



**SSM INSTITUTE OF ENGINEERING AND TECHNOLOGY**

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Dindigul – Palani Highway, Dindigul – 624 002

***LIST OF COURSES RELATED TO  
GENDER, HUMAN VALUES,  
ENVIRONMENT AND SUSTAINABILITY  
AND PROFESSIONAL ETHICS***

## 1.3.1 List of courses with topics of Professional Ethics, Gender, Human Values, Environment and Sustainability

Sl. No	Program Name	Name of the programs	Program Code	Name of the core courses	Name of the topic	Regulation
1	B.E	Automobile Engineering	102	GE3451 -Environmental Science and Sustainability	Environment and Sustainability	2021
2				GE8077-Total Quality Management	Professional Ethics	2017
3	B.E	Civil Engineering	103	GE3451 -Environmental Science and Sustainability	Environment and Sustainability	2021
4				GE8071 – Disaster Management	Human Values	2017
5				EN8591 – Municipal solid Waste Management	Professional Ethics	2017
6				EN8491 - Water Supply Engineering	Environment and Sustainability	2017
7				GE8076 - Professional Ethics in Engineering	Professional Ethics	2017
8	B.E	Computer Science Engineering	104	GE3451 -Environmental Science and Sustainability	Environment and Sustainability	2021
9				OME752 – Supply Chain Management	Professional Ethics	2017
10	B.E	Computer Science Engineering	104	GE8077-Total Quality Management	Professional Ethics	2017
11				GE8076 - Professional Ethics in Engineering	Professional Ethics	2017
12	B.E	Electrical and Electronics Engineering	105	GE3451 -Environmental Science and Sustainability	Environment and Sustainability	2021
13				EE8703 - Renewable Energy Systems	Environment and Sustainability	2017
14				GE8071 – Disaster Management	Human Values	2017
15				GE8074 - Human Rights	Human Values	2017
16				GE8076 - Professional Ethics in Engineering	Professional Ethics	2017



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17	B.E	Electronics and Communication Engineering	106	GE3451 -Environmental Science and Sustainability	Environment and Sustainability	2021
18				MG8591- Principles of Management	Professional Ethics	2017
19				GE8076 - Professional Ethics in Engineering	Environment and Sustainability	2017
20	B.E	Mechanical Engineering	114	GE3451 - Environmental Science and Sustainability	Environment and Sustainability	2021
21				ORO551 – Renewable Energy Sources	Environment and Sustainability	2017
22				GE8077 - Total Quality Management	Professional Ethics	2017
23				MG8591 - Principles of Management	Professional Ethics	2017
24				GE8076 - Professional Ethics in Engineering	Professional Ethics	2017



*[Signature]*  
PRINCIPAL

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## GE3451 ENVIRONMENTAL SCIENCES AND SUSTAINABILITY

L T P C

2 0 0 2

### 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

9

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 (OHSAS). 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 Cyclescarbon cycle, emission and sequestration, Green Engineering: Sustainable urbanization- Socioeconomical and technological change.

**TOTAL: 30 PERIODS**

### TEXT BOOKS:

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.
4. Rajagopalan, R, 'Environmental Studies-From Crisis to Cure', Oxford University Press, Third Edition, 2015.
5. Erach Bharucha "Textbook of Environmental Studies for Undergraduate Courses" Orient Blackswan Pvt. Ltd. 2013.

## 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



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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**

### OUTCOME:

- The student would be able to apply the tools and techniques of quality management to manufacturing and services processes.

### TEXTBOOK:

1. Dale H.Besterfield, Carol B.Michna,Glen H. Besterfield, Mary B.Sacre,Hemant Urdhwareshe and Rashmi Urdhwareshe, “Total Quality Management”, Pearson Education Asia, Revised Third Edition, Indian Reprint, Sixth Impression, 2013.

**REFERENCES:**

1. James R. Evans and William M. Lindsay, "The Management and Control of Quality", 8<sup>th</sup> Edition, First Indian Edition, Cengage Learning, 2012.
2. Janakiraman. B and Gopal .R.K., "Total Quality Management - Text and Cases", Prentice Hall (India) Pvt. Ltd., 2006.
3. Suganthi.L and Anand Samuel, "Total Quality Management", Prentice Hall (India) Pvt. Ltd., 2006.
4. ISO9001-2015 standards

**GE8071 DISASTER MANAGEMENT****L T P C****3 0 0 3****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 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 stakeholders- Institutional Processes and Framework at State and Central Level- State Disaster Management Authority(SDMA) – Early Warning System – Advisories from Appropriate Agencies.



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## 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.

### TEXTBOOKS:

1. Singhal J.P. “Disaster Management”, Laxmi Publications, 2010. ISBN-10: 9380386427 ISBN-13: 978-9380386423





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2. Tushar Bhattacharya, “Disaster Science and Management”, McGraw Hill India Education Pvt. Ltd., 2012. ISBN-10: 1259007367, ISBN-13: 978-1259007361]
3. Gupta Anil K, Sreeja S. Nair. Environmental Knowledge for Disaster Risk Management, NIDM, New Delhi, 2011
4. Kapur Anu Vulnerable India: A Geographical Study of Disasters, IIAS and Sage Publishers, New Delhi, 2010.

## REFERENCES:

1. Govt. of India: Disaster Management Act , Government of India, New Delhi, 2005
2. Government of India, National Disaster Management Policy, 2009.

## 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.



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## 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. 2 George Tchobanoglous and Frank Kreith (2002). Handbook of Solid waste management, McGraw Hill, New York.



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## EN8491 WATER SUPPLY ENGINEERING

**L T P C**

**3 0 0 3**

### OBJECTIVE:

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

### UNIT I SOURCES OF WATER

**9**

Public water supply system – Planning, Objectives, Design period, Population forecasting; Water demand – Sources of water and their characteristics, Surface and Groundwater – Impounding Reservoir – 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 treatment plant units, aerators of flash mixers, Coagulation and flocculation – Clariflocculator-Plate and tube settlers - 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 -Computer applications – Appurtenances – Leak detection. Principles of design of water supply in buildings – House service connection – Fixtures and fittings, systems of plumbing and types of plumbing.

**TOTAL: 45 PERIODS**

### OUTCOMES:

The students completing the course will have



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- An insight into the structure of drinking water supply systems, including water transport, treatment and distribution
- The knowledge in various unit operations and processes in water treatment
- An ability to design the various functional units in water treatment
- An understanding of water quality criteria and standards, and their relation to public health
- The ability to design and evaluate water supply project alternatives on basis of chosen criteria.

## TEXTBOOKS:

1. Garg, S.K. Environmental Engineering, Vol.I Khanna 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.

## GE8076 PROFESSIONAL ETHICS IN ENGINEERING

**LT P C**  
**3 0 0 3**

### OBJECTIVE:

- 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 –



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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

### OUTCOME:

- 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.



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## GE8074 HUMAN RIGHTS

**L T P C**

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### OBJECTIVE:

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

### 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 Magna 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

### OUTCOME :

- Engineering students will acquire the basic knowledge of human rights.

### 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



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## OME752 SUPPLY CHAIN MANAGEMENT

**L T P C**

**3 0 0 3**

### OBJECTIVE:

- To provide an insight on the fundamentals of supply chain networks, tools and techniques.

### UNIT I INTRODUCTION

**9**

Role of Logistics and Supply chain Management: Scope and Importance- Evolution of Supply Chain - Decision Phases in Supply Chain - Competitive and Supply chain Strategies – Drivers of Supply Chain Performance and Obstacles.

### UNIT II SUPPLY CHAIN NETWORK DESIGN

**9**

Role of Distribution in Supply Chain – Factors influencing Distribution network design – Design options for Distribution Network Distribution Network in Practice-Role of network Design in Supply Chain – Framework for network Decisions.

### UNIT III LOGISTICS IN SUPPLY CHAIN

**9**

Role of transportation in supply chain – factors affecting transportations decision – Design option for transportation network – Tailored transportation – Routing and scheduling in transportation.

### UNIT IV SOURCING AND COORDINATION IN SUPPLY CHAIN

**9**

Role of sourcing supply chain supplier selection assessment and contracts- Design collaboration - sourcing planning and analysis - supply chain co-ordination - Bull whip effect – Effect of lack of co-ordination in supply chain and obstacles – Building strategic partnerships and trust within a supply chain.

### UNIT V SUPPLY CHAIN AND INFORMATION TECHNOLOGY

**9**

The role IT in supply chain- The supply chain IT frame work Customer Relationship Management – Internal supply chain management – supplier relationship management – future of IT in supply chain – E-Business in supply chain.

**TOTAL: 45 PERIODS**

### OUTCOME:

- The student would understand the framework and scope of supply chain networks and functions.

### TEXTBOOK:

1. Sunil Chopra, Peter Meindl and Kalra, “Supply Chain Management, Strategy, Planning, and Operation”, Pearson Education, 2010.



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## REFERENCES:

1. Jeremy F.Shapiro, “Modeling the Supply Chain”, Thomson Duxbury, 2002.
2. Srinivasan G.S, “Quantitative models in Operations and Supply Chain Management, PHI, 2010
3. David J.Bloomberg , Stephen Lemay and Joe B.Hanna, “Logistics”, PHI 2002. 4. James B.Ayers, “Handbook of Supply Chain Management”, St.Lucle press, 2000.

## EE8703 RENEWABLE ENERGY SYSTEMS

**L T P C**

**3 0 0 3**

## OBJECTIVES:

To impart knowledge on the following Topics

- 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.

## 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-Working of 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 Receiver Power Plants, Solar Ponds.- Thermal Energy storage system with PCM- Solar Photovoltaic systems : 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-Biomass Cogeneration-Environmental Benefits. Geothermal Energy: Basics, Direct Use, Geothermal





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Electricity. Mini/micro hydro power: Classification of hydropower schemes, Classification of water 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. Wave Energy: 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

### OUTCOMES:

- Ability to create awareness about renewable Energy Sources and technologies.
- Ability to get adequate inputs on a variety of issues in harnessing renewable Energy.
- Ability to recognize current and possible future role of renewable energy sources.
- Ability to explain the various renewable energy resources and technologies and their applications.
- Ability to understand basics about biomass energy.
- Ability to acquire knowledge about solar energy.

### TEXT BOOKS:

1. Joshua Earnest, Tore Wizeliu, 'Wind Power Plants and Project Development', PHI Learning Pvt.Ltd, New Delhi, 2011.
2. D.P.Kothari, K.C Singal, Rakesh Ranjan "Renewable Energy Sources and Emerging Technologies", PHI Learning Pvt.Ltd, New Delhi, 2013.
3. Scott Grinnell, "Renewable Energy & Sustainable Design", CENGAGE Learning, USA, 2016.

### REFERENCES

1. A.K.Mukerjee and Nivedita Thakur," Photovoltaic Systems: Analysis and Design", PHI Learning Private Limited, New Delhi, 2011
2. Richard A. Dunlap," Sustainable Energy" Cengage Learning India Private Limited, Delhi, 2015.
3. Chetan Singh Solanki, " Solar Photovoltaics : Fundamentals, Technologies and Applications", PHI Learning Private Limited, New Delhi, 2011
4. Bradley A. Striebig,Adebayo A.Ogundipe and Maria Papadakis," Engineering Applications in Sustainable Design and Development", Cengage Learning India Private Limited, Delhi, 2016.
5. Godfrey Boyle, "Renewable energy", Open University, Oxford University Press in association with the Open University, 2004.
6. Shobh Nath Singh, 'Non-conventional Energy resources' Pearson Education ,2015.



# SSM INSTITUTE OF ENGINEERING AND TECHNOLOGY

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Dindigul – Palani Highway, Dindigul – 624 002

## ME8072 RENEWABLE SOURCES OF ENERGY

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### UNIT I INTRODUCTION

9

World Energy Use – Reserves of Energy Resources – Environmental Aspects of Energy Utilisation – Renewable Energy Scenario in Tamilnadu, India and around the World – Potentials - Achievements / Applications – Economics of renewable energy systems.

### UNIT II SOLAR ENERGY

9

Solar Radiation – Measurements of Solar Radiation - Flat Plate and Concentrating Collectors – Solar direct Thermal Applications – Solar thermal Power Generation - Fundamentals of Solar Photo Voltaic Conversion – Solar Cells – Solar PV Power Generation – Solar PV Applications.

### UNIT III WIND ENERGY

9

Wind Data and Energy Estimation – Types of Wind Energy Systems – Performance – Site Selection – Details of Wind Turbine Generator – Safety and Environmental Aspects

### UNIT IV BIO - ENERGY

9

Biomass direct combustion – Biomass gasifiers – Biogas plants – Digesters – Ethanol production – Bio diesel – Cogeneration - Biomass Applications

### UNIT V OTHER RENEWABLE ENERGY SOURCES

9

Tidal energy – Wave Energy – Open and Closed OTEC Cycles – Small Hydro-Geothermal Energy – Hydrogen and Storage - Fuel Cell Systems – Hybrid Systems.

TOTAL : 45 PERIODS

### OUTCOMES:

Upon the completion of this course the students will be able to

- Discuss the importance and Economics of renewable Energy
- Discuss the method of power generation from Solar Energy
- Discuss the method of power generation from Wind Energy
- Explain the method of power generation from Bio Energy
- Explain the Tidal energy, Wave Energy, OTEC, Hydro energy, Geothermal Energy, Fuel

### TEXT BOOKS:

1. Rai. G.D., "Non-Conventional Energy Sources", Khanna Publishers, New Delhi, 2011.
2. Twidell, J.W. & Weir, A., "Renewable Energy Sources", EFN Spon Ltd., UK, 2006.

### REFERENCES:

1. Chetan Singh Solanki, Solar Photovoltaics, "Fundamentals, Technologies and Applications", PHI Learning Private Limited, New Delhi, 2015.
2. David M. Mousdale – "Introduction to Biofuels", CRC Press, Taylor & Francis Group, USA 2017
3. Freris. L.L., "Wind Energy Conversion Systems", Prentice Hall, UK, 1990.
4. Godfrey Boyle, "Renewable Energy, Power for a Sustainable Future", Oxford University Press, U.K., 2012.