Third Semester Syllabus

Sl No.	Type	Subject Code	Topic	L	T	P	Credit Points
1.	DE	Prog. Specific Elective	Suggestive Choice Based Subject V	3	0	0	3
2.	OE	---	Open Elective	3	0	0	3
3.		CED391	Dissertation Phase – I	0	0	20	10
			Total	6	0	20	16

Suggestive Choice Based Subjects

Sl No.	Type	Subject Code	Topic	L	T	P	Credit Points
1	DE	CED301	High Performance Networks	3	0	0	3
2	DE	CED302	Pattern Recognition and Machine learning	3	0	0	3
3	DE	CED303	Remote Sensing	3	0	0	3

Open Elective Subjects

Sl No.	Type	Subject Code	Topic	L	T	P	Credit Points
1	OE	CEO301	Business Analytics	3	0	0	3
2	OE	CEO302	Industrial Safety	3	0	0	3
3	OE	CEO303	Operations Research	3	0	0	3
4	OE	CEO304	Cost Management of Engineering Projects	3	0	0	3
5	OE	CEO305	Composite Materials	3	0	0	3
6	OE	CEO306	Waste to Energy	3	0	0	3

Third Semester Syllabus

TITLE OF COURSE: HIGH-PERFORMANCE NETWORKS
COURSE CODE: CED301
L-T-P: 3-0-0
CREDITS: 3

Course Outcomes (CO):
At the end of this course, students will demonstrate the ability to
CO1: Apply knowledge of mathematics, probability, and statistics to model and analyze some networking protocols.
CO2: Design, implement, and analyze computer networks.
CO3: Identity, formulate, and solve network engineering problems.
CO4: Show knowledge of contemporary issues in high-performance computer networks.
Use techniques, skills, and modern networking tools necessary for engineering practice.

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓		✓							✓
CO2	✓			✓								✓
CO3	✓	✓	✓								✓	✓
CO4	✓	✓	✓		✓							✓

Course Contents:

Unit 1: Types of Networks, Network design issues, Data in support of network design. Network design tools, protocols and architecture. Streaming stored Audio and Video, Best effort service, protocols for real time interactive applications, Beyond best effort, scheduling and policing mechanism, integrated services, and RSVP-differentiated services.

Unit 2: VoIP system architecture, protocol hierarchy, Structure of a voice endpoint, Protocols for the transport of voice media over IP networks. Providing IP quality of service for voice, signaling protocols for VoIP, PSTN gateways, VoIP applications**.**

Unit 3: VPN-Remote-Access VPN, site-to-site VPN, Tunneling to PPP, Security in VPN. MPLS-operation, Routing, Tunneling and use of FEC, Traffic Engineering, MPLS based VPN, overlay networks-P2P connections.

Unit 4: Traffic Modeling: Little's theorem, Need for modeling, Poisson modeling, Non-poisson models, Network performance evaluation.

Unit 5: Network Security and Management: Principles of cryptography, Authentication, integrity, key distribution and certification, Access control and fire walls, attacks and counter measures, security in

many layers.

Unit 6: Infrastructure for network management, The internet standard management framework – SMI, MIB, SNMP, Security and administration, ASN.1.

Text Books

- Kershenbaum A., "Telecommunications Network Design Algorithms", Tata McGraw Hill, 1993.
- Larry Peterson & Bruce David, "Computer Networks: A System Approach", Morgan Kaufmann, 2003.
- Douskalis B., "IP Telephony: The Integration of Robust VoIP Services", Pearson Ed. Asia, 2000.
- Warland J., Varaiya P., "High-Performance Communication Networks", Morgan Kaufmann, 1996.

TITLE OF COURSE: PATTERN RECOGNITION AND MACHINE LEARNING
COURSE CODE: CED302
L-T-P: 3-0-0
CREDITS: 3

Course Outcomes (CO):
At the end of this course, students will demonstrate the ability to
CO1: Study the parametric and linear models for classification
CO2: Design neural network and SVM for classification
CO3: Develop machine-independent and unsupervised learning techniques.

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓		✓							✓
CO2	✓			✓								✓
CO3	✓	✓	✓									✓

Course Contents:

Unit 1
Introduction to Pattern Recognition: Problems, applications, design cycle, learning and adaptation, examples, Probability Distributions, Parametric Learning - Maximum likelihood and Bayesian Decision Theory- Bayes rule, discriminant functions, loss functions and Bayesian error analysis

Unit 2
Linear models: Linear Models for Regression, linear regression, logistic regression Linear Models for Classification

Unit 3
Neural Network: perceptron, multi-layer perceptron, backpropagation algorithm, error surfaces, practical techniques for improving backpropagation, additional networks and training methods, Adaboost, Deep Learning

Unit 4
Linear discriminant functions - decision surfaces, two-category, multi-category, minimum- squared error procedures, the Ho-Kashyap procedures, linear programming algorithms, Support vector machine

Unit 5
Algorithm independent machine learning – lack of inherent superiority of any classifier, bias and variance, re-sampling for classifier design, combining classifiers

Unit 6
Unsupervised learning and clustering – k-means clustering, fuzzy k-means clustering, hierarchical clustering

Text Books

- Richard O. Duda, Peter E. Hart, David G. Stork, “Pattern Classification”, 2nd Edition John Wiley & Sons, 2001.
- Trevor Hastie, Robert Tibshirani, Jerome H. Friedman, “The Elements of Statistical Learning”, 2nd Edition, Springer, 2009.
- C. Bishop, “Pattern Recognition and Machine Learning”, Springer, 2006.

TITLE OF COURSE: REMOTE SENSING
COURSE CODE: CED303
L-T-P: 3-0-0
CREDITS: 3

Course Outcomes (CO):
At the end of this course, students will demonstrate the ability to
CO1: Understand basic concepts, principles, and applications of remote sensing, particularly the geometric and radiometric principles;
CO2: Provide examples of applications of principles to a variety of topics in remote sensing, particularly related to data collection, radiation, resolution, and sampling.

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓		✓							✓
CO2	✓			✓								✓

Course Contents:

Unit 1: Physics Of Remote Sensing: Electro-Magnetic Spectrum, Physics of Remote Sensing- Effects of Atmosphere-Scattering–Different types–Absorption-Atmospheric window-Energy interaction with surface features –Spectral reflectance of vegetation, soil and water atmospheric influence on spectral response patterns-multi concept in Remote sensing.

Unit 2: Data Acquisition: Types of Platforms–different types of aircraft -Manned and Unmanned spacecraft–sun-synchronous and geosynchronous satellites –Types and characteristics of different platforms –LANDSAT, SPOT, IRS, INSAT, IKONOS, QUICKBIRD, etc

Unit 3: Photographic products, B/W, color, color IR film, and their characteristics –resolving power of lens and film - Optomechanical electro-optical sensors –across the track and along-track scanners-multispectral scanners and thermal scanners–geometric characteristics of scanner imagery -calibration of thermal scanners.

Unit 4: Scattering System: Microwave scatterometry, types of RADAR –SLAR –resolution – range and azimuth – real aperture and synthetic aperture RADAR. Characteristics of Microwave images topographic effect-different types of Remote Sensing platforms –airborne and spaceborne sensors -ERS, JERS, RADARSAT, RISAT -Scatterometer, Altimeter-LiDAR remote sensing, principles, applications.

Unit 5: Thermal And Hyper Spectral Remote Sensing: Sensors characteristics-principle of spectroscopy-imaging spectroscopy–field conditions, compound spectral curve, Spectral library, radiative models, processing procedures, derivative spectrometry, thermal remote sensing – thermal sensors, principles, thermal data processing, applications.

Unit 6: Data Analysis: Resolution–Spatial, Spectral, Radiometric and temporal resolution-signal to noise ratio-data products and their characteristics-visual and digital interpretation–Basic data processing principles –Radiometric correction–Image enhancement–Image classification– Principles of LiDAR, Aerial Laser Terrain Mapping.

Text Books

Lillesand T.M., and Kiefer, R.W. Remote Sensing and Image Interpretation, John Wiley & Sons-2000, 6thEdition

- John R. Jensen, Introductory Digital Image Processing: A Remote Sensing Perspective, 2nd Edition, 1995.
- John A.Richards, Springer –Verlag, Remote Sensing Digital Image Analysis,1999.
- Paul Curran P.J. Principles of Remote Sensing, ELBS; 1995

TITLE OF COURSE: BUSINESS ANALYTICS
COURSE CODE: CEO301
L-T-P: 3-0-0
CREDITS: 3

Course Outcomes (CO):

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

CO1: Students will demonstrate knowledge of data analytics.

CO2: Students will demonstrate the ability of think critically in making decisions based on data and deep analytics.

CO3: Students will demonstrate the ability to use technical skills in predicative and prescriptive modelling to support business decision-making.

CO4: Students will demonstrate the ability to translate data into clear, actionable insights.

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	✓										
CO2		✓	✓	✓							
CO3		✓	✓								
CO4	✓	✓	✓								

Course Contents:

Module 1

Business analytics: Overview of Business analytics, Scope of Business analytics, Business Analytics Process, Relationship of Business Analytics Process and organisation, competitive advantages of Business Analytics. Statistical Tools: Statistical Notation, Descriptive Statistical methods, Review of probability distribution and data modelling, sampling and estimation methods overview.

Module 2

Trendiness and Regression Analysis: Modelling Relationships and Trends in Data, simple Linear Regression. Important Resources, Business Analytics Personnel, Data and models for Business analytics, problem solving, Visualizing and Exploring Data, Business Analytics Technology.

Module 3:

Organization Structures of Business analytics, Team management, Management Issues, Designing Information Policy, Outsourcing, Ensuring Data Quality, measuring contribution of Business analytics, Managing Changes.

Descriptive Analytics, predictive analytics, predicative Modelling,

Predictive analytics analysis, Data Mining, Data Mining Methodologies, Prescriptive analytics and its step in the business analytics Process, Prescriptive Modelling, nonlinear Optimization.

Module 4:

Forecasting Techniques: Qualitative and Judgmental Forecasting, Statistical Forecasting Models, Forecasting Models for Stationary Time Series, Forecasting Models for Time Series with a Linear Trend, Forecasting Time Series with Seasonality, Regression Forecasting with Casual Variables, Selecting Appropriate Forecasting Models.

Monte Carlo Simulation and Risk Analysis: Monte Carle Simulation Using Analytic Solver Platform, New-Product Development Model, Newsvendor Model, Overbooking Model, Cash Budget Model.

Module 5:

Decision Analysis: Formulating Decision Problems, Decision Strategies with the without Outcome Probabilities, Decision Trees, The Value of Information, Utility and Decision Making.

Module 6:

Recent Trends in: Embedded and collaborative business intelligence, Visual data recovery, Data Storytelling and Data

journalism.

Text Books

1. Business analytics Principles, Concepts, and Applications by Marc J. Schniederjans, Dara G. Schniederjans, Christopher M. Starkey, Pearson FT Press.

References

1. Business Analytics by James Evans, persons Education.

TITLE OF COURSE: INDUSTRIAL SAFETY
COURSE CODE: CEO302
L-T-P: 3-0-0
CREDITS: 3

Course Outcomes (CO):

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

CO1: Students will be able to identify the various possible hazards in different fields of engineering.

CO2: Students will be able to classify various hazards based on their nature and severity.

CO3: Students will be able to use the knowledge gained for maintaining safety, occupational health and hygiene in an industry.

CO4: Students will be able to examine the factors that lead to an accident.

CO5: Students will be able to select the safety equipment to be used for prevention of various hazards.

CO6: Students will be able to plan the safety measures appropriate for an industry.

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1						✓	✓					
CO2						✓	✓			✓		
CO3						✓	✓			✓	✓	
CO4						✓						
CO5					✓	✓						
CO6					✓						✓	

Course Contents:

Module 1: Development of safety movement

Need for safety-safety and productivity-planning for safety planning procedure-safety policy-formulation of safety policy-safety budget-role and qualification of safety professional-safety committees-need, types and functions of committee's safety organizations.

Module 2: Accident prevention

Basic philosophy of accident prevention-nature and causes of accidents, accident proneness-cost of accidents-accident prevention methods-Domino theory-safety education and training-training methods-motivation and communicating safety-personal protective equipment's.

Module 3: Safety management techniques

Safety inspection-Safety sampling technique-Safety audit-Safety survey-Incident recall technique-Job safety analysis-Damage control-Risk management.

Module 4: Involvement in safety

Role of management-role of supervisors-role of workmen- role of unions-role of government

Module 5: Occupational health and hygiene

Functional units and activities of occupational health and hygiene-types of industrial hazards-physical, chemical, mechanical, electrical, social, biological, ergonomic and environmental hazards-factors impeding safety-housekeeping-hearing conservation programme.

Module 6: Industrial fire protection

Fire chemistry-classification of fires-fire prevention activities-fire risks-fire load -contributing factors to industrial fires-fire detection-industrial fire protection systems.

Text Books

1. Heinrich H.W, „Industrial accident prevention‟, McGraw Hill Company, New York, 1980.
2. Frank P Lees, Loss prevention in process industries‟, Vol I, II, III, Butterworth, London, 1980.
3. R.P.Blake, “Industrial Safety”, Prentice Hall of India, New Delhi

References

1. “Accident prevention manual for Industrial Operations”, National Safety Council, Chicago, 1989.
2. Brown D.B, “System Analysis and Design for safety”, Prentice Hall, New Jercy.

TITLE OF COURSE: OPERATIONS RESEARCH
COURSE CODE: CEO303
L-T-P: 3-0-0
CREDITS: 3

Course Outcomes (CO):

At the end of the course, the student should be able to

CO1: Students should able to apply the dynamic programming to solve problems of discreet and continuous variables.

CO2: Students should able to apply the concept of non-linear programming

CO3: Students should able to carry out sensitivity analysis

CO4: Student should able to model the real-world problem and simulate it.

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	√	√	√	√	√			√		√	√	√
CO2	√	√			√		√	√		√		√
CO3	√	√					√			√	√	√
CO4	√	√	√	√			√	√			√	√

Course Contents:

Module 1:
Optimization Techniques, Model Formulation, models, General L.R Formulation, Simplex Techniques, Sensitivity Analysis, Inventory Control Models.

Module 2:
Formulation of a LPP - Graphical solution revised simplex method - duality theory - dual simplex method - sensitivity analysis - parametric programming.

Module 3:
Nonlinear programming problem - Kuhn-Tucker conditions min cost flow problem - max flow problem - CPM/PERT.

Module 4:
Scheduling and sequencing - single server and multiple server models - deterministic inventory models - Probabilistic inventory control models - Geometric Programming.

Module 5:

Competitive Models,Single and Multi-channel Problems, Sequencing Models, Dynamic Programming, Flow in Networks, Elementary Graph Theory, Game Theory Simulation.

Books/ References:

1. H.A. Taha, Operations Research, An Introduction, PHI, 2008
2. H.M. Wagner, Principles of Operations Research, PHI, Delhi, 1982.
3. J.C. Pant, Introduction to Optimisation: Operations Research, Jain Brothers, Delhi, 2008
4. Hitler Libermann Operations Research: McGraw Hill Pub. 2009
5. Pannerselvam, Operations Research: Prentice Hall of India 2010
6. Harvey M Wagner, Principles of Operations Research: Prentice Hall of India 2010

TITLE OF COURSE: COST MANAGEMENT OF ENGINEERING PROJECTS
COURSE CODE: CEO304
L-T-P: 3-0-0
CREDITS: 3

Course Outcomes (CO):
Upon successful completion of this course, students should be able to:

CO1: Students will be able to identify the various possible hazards in different fields of engineering.

CO2: Students will be able to classify various hazards based on their nature and severity.

CO3: Students will be able to use the knowledge gained for maintaining safety, occupational health and hygiene in an industry.

CO4: Students will be able to examine the factors that lead to an accident.

CO5: Students will be able to select the safety equipment to be used for prevention of various hazards.

CO6: Students will be able to plan the safety measures appropriate for an industry.

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1						✓	✓					
CO2						✓	✓			✓		
CO3						✓	✓			✓	✓	
CO4						✓						
CO5					✓	✓						
CO6					✓						✓	

Course Contents:

Module 1: Introduction and Overview of the Strategic Cost Management Process

Module 2: Cost concepts in decision-making; Relevant cost, Differential cost, Incremental cost and Opportunity cost. Objectives of a Costing System; Inventory valuation; Creation of a Database for operational control; Provision of data for Decision-Making.

Module 3: Project: meaning, Different types, why to manage, cost overruns centres, various stages of project execution: conception to commissioning. Project execution as conglomeration of technical and non- technical activities. Detailed Engineering activities. Pre project execution main clearances and documents Project team: Role of each member. Importance Project site: Data

required with significance. Project contracts. Types and contents. Project execution Project cost control. Bar charts and Network diagram. Project commissioning: mechanical and process

Module 4: Involvement in safety (5)

Cost Behavior and Profit Planning Marginal Costing; Distinction between Marginal Costing and Absorption Costing; Break-even Analysis, Cost-Volume-Profit Analysis. Various decision-making problems. Standard Costing and Variance Analysis. Pricing strategies: Pareto Analysis. Target costing, Life Cycle Costing. Costing of service sector. Just-in-time approach, Material Requirement Planning, Enterprise Resource Planning, Total Quality Management and Theory of constraints. Activity-Based Cost Management, Bench Marking; Balanced Score Card and Value-Chain Analysis. Budgetary Control; Flexible Budgets; Performance budgets; Zero-based budgets. Measurement of Divisional profitability pricing decisions including transfer pricing.

Module 5: Chemistry-classification of fires-fire prevention activities-fire risks-fire load - contributing factors to industrial fires-fire detection-industrial fire protection systems.

Text Books

1. Cost Accounting A Managerial Emphasis, Prentice Hall of India, New Delhi
2. Charles T. Horngren and George Foster, Advanced Management Accounting
3. Robert S Kaplan Anthony A. Alkinson, Management & Cost Accounting
4. Ashish K. Bhattacharya, Principles & Practices of Cost Accounting A. H. Wheeler publisher
5. N.D. Vohra, Quantitative Techniques in Management, Tata McGraw Hill Book Co. Ltd.

TITLE OF COURSE: COMPOSITE MATERIALS
COURSE CODE: CEO305
L-T-P: 3-0-0
CREDITS: 3

Course Outcomes (CO):

Develop knowledge about the Classification and characteristics of Composite materials and Manufacturing of Polymer Matrix Composites.

CO1: Understand and apply the concepts of crystal structures, crystal imperfections and diffusions in metals

CO2: Analyze and interpret the mechanical properties of materials and identify the various modes of failure

CO3: Understand various solidification mechanisms, develop binary phase diagrams and analyze the microstructures of ferrous, non-ferrous materials and its effects on mechanical properties.

CO4: Distinguish and apply various heat treatment processes, which are necessary for engineering practice.

CO5: Understand and apply the properties and potentials of various engineering materials.

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓									
CO2	✓	✓	✓							✓		
CO3	✓	✓	✓							✓	✓	
CO4	✓	✓										
CO5	✓	✓										

Course Contents:

Module-1: INTRODUCTION: Definition – Classification and characteristics of Composite materials. Advantages and application of composites. Functional requirements of reinforcement and matrix. Effect of reinforcement (size, shape, distribution, volume fraction) on overall composite performance.

Module-2: **REINFORCEMENTS:** Preparation-layup, curing, properties and applications of glass fibers, carbon fibers, Kevlar fibers and Boron fibers. Properties and applications of whiskers, particle reinforcements. Mechanical Behavior of composites: Rule of mixtures, Inverse rule of mixtures. Iso-strain and Iso-stress conditions.

Module-3: Manufacturing of Metal Matrix Composites: Casting – Solid State diffusion

technique, Cladding – Hot isostatic pressing. Properties and applications. Manufacturing of Ceramic Matrix Composites: Liquid Metal Infiltration – Liquid phase sintering. Manufacturing of Carbon – Carbon composites: Knitting, Braiding, Weaving. Properties and applications.

Module-4: Manufacturing of Polymer Matrix Composites: Preparation of Molding compounds and prepregs – hand layup method – Autoclave method – Filament winding method – Compression molding – Reaction injection molding. Properties and applications.

Module-5: Strength: Laminar Failure Criteria-strength ratio, maximum stress criteria, maximum strain criteria, interacting failure criteria, hygrothermal failure. Laminate first play failure-insight strength; Laminate strength-ply discount truncated maximum strain criterion; strength design using caplet plots; stress concentrations.

Text Books:

1. Material Science and Technology – Vol 13 – Composites by R.W. Cahn – VCH, West Germany.
2. Materials Science and Engineering, An introduction. WD Callister, Jr., Adapted by R. Balasubramaniam, John Wiley & Sons, NY, Indian edition, 2007.

TITLE OF COURSE: WASTE TO ENERGY
COURSE CODE: CEO306
L-T-P: 3-0-0
CREDITS: 3

Course Outcomes (CO):
Upon successful completion of this course, students should be able to:

CO1: Explain renewable energy sources & systems.
CO2: Apply engineering techniques to build solar, wind, tidal, geothermal, biofuel, fuel cell, Hydrogen and sterling engine.
CO3: Analyze and evaluate the implication of renewable energy. Concepts in solving numerical problems pertaining to solar radiation geometry and wind energy systems.
CO4: Demonstrate self -learning capability to design & establish renewable energy systems.
CO5: Conduct experiments to assess the performance of solar PV, solar thermal and biodiesel systems.

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓			✓	✓	✓	✓	✓		
CO2	✓	✓	✓									
CO3	✓	✓	✓	✓	✓			✓		✓		
CO4	✓				✓	✓	✓		✓			
CO5	✓					✓	✓	✓	✓	✓		

Course Contents:

Module-1:

Introduction to Energy from Waste: Classification of waste as fuel – Agro based, Forest residue, Industrial waste - MSW – Conversion devices – Incinerators, gasifiers, digestors

Module-2:

Biomass Pyrolysis: Pyrolysis – Types, slow fast – Manufacture of charcoal – Methods - Yields and application – Manufacture of pyrolytic oils and gases, yields and applications.

Module-3:

Biomass Gasification: Gasifiers – Fixed bed system – Downdraft and updraft gasifiers-Fluidized bed gasifiers – Design, construction and operation – Gasifier burner arrangement for thermal heating – Gasifier engine arrangement and electrical power – Equilibrium and kinetic consideration in gasifier operation.

Module-4:

Biomass Combustion: Biomass stoves – Improved chullahs, types, some exotic designs, Fixed bed combustors, Types, inclined grate combustors, Fluidized bed combustors, Design, construction and operation - Operation of all the above biomass combustors.

Module-5:

Biogas: Properties of biogas (Calorific value and composition) - Biogas plant technology and status - Bio energy system - Design and constructional features - Biomass resources and their classification - Biomass conversion processes - Thermo chemical conversion - Direct combustion - biomass gasification - pyrolysis and liquefaction - biochemical conversion - anaerobic digestion - Types of biogas Plants – Applications - Alcohol production from biomass - Bio diesel production - Urban waste to energy conversion - Biomass energy programme in India.

Text Books

1. M.M. EL-Halwagi, Biogas Technology- Transfer and diffusion, Elsevier Applied science Publisher, New York, 1984.
2. D.O Hall and R.P. Overeed, Biomass – regenerable energy, John Willy and Sons Ltd.New York. 1987.

References

1. Non-Conventional Energy, Desai, Ashok V., Wiley Eastern Ltd., 1990.

2. Biogas Technology - A Practical Hand Book - Khandelwal, K. C. and Mahdi, S. S., Vol. I & II, Tata McGraw Hill Publishing Co. Ltd., 1983.

3. Food, Feed and Fuel from Biomass, Challal, D. S., IBH Publishing Co. Pvt. Ltd., 1991.

4. Biomass Conversion and Technology, C. Y. WereKo-Brobby and E. B. Hagan, John Wiley & Sons, 1996.

TITLE OF COURSE: DISSERTATION PHASE – I
COURSE CODE: CED391
L-T-P: 0-0-20
CREDITS: 10

Course Outcomes (CO):
At the end of this course, students will be able to
CO1: Ability to synthesize knowledge and skills gained and applied to an in-depth study and execution of new technical problems.
CO2: Capable to select from different methodologies, methods, and forms of analysis to produce a suitable research design and justify their design.
CO3: Ability to present the findings of their technical solution in a written report.
CO4: Presenting the work in International/ National conferences or reputed journals.

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓		✓							✓
CO2	✓			✓								✓
CO3	✓	✓	✓									✓
CO4	✓	✓	✓		✓							✓

Course Contents:

The dissertation/project topic should be selected/chosen to ensure the urgent need to establish a direct link between education, national development, and productivity and thus reduce the gap between the world of work and the world of study. The dissertation should have the following

- Relevance to social needs of society
- Relevance to value addition to existing facilities in the institute
- Relevance to industry need
- Problems of national importance
- Research and development in various domain

The student should complete the following:

- Literature survey Problem Definition
- Motivation for study and Objectives
- Preliminary design/feasibility / modular approaches
- Implementation and Verification
- Report and presentation

The dissertation stage II is based on a report prepared by the students on the dissertation allotted to them. It may be based on:

- Experimental verification / Proof of concept.
- Design, fabrication, testing of Communication System.
- The viva-voce examination will be based on the above report and work

Guidelines for Dissertation Phase – I

- As per the AICTE directives, the dissertation is a year-long activity to be carried out and evaluated in two phases, i.e., Phase – I: July to December and Phase – II: January to June.
- The dissertation may be carried out preferably in-house, i.e., department's laboratories and centers, OR in industry allotted through the department's T & P coordinator.
- After multiple interactions with a guide and a comprehensive literature survey, the student shall identify the domain and define dissertation objectives. The referred literature should preferably include IEEE/IET/IETE/Springer/Science Direct/ACM journals in the areas of Computing and Processing (Hardware and Software), Circuits- Devices and Systems, Communication-Networking and Security, Robotics and Control Systems, Signal Processing and Analysis and any other related domain. In industry-sponsored projects, the relevant application notes, papers, and product catalogs should be referred to and reported.
- Student is expected to detail specifications, methodology, resources required, critical issues involved in design and implementation, and phase-wise work distribution. Submitting the proposal within a month from the date of registration.
- Phase – I deliverables: A document report comprising of summary of literature survey, detailed objectives, project specifications, paper and/or computer-aided design, proof of concept/functionality, part results, A record of continuous progress.
- Phase – I evaluation: A committee comprising of guides of respective specialization shall assess the progress/performance of the student based on the report, presentation, and Q & A. In case of unsatisfactory performance, the committee may recommend repeating the Phase-I work.