodson, Concrete Structures, Protection, Repair and Rehabilitation, Butterworth-Heinemann, Elsevier, New Delhi 2012

**COs- PO's & PSO's MAPPING**

PO/PSO		Course Outcome					Overall Correlation of CO s to POs
		CO1	CO2	CO3	CO4	CO5	
<b>PROGRAM OUTCOMES(PO)</b>							
PO1	Knowledge of Engineering Sciences	3	3	3	2	2	3
PO2	Problem analysis	2	2	2	2	2	2
PO3	Design / development of solutions	3	3	3	3	3	3
PO4	Investigation	-	-	-	-	-	-
PO5	Modern Tool Usage	-	-	-	-	-	-
PO6	Engineer and Society	-	-	-	-	-	-
PO7	Environment and Sustainability	1	1	1	1	1	1
PO8	Ethics	1	1	1	1	1	1
PO9	Individual and Team work	2	1	1	1	1	1
PO10	Communication	-	-	-	-	-	-
PO11	Project Management and Finance	-	-	-	-	-	-
PO12	Life Long Learning	1	1	1	1	1	1
<b>PROGRAM SPECIFIC OUTCOMES (PSO)</b>							
PSO1	Knowledge of Civil Engineering discipline	-	1	1	-	-	1
PSO2	Critical analysis of Civil Engineering problems and innovation	-	1	-	1	2	1
PSO3	Conceptualization and evaluation of engineering solutions to Civil Engineering Issues	-	1	2	-	2	2

**REFERENCES:**

1. IPCC Fourth Assessment Report, Cambridge University Press, Cambridge, UK, 2007
2. Thomas E, Lovejoy and Lee Hannah "Climate Change and Biodiversity", TERI Publishers, 2005
3. Jan C. van Dam, Impacts of "Climate Change and Climate Variability on Hydrological Regimes", Cambridge University Press, 2003.

**COs- PO's & PSO's MAPPING**

PO/PSO		Course Outcome					Over all Correlation of COs to POs
		CO1	CO2	CO3	CO4	CO5	
<b>PROGRAM OUTCOMES (PO)</b>							
PO1	Knowledge of Engineering Sciences			2	2		2
PO2	Problem analysis	3		3		3	3
PO3	Design / development of solutions				2		2
PO4	Investigation			2	2		2
PO5	Modern Tool Usage			3	3	3	3
PO6	Engineer and Society		2			2	2
PO7	Environment and sustainability		3				3
PO8	Ethics						
PO9	Individual and Team work				3	3	3
PO10	Communication	1				2	1
PO11	Project Management and Finance					3	3
PO12	Life Long Learning	2		3		2	2
<b>PROGRAM SPECIFIC OUTCOMES (PSO)</b>							
PSO1	Knowledge of Civil Engineering discipline		2				2
PSO2	Critical analysis of Civil Engineering problems and innovation					2	2
PSO3	Conceptualization and evaluation of engineering solutions to Civil Engineering Issues		3				3

**CCE331****AIR AND NOISE POLLUTION CONTROL ENGINEERING****L T P C****3 0 0 3****COURSE OBJECTIVE:**

- To impart knowledge on the sources, effects and control techniques of air pollutants and noise pollution.

**UNIT I GENERAL****9**

Atmosphere as a place of disposal of pollutants – Air Pollution – Definition - Air Pollution and Global Climate - Units of measurements of pollutants - Air quality criteria - emission standards - National ambient air quality standards - Air pollution indices - Air quality management in India.

**UNIT II SOURCES, CLASSIFICATION AND EFFECTS****9**

Sources and classification of air pollutants - Man made - Natural sources - Type of air pollutants - Pollution due to automobiles - Analysis of air pollutants - Chemical, Instrumental and biological methods. Air pollution and its effects on human beings, plants and animals - Economic effects of air pollution - Effect of air pollution on meteorological conditions - Changes on the Meso scale, Micro scale and Macro scale.



**UNIT III SAMPLING, METEOROLOGY AND AIR QUALITY MODELLING 9**

Sampling and measurement of particulate and gaseous pollutants - Ambient air sampling - Stack sampling. Environmental factors - Meteorology - temperature lapse rate and stability – Adiabatic lapse rate - Wind Rose - Inversion – Wind velocity and turbulence - Plume behavior - Dispersion of air pollutants- Air Quality Modeling.

**UNIT IV AIR POLLUTION CONTROL MEASURES 9**

Control - Source correction methods - Control equipments - Particulate control methods – Bag house filter - Settling chamber - cyclone separators - inertial devices - Electrostatic precipitator - scrubbers - Control of gaseous emissions - Absorption - Absorption equipments - adsorption and combustion devices (Theory and working of equipments only).

**UNIT V NOISE POLLUTION AND ITS CONTROL 9**

Sources of noise – Units and Measurements of Noise - Characterization of Noise from Construction, Mining, Transportation and Industrial Activities, Airport Noise – General Control Measures – Effects of noise pollution – auditory effects, non-auditory effects. Noise Menace– Prevention and Control of Noise Pollution – Control of noise at source, control of transmission, protection of exposed person - Control of other types of Noise Sound Absorbent

**TOTAL: 45 PERIODS****COURSE OUTCOMES:**

On completion of the course, the student is expected to

- CO1** Understand various types and sources of air pollution and its effects
- CO2** Know the dispersion of air pollutants and their modeling
- CO3** Know about the principles and design of control of particulate pollutants
- CO4** Understand the principles and design of control of gaseous pollutant
- CO5** Know the sources, effects and control of vehicular, indoor air and noise pollution

**TEXTBOOKS:**

1. C. S. Rao, "Environmental Pollution Control Engineering", Wiley Eastern Limited, 2006.
2. M. N. Rao, H. V. N. Rao, Air pollution, Tata McGraw Hill Pvt Ltd, New Delhi, 2017
3. Dr. Y. Anjaneyulu, "Air Pollution and Control Technologies", Allied publishers Pvt. Ltd., 2019.

**REFERENCES:**

1. Noel De Nevers, "Air pollution control Engineering", McGraw Hill International Edition, McGraw Hill Inc, New Delhi, 2000.
2. Air Pollution act, India, 1987
3. Peterson and E.Gross Jr., "Hand Book of Noise Measurement", 7<sup>th</sup> Edition, 1974
4. Mukherjee, "Environmental Pollution and Health Hazards", causes and effects, 1986
5. Antony Milne, "Noise Pollution: Impact and Counter Measures", David & Charles PLC, 1979.
6. Kenneth wark, Cecil F.Warner, "Air Pollution its Origin and Control", Harper and Row Publishers, New York, 1998.

**COs- PO's & PSO's MAPPING**

CO's	PO's												PSO's		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
<b>1</b>	3				3			2	1	2			2		
<b>2</b>	2			3		2						2	1	2	2
<b>3</b>	2		3		3		1				2		2	2	2
<b>4</b>	2		3		3		1				2		2	2	2
<b>5</b>	3	3	2	3	2					2			2		
<b>Avg.</b>	2	3	3	3	3			2	1	2	2	2	2	2	2

1.low, 2-medium, 3-high, '-'- no correlation

Note: The average value of this course to be used for program articulation matrix

**Theme - B: Evolution of Film Language**

- B-1: Film language, form, movement etc.
- B-2: Early cinema... **silent film** (Particularly French)
- B-3: The emergence of feature films: **Birth of a Nation**
- B-4: Talkies

**Theme - C: Film Theories and Criticism/Appreciation**

- C-1: Realist theory; Auteurists
- C-2: Psychoanalytic, Ideological, Feminists
- C-3: How to read films?
- C-4: Film Criticism / Appreciation

**Theme - D: Development of Films**

- D-1: Representative Soviet films
- D-2: Representative Japanese films
- D-3: Representative Italian films
- D-4: Representative Hollywood film and the studio system

**Theme - E: Indian Films**

- E-1: The early era
- E-2: The important films made by the directors
- E-3: The regional films
- E-4: The documentaries in India

**READING:**

A Reader containing important articles on films will be prepared and given to the students. The students must read them and present in the class and have discussion on these.

**MX3084****DISASTER RISK REDUCTION AND MANAGEMENT****L T P C  
3 0 0 0****COURSE OBJECTIVE**

- To impart knowledge on concepts related to disaster, disaster risk reduction, disaster management
- To acquaint with the skills for planning and organizing disaster response

**UNIT I HAZARDS, VULNERABILITY AND DISASTER RISKS 9**

Definition: Disaster, Hazard, Vulnerability, Resilience, Risks – Types of Disasters: Natural, Human induced, Climate change induced –Earthquake, Landslide, Flood, Drought, Fire etc – Technological disasters- Structural collapse, Industrial accidents, oil spills -Causes, Impacts including social, Economic, political, environmental, health, psychosocial, etc.- Disaster vulnerability profile of India and Tamil Nadu - Global trends in disasters: urban disasters, pandemics, Complex emergencies, -, Inter relations between Disasters and Sustainable development Goals

**UNIT II DISASTER RISK REDUCTION (DRR) 9**

Sendai Framework for Disaster Risk Reduction, Disaster cycle - Phases, Culture of safety, prevention, mitigation and preparedness community Based DRR, Structural- nonstructural measures, Roles and responsibilities of- community, Panchayati Raj Institutions / Urban Local Bodies (PRIs/ULBs), States, Centre, and other stakeholders- Early Warning System – Advisories from Appropriate Agencies.- Relevance of indigenous Knowledge, appropriate technology and Local resources.

**UNIT III DISASTER MANAGEMENT 9**

Components of Disaster Management – Preparedness of rescue and relief, mitigation, rehabilitation and reconstruction- Disaster Risk Management and post disaster management – Compensation and Insurance- Disaster Management Act (2005) and Policy - Other related policies, plans, programmers and legislation - Institutional Processes and Framework at State and Central Level- (NDMA –SDMA- DDMA-NRDF- Civic Volunteers)

**UNIT IV TOOLS AND TECHNOLOGY FOR DISASTER MANAGEMENT 9**

Early warning systems -Components of Disaster Relief: Water, Food, Sanitation, Shelter, Health, Waste Management, Institutional arrangements (Mitigation, Response and Preparedness, – Role of GIS and Information Technology Components in Preparedness, Risk Assessment, Response and Recovery Phases of Disaster – Disaster Damage Assessment. - Elements of Climate Resilient Development –Standard operation Procedure for disaster response – Financial planning for disaster Management

**UNIT V DISASTER MANAGEMENT: CASE STUDIES 9**

Discussion on selected case studies to analyse the potential impacts and actions in the contest of disasters-Landslide Hazard Zonation: Earthquake Vulnerability Assessment of Buildings and Infrastructure: Case Studies, Drought Assessment: Case Studies, Coastal Flooding: Storm Surge Assessment, Floods: Fluvial and Pluvial Flooding: Case Studies; Forest Fire: Case Studies, Man Made disasters: Case Studies, Space Based Inputs for Disaster Mitigation and Management and field works related to disaster management.- Field work-Mock drill -

**TOTAL : 45 PERIODS****TEXT BOOKS:**

- 1 Taimpo (2016), Disaster Management and Preparedness, CRC Publications
- 2 Singh R (2017), Disaster Management Guidelines for earthquakes, Landslides, Avalanches and tsunami, Horizon Press Publications
- 3 Singhal J.P. "Disaster Management", Laxmi Publications, 2010. ISBN-10: 9380386427 ISBN-13: 978-9380386423
- 4 Tushar Bhattacharya, "Disaster Science and Management", McGraw Hill India Education Pvt. Ltd., 2012. ISBN-10: 1259007367, ISBN-13: 978-1259007361]

**REFERENCES**

1. Govt. of India: Disaster Management Act, Government of India, New Delhi, 2005.
2. Government of India, National Disaster Management Policy, 2009.
3. Shaw R (2016), Community based Disaster risk reduction, Oxford University Press

**COURSE OUTCOME:**

**CO1:** To impart knowledge on the concepts of Disaster, Vulnerability and Disaster Risk reduction (DRR)

**CO2:** To enhance understanding on Hazards, Vulnerability and Disaster Risk Assessment prevention and risk reduction

**CO3:** To develop disaster response skills by adopting relevant tools and technology

**CO4:** Enhance awareness of institutional processes for Disaster response in the country and

**CO5:** Develop rudimentary ability to respond to their surroundings with potential Disaster response in areas where they live, with due sensitivity

**CO's – PO's & PSO's MAPPING**

CO's	PO's												PSO's		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3	3	2	3	-	-	2	2	-	-	2	-	2	-	1
2	3	3	3	3	-	-	2	1	-	-	2	-	2	-	1
3	3	3	3	3	-	-	2	2	-	-	-	-	2	-	1
4	3	3	2	3	-	-	2	1	-	-	2	-	2	-	1
5	3	3	2	3	-	-	2	2	-	-	2	-	3	-	1
AVG	3	3	3	3	-	-	2	2	-	-	2	-	2	-	1

7. Sam Mannan, Lees' Loss Prevention in the Process Industries, Hazard Identification, Assessment and Control, 4th Edition, Butterworth Heineman, 2012.

#### COs- PO's & PSO's MAPPING

CO's	PO's												PSO's		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1						2	3	3					2		
2	3	2	3	2	2			3	2			1		2	2
3		2	3	2	2			3	2			1		2	
4			3		3	2	2	2	2	1	1			2	2
5	3			2				2							
Avg.	3	2	3	2	2	2	2	3	2	1	1	1	2	2	2

1.low, 2-medium, 3-high, '-'- no correlation

**CCE334**

**INDUSTRIAL WASTEWATER MANAGEMENT**

**L T P C**  
**3 0 0 3**

#### **COURSE OBJECTIVES:**

- To impart knowledge on the concept and application of Industrial pollution prevention, cleaner technologies, industrial wastewater treatment and residue management.
- Understand principles of various processes applicable to industrial wastewater treatment
- Identify the best applicable technologies for wastewater treatment from the perspective of yield production.

#### **UNIT I INTRODUCTION**

**8**

Industrial scenario in India– Industrial activity and Environment - Uses of Water by industry – Sources and types of industrial wastewater – Nature and Origin of Pollutants - Industrial wastewater and environmental impacts – Regulatory requirements for treatment of industrial wastewater – Industrial waste survey – Industrial wastewater monitoring and sampling – generation rates, characterization and variables –Toxicity of industrial effluents and Bioassay tests – Major issues on water quality management.

#### **UNIT II INDUSTRIAL POLLUTION PREVENTION &WASTE MINIMISATION**

**8**

Prevention vis a vis Control of Industrial Pollution – Benefits and Barriers – Waste management Hierarchy - Source reduction techniques – Periodic Waste Minimisation Assessments – Evaluation of Pollution Prevention Options – Cost benefit analysis – Pay-back period – Implementing & Promoting Pollution Prevention Programs in Industries.

#### **UNIT III INDUSTRIAL WASTEWATER TREATMENT**

**10**

Flow and Load Equalisation – Solids Separation – Removal of Fats, Oil & Grease- Neutralisation-Removal of Inorganic Constituents – Precipitation, Heavy metal removal, Nitrogen & Phosphorousremoval, Ion exchange, Adsorption, Membrane Filtration, Electro dialysis & Evaporation –Removal of Organic Constituents – Biological treatment Processes, Chemical OxidationProcesses, Advanced Oxidation processes – Treatability Studies.

#### **UNIT IV WASTEWATER REUSE AND RESIDUAL MANAGEMENT**

**9**

Individual and Common Effluent Treatment Plants – Joint treatment of industrial and domestic wastewater - Zero effluent discharge systems - Quality requirements for Wastewater reuse Industrial reuse , Present status and issues - Disposal on water and land – Residuals of industrialwastewater treatment – Quantification and characteristics of Sludge – Thickening, digestion,conditioning, dewatering and disposal of sludge – Management of ROrejects.

**UNIT V CASE STUDIES****10**

Industrial manufacturing process description, wastewater characteristics, source reduction options and waste treatment flow sheet for Textiles – Tanneries – Pulp and paper – metal finishing – Sugar and Distilleries

**TOTAL: 45 PERIODS****COURSE OUTCOMES:**

After completion of this course, the students is expected to be able to,

- CO1** Explain the source and types of industrial wastewater and their environmental impacts and choose the regulatory laws pertaining to environmental protection
- CO2** Identify industrial wastewater pollution and implement pollution prevention, waste minimization in industries
- CO3** Apply knowledge and skills to design industrial wastewater treatment schemes
- CO4** Audit and analyze environmental performance of industries to internal, external client, regulatory bodies and design water reuse management techniques
- CO5** Conduct research to develop effective management systems for industrial wastewater that are technically sound, economically feasible and socially acceptable

**REFERENCES:**

1. "Industrial wastewater management, Treatment & disposal, Water Environment" Federation Alexandria Virginia, Third Edition, 2008.
2. Lawrence K. Wang, Yung Tse Hung, Howard H.Lo and Constantine Yapijakis "handbook of Industrial and Hazardous waste Treatment", Second Edition, 2004.
3. Metcalf & Eddy, Inc., George Tchobanoglous, Franklin L. Burton and H. David Stensel, Wastewater engineering, treatment and reuse, Fourth Edition, McGraw-Hill, 2017
4. Nelson Leonard Nemerow, " industrial waste Treatment", Elsevier, 2007.
5. Wesley Eckenfelder W., " Industrial Water Pollution Control", Second Edition, Mc Graw Hill, 2000.
6. Paul L. Bishop, Pollution Prevention: - Fundamentals and Practice', Mc-Graw Hill International, Boston, 2000.
7. Waste water Treatment for pollution control and reuse by Soli. J. Arceivala, Shyam. R. Asolekar, Tata McGraw Hill, 2007

**COs- PO's & PSO's MAPPING**

CO's	PO's												PSO's		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
<b>1</b>	3										3	1	2		3
<b>2</b>		3	2	2				3	3	2				2	
<b>3</b>	2	3	3						3	2	2	3		2	3
<b>4</b>	2		3		2		2	3	3						
<b>5</b>	2	3	2	3		1	2			2	3		3		3
<b>Avg.</b>	2	3	3	2	2	1	2	3	3	2	3	2	2	2	3

1.low, 2-medium, 3-high, '-'- no correlation

Note: The average value of this course to be used for program articulation matrix.

**CE3033****SOLID AND HAZARDOUS WASTE MANAGEMENT****L T P C  
3 0 0 3****COURSE OBJECTIVE**

- To impart knowledge and skills relevant to minimization, storage, collection, transport, recycling, processing and disposal of solid and hazardous wastes including the related regulations, engineering principles, design criteria, methods and equipment.

Associative Memory -Adaptive Resonance Theory Neural Networks- Support Vector Machines - Spike Neuron Models.

**UNIT III FUZZY SYSTEMS 9**

Introduction to Fuzzy Logic, Classical Sets and Fuzzy Sets - Classical Relations and Fuzzy Relations -Membership Functions -Defuzzification - Fuzzy Arithmetic and Fuzzy Measures - Fuzzy Rule Base and Approximate Reasoning - Introduction to Fuzzy Decision Making.

**UNIT IV GENETIC ALGORITHMS 9**

Basic Concepts- Working Principles -Encoding- Fitness Function - Reproduction - Inheritance Operators - Cross Over - Inversion and Deletion -Mutation Operator - Bit-wise Operators -Convergence of Genetic Algorithm.

**UNIT V HYBRID SYSTEMS 9**

Hybrid Systems -Neural Networks, Fuzzy Logic and Genetic -GA Based Weight Determination - LR-Type Fuzzy Numbers - Fuzzy Neuron - Fuzzy BP Architecture - Learning in Fuzzy BP- Inference by Fuzzy BP - Fuzzy ArtMap: A Brief Introduction - Soft Computing Tools - GA in Fuzzy Logic Controller Design - Fuzzy Logic Controller

**TOTAL : 45 PERIODS**

**OUTCOMES:**

**Upon completion of this course, the students should be able to**

- Apply suitable soft computing techniques for various applications.
- Integrate various soft computing techniques for complex problems.

**TEXT BOOKS:**

1. N.P.Padhy, S.P.Simon, "Soft Computing with MATLAB Programming", Oxford University Press, 2015.
2. S.N.Sivanandam , S.N.Deepa, "Principles of Soft Computing", Wiley India Pvt. Ltd., 2nd Edition, 2011.
3. S.Rajasekaran, G.A.Vijayalakshmi Pai, "Neural Networks, Fuzzy Logic and Genetic Algorithm, Synthesis and Applications ", PHI Learning Pvt. Ltd., 2017.

**REFERENCES:**

1. Jyh-Shing Roger Jang, Chuen-Tsai Sun, Eiji Mizutani, "Neuro-Fuzzy and Soft Computing", Prentice-Hall of India, 2002.
2. Kwang H.Lee, "First course on Fuzzy Theory and Applications", Springer, 2005.
3. George J. Klir and Bo Yuan, "Fuzzy Sets and Fuzzy Logic-Theory and Applications", Prentice Hall, 1996.
4. James A. Freeman and David M. Skapura, "Neural Networks Algorithms, Applications, and Programming Techniques", Addison Wesley, 2003.

**GE8076**

**PROFESSIONAL ETHICS IN ENGINEERING**

**LT P C  
3 0 3**

**OBJECTIVES:**

- 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.

**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**

**OUTCOMES:**

- Upon completion of the course, the student should be able to apply ethics in society, discuss the ethical issues related to engineering and realize the responsibilities and rights in the society.

**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.

**Web sources:**

1. [www.onlineethics.org](http://www.onlineethics.org)
2. [www.nspe.org](http://www.nspe.org)
3. [www.globalethics.org](http://www.globalethics.org)
4. [www.ethics.org](http://www.ethics.org)

**OBJECTIVES:**

- To provide students an exposure to disasters, their significance and types.
- To ensure that students begin to understand the relationship between vulnerability, disasters, disaster prevention and risk reduction
- To gain a preliminary understanding of approaches of Disaster Risk Reduction (DRR)
- To enhance awareness of institutional processes in the country and
- To develop rudimentary ability to respond to their surroundings with potential disaster response in areas where they live, with due sensitivity

**UNIT I INTRODUCTION TO DISASTERS 9**

Definition: Disaster, Hazard, Vulnerability, Resilience, Risks – Disasters: Types of disasters – Earthquake, Landslide, Flood, Drought, Fire etc - Classification, Causes, Impacts including social, economic, political, environmental, health, psychosocial, etc.- Differential impacts- in terms of caste, class, gender, age, location, disability - Global trends in disasters: urban disasters, pandemics, complex emergencies, Climate change- Dos and Don'ts during various types of Disasters.

**UNIT II APPROACHES TO DISASTER RISK REDUCTION (DRR) 9**

Disaster cycle - Phases, Culture of safety, prevention, mitigation and preparedness community based DRR, Structural- nonstructural measures, Roles and responsibilities of- community, Panchayati Raj

Institutions/Urban Local Bodies (PRIs/ULBs), States, Centre, and other stake-holders- Institutional Processes and Framework at State and Central Level- State Disaster Management Authority(SDMA) – Early Warning System – Advisories from Appropriate Agencies.

**UNIT III INTER-RELATIONSHIP BETWEEN DISASTERS AND DEVELOPMENT 9**

Factors affecting Vulnerabilities, differential impacts, impact of Development projects such as dams, embankments, changes in Land-use etc.- Climate Change Adaptation- IPCC Scenario and Scenarios in the context of India - Relevance of indigenous knowledge, appropriate technology and local resources.

**UNIT IV DISASTER RISK MANAGEMENT IN INDIA 9**

Hazard and Vulnerability profile of India, Components of Disaster Relief: Water, Food, Sanitation, Shelter, Health, Waste Management, Institutional arrangements (Mitigation, Response and Preparedness, Disaster Management Act and Policy - Other related policies, plans, programmes and legislation – Role of GIS and Information Technology Components in Preparedness, Risk Assessment, Response and Recovery Phases of Disaster – Disaster Damage Assessment.

**UNIT V DISASTER MANAGEMENT: APPLICATIONS AND CASE STUDIES AND FIELD WORKS 9**

Landslide Hazard Zonation: Case Studies, Earthquake Vulnerability Assessment of Buildings and Infrastructure: Case Studies, Drought Assessment: Case Studies, Coastal Flooding: Storm Surge Assessment, Floods: Fluvial and Pluvial Flooding: Case Studies; Forest Fire: Case Studies, Man Made disasters: Case Studies, Space Based Inputs for Disaster Mitigation and Management and field works related to disaster management.

**TOTAL: 45 PERIODS****OUTCOMES:****The students will be able to**

- Differentiate the types of disasters, causes and their impact on environment and society
- Assess vulnerability and various methods of risk reduction measures as well as mitigation.
- Draw the hazard and vulnerability profile of India, Scenarios in the Indian context, Disaster damage assessment and management.



### UNIT III

Introduction to Group Discussion— Participating in group discussions – understanding group dynamics - brainstorming the topic – questioning and clarifying –GD strategies- activities to improve GD skills

### UNIT IV

Interview etiquette – dress code – body language – attending job interviews– telephone/skype interview -one to one interview &panel interview – FAQs related to job interviews

### UNIT V

Recognizing differences between groups and teams- managing time-managing stress- networking professionally- respecting social protocols-understanding career management-developing a long-term career plan-making career changes

**TOTAL : 30 PERIODS**

### OUTCOMES:

**At the end of the course Learners will be able to:**

- Make effective presentations
- Participate confidently in Group Discussions.
- Attend job interviews and be successful in them.
- Develop adequate Soft Skills required for the workplace

### Recommended Software

1. Open Source Software
2. Win English

### REFERENCES:

1. Butterfield, Jeff Soft Skills for Everyone. Cengage Learning: New Delhi, 2015
2. E. Suresh Kumar et al. Communication for Professional Success. Orient Blackswan: Hyderabad, 2015
3. Interact English Lab Manual for Undergraduate Students,. OrientBalckSwan: Hyderabad, 2016.
4. Raman, Meenakshi and Sangeeta Sharma. Professional Communication. Oxford University Press: Oxford, 2014
5. S. Hariharanetal. Soft Skills. MJP Publishers: Chennai, 2010.

**MG8591**

**PRINCIPLES OF MANAGEMENT**

**LT PC  
3 0 0 3**

### OBJECTIVES:

- To enable the students to study the evolution of Management, to study the functions and principles of management and to learn the application of the principles in an organization .

### **UNIT I INTRODUCTION TO MANAGEMENT AND ORGANIZATIONS 9**

Definition of Management – Science or Art – Manager Vs Entrepreneur - types of managers - managerial roles and skills – Evolution of Management – Scientific, human relations , system and contingency approaches – Types of Business organization - Sole proprietorship, partnership, company-public and private sector enterprises - Organization culture and Environment – Current trends and issues in Management.

### **UNIT II PLANNING 9**

Nature and purpose of planning – planning process – types of planning – objectives – setting objectives – policies – Planning premises – Strategic Management – Planning Tools and Techniques – Decision making steps and process.

### **UNIT III ORGANISING 9**

Nature and purpose – Formal and informal organization – organization chart – organization structure – types – Line and staff authority – departmentalization – delegation of authority –

centralization and decentralization – Job Design - Human Resource Management – HR Planning, Recruitment, selection, Training and Development, Performance Management , Career planning and management

**UNIT IV DIRECTING 9**

Foundations of individual and group behaviour – motivation – motivation theories – motivational techniques – job satisfaction – job enrichment – leadership – types and theories of leadership – communication – process of communication – barrier in communication – effective communication –communication and IT.

**UNIT V CONTROLLING 9**

System and process of controlling – budgetary and non-budgetary control techniques – use of computers and IT in Management control – Productivity problems and management – control and performance – direct and preventive control – reporting.

**TOTAL: 45 PERIODS**

**OUTCOMES:**

- Upon completion of the course, students will be able to have clear understanding of managerial functions like planning, organizing, staffing, leading & controlling and have same basic knowledge on international aspect of management

**TEXTBOOKS:**

1. Stephen P. Robbins & Mary Coulter, "Management", Prentice Hall (India) Pvt. Ltd., 10<sup>th</sup> Edition, 2009.
2. JAF Stoner, Freeman R.E and Daniel R Gilbert "Management", Pearson Education, 6th Edition, 2004.

**REFERENCES:**

1. Stephen A. Robbins & David A. Decenzo & Mary Coulter, "Fundamentals of Management" Pearson Education, 7th Edition, 2011.
2. Robert Kreitner & Mamata Mohapatra, " Management", Biztantra, 2008.
3. Harold Koontz & Heinz Weihrich "Essentials of management" Tata McGraw Hill, 1998.
4. Tripathy PC & Reddy PN, "Principles of Management", Tata McGraw Hill, 1999

<b>CS8792</b>	<b>CRYPTOGRAPHY AND NETWORK SECURITY</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**OBJECTIVES:**

- To understand Cryptography Theories, Algorithms and Systems.
- To understand necessary Approaches and Techniques to build protection mechanisms in order to secure computer networks.

**UNIT I INTRODUCTION 9**

Security trends - Legal, Ethical and Professional Aspects of Security, Need for Security at Multiple levels, Security Policies - Model of network security – Security attacks, services and mechanisms – OSI security architecture – Classical encryption techniques: substitution techniques, transposition techniques, steganography- Foundations of modern cryptography: perfect security – information theory – product cryptosystem – cryptanalysis.

**UNIT II SYMMETRIC KEY CRYPTOGRAPHY 9**

**MATHEMATICS OF SYMMETRIC KEY CRYPTOGRAPHY:** Algebraic structures - Modular arithmetic-Euclid's algorithm- Congruence and matrices - Groups, Rings, Fields- Finite fields- **SYMMETRIC KEY CIPHERS:** SDES – Block cipher Principles of DES – Strength of DES – Differential and linear cryptanalysis - Block cipher design principles – Block cipher mode of operation – Evaluation criteria for AES – Advanced Encryption Standard - RC4 –

### OUTCOME OF THE COURSE:

It is expected that this course will make students aware of the theoretical aspect of the state, its organs, its operationalization aspect, the background and philosophy behind the founding of the present political system, broad streams and challenges of national integration and nation-building in India. It will equip the students with the real understanding of our political system/ process in correct perspective and make them sit up and think for devising ways for better participation in the system with a view to making the governance and delivery system better for the common man who is often left unheard and unattended in our democratic setup besides generating a lot of dissatisfaction and difficulties for the system.

### SUGGESTED READING:

- i. Sunil Khilnani, The Idea of India. Penguin India Ltd., New Delhi.
- ii. Madhav Khosla, The Indian Constitution, Oxford University Press. New Delhi, 2012.
- iii. Brij Kishore Sharma, Introduction to the Indian Constitution, PHI, New Delhi, latest edition.
- iv. Sumantra Bose, Transforming India: Challenges to the World's Largest Democracy, Picador India, 2013.
- v. Atul Kohli, Democracy and Discontent: India's Growing Crisis of Governability, Cambridge University Press, Cambridge, U. K., 1991.
- vi. M. P. Singh and Rekha Saxena, Indian Politics: Contemporary Issues and Concerns, PHI, New Delhi, 2008, latest edition.
- vii. Rajni Kothari, Rethinking Democracy, Orient Longman, New Delhi, 2005.

**TOTAL : 45 PERIODS**

**MX3089**

**INDUSTRIAL SAFETY**

**L T P C**

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### COURSE OBJECTIVES

- To Understand the Introduction and basic Terminologies safety.
- To enable the students to learn about the Important Statutory Regulations and standards.
- To enable students to Conduct and participate the various Safety activities in the Industry.
- To have knowledge about Workplace Exposures and Hazards.
- To assess the various Hazards and consequences through various Risk Assessment Techniques.

### UNIT I SAFETY TERMINOLOGIES

Hazard-Types of Hazard- Risk-Hierarchy of Hazards Control Measures-Lead indicators- lag Indicators-Flammability- Toxicity Time-weighted Average (TWA) - Threshold LimitValue (TLV) - Short Term Exposure Limit (STEL)- Immediately dangerous to life or health (IDLH)- acute and chronic Effects- Routes of Chemical Entry-Personnel Protective Equipment- Health and Safety Policy-Material Safety Data Sheet MSDS

### UNIT II STANDARDS AND REGULATIONS

Indian Factories Act-1948- Health- Safety- Hazardous materials and Welfare- ISO 45001:2018 occupational health and safety (OH&S) - Occupational Safety and Health Audit IS14489:1998- Hazard Identification and Risk Analysis- code of practice IS 15656:2006

### **UNIT III SAFETY ACTIVITIES**

Toolbox Talk- Role of safety Committee- Responsibilities of Safety Officers and Safety Representatives- Safety Training and Safety Incentives- Mock Drills- On-site Emergency Action Plan- Off-site Emergency Action Plan- Safety poster and Display- Human Error Assessment

### **UNIT IV WORKPLACE HEALTH AND SAFETY**

Noise hazard- Particulate matter- musculoskeletal disorder improper sitting posture and lifting Ergonomics RULE & REBA- Unsafe act & Unsafe Condition- Electrical Hazards- Crane Safety- Toxic gas Release

### **UNIT V HAZARD IDENTIFICATION TECHNIQUES**

Job Safety Analysis-Preliminary Hazard Analysis-Failure mode and Effects Analysis- Hazard and Operability- Fault Tree Analysis- Event Tree Analysis Qualitative and Quantitative Risk Assessment- Checklist Analysis- Root cause analysis- What-If Analysis- and Hazard Identification and Risk Assessment

**TOTAL : 45 PERIODS**

### **COURSE OUTCOMES:**

Course outcomes on completion of this course the student will be able:

**CO1:** Understand the basic concept of safety.

**CO2:** Obtain knowledge of Statutory Regulations and standards.

**CO3:** Know about the safety Activities of the Working Place.

**CO4:** Analyze on the impact of Occupational Exposures and their Remedies

**CO5:** Obtain knowledge of Risk Assessment Techniques.

### **TEXTBOOKS**

1. R.K. Jain and Prof. Sunil S. Rao Industrial Safety, Health and Environment Management Systems KHANNA PUBLISHER
2. L. M. Deshmukh Industrial Safety Management: Hazard Identification and Risk Control McGraw-Hill Education

### **REFERENCES**

1. Frank Lees (2012) 'Lees' Loss Prevention in Process Industries. Butterworth-Heinemann publications, UK, 4th Edition.
2. John Ridley & John Channing (2008) Safety at Work: Routledge, 7th Edition.
3. Dan Petersen (2003) Techniques of Safety Management: A System Approach.
4. Alan Waring. (1996). Safety management system: Chapman & Hall, England
5. Society of Safety Engineers, USA

### **ONLINE RESOURCES**

ISO 45001:2018 occupational health and safety (OH&S) International Organization for Standardization <https://www.iso.org/standard/63787.html>

Indian Standard code of practice on occupational safety and health audit <https://law.resource.org/pub/in/bis/S02/is.14489.1998.pdf>

Indian Standard code of practice on Hazard Identification and Risk Analysis IS 15656:2006 <https://law.resource.org/pub/in/bis/S02/is.15656.2006.pdf>

