

UNIT V SCIENTIFIC ETHICS

6

Transparency and Fairness in scientific pursuits – Scientific inventions for the betterment of society - Unfair application of scientific inventions – Role and Responsibility of Scientist in the modern society.

Reading Text: Excerpt from *American Prometheus: The Triumph and Tragedy of J.Robert Oppenheimer* by Kai Bird and Martin J. Sherwin.

TOTAL: 30 PERIODS

REFERENCES:

1. The Nonreligious: Understanding Secular People and Societies, Luke W. Galen Oxford University Press, 2016.
2. Secularism: A Dictionary of Atheism, Bullivant, Stephen; Lee, Lois, Oxford University Press, 2016.
3. The Oxford Handbook of Secularism, John R. Shook, Oxford University Press, 2017.
4. The Civic Culture: Political Attitudes and Democracy in Five Nations by Gabriel A. Almond and Sidney Verba, Princeton University Press,
5. Research Methodology for Natural Sciences by Soumitro Banerjee, IISc Press, January 2022

COURSE OUTCOMES

Students will be able to

- CO1 : Identify the importance of democratic, secular and scientific values in harmonious functioning of social life
- CO2 : Practice democratic and scientific values in both their personal and professional life.
- CO3 : Find rational solutions to social problems.
- CO4 : Behave in an ethical manner in society
- CO5 : Practice critical thinking and the pursuit of truth.

MANDATORY COURSES I

MX3081

INTRODUCTION TO WOMEN AND GENDER STUDIES

L T P C
3 0 0 0

COURSE OUTLINE

UNIT I CONCEPTS

Sex vs. Gender, masculinity, femininity, socialization, patriarchy, public/ private, essentialism, binaryism, power, hegemony, hierarchy, stereotype, gender roles, gender relation, deconstruction, resistance, sexual division of labour.

UNIT II FEMINIST THEORY

Liberal, Marxist, Socialist, Radical, Psychoanalytic, postmodernist, ecofeminist.

UNIT III WOMEN'S MOVEMENTS: GLOBAL, NATIONAL AND LOCAL

Rise of Feminism in Europe and America.
Women's Movement in India.




Dr. M. JEYAKUMAR, M.E., Ph.D.
PRINCIPAL
CHRIST THE KING ENGINEERING COLLEGE,
Chikkarampalayam Village,
Karamadai, Mettupalayam Taluk,
Coimbatore - 641 104.

UNIT IV GENDER AND LANGUAGE

Linguistic Forms and Gender,
Gender and narratives.

UNIT V GENDER AND REPRESENTATION

Advertising and popular visual media.

Gender and Representation in Alternative Media,
Gender and social media.

TOTAL : 45 PERIODS

CME350

ENVIRONMENT SUSTAINABILITY AND IMPACT ASSESSMENT

L	T	P	C
3	0	0	3

COURSE OBJECTIVES

- 1 To make the students to understand the concepts of Environmental Sustainability & Impact Assessment
- 2 To familiarize the students in environmental decision making procedure.
- 3 Make the students to identify, predict and evaluate the economic, environmental, and social impact of development activities
- 4 To provide information on the environmental consequences for decision making
- 5 To promote environmentally sound and sustainable development through the identification of appropriate alternatives and mitigation measures.

UNIT – I ENVIRONMENTAL IMPACT ASSESMENT 9

Environmental impact assessment objectives – rationale and historical development of EIA - Conceptual frameworks for EIA Legislative development – European community directive – Hungarian directive.

UNIT – II ENVIRONMENTAL DECISION MAKING 9

Strategic environmental assessment and sustainability appraisal – Mitigation, monitoring and management of environmental impacts- Socio economic impact assessment.

UNIT – III ENVIRONMENTAL POLICY, PLANNING AND LEGISLATION 9

Regional spatial planning and policy – Cumulative effects assessment – Planning for climate change, uncertainty and risk.

UNIT – IV LIFE CYCLE ASSESSMENT 9

Life cycle assessment; Triple bottom line approach; Industrial Ecology. Ecological foot printing, Design for Environment, Future role of LCA, Product stewardship, design, durability and justifiability, measurement techniques and reporting

UNIT – V SUSTAINABLE URBAN ECONOMIC DEVELOPMENT 9

Spatial economics – Knowledge economy and urban regions.

TOTAL: 45 PERIODS



M. Jeyakumar
Dr.M.JEYAKUMAR, M.E.,Ph.D.
PRINCIPAL
CHRIST THE KING ENGINEERING COLLEGE,
Chikkarampalayam Village,
Karamadai, Mettupalayam Taluk,
Coimbatore - 641 104.

OUTCOMES: At the end of the course the students would be able to

1. Explain the concepts of Environment Sustainability and trained to make decision related to Environment.
2. Make decision that has an effect on our environment
3. Evaluate the basics of environmental policy, planning and various legislation
Get valuable information for exploring decisions in each life stage of materials, buildings, services and infrastructure.
4. Explain the Life cycle assessment of Environmental sustainability.
5. Explain sustainable urban economic development.

TEXT BOOKS:

1. The Application of Science in Environmental Impact Assessment, by Aaron J. MacKinnon, Peter I Duinker, Tony R. Walker, Routledge; 1st edition (14 May 2019), ISBN-10 : 0367340194
2. Routledge Handbook of Environmental Impact Assessment, by Kevin Hanna, Routledge; 1st editic (11 April 2022), ISBN-10 : 0367244470

REFERENCES:

1. Clive George, C. Collin, H. Kirkpolarice – Impact Assessment and sustainable development – Edward Elgar Publishing, 2007
2. Robert B Gibsan, Sustainability Assessment, Earth Scan publishers, 2005
3. Simon Dresner, The principle of sustainability – Earth Scan publishers, 2008
4. Canter, R.L., "Environmental Impact Assessment", McGraw Hill Inc., New Delhi, 1996.
5. Shukla, S.K. And Srivastava, P.R., "Concepts In Environmental Impact Analysis", Common Wealth Publishers, New Delhi, 1992.
6. John G. Rau And David C Hooten "Environmental Impact Analysis Handbook", McGraw Hill Book Company, 1990.

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	1		2				3		1			1	1	2	1
2	1		2				3		1			1	1	2	1
3	1		2				3		1			1	1	2	1
4	1		2				3		1			1	1	2	1
5	1		2				3		1			1	1	2	1
Low (1) : Medium (2) : High (3)															



4 *M. Jeyakumar*
Dr. M. JEYAKUMAR, M.E., Ph.D.
 PRINCIPAL
 CHRIST THE KING ENGINEERING COLLEGE,
 Chikkarampalayam Village,
 Karamadai, Mettupalayam Taluk,
 Coimbatore - 641 104.

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** 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 (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.

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.

OCE351 **ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT**

L T P C
3 0 0 3

COURSE OBJECTIVE:

- To impart the knowledge and skills to identify, assess and mitigate the environmental and social impacts of developmental projects



6

Dr. M. Jeyakumar
Dr. M. JEYAKUMAR, M.E., Ph.D.
PRINCIPAL
CHRIST THE KING ENGINEERING COLLEGE,
Chikkarampalayam Village,
Karamadai, Mettupalayam Taluk,
Coimbatore - 641 104.

UNIT I	INTRODUCTION	9
Impacts of Development on Environment – Rio Principles of Sustainable Development- Environmental Impact Assessment (EIA) – Objectives – Historical development – EIA Types – EIA in project cycle –EIA Notification and Legal Framework–Stakeholders and their Role in EIA– Selection & Registration Criteria for EIA Consultants		
UNIT II	ENVIRONMENTAL ASSESSMENT	9
Screening and Scoping in EIA – Drafting of Terms of Reference, Baseline monitoring, Prediction and Assessment of Impact on land, water, air, noise and energy, flora and fauna - Matrices – Networks – Checklist Methods - Mathematical models for Impact prediction – Analysis of alternatives		
UNIT III	ENVIRONMENTAL MANAGEMENT PLAN	9
Plan for mitigation of adverse impact on water, air and land, water, energy, flora and fauna – Environmental Monitoring Plan – EIA Report Preparation – Review of EIA Reports – Public Hearing- Environmental Clearance Post Project Monitoring		
UNIT IV	SOCIO ECONOMIC ASSESSMENT	9
Baseline monitoring of Socio economic environment – Identification of Project Affected Personal – Rehabilitation and Resettlement Plan- Economic valuation of Environmental impacts – Cost benefit Analysis-		
UNIT V	CASE STUDIES	9
EIA case studies pertaining to Infrastructure Projects – Real Estate Development - Roads and Bridges – Mass Rapid Transport Systems - Ports and Harbor – Airports - Dams and Irrigation projects - Power plants – CETPs- Waste Processing and Disposal facilities – Mining Projects.		

TOTAL: 45 PERIODS

COURSE OUTCOMES:

The students completing the course will have ability to

- CO1:carry out scoping and screening of developmental projects for environmental and social assessments
- CO2:explain different methodologies for environmental impact prediction and assessment
- CO3:plan environmental impact assessments and environmental management plans
- CO4:evaluate environmental impact assessment reports

TEXTBOOKS:

1. Canter, R.L, "Environmental impact Assessment ", 2nd Edition, McGraw Hill Inc, New Delhi,1995.
2. Lohani, B., J.W. Evans, H. Ludwig, R.R. Everitt, Richard A. Carpenter, and S.L. Tu, "Environmental Impact Assessment for Developing Countries in Asia", Volume 1 – Overview, Asian Development Bank,1997.
3. Peter Morris, Riki Therivel "Methods of Environmental Impact Assessment", Routledge Publishers,2009.



M. Jeyakumar
Dr.M.JEYAKUMAR, M.E.,Ph.D.
PRINCIPAL
CHRIST THE KING ENGINEERING COLLEGE,
 Chikkarampalayam Village,
 Karamadai, Mettupalayana Taluk,
 Coimbatore - 641 104.

REFERENCES:

1. Becker H. A., Frank Vanclay, "The International handbook of social impact assessment" conceptual and methodological advances, Edward Elgar Publishing, 2003.
2. Barry Sadler and Mary McCabe, "Environmental Impact Assessment Training Resource Manual", United Nations Environment Programme, 2002.
3. Judith Petts, "Handbook of Environmental Impact Assessment Vol. I and II", Blackwell Science New York, 1998.
4. Ministry of Environment and Forests EIA Notification and Sectoral Guides, Government of India, New Delhi, 2010.

EE3036

**SUSTAINABLE AND ENVIRONMENTAL FRIENDLY
HV INSULATION SYSTEM**

LTPC
3003

COURSE OBJECTIVES:

- To Know about the products related with sustainable applicaton.
- To learn about Green Gaseous, liquid solid insulators.
- To understand the standards for green insulation systems.

UNIT I	SUSTAINABLE AND ENVIRONMENTAL ENERGY AND PRODUCTS	9
Carbon print, global warming potential, environment requirement for any product and system.		
UNIT II	ALTERNATE GREEN GASEOUS INSULATORS	9
SF6 gas and its hazardous environmental effects, alternate gases, gaseous mixtures and other sources and it's properties.		
UNIT III	ALTERNATE GREEN LIQUID INSULATORS	9
hazardous effects of existing liquid dielectric materials (such as organic oil), alternate sources of environmental friendly liquid such as ester oil, vegetable oils dielectric and it's properties.		
UNIT IV	ALTERNATE GREEN SOLID INSULATORS	9
hazardous effects of existing solid dielectric materials, alternate sources of environmental friendly solid dielectric and its properties.		
UNIT V	EVOLVING STANDARDS FOR GREEN INSULATION SYSTEMS	9
Requirements, evolving standards of management, testing, usage and disposal of alternate insulation systems, Major applications and standards		

TOTAL : 45 PERIODS

REFERENCES:

1. <https://www.iso.org/standard/79064.html>
2. <https://www.ictfootprint.eu/en/iec-tr-627252013-factsheet>
3. https://www.lec.ch/dyn/www/f?p=103:7:0:::FSP_ORG_ID,FSP_LANG_ID:1275,25
4. https://www.lec.ch/ords/f?p=103:41:628762356646470:::FSP_ORG_ID,FSP_LANG_ID:3237,25
5. https://www.lec.ch/dyn/www/f?p=103:7:0:::FSP_ORG_ID,FSP_LANG_ID:1299,25
6. <https://www.lec.ch/sdqs/sdq13>
7. http://highperformanceinsulation.eu/wp-content/uploads/2016/08/sustainability_a_guide.pdf



COURSE OUTCOMES:

Upon completion of the course, students will be able to:

CO1: Know about sustainable and environmental energy and products.

CO2: Describe the alternate green gaseous Insulators.

CO3: Describe the alternate green liquid insulators

CO4: Describe the alternate green solid insulators

CO5: Elaborate the standards for Green insulation systems.

MAPPING OF COs WITH POs AND PSOs

COs	POs												PSOs		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	3	-	-	-	3	-	-	-	-	-	3	-	3
CO2	3	-	3	-	-	-	3	-	-	-	-	-	3	-	3
CO3	3	-	3	-	-	-	3	-	-	-	-	-	3	-	3
CO4	3	-	3	-	-	-	3	-	-	-	-	-	3	-	3
CO5	3	-	3	-	-	-	3	-	-	-	-	-	3	-	3
Avg	3	-	3	-	-	-	3	-	-	-	-	-	3	-	3

OMG352

NGOS AND SUSTAINABLE DEVELOPMENT

L T P C

3 0 0 3

COURSE OBJECTIVES

- to understand the importance of sustainable development
- to acquire a reasonable knowledge on the legal frameworks pertaining to pollution control and environmental management
- to comprehend the role of NGOs in attaining sustainable development

Unit I ENVIRONMENTAL CONCERNS

9

Introduction to sustainable development goals, Global responsibility of environmental concern, Importance of environmental preservation, Environmental threats, Pollution and its types, Effects of Pollution, Pollution control, Treatment of wastes

UNIT II ROLE OF NGOS

9

Role of NGO's in national development, NGO's and participatory management, Challenges and limitations of NGO's, Community Development programmes, Role of NGO's in Community Development programmes, Participation of NGO's in environment management, Corporate Social responsibility, NGO's and corporate social responsibility

UNIT III SUSTAINABLE DEVELOPMENT

9

Issues and Challenges of Sustainable Development, Bioenergy, Sustainable Livelihoods and Rural Poor in Sustainable Development, Protecting ecosystem services for sustainable development, Non-renewable sources of energy and its effect, Renewable sources of energy for sustainability, Nuclear resources and Legal Regulation of Hazardous Substances, Sustainable Development: Programme and Policies, Sustainability assessment and Indicators



Dr. M. JEYAKUMAR, M.E., Ph.D.
PRINCIPAL
 CHRIST THE KING ENGINEERING COLLEGE,
 Chikkatapalayam Village,
 Karamadai, Mettupalayam Taluk,
 Coimbatore - 641 104.

UNIT IV NGO'S FOR SUSTAINABILITY

9

Civil Society Initiatives In Environment Management, Civil Society Initiatives for Sustainable Development, Global Initiatives In Protecting Global Environment, World Summit on Sustainable Development (Johannesburg Summit 2002), Ecological economics, Environmental sustainability, Social inclusion, Health for all, education for all, Food security and Water security, NGOs and Sustainable Development strategies

UNIT V LEGAL FRAMEWORKS

9

Need for a Legal framework and its enforcement, Legal measures to control pollution, Environmental Legislations In India, Mechanism to implement Environmental Laws in India, Legal Protection of Forests Act 1927, Legal Protection of Wild Life, Role of NGO's in implementing environmental laws, Challenges in the implementation of environmental legislation

TOTAL 45 : PERIODS**COURSE OUTCOMES**

Upon completion of this course, the student will :

CO1 Have a thorough grounding on the issues and challenges being faced in attaining sustainable development

CO2 have a knowledge on the role of NGOs towards sustainable development

CO3 present strategies for NGOs in attaining sustainable development

CO4 recognize the importance of providing energy, food security and health equity to all members of the society without damaging the environment

CO5 understand the environmental legislations

REFERENCE BOOKS

1. Kulsange, S and Kamble, R. (2019). Environmental NGO's: Sustainability Stewardship, Lap Lambert Academic Publishing, India, ISBN-13: 978-6200442444.
2. Dodds, F. (2007). NGO diplomacy: The influence of nongovernmental organizations in international environmental negotiations. Mit Press, Cambridge, ISBN-13: 978-0262524766.
3. Ghosh, S. (Ed.). (2019). Indian environmental law: Key concepts and principles. Orient BlackSwan, India, ISBN-13: 978-9352875795.
4. Alan Fowler and Chiku Matunga (2010) NGO Management: The Earthscan Companion, Routledge, ISBN-13 : 978-1849711197.

OPR351

SUSTAINABLE MANUFACTURINGL T P C
3 0 0 3**COURSE OBJECTIVES:**

- To be acquainted with sustainability in manufacturing and its evaluation.
- To provide knowledge in environment and social sustainability.
- To provide the student with the knowledge of strategy to achieve sustainability.
- To familiarize with trends in sustainable operations.
- To create awareness in current sustainable practices in manufacturing industry.



[Signature]
DEVIJAYAKUMAR, M.E., Ph.D.
 PRINCIPAL
 CHRIST THE KING ENGINEERING COLLEGE,
 Chikurampalayam Village,
 Karamadai, Metupalayam Taluk,
 Coimbatore - 641 104

- UNIT I ECONOMIC SUSTAINABILITY 9**
 Industrial Revolution-Economic sustainability: globalization and international issues Sustainability status - Emerging issues- Innovative products- Reconfiguration manufacturing enterprises - Competitive manufacturing strategies - Performance evaluation- Management for sustainability - Assessments of economic sustainability
- UNIT II SOCIAL AND ENVIRONMENTAL SUSTAINABILITY 9**
 Social sustainability – Introduction-Work management -Human rights - Societal commitment - Customers -Business practices -Modelling and assessing social sustainability. Environmental issues pertaining to the manufacturing sector: Pollution - Use of resources -Pressure to reduce costs - Environmental management: Processes that minimize negative environmental impacts - environmental legislation and energy costs - need to reduce the carbon footprint of manufacturing Operations-Modelling and assessing environmental sustainability
- UNIT III SUSTAINABILITY PRACTICES 9**
 Sustainability awareness - Measuring Industry Awareness-Drivers and barriers -Availability of sustainability indicators -Analysis of sustainability practicing -Modeling and assessment of sustainable practicing -Sustainability awareness -Sustainability drivers and barriers - Availability of sustainability indicators- Designing questionnaires- Optimizing Sustainability Indexes-Elements – Cost and time model.
- UNIT IV MANUFACTURING STRATEGY FOR SUSTAINABILITY 9**
 Concepts of competitive strategy and manufacturing strategies and development of a strategic improvement programme - Manufacturing strategy in business success strategy formation and formulation - Structured strategy formulation - Sustainable manufacturing system design options - Approaches to strategy formulation - Realization of new strategies/system designs.
- UNIT V TRENDS IN SUSTAINABLE OPERATIONS 9**
 Principles of sustainable operations - Life cycle assessment manufacturing and service activities - influence of product design on operations - Process analysis – Capacity management - Quality management -Inventory management - Just-In-Time systems - Resource efficient design - Consumerism and sustainable well-being.

TOTAL: 45 PERIODS

COURSE OUTCOMES

Upon successful completion of the course, students should be able to:

- CO1: Discuss the importance of economic sustainability.
- CO2: Describe the importance of sustainable practices.
- CO3: Identify drivers and barriers for the given conditions.
- CO4: Formulate strategy in sustainable manufacturing.
- CO5: Plan for sustainable operation of industry with environmental, cost consciousness.



M. Jeyakumar
Dr.M.JEYAKUMAR, M.E., Ph.D.
 PRINCIPAL
 CHRIST THE KING ENGINEERING COLLEGE,
 Chikkarampalayam Village,
 Karamadai, Mettupalayam Taluk,
 Coimbatore - 641 104.

TEXT BOOKS:

1. Ibrahim Garbie, "Sustainability In Manufacturing Enterprises Concepts, Analyses and Assessments for Industry 4.0", Springer International Publishing., United States, 2016, ISBN-13: 978-3319293042.
2. Davim J.P., "Sustainable Manufacturing", John Wiley & Sons., United States, 2010, ISBN: 978-1-848-21212-1.

REFERENCES:

1. Jovane F, Emper, W.E. and Williams, D.J., "The ManuFuture Road: Towards Competitive and Sustainable High-Adding-Value Manufacturing", Springer, 2009, United States, ISBN 978-3-540-77011-4.
2. Kutz M., "Environmentally Conscious Mechanical Design", John Wiley & Sons., United States, 2007, ISBN: 978-0-471-72636-4.
3. Seliger G., "Sustainable Manufacturing: Shaping Global Value Creation", Springer, United States, 2012, ISBN 978-3-642-27289-9.

CO's-PO's & PSO's MAPPING

Mapping of COs with POs and PSOs															
COs/Pos & PSOs	POs												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	-	2	-	-	-	2	2	-	1	1	2	2	2	1
CO2	3	-	-	-	-	-	2	-	-	1	1	2	1	2	2
CO3	3	-	-	-	-	-	2	3	-	1	1	2	1	2	2
CO4	3	-	3	-	-	-	2	-	-	1	1	2	2	2	1
CO5	3	-	3	-	-	-	2	2	-	1	1	2	2	2	1
CO/PO & PSO Average	3	-	3	-	-	-	2	2	-	1	1	2	2	2	1

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

CES336

ENVIRONMENTAL QUALITY MONITORING AND ANALYSISL T P C
3 0 0 3**OBJECTIVES:**

- to understand and study the complexity of the environment in relation to pollutants generated due to industrial activity.
- To analyze the quality of the environmental parameters and monitor the same for the purpose of environmental risk assessment.

UNIT I ENVIRONMENTAL MONITORING AND STANDARDS

9

Introduction- Environmental Standards- Classification of Environmental Standards- Global Environmental Standards- Environmental Standards in India- Ambient air quality standards- water quality standard- Environmental Monitoring-Need for environmental monitoring- Concepts of environmental monitoring- Techniques of Environmental Monitoring.



12

M. Jeyakumar
DR. M. JEYAKUMAR, M.E., Ph.D.
 PRINCIPAL
 CHRIST THE KING ENGINEERING COLLEGE,
 Chikkarampalayam Village,
 Karamadai, Mettupalayam Taluk,
 Coimbatore - 641 104.

UNIT II MONITORING OF ENVIRONMENTAL PARAMETERS

9

Current Environmental Issues- Global Environmental monitoring programme-International conventions- Application of Environmental Monitoring- Atmospheric Monitoring - screening parameters – Significance of environmental sampling- sampling methods – water sampling - sampling of ambient air-sampling of flue gas.

UNIT III ANALYTICAL METHODS FOR ENVIRONMENTAL MONITORING

9

Classification of Instrumental Method- Analysis of Organic Pollutants by Spectrophotometric methods - Determination of nitrogen, phosphorus and, chemical oxygen demand (COD) in sewage; Biochemical oxygen demand (BOD)- Sampling techniques for air pollution measurements; analysis of particulates and air pollutants like oxides of nitrogen, oxides of sulfur, carbon monoxide, hydrocarbon; Introduction to advanced instruments for environmental analysis

UNIT IV ENVIRONMENTAL MONITORING PROGRAMME (EMP) & RISKASSESSMENT 9

Water quality monitoring programme- national water quality monitoring- Parameters for National Water Quality Monitoring- monitoring protocol; Process of risk assessment- hazard identification- exposure assessment- dose-response assessment; risk characterization.

UNIT V AUTOMATED DATA ACQUISITION AND PROCESSING

9

Data Acquisition for Process Monitoring and Control - The Data Acquisition System - Online Data Acquisition, Monitoring, and Control - Implementation of a Data Management System - Review of Observational Networks -Sensors and transducers- classification of transducers- data acquisition system- types of data acquisition systems- data management and quality control; regulatory overview.

TOTAL: 45 PERIODS**COURSE OUTCOMES**

After completion of this course, the students will know

CO1	Basic concepts of environmental standards and monitoring.
CO2	the ambient air quality and water quality standards;
CO3	the various instrumental methods and their principles for environmental monitoring
CO4	The significance of environmental standards in monitoring quality and sustainability of the environment.
CO5	the various ways of raising environmental awareness among the people.
CO6	Know the standard research methods that are used worldwide for monitoring the environment.

TEXTBOOKS

1. Environmental monitoring Handbook, Frank R. Burden, © 2002 by The McGraw-Hill Companies, Inc.
2. Handbook of environmental analysis: chemical pollutants in the air, water, soil, and solid wastes / Pradyot Patnaik, © 1997 by CRC Press, Inc

REFERENCES

1. Environmental monitoring / edited by G. Bruce Wiersma, © 2004 by CRC Press LLC.
2. H. H. Willard, L. L. Merit, J. A. Dean and F. A. Settle, Instrumental Methods of Analysis, CBP Publishers and Distributors, New Delhi, 1988.
3. Heaslip, G. (1975) Environmental Data Handling. John Wiley & Sons. New York.

COURSE ARTICULATION MATRIX

Course Outcome	Program Outcomes														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1	PO1	PO1	PSO	PSO2	PSO3
CO1	1	1	1	-	-	-	-	-	-	-	-	-	3	-	-
CO2	1	1	1	1	1	-	-	-	1	-	2	2	2	1	1
CO3	1	1	2	1	1	-	-	-	2	-	1	1	1	-	-
CO4	1	2	3	3	1	-	-	-	2	-	3	3	1	-	-
CO5	1	1	3	2	1	-	-	-	3	-	3	1	2	-	-
CO6	3	2	3	3	2	-	-	-	3	-	3	3	3	1	1
Over all	3	2	3	3	2	-	-	-	3	-	3	3	3	1	1



COURSE OBJECTIVES:

1. To understand the types of energy sources, energy efficiency and environmental implications of energy utilisation
2. To create awareness on energy audit and its impacts
3. To acquaint the techniques adopted for performance evaluation of thermal utilities
4. To familiarise on the procedures adopted for performance evaluation of electrical utilities
5. To learn the concept of sustainable development and the implication of energy usage

UNIT I ENERGY AND ENVIRONMENT 9

Primary energy sources - Coal, Oil, Gas – India Vs World with respect to energy production and consumption, Climate Change, Global Warming, Ozone Depletion, UNFCCC, COP

UNIT II ENERGY AUDITING 9

Need and types of energy audit, Energy management (audit) approach-understanding energy costs, bench marking, energy performance, matching energy use to requirement, maximizing system efficiencies, optimizing the input energy requirements, fuel & energy substitution, energy audit instruments

UNIT III ENERGY EFFICIENCY IN THERMAL UTILITIES 9

Energy conservation avenues in steam generation and utilisation, furnaces, Thermic Fluid Heaters, Insulation and Refractories - Commercial waste heat recovery devices: recuperator, regenerator, heat pipe, heat exchangers (Plate, Shell & Tube), heat pumps, and thermocompression

UNIT IV ENERGY CONSERVATION IN ELECTRICAL UTILITIES 9

Demand side management - Power factor improvement – Energy efficient transformers - Energy conservation avenues in Motors, HVAC, fans, blowers, pumps, air compressors, illumination systems and cooling towers

UNIT V SUSTAINABLE DEVELOPMENT 9

Sustainable Development: Concepts and Stakeholders, Sustainable Development Goal (SDG). Globalization and Economic growth. Economic development: Economic inequalities, Income and growth. Social development: Poverty, conceptual issues and measures, impact of poverty,

TOTAL:45 PERIODS**COURSE OUTCOMES:**

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

1. Understand the prevailing energy scenario
2. Familiarise on energy audits and its relevance
3. Apply the concept of energy audit on thermal utilities
4. Employ relevant techniques for energy improvement in electrical utilities
5. Understand Sustainable development and its impact on human resource development

REFERENCES:

1. Energy Manager Training Manual (4Volumes) available at <http://www.em-ea.org/gbook1.asp>, a website administered by Bureau of Energy Efficiency (BEE), a statutory body under Ministry of Power, Government of India.2004
2. Eastop.T.D& Croft D.R, "Energy Efficiency for Engineers and Technologists", Logman Scientific & Technical, ISBN-0-582-03184, 1990
3. W.R. Murphy and G. McKay "Energy Management" Butterworths, London 1987
4. Pralap Bhattacharyya, "Climate Change and Greenhouse Gas Emission", New India Publishing Agency-Nipa,2020



5. Matthew John Franchetti , Defne Apul "Carbon Footprint Analysis: Concepts, Methods, Implementation, and Case Studies" CRC Press,2012
6. Robert A. Ristinen, Jack J. Kraushaar, Jeffrey T. Brack, "Energy and the Environment", 4th Edition,Wiley,2022
7. M.H. Fulekar,Bhawana Pathak, R K Kale,"Environment and Sustainable Development" Springer,2016
8. Sustainable development in India: Stocktaking in the run up to Rio+20: Report prepared by TERI for MoEF, 2011.

CES332 SUSTAINABLE AGRICULTURE AND ENVIRONMENTAL MANAGEMENT

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

OBJECTIVES:

- To educate the students about the issues of sustainability in agroecosystems, introduce the concepts and principles of agroecology as applied to the design and management of sustainable agricultural systems for a changing world.

UNIT I AGROECOLOGY, AGROECOSYSTEM AND SUSTAINABLE AGRICULTURE CONCEPTS

9

Ecosystem definition - Biotic Vs. abiotic factors in an ecosystem - Ecosystem processes - Ecological services and agriculture - Problems associated with industrial agriculture/food systems - Defining sustainability - Characteristics of sustainable agriculture - Difference between regenerative and sustainable agriculture systems

UNIT II SOIL HEALTH, NUTRIENT AND PEST MANAGEMENT

9

Soil health definition - Factors to consider (physical, chemical and biological) - Composition of healthy soils - Soil erosion and possible control measures - Techniques to build healthy soil - Management practices for improving soil nutrient - Ecologically sustainable strategies for pest and disease control

UNIT III WATER MANAGEMENT

9

Soil water storage and availability - Plant yield response to water - Reducing evaporation in agriculture - Earthworks and tanks for rainwater harvesting - Options for improving the productivity of water - Localized irrigation - Irrigation scheduling - Fertigation - Advanced irrigation systems and agricultural practices for sustainable water use

UNIT IV ENERGY AND WASTE MANAGEMENT

9

Types and sources of agricultural wastes - Composition of agricultural wastes - Sustainable technologies for the management of agricultural wastes - Useful and high value materials produced using different processes from agricultural wastes - Renewable energy for sustainable agriculture

UNIT V EVALUATING SUSTAINABILITY IN AGROECOSYSTEMS

9

Indicators of sustainability in agriculture - On-farm evaluation of agroecosystem sustainability - Alternative agriculture approaches/ farming techniques for sustainable food production - Goals and components of a community food system - Case studies

TOTAL: 45 PERIODS



OUTCOMES:

On completion of the course, the student is expected to be able to

- CO1 Have an in-depth knowledge about the concepts, principles and advantages of sustainable agriculture
- CO2 Discuss the sustainable ways in managing soil health, nutrients, pests and diseases
- CO3 Suggest the ways to optimize the use of water in agriculture to promote an ecological use of resources
- CO4 Develop energy and waste management plans for promoting sustainable agriculture in non-sustainable farming areas
- CO5 Assess an ecosystem for its level of sustainability and prescribe ways of converting to a sustainable system through the redesign of a conventional agroecosystem

REFERENCES:

1. Approaches to Sustainable Agriculture – Exploring the Pathways Towards the Future of Farming, Oberc, B.P. & Arroyo Schnell, A., IUCN, Belgium, 2020
2. Natural bioactive products in sustainable agriculture, Singh, J. & Yadav, A.N., Springer, 2020
3. Organic Farming for Sustainable Agriculture, Nandwani, D., Springer, 2016
4. Principles of Agronomy for Sustainable Agriculture, Villalobos, F.J. & Fereres, E., Springer, 2016
5. Sustainable Agriculture for Food Security: A Global Perspective, Balkrishna, A., CRC Press, 2021
6. Sustainable Energy Solutions in Agriculture, Bundschuh, J. & Chen, G., CRC Press, 2014

CO – PO Mapping - SUSTAINABLE AGRICULTURE PRACTICES

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

1 – Low; 2 – Medium; 3 – High; '-' – No correlation

OSF352

INDUSTRIAL HYGIENE

L T P C
3 0 0 3

COURSE OBJECTIVES:

- Demonstrate an understanding of how occupational hygiene standards are set and used in work health and safety.
- Compare and contrast the roles of environmental and biological monitoring in work health and safety
- Outline strategies for identifying, assessing and controlling risks associated with airborne gases, vapours and particulates
- Discuss how personal protective equipment can be used to reduce risks associated with workplace exposures
- Provide high-level advice on managing and controlling noise and noise-related hazards

UNIT I INTRODUCTION AND SCOPE

9

Occupational Health and Environmental Safety Management - Principles practices. Comm on Occupational diseases: Occupational Health Management Services at the work place. Pre-employment, periodic medical examination of workers, medical surveillance for control of occupational diseases and health records.



UNIT II MONITORING FOR SAFETY, HEALTH & ENVIRONMENT 9

Occupational Health and Environment Safety Management System, ILO and EPA Standards
Industrial Hygiene: Definition of Industrial Hygiene, Industrial Hygiene: Control Methods,
Substitution, Changing the process, Local Exhaust Ventilation, Isolation, Wet method, Personal
hygiene, housekeeping and maintenance, waste disposal, special control measures.

UNIT III OCCUPATIONAL HEALTH AND ENVIRONMENTAL SAFETY EDUCATION 9

Element of training cycle, Assessment of needs. Techniques of training, design and development of
training programs. Training methods and strategies types of training. Evaluation and review of
training programs. Occupational Health Hazards, Promoting Safety, Safety and Health training,
Stress and Safety, Exposure Limit .

UNIT IV OCCUPATIONAL SAFETY, HEALTH AND ENVIRONMENT MANAGEMENT 9

Bureau of Indian standards on safety and health 14489 - 1998 and 15001 – 2000, OSHA, Process
Safety Management (PSM) as per OSHA, PSM principles, OHSAS – 18001, EPA Standards,
Performance measurements to determine effectiveness of PSM. Importance of Industrial safety,
role of safety department,

UNIT-V INDUSTRIAL HAZARDS 9

i. Radiation: Types and effects of radiation on human body, Measurement and detection of
radiation intensity. Effects of radiation on human body, Measurement – disposal of radioactive
waste, Control of radiation ii. Noise and Vibration: Sources, and its control, Effects of noise on the
auditory system and health, Measurement of noise . Different air pollutants in industries, Effect of
different gases and particulate matter ,acid fumes ,smoke, fog on human health, Vibration: effects.

TOTAL PERIODS: 45

COURSE OUTCOMES:

Students able to

CO1: Explain and apply human factors engineering concepts in both evaluation of existing systems
and design of new systems

CO2: Specify designs that avoid occupation related injuries

CO3: Define and apply the principles of work design, motion economy, and work environment
design.

CO4: Identify the basic human sensory, cognitive, and physical capabilities and limitations with
respect to human-machine system performance.

CO5: Acknowledge the impact of workplace design and environment on productivity

TEXT BOOKS:

1. R. K. Jain and Sunil S. Rao , Industrial Safety , Health and Environment Management Systems,
Khanna publishers, New Delhi (2006)

2. Slote. L, Handbook of Occupational Safety and Health, John Willey and Sons, New York .



REFERENCES:

1. Jeanne MagerStellman, Encyclopedia of Occupational Health and Safety (ILO) Ms. Irma Jourdan publication
2. Frank P Lees - Loss of prevention in Process Industries, Vol. 1 and 2,
3. ButterworthHeinemann Ltd., London (1991). 2. Industrial Safety - National Safety Council of India
4. Frank P Lees – Loss of prevention in Process Industries , Vol. 1 and 2, Butterworth- Heinemann Ltd., London
5. R. K. Jain and Sunil S. Rao, Industrial Safety , Health and Environment Management Systems, Khanna publishers, New Delhi (2006).

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	2		2		2	-	-	-	-	-	2	-	-	-	-
2	-		2		-	-	1	-	-	-	1	-	-	-	-
3	-		-		2	-	-	-	-	-	2	-	-	-	-
4	-		-		-	-	-	-	2	-	3	-	-	-	-
5	-		-		-	-	-	1	-	-	-	-	-	-	-
AVg.	2	-	2	-	-	-	1	1	2	-	2	-	-	-	-

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

OAI352

AGRICULTURE ENTREPRENEURSHIP DEVELOPMENT

L T P C

3 0 0 3

COURSE OBJECTIVES

- To introduce the importance of Agri-business management, its characteristics and principles
- To impart knowledge on the functional areas of Agri-business like Marketing management, Product pricing methods and Market potential assessment.

UNIT I ENTREPRENEURIAL ENVIRONMENT IN INDIAN CONTEXT

9

Entrepreneur Development(ED): Concept of entrepreneur and entrepreneurship assessing overall business environment in Indian economy- Entrepreneurial and managerial characteristics- Entrepreneurship development programmers (EDP)-Generation incubation and commercialization of ideas and innovations- Motivation and entrepreneurship development- Globalization and the emerging business entrepreneurial environment.

UNIT II AGRIPRNEURSHIP IN GLOBAL ARENA: LEGAL PERSPECTIVE

9

Importance of agribusiness in Indian economy - International trade-WTO agreements- Provisions related to agreements in agricultural and food commodities - Agreements on Agriculture (AOA)- Domestic supply, market access, export subsidies agreements on sanitary and phyto-sanitary (SPS) measures, Trade related intellectual property rights (TRIPS).



[Signature]
DR. RAJESH K. KUMAR, M.E., Ph.D
PRINCIPAL
CHRIST THE KING ENGINEERING COLLEGE,
Chikkarampalayam Village,
Kamada, Mettupalayam Taluk,
Coimbatore - 641 104.

UNIT III ENTREPRENEURSHIP MANAGEMENT: FINANCIAL PERSPECTIVE 9
Entrepreneurship - Essence of managerial Knowledge -Management functions- Planning-organizing-Directing-Motivation-ordering-leading-supervision- communication and control-Understanding Financial Aspects of Business - Importance of financial statements-liquidity ratios-leverage ratios, coverage ratios-turnover ratios-Profitability ratios. Agro-based Industries-Project-Project cycle-Project appraisal and evaluation techniques-undiscounted measures-Payback period-proceeds per rupee of outlay, Discounted measures-Net Present Value (NPV)-Benefit-Cost Ratio(BCR)-Internal Rate of Return(IRR)-Net benefit investment ratio(N/K ratio)-sensivity analysis.

UNIT IV ENTREPRENEURIAL OPPORTUNITIES: ECONOMIC GROWTH PERSPECTIVE 9
Managing an enterprise: Importance of planning, budgeting, monitoring evaluation and follow-up managing competition. Role of ED in economic development of a country- Overview of Indian social, political system and their implications for decision making by individual entrepreneurs- Economic system and its implication for decision making by individual entrepreneurs.

UNITV ENTREPRENEURIAL PROMOTION MEASURES AND GOVERNMENT SUPPORT 9
Social responsibility of business. Morals and ethics in enterprise management- SWOT analysis-Government schemes and incentives for promotions of entrepreneurship. Government policy on small and medium enterprises (SMEs)/SSIs/MSME sectors- Venture capital (VC), contract framing (CF) and Joint Venture (JV), public-private partnerships (PPP) - overview of agricultural engineering industry, characteristics of Indian farm machinery industry.

TOTAL: 45 PERIODS

COURSE OUTCOMES

- CO1:Judge about agricultural finance, banking and cooperation
- CO2:Evaluate basic concepts, principles and functions of financial management
- CO3:Improve the skills on basic banking and insurance schemes available to customers
- CO4:Analyze various financial data for efficient farm management
- CO5:Identify the financial institutions

TEXT BOOKS

1. Joseph L. Massie, 1995, "Essentials of Management", prentice Hall of India Pvt limited, New Delhi
2. Khanka S, 1999, Entrepreneurial Development, S, Chand and Co, New Delhi
3. Mohanty S K, 2007, Fundamentals of Entrepreneurship, Prentice Hall India, New Delhi.

REFERENCES

1. Harih S B, Conner U J and Schwab G D, 1981, Management of the Farm Business, Prentice Hall Inc, New Jersey
2. Omri Ralins, N.1980, Introduction to Agricultural: Prentice Hall Inc, New Jersey
3. Gittenger Price, 1989, Economic Analysis of Agricultural project, John Hopkins University, Press, London.



4. Thomas W Zimmer and Norman M Scarborough, 1996, Entrepreneurship, Prentice Hall, New Jersey.
5. Mar J Dollinger, 1999, Entrepreneurship strategies and resources, Prentice -Hall, Upper Saddal Rover, New Jersey.

CO's-PO's & PSO's MAPPING

PO/PSO		CO1	CO2	CO3	CO4	CO5	Overall correlation of COs with POs
PO1	Engineering Knowledge	1	2	1	1	1	2
PO2	Problem Analysis	2	1	1	1	2	1
PO3	Design/ Development of Solutions	1	1	1	2	1	2
PO4	Conduct Investigations of Complex Problems	1	1	2	1	1	1
PO5	Modern Tool Usage	2	1	1	1	1	2
PO6	The Engineer and Society	1	2	1	2	1	1
PO7	Environment and sustainability	1	1	2	1	1	1
PO8	Ethics	1	2	1	1	1	1
PO9	Individual and team work:	1	1	1	2	1	1
PO10	Communication	1	1	1	1	2	1
PO11	Project management and finance	1	1	2	1	1	1
PO12	Life-long learning:	1	2	1	1	1	2
PSO1	To make expertise in design and engineering problem solving approach in agriculture with proper knowledge and skill	1	2	1	1	1	1
PSO2	To enhance students ability to formulate solutions to real-world problems pertaining to sustained agricultural productivity using modern technologies.	1	1	2	1	1	1
PSO3	To inculcate entrepreneurial skills through strong Industry-Institution linkage.	1	2	1	1	2	1

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

OPE353

INDUSTRIAL SAFETY

L T P C
3 0 0 3

COURSE OBJECTIVES:

- To educate about the health hazards and the safety measures to be followed in the industrial environment.
- Describe industrial legislations (Factories Acts, Workmen's Compensation and other laws) enacted for the protection of employees health at work settings
- Describe methods of prevention and control of Occupational Health diseases, accidents / emergencies and other hazards



M. Jeyakumar
Dr. M. JEYAKUMAR, M.E., Ph.D
PRINCIPAL
CHRIST THE KING ENGINEERING COLLEGE,
Chikkarampalayam Village,
Karamadai, Mettupalayam Taluk,
Coimbatore - 641 104.

UNIT II ENERGY CALCULATIONS 9
Components of embodied energy - calculation of embodied energy for construction materials - Energy concept and primary energy - Embodied energy via-a-vis operational energy in conditioned building - Life Cycle energy use.

UNIT III GREEN BUILDINGS 9
Control of energy use in building – National Building Code (NBC), ECBC code, codes in neighboring tropical countries - OTTV concepts and calculations – Features of LEED and TERI – Griha ratings - Role of insulation and thermal properties of construction materials - influence of moisture content and modeling -Performance ratings of green buildings - Zero energy building'

UNIT IV CORE CONCEPTS IN LEAN 9
Introduction to the Course; Lean Overview; Need for Productivity Measurement and improvement; Productivity Measurement System (PMS).

UNIT V LEAN CONSTRUCTION TOOLS AND TECHNIQUES 9
Sampling/ Work Sampling; Survey/ Foreman delay survey; Value Stream/ Process Mapping– 5S , Collaborative Planning System (CPS) Last Planner™ System (LPS) – Big Room Approach, IT/BIM and Lean, How to Start Practicing Lean Tools in Project Site.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

- On completion of the course, the student is expected to be able to
- CO1 Describe the various sustainable materials used in construction.
- CO2 Explain the method of estimating the amount of energy required for building.
- CO3 Describe the features of LEED, TERI and GRIHA ratings of buildings.
- CO4 Explain the core concepts of lean construction tools and techniques and their importance in achieving better productivity.
- CO5 Apply lean tools & techniques to achieve sustainability in construction projects.

REFERENCES:

1. Charles J Kibert, Sustainable Construction: Green Building Design & Delivery, 4th Edition, Wiley Publishers 2016.
2. Steve Goodhew, Sustainable Construction Process, Wiley Blackwell,UK, 2016.
3. Craig A. Langston & Grace K.C. Ding, Sustainable Practices in the Built Environment, Butterworth Heinemann Publishers, 2011.
4. Ballard, G., Tommelein, I., Koskela, L and Howell, G., Lean construction tools and techniques, 2002.
5. Salem, O., Solomon, J., Genaidy, A. and Luegring, M., Site implementation and Assessment of Lean Construction Techniques, Lean Construction Journal, 2005.



COs- PO's & PSO's MAPPING

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

CE3015

GEOENVIRONMENTAL ENGINEERING

L T P C
3 0 0 3

COURSE OBJECTIVE:

- The student acquires the knowledge on the Geotechnical engineering problems associated with soil contamination, safe disposal of waste and remediate the contaminated soils by different techniques hereby protecting **environment**.

UNIT I SOIL – WASTE INTERACTION

9

Role of Geo-**environmental** Engineering – sources, generation and classification of wastes – causes and consequences of soil pollution – case studies in soil failure -factors influencing soilpollutant interaction – modification of Index, chemical and engineering properties – physical and physio-chemical mechanisms.

UNIT II CONTAMINANT TRANSPORT AND SITE CHARACTERISATION

9

Transport of contaminant in subsurface – advection, diffusion, dispersion – chemical process – biological process, sorption, desorption, precipitation, dissolution, oxidation, complexation, ion exchange, Volatization, biodegradation – characterization of contaminated sites – soil and rock data – hydrological and chemical data – analysis and evaluation.

UNIT III WASTE CONTAINMENT AND REMEDIATION OF CONTAMINATED SITES

9

In-situ containment – vertical and horizontal barrier – surface cover – ground water pumping system on subsurface drain – soil remediation – Soil Vapour extraction, soil waste stabilization, solidification of soils, electrokinetic remediation, soil heating, vitrification, bio remediation, Phyto-remediation – ground water remediation – pump and treat , In-situ flushing, permeable reacting barrier, In-situ air sparging.



M. Jeyaraj
DR. M. JEYARAJ, M.E., Ph.D.
 PRINCIPAL
 CHRIST THE KING ENGINEERING COLLEGE,
 Chikorampalayam Village,
 Karamadai, Metturpalayam Taluk,
 Coimbatore - 641 104.

UNIT IV LANDFILLS AND SURFACE IMPOUNDMENTS

9

system – Source and characteristics of waste - site selection for landfills – components of landfills – liner soil, geomembrane, geosynthetic clay, geo-composite liner system – leachate collection – final cover design – monitoring landfill - **Environmental** laws and regulations.

UNIT V STABILISATION OF WASTE

9

Evaluation of waste materials – flyash, municipal sludge, plastics, scrap tire, blast furnace slag, construction waste, wood waste and their physical, chemical and biological characteristics – potential reuse – utilization of waste and soil stabilization.

TOTAL:45 PERIODS**COURSE OUTCOMES:**

On completion of the course, the student is expected to be able to;

- CO1 Understand the various causes and consequences of waste interaction with soil and their modification.
- CO2 Understand the various mechanism of transport of contaminants into the subsurface and characterization of contaminated sites and their risk analysis.
- CO3 Understand on how to decontaminate the site so as to reuse the site for human settlement
- CO4 Understand how to safely dispose the waste through different containment process.
- CO5 Expose on how to convert the waste into a resource material through soil waste stabilization techniques with or without chemical stabilization.

REFERENCES:

1. Daniel B.E, Geotechnical Practice for waste disposal, Chapman & Hall, London, 1993.
2. Hari D. Sharma and Krishna R.Reddy, Geo-**Environmental** Engineering – John Wiley and Sons, INC, USA, 2004.
3. Westlake, K., Landfill Waste pollution and Control, Albion Publishing Ltd., England, 1995.
4. Wentz, C.A., Hazardous Waste Management, McGraw Hill, Singapore, 1989.
5. Proceedings of the International symposium of **Environmental** Geotechnology (Vol.I and II), **Environmental Publishing** Company, 1986 and 1989.
6. Ott, W.R., **Environmental** Indices, Theory and Practice, Ann Arbor, 1978.
7. Fried, J.J., Ground Water Pollution, Elsevier, 1975.
8. ASTM Special Tech. Publication 874, Hydraulic Barrier in Soil and Rock, 1985.
9. Lagrega, M.d., Buckingham, P.L., and Evans, J.C., Hazardous Waste Management, McGraw Hill, Inc. Singapore, 1994.

COs- PO's & PSO's MAPPING

PO/PSO		Course Outcome					Overall Correlation of COs to POs
		CO1	CO2	CO3	CO4	CO5	
PROGRAM OUTCOMES(PO)							
PO1	Knowledge of Engineering Sciences	1	3	2	1	2	1
PO2	Problem analysis	1	1	1	3	2	1
PO3	Design / development of solutions	1		2	3	3	2
PO4	Investigation	1		2	2	3	2
PO5	Modern Tool Usage	2	2	1			1
PO6	Engineer and Society	2	2	3	2	2	2
PO7	Environmental and Sustainability	3	3	3	3	3	3
PO8	Ethics			2	2	2	2
PO9	Individual and Team work		2		2	3	3
PO10	Communication				2	2	2
PO11	Project Management and Finance	1		1		1	1
PO12	Life Long Learning	3	3	3	3	3	3



PROGRAM SPECIFIC OUTCOMES (PSO)							
PSO1	Knowledge of Geotechnical Engineering discipline	2	2	2	3	1	2
PSO2	Critical analysis of Geotechnical Engineering problems and Innovation	2	2	2	2	2	2
PSO3	Conceptualization and evaluation Of engineering solutions to geotechnical engineering issues	3	3	2	3	2	3

CCE333

ENVIRONMENTAL IMPACT ASSESSMENT

L T P C

3 0 0 3

COURSE OBJECTIVES:

- To expose the students to the need, methodology, documentation and usefulness of **environmental** impact assessment and to develop the skill to prepare **environmental** management plan.
- To participate in the performance of an **environmental** assessment process (EIA or SEA), given the disciplinary knowledge and skills in natural sciences and engineering the student have achieved in other courses.

UNIT I INTRODUCTION

9

Historical development of **Environmental** Impact Assessment (EIA). **Environmental** Clearance- EIA in project cycle. legal and regulatory aspects in India – types and limitations of EIA –EIA process screening – scoping - terms of reference in EIA- setting – analysis – mitigation. Cross sectoral issues –public hearing in EIA- EIA consultant accreditation.

UNIT II IMPACT IDENTIFICATION AND PREDICTION

10

Matrices – networks – checklists – cost benefit analysis – analysis of alternatives – expert systems in EIA. prediction tools for EIA – mathematical modelling for impact prediction – assessment of impacts – air – water – soil – noise – biological — cumulative impact assessment

UNIT III SOCIO-ECONOMIC IMPACT ASSESSMENT

8

Socio-economic impact assessment - relationship between social impacts and change in community and institutional arrangements. factors and methodologies- individual and family level impacts. communities in transition-rehabilitation

UNIT IV EIA DOCUMENTATION AND ENVIRONMENTAL MANAGEMENT PLAN

9

Environmental management plan - preparation, implementation and review – mitigation and rehabilitation plans – policy and guidelines for planning and monitoring programmes – post project audit – documentation of EIA findings – ethical and quality aspects of **environmental** impact assessment

UNIT V CASE STUDIES

9

Mining, power plants, cement plants, highways, petroleum refining industry, storage & handling of hazardous chemicals, common hazardous waste facilities, CETPs, CMSWMF, building and construction projects

TOTAL: 45 PERIODS



COURSE OUTCOMES:

On completion of the course, the student is expected to be able to

- CO1 carry out scoping and screening of developmental projects for **environmental** and social assessments
- CO2 explain different methodologies for **environmental** impact prediction and assessment
- CO3 asses socio-economic investigation of the **environment** in a project
- CO4 plan **environmental** impact assessments and **environmental** management plans
- CO5 knowledge to prepare **environmental** impact assessment reports for various projects

REFERENCES:

1. Canter, L.W., "Environmental Impact Assessment", McGraw Hill, New York. 1996
2. Lawrence, D.P., "Environmental Impact Assessment – Practical solutions to recurrent problems", Wiley-Interscience, New Jersey. 2003
3. World Bank –Source book on EIA
4. Cutter, S.L., "Environmental Risk and Hazards", Prentice-Hall of India Pvt. Ltd., New Delhi, 1999.
5. Kolluru Rao, Bartell Steven, Pitblado R and Stricoff "Risk Assessment and Management Handbook", McGraw Hill Inc., New York, 1996.
6. K. V. Raghavan and A. A. Khan, "Methodologies in Hazard Identification and Risk Assessment", Manual by CLRI, 1990.
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

CE3034

ENVIRONMENTAL POLICY AND LEGISLATIONS

L T P C

3 0 0 3

COURSE OBJECTIVES:

- The course will analyze the legislative and judicial responses to **environmental** problems and the administrative system of **environment** related laws such as air, water, land, and hazardous substances etc. **Environment** advocacy and approaches for using litigation in **environment** protection will receive special attention



H. Jeyakumar
 Dr.M.JEYAKUMAR, M.E.,Ph.D.
 PRINCIPAL
 CHRIST THE KING ENGINEERING COLLEGE,
 Chikkarampalavam Village,
 Karamadai, Muthupalayam Taluka,
 Coimbatore - 641 104.

UNIT I INTRODUCTION TO ENVIRONMENTAL LEGISLATIONS AND INTERNATIONAL SCENARIO 9

Significance of Environmental Law -International Environmental Law -Development of International Environmental Law -Source and General principals of International Environmental Law –General rights and obligations of States -General Issues of the international law related to environmental protection -Stockholm Declaration-Rio Declaration on Environment and Development-Basel Convention on the Control of Trans boundary Movement of Hazardous Wastes and their disposal-Convention of Biological Diversity-U.N Frame Work Convention on Climate Change-Montreal Protocol on Substances that deplete Ozone Layer-Kyoto Protocol.

UNIT II INDIAN CONSTITUTIONS AND ENVIRONMENTAL PROTECTION 9

Indian Constitution and Environmental Protection -Constitutional provisions concerning Environment Articles 14,15,(2) (b) 19 (e),21,31,32,38,39,42,47, 48-A,49,51,51-A: Indian Environmental Policy 2006 Administrative machinery for pollution control Common Law & Criminal Law Nuisance, Negligence, Strict liability and Absolute liability, Provisions of IPC relating to environmental problems (public nuisance u/s 268 and others (Sections 269,270,277,284,285,286,425 to 440) Section 133 of Cr.P.C.

UNIT III REMEDIES FOR ENVIRONMENTAL POLLUTION 9

Common Law Remedies/Remedies under Law of Tort – Penal Remedies – Indian Penal Code and Code of Criminal Procedure – Remedies under Constitutional Law – Writs – Public Interest Litigation - Public Liability Insurance Act, 1991 – The National Green Tribunal Act 2010

UNIT IV MAJOR INDIAN LEGISLATIONS 9

Water Act (1974) Air Act (1981) Environmental Protection Act (1986) Major Notifications, The Municipal solid Wastes (Management and Handling) Rules 2000-Bio Medical Wastes (Management and Handling) Rules 1998- Hazardous Wastes (Management and Handling Rules 1989-Environment Impact Assessment Notifications- Coastal Regulation Zone Notification- Public Hearing Notifications

UNIT V ENVIRONMENT AND DEVELOPMENT CASE LAWS 9

Meaning and concept of development - Its impact on environment; conflict between environment and development, Concept of Sustainable Development, Polluter Pay Principle, Precautionary Principle, Public Trust Doctrine. Landmark Judgments - Orium gas leakage case, Rural Litigation and Entitlement Kendra, Dehradun, (1985) Supp SCC 487) Vellore Citizen Welfare Forum v. Union of India, (1996) 5SCC 647) Ganga Pollution case (1988) I SCC) S. Jagannath v. UOI (1997) SCC867) Vellore Citizens welfare forum case M.C. Mehta V. Kamalnath (1997) I SCC 388)

TOTAL: 45 PERIODS

COURSE OUTCOMES:

On completion of the course, the student is expected to be able to

- CO1 Understand origins and sources of environmental laws, and understand how and by whom environmental laws are made and interpreted
- CO2 Understand the key principles of, and actors within, environmental laws
- CO3 Understand the National Environmental Policy and Various Legislations enacted in line with Policy
- CO4 Critically analyze environmental laws within various contexts and to evaluate laws against procedural and substantive criteria.
- CO5 Understand and the Legal system operating in India and will be in a position to prepare compliance reports for getting environmental clearance.



REFERENCES

1. Leelakrishnan P., **Environmental** Law in India, Butterworths, 1998
2. Leelakrishnan P., **Environmental** Case Book, Lexis Nexis, 2000
3. Shanthakumar S., **Environmental** Law – An Introduction, Butterworths, 2004
4. Shyam Divan and Armin Rosencranz, Environmental Law and Policy in India, Oxford, 2001

COs- PO's & PSO's MAPPING

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

CE3054

TRANSPORT AND **ENVIRONMENT**

LT PC
3 0 0 3

COURSE OBJECTIVE:

- The objective of this course is to create an awareness / overview of the impact of Transportation Projects on the **environment** and society.

UNIT I INTRODUCTION

8

Environmental Inventory, **Environmental** Assessment, **Environmental** Impact Assessment (EIA), **Environmental** Impact of Transportation Projects, Need for EIA, EIA Guidelines for Transportation Project, Historical Development.

UNIT II METHODOLOGIES

8

Elements of EIA – Screening and Scoping – Methods of Impact Analysis – Applications – Appropriate methodology.



[Signature]
BDMWEYAKUMAR, M.E., Ph.D
PRINCIPAL
CHRIST THE KING ENGINEERING COLLEGE,
Chikkarampalayam Village,
Karamadai, Mettupalayam Taluk,
Coimbatore - 641 104

UNIT III ENVIRONMENTAL IMPACT, PREDICTION AND ASSESSMENT 10
 Prediction and Assessment of Impact of Transportation Project at various stages on water, air, noise, land acquisition and resettlement, Socio economic impact, indigenous people, aesthetics, health and safety, energy studies, traffic impact studies, IRC guidelines.

UNIT IV ENVIRONMENTAL MITIGATION AND MANAGEMENT PLAN 10
 Mitigation of the impact on Natural and Man-made Environment, Health, Water, Land, Noise, Air, Public participation, Environmental Management Plan, Energy Conservation, Methods to reduce Global Warming.

UNIT V EIA CASE STUDIES 9
 EIA Case Studies on Highway, Railway - EIA Case Studies on Transit Oriented Development (TOD), Compact Cities, Non-Motorised Transport (NMT)

TOTAL: 45 PERIODS

COURSE OUTCOMES

- CO1 Understand the basic concepts of Environmental Impact of Assessment
- CO2 Apply various methods of analyzing environmental Impact Analysis.
- CO3 Gain knowledge on Stage Wise Assessment and Prediction of impact of transportation projects
- CO4 Adopt environmental management plan and their impact on earth.
- CO5 Reviewing various case studies on environmental impact assessment of transport projects.

TEXTBOOKS:

1. Canter, L.R., Environmental Impact Assessment, McGraw Hill, New Delhi, 1996.
2. Indian Road Congress (IRC), Environmental Impact of Highway Projects, IRC, Delhi, 1998.
3. EIA Guidance Manual- Highway- MOEF & Govt of India, 2010
4. P. Meenakshi, Elements of Environmental Science and Engineering, Prentice Hall of India, New Delhi, 2006
5. Thirumurthy A.M., Introduction to Environmental Science and Management, Shroff Publishers, Bombay, 2005.

REFERENCES:

1. John G.Rau and David, C.Hooten, Environmental Impact Analysis Handbook, McGraw Hill Book Company, 1995
2. James H.Banks, Introduction to Transportation Engineering, McGraw Hill Book Company, 2000
3. World Bank, A Handbook on Roads and Environment, Vol.I and II, Washington DC, 1997
4. Priya Ranjan Trivedi, International Encyclopedia of Ecology and Environment – EIA, Indian Institute of Ecology and Environment, New Delhi, 1998
5. Manual on Norms & Standards for Environmental Clearance of large construction projects, MOEF & Govt of India

COs- PO's & PSO's MAPPING

PO/PSO		Course Outcome					Over all Correlation of COs to POs
		CO1	CO2	CO3	CO4	CO5	
PROGRAM OUTCOMES (PO)							
PO1	Knowledge of Engineering Sciences	3	3				3
PO2	Problem analysis		3	3	3	2	3
PO3	Design / development of solutions		3	3	2	1	3
PO4	Investigation			2	2	1	2
PO5	Modern Tool Usage		2	3	2	2	2
PO6	Engineer and Society	3			3	3	3



Dr. M. Jeyakumar
Dr. M. JEYAKUMAR, M.E., Ph.D
 PRINCIPAL
 CHRIST THE KING ENGINEERING COLLEGE
 Chikkarampalayam Village,
 Karamadai, Mettupalayam Taluk,
 Coimbatore - 641 104.

PO7	Environment and sustainability	1	1	2	3	1	2
PO8	Ethics			3	3	3	3
PO9	Individual and Team work	2	2			2	2
PO10	Communication					1	1
PO11	Project Management and Finance			2	2	3	2
PO12	Life Long Learning	2		2	1	1	2
PROGRAM SPECIFIC OUTCOMES (PSO)							
PSO1	Knowledge of Civil Engineering discipline	3	3	3	3	2	3
PSO2	Critical analysis of Civil Engineering problems and innovation	2	1	2	3		2
PSO3	Conceptualization and evaluation of engineering solutions to Civil Engineering Issues		2	3	2	3	3

OSF352

INDUSTRIAL HYGIENE

L T P C
3 0 0 3

COURSE OBJECTIVES:

- Demonstrate an understanding of how occupational hygiene standards are set and used in work health and safety.
- Compare and contrast the roles of environmental and biological monitoring in work health and safety
- Outline strategies for identifying, assessing and controlling risks associated with airborne gases, vapours and particulates
- Discuss how personal protective equipment can be used to reduce risks associated with workplace exposures
- Provide high-level advice on managing and controlling noise and noise-related hazards

UNIT I : INTRODUCTION AND SCOPE

9

Occupational Health and Environmental Safety Management - Principles practices. Comm on Occupational diseases: Occupational Health Management Services at the work place. Pre-employment, periodic medical examination of workers, medical surveillance for control of occupational diseases and health records.

UNIT II : MONITORING FOR SAFETY, HEALTH & ENVIRONMENT

9

Occupational Health and Environment Safety Management System, ILO and EPA Standards Industrial Hygiene: Definition of Industrial Hygiene, Industrial Hygiene: Control Methods, Substitution, Changing the process, Local Exhaust Ventilation, Isolation, Wet method, Personal hygiene, housekeeping and maintenance, waste disposal, special control measures.

UNIT III : OCCUPATIONAL HEALTH AND ENVIRONMENTAL SAFETY EDUCATION

9

Element of training cycle, Assessment of needs. Techniques of training, design and development of training programs. Training methods and strategies types of training. Evaluation and review of training programs. Occupational Health Hazards, Promoting Safety, Safety and Health training, Stress and Safety, Exposure Limit .

UNIT IV : OCCUPATIONAL SAFETY, HEALTH AND ENVIRONMENT MANAGEMENT

9

Bureau of Indian standards on safety and health 14489 - 1998 and 15001 - 2000, OSHA, Process Safety Management (PSM) as per OSHA, PSM principles, OHSAS - 18001, EPA Standards, Performance measurements to determine effectiveness of PSM. Importance of Industrial safety, role of safety department,




INDRAJ KUMAR, M.E., Ph.D.
PRINCIPAL
CHRIST THE KING ENGINEERING COLLEGE,
 Chikkarampuzha Village,
 Karamnadi, Mettupalayam Taluk,
 Coimbatore - 641 104.

UNIT V : INDUSTRIAL HAZARDS

9

i. Radiation: Types and effects of radiation on human body, Measurement and detection of radiation intensity. Effects of radiation on human body, Measurement – disposal of radioactive waste, Control of radiation ii. Noise and Vibration: Sources, and its control, Effects of noise on the auditory system and health, Measurement of noise , Different air pollutants in industries, Effect of different gases and particulate matter ,acid fumes ,smoke, fog on human health, Vibration: effects.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

Students able to

CO1: Explain and apply human factors engineering concepts in both evaluation of existing systems and design of new systems

CO2: Specify designs that avoid occupation related injuries

CO3: Define and apply the principles of work design, motion economy, and work environment design.

CO4: Identify the basic human sensory, cognitive, and physical capabilities and limitations with respect to human-machine system performance.

CO5: Acknowledge the impact of workplace design and environment on productivity

TEXT BOOKS:

1. R. K. Jain and Sunil S. Rao , Industrial Safety , Health and Environment Management Systems, Khanna publishers, New Delhi (2006)

2. Slote. L, Handbook of Occupational Safety and Health, John Willey and Sons, New York .

REFERENCES:

1. Jeanne MagerStellman, Encyclopedia of Occupational Health and Safety (ILO) Ms. Irma Jourdan publication

2. Frank P Lees - Loss of prevention in Process Industries, Vol. 1 and 2,

3. ButterworthHeinemann Ltd., London (1991). 2. Industrial Safety - National Safety Council of India

4. Frank P Lees – Loss of prevention in Process Industries , Vol. 1 and 2, Butterworth- Heinemann Ltd., London

5. R. K. Jain and Sunil S. Rao, Industrial Safety , Health and Environment Management Systems, Khanna publishers, New Delhi (2006).

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	2		2		2	-	-	-	-	-	2	-	-	-	-
2	-		2		-	-	1	-	-	-	1	-	-	-	-
3	-		-		2	-	-	-	-	-	2	-	-	-	-
4	-		-		-	-	-	-	2	-	3	-	-	-	-
5	-		-		-	-	-	1	-	-	-	-	-	-	-
AVg.	2	-	2	-	-	-	1	1	2	-	2		-	-	-



COURSE OBJECTIVES

- 1 To introduce the concept of **environmental** design and industrial ecology.
- 2 To impart knowledge about air pollution and its effects on the **environment**.
- 3 To enlighten the students with knowledge about noise and its effects on the **environment**.
- 4 To enlighten the students with knowledge about water pollution and its effects on the **environment**.
- 5 To introduce the concept of green co-rating and its need

UNIT – I DESIGN FOR **ENVIRONMENT AND LIFE CYCLE ASSESSMENT 9**

Environmental effects of design -selection of natural friendly material - Eco design - **Environmental** damage Material flow and cycles – Material recycling – Emission less manufacturing- Industrial Ecology – Pollution prevention – Reduction of toxic emission – design for recycle.

UNIT – II AIR POLLUTION SAMPLING AND MEASUREMENT 9

Primary and Secondary Pollutants, Automobile Pollutants, Industrial Pollution, Ambient air quality Standards, Metrological aspects of air Pollution, Temperature lapse Rates and Stability-wind velocity and turbulence-Pump behavior dispersion of air Pollutants-solution to the atmosphere dispersion equation-the Gaussian Plume Model, Air pollution sampling-collection of gaseous air pollutants-collection of particulate pollutants-stock sampling, analysis of air pollutants-sulfur dioxide-nitrogen dioxide, carbon monoxide, oxidants and ozone.

UNIT – III NOISE POLLUTION AND CONTROL 9

Frequency and Sound Levels, Units of Noise based power ratio, contours of Loudness. Effect of human, **Environment** and properties, Natural and Anthropogenic Noise Sources, Measuring Instruments for frequency and Noise levels, Masking of sound, Types, Kinetics, Selection of different reactors used for waste treatment, Treatment of noise at source, Path and Reception, Sources of noise, Effects of noise-Occupational Health hazards, thermal Comforts, Heat Island Effects, Radiation Effects.

UNIT – IV WATER DEMAND AND WATER QUALITY 9

Factors affecting consumption, Variation, Contaminants in water, Nitrates, Fluorides, Detergents, taste and odour, Radio activity in water, Criteria, for different impurities in water for portable and non-portable use, Point and non-point Source of pollution, Major pollutants of Water, Water Quality Requirement for different uses, Global water crisis issues.

UNIT – V GREEN CO-RATING 9

Ecological Footprint - Need For Green Co-Rating – Green Co-Rating System – Intent – System Approach – Weightage- Assessment Process – Types Of Rating – Green Co-Benefits – Case Studies Of Green Co-Rating

TOTAL:45 PERIODS**OUTCOMES:** At the end of the course the students would be able to

1. Explain the **environmental** design and selection of eco-friendly materials.
2. Analyse manufacturing processes towards minimization or prevention of air pollution.
3. Analyse manufacturing processes towards minimization or prevention of noise pollution.
4. Analyse manufacturing processes towards minimization or prevention of water pollution.
5. Evaluate green co-rating and its benefits.



TEXT BOOKS:

1. Gradel.T.E. and B.R. Allenby – Industrial Ecology – Prentice Hall – 2010
2. Rao M.N. and Dutta A.K. "Wastewater treatment", Oxford & IBH publishing Co. Pvt. Ltd., New Delhi, Second Edition, 2006

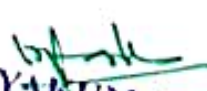
REFERENCES:

1. Gradel.T.E. and B.R. Allenby – Industrial Ecology – Prentice Hall – 2010
2. Frances Cairncross– Costing the Earth: The Challenge for Governments, the Opportunities for Business – Harvard Business School Press – 1993.
3. World Commission on **Environment** and Development (WCED), Our Common Future, Oxford University Press 2005.
4. Rao M.N. and Dutta A.K. "Wastewater treatment", Oxford & IBH publishing Co. Pvt. Ltd., New Delhi, Second Edition, 2006
5. Rao CS **Environmental** Pollution Control Engineering-, Wiley Eastern Ltd., New Delhi, 2006.
6. Lewis H Bell and Douglas H Bell, Industrial noise control, Fundamentals and applications, Marcel Decker, 1994.

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	1	1	3	1			3		1			1	1	2	2
2	1	1	3	1			3		1			1	1	2	2
3	1	1	3	1			3		1			1	1	2	2
4	1	1	3	1			3		1			1	1	2	2
5	1	1	3	1			3		1			1	1	2	2

Low (1) ; Medium (2) ; High (3)




Dr. M. JEYAKUMAR, M.E., Ph.D
 PRINCIPAL
 CHRIST THE KING ENGINEERING COLLEGE,
 Chikkarampalayam Village,
 Karamadai, Mettupalayam Taluk,
 Coimbatore - 641 104.