ACE EngineeringCollege

Ankushapur(V), Ghatkesar(M), R.R.Dist - 501301

(Autonomous)

B.TECH COURSE STRUCTURE & SYLLABUS

(Common to CSE, EEE, IT, CSE(DS))

(R20)

IV YEAR II SEMESTER

S.No.	Course Code	Course Title	L	T	P	Credits
1	SM801MS	Organizational Behaviour	3	0	0	3
2		Professional Elective-VI	3	0	0	3
3		Open Elective-III	3	0	0	3
4	CD804PC	Project Stage-II	0	0	14	7
Total Credits			**9**	**0**	**14**	**16**

***Note:** Industrial Oriented Mini Project/ Summer Internship is to be carried out during the summer vacation between 6th and 7th semesters. Students should submit report of Industrial Oriented Mini Project /Summer Internship for evaluation.

MC-Environmental Science–Should be Registered by Lateral Entry Students Only.MC–Satisfactory/Unsatisfactory

Professional Elective–VI

CD811PE	Data Stream Mining
CD812PE	Web Security
CD813PE	Video Analytics
CD814PE	Block chain Technology
CD815PE	Parallel and Distributed Computing

Open Electives

S No	Branch	Course Code	IV Yr II Sem Open Elective (OE – II)
1	Civil Engineering	CE800OE	Environmental Impact Assessment
2	Electronics and Communication Engineering	EC800OE	Measuring Instruments
3	Electrical and Electronics Engineering	EE800OE	1. Basics of Power Plant Engineering
		EE801OE	2. Energy Sources and Applications
4	Mechanical Engineering	ME800OE	Non-Conventional Sources of energy

***Note:** Students should take Open Electives from the List of Open Electives Offered by Other Departments/Branches Only.

SM801MS: ORGANIZATIONAL BEHAVIOUR

B.Tech. IV Year II Sem. **L T P C**

3 0 0 3

Course Objectives: The objective of the course is to provide the students with the conceptual framework and the theories underlying Organizational Behavior.

Course Outcomes:

1. Demonstrate the applicability of analyzing the complexities associated with management ofindividual behavior in the organization.
2. Analyze the complexities associated with management of the group behavior in theorganization.
3. Demonstrate how the organizational behavior can integrate in understanding the motivation(why) behind behavior of people in the organization.

UNIT - I:

Introduction to OB - Definition, Nature and Scope – Environmental and organizational context – Impact of IT, globalization, Diversity, Ethics, culture, reward systems and organizational design on Organizational Behaviour. Cognitive Processes-I: Perception and Attribution: Nature and importance of Perception – Perceptual selectivity and organization – Social perception – Attribution Theories – Locusof control –Attribution Errors –Impression Management.

UNIT- II:

Cognitive Processes-II: Personality and Attitudes – Personality as a continuum – Meaning of personality
- Johari Window and Transactional Analysis - Nature and Dimension of Attitudes – Job satisfaction and organizational commitment-Motivational needs and processes-Work-Motivation Approaches Theories of Motivation- Motivation across cultures - Positive organizational behaviour: Optimism – Emotional intelligence – Self-Efficacy.

UNIT - III:

Dynamics of OB-I: Communication – types – interactive communication in organizations – barriers to communication and strategies to improve the follow of communication - Decision Making: Participative decision-making techniques – creativity and group decision making. Dynamics of OB –II Stress and Conflict: Meaning and types of stress –Meaning and types of conflict - Effect of stress and intra- individual conflict - strategies to cope with stress and conflict.

UNIT - IV:

Dynamics of OB –III Power and Politics: Meaning and types of power – empowerment - Groups Vs. Teams – Nature of groups – dynamics of informal groups – dysfunctions of groups and teams – teamsin modern work place.

UNIT - V:

Leading High performance: Job design and Goal setting for High performance-

Quality of Work Life- Socio technical Design and High-performance work practices - Behavioural performance management:reinforcement and punishment as principles of Learning –Process of Behavioural modification - Leadership theories - Styles, Activities and skills of Great leaders.

REFERENCE BOOKS:

1. Luthans, Fred: Organizational Behaviour 10/e, McGraw-Hill, 2009
2. McShane: Organizational Behaviour, 3e, TMH, 2008
3. Nelson: Organizational Behaviour, 3/e, Thomson, 2008.
4. Newstrom W. John & Davis Keith, Organisational Behaviour-- Human Behaviour at Work, 12/e,TMH, New Delhi, 2009.
5. Pierce and Gardner: Management and Organisational Behaviour: An Integrated perspective,Thomson, 2009.
6. Robbins, P. Stephen, Timothy A. Judge: Organisational Behaviour, 12/e, PHI/Pearson, NewDelhi, 2009.
7. Pareek Udai: Behavioural Process at Work: Oxford & IBH, New Delhi, 2009.
8. Schermerhorn: Organizational Behaviour 9/e, Wiley, 2008.
9. Hitt: Organizational Behaviour, Wiley, 2008
10. Aswathappa: Organisational Behaviour, 7/e, Himalaya, 2009
11. Mullins: Management and Organisational Behaviour, Pearson, 2008.
12. McShane, Glinow: Organisational Behaviour--Essentials, TMH, 2009.
13. Ivancevich: Organisational Behaviour and Management, 7/e, TMH, 2008.

CD811PE: DATA STREAM MINING
(Professional Elective – VI)

B.Tech. IV Year II Sem. **L T P C**

3 0 0 3

Prerequisites

1. A basic knowledge of "Data Mining"

Course Objectives:

1. The aim of the course is to introduce the fundamentals of Data Stream Mining.
2. The course gives an overview of – Mining Strategies, methods and algorithmsfor data stream mining.

Course Outcomes:

1. Understand how to formulate a knowledge extraction problem from data streams.
2. Ability to apply methods / algorithms to new data stream analysis problems.
3. Evaluate the results and understand the functioning of the methods studied.
4. Demonstrate decision tree and adaptive Hoeffding Tree concepts

UNIT - I

MOA Stream Mining, Assumptions, Requirements, Mining Strategies, Change Detection Strategies, MOA Experimental Settings, Previous Evaluation Practices, Evaluation Procedures for Data Streams, Testing Framework, Environments, Data Sources, Generation Speed and Data Size, Evolving StreamExperimental Setting.

UNIT - II

Hoeffding Trees, The Hoeffding Bound for Tree Induction, The Basic Algorithm, Memory Management, Numeric Attributes, Batch Setting Approaches, Data Stream Approaches.

UNIT - III

Prediction Strategies, Majority Class, Naïve Bayes Leaves, Adaptive Hybrid, Hoeffding Tree Ensembles, Data Stream Setting, Realistic Ensemble Sizes.

UNIT - IV

Evolving Data Streams, Algorithms for Mining with Change, A Methodology for Adaptive Stream Mining, Optimal Change Detector and Predictor, Adaptive Sliding Windows, Introduction, Maintaining UpdatedWindows of Varying Length.

UNIT - V

Adaptive Hoeffding Trees, Introduction, Decision Trees on Sliding Windows, Hoeffding Adaptive Trees, Adaptive Ensemble Methods, New methods of Bagging using trees of different size, New method of bagging using ADWIN, Adaptive Hoeffding Option Trees, Method performance.

TEXT BOOK:

1. DATA STREAM MINING: A Practical Approach by Albert Bifet and Richard Kirkby.

REFERENCE BOOKS:

1. Knowledge discovery from data streams by Gama João. ISBN: 978-1-4398-2611-9.
2. Machine Learning for Data Streams by Albert Bifet, Ricard Gavalda; MIT Press, 2017.

CD812PE: WEB SECURITY
(Professional Elective – VI)

B.Tech. IV Year II Sem. **L T P C**

3 0 0 3

Course Objectives:

- Give an Overview of information security
- Give an overview of Access control of relational databases

Course Outcomes: Students should be able to

- Understand the Web architecture and applications
- Understand client side and service side programming
- Understand how common mistakes can be bypassed and exploit the application
- Identify common application vulnerabilities

UNIT - I

The Web Security, The Web Security Problem, Risk Analysis and Best Practices. Cryptography and the Web: Cryptography and Web Security, Working Cryptographic Systems and Protocols, Legal Restrictions on Cryptography, Digital Identification.

UNIT - II

The Web's War on Your Privacy, Privacy-Protecting Techniques, Backups and Antitheft, Web Server Security, Physical Security for Servers, Host Security for Servers, Securing Web Applications.

UNIT - III

Database Security: Recent Advances in Access Control, Access Control Models for XML, Database Issues in Trust Management and Trust Negotiation, Security in Data Warehouses and OLAP Systems.

UNIT - IV

Security Re-engineering for Databases: Concepts and Techniques, Database Watermarking for Copyright Protection, Trustworthy Records Retention, Damage Quarantine and Recovery in Data Processing Systems, Hippocratic Databases: Current Capabilities and Future Trends.

UNIT - V

Privacy in Database Publishing: A Bayesian Perspective, Privacy-enhanced Location-based Access Control, Efficiently Enforcing the Security and Privacy Policies in a Mobile Environment.

TEXT BOOKS:

1. Web Security, Privacy and Commerce Simson G Arfinkel, Gene Spafford, O'Reilly.
2. Handbook on Database security applications and trends Michael Gertz, Sushil Jajodia.

CD813PE: VIDEO ANALYTICS
(Professional Elective – VI)

B.Tech. IV Year II Sem. **L T P C**

3 0 0 3

Course Objectives: To acquire the knowledge of extracting information from surveillance videos, understand the models used for recognition of objects, humans in videos and perform gait analysis.

Course Outcomes:

1. Understand the basics of video- signals and systems.
2. Able to estimate motion in a video.
3. Able to detect the objects and track them.
4. Recognize activity and analyze behaviour.
5. Evaluate face recognition technologies.

UNIT - I

INTRODUCTION Multidimensional signals and systems: signals, transforms, systems, sampling theorem. Digital Images and Video: human visual system and color, digital video, 3D video, digital-video applications, image and video quality.

UNIT - II

MOTION ESTIMATION Image formation, motion models, 2D apparent motion estimation, differential methods, matching methods, non-linear optimization methods, transform domain methods, 3D motion and structure estimation.

UNIT - III

VIDEO ANALYTICS Introduction- Video Basics - Fundamentals for Video Surveillance- Scene Artifacts- Object Detection and Tracking: Adaptive Background Modelling and Subtraction- Pedestrian Detection and Tracking Vehicle Detection and Tracking- Articulated Human Motion Tracking in Low- Dimensional Latent Spaces.

UNIT - IV

BEHAVIORAL ANALYSIS & ACTIVITY RECOGNITION Event Modelling- Behavioral Analysis- Human Activity Recognition-Complex Activity Recognition Activity modelling using 3D shape, Video summarization, shape-based activity models- Suspicious Activity Detection.

UNIT - V

HUMAN FACE RECOGNITION & GAIT ANALYSIS Introduction: Overview of Recognition algorithms –Human Recognition using Face: Face Recognition from still images, Face Recognition from video, Evaluation of Face Recognition Technologies- Human Recognition using gait: HMM Framework for Gait Recognition, View Invariant Gait Recognition, Role of Shape and Dynamics in Gait Recognition.

TEXT BOOKS:

1. Murat Tekalp, “Digital Video Processing”, second edition, Pearson, 2015
2. Rama Chellappa, Amit K. Roy-Chowdhury, Kevin Zhou. S, “Recognition of Humans and their Activities using Video”, Morgan & Claypool Publishers, 2005.
3. Yunqian Ma, Gang Qian, “Intelligent Video Surveillance: Systems and Technology”, CRC Press (Taylor and Francis Group), 2009.

REFERENCE BOOKS:

1. Richard Szeliski, “Computer Vision: Algorithms and Applications”, Springer, 2011.
2. Yao Wang, JornOstermann and Ya-Qin Zhang, “Video Processing and Communications”, Prentice Hall, 2001.
3. Thierry Bouwmans, FatihPorikli, Benjamin Höferlin and Antoine Vacavant, “Background Modeling and Foreground Detection for Video Surveillance: Traditional and Recent Approaches, Implementations, Benchmarking and Evaluation”, CRC Press, Taylor and FrancisGroup, 2014.
4. Md. Atiqur Rahman Ahad, “Computer Vision and Action Recognition-A Guide for Image Processing and Computer Vision Community for Action Understanding”, Atlantis Press, 2011.

CD814PE: BLOCKCHAIN TECHNOLOGY
(Professional Elective – VI)

B.Tech. IV Year II Sem.

L	T	P	C
3	0	0	3

Prerequisites:

1. Knowledge in security and applied cryptography.
2. Knowledge in distributed databases.

Course Objectives: To Introduce block chain technology and Cryptocurrency.

Course Outcomes:

1. Learn about research advances related to one of the most popular technological areas today.
2. Understand Extensibility of Blockchain concepts.
3. Understand and Analyze Blockchain Science.
4. Understand Technical challenges, Business model challenges.

UNIT - I

Introduction: Block chain or distributed trust, Protocol, Currency, Cryptocurrency, How a Cryptocurrency works, Crowdfunding.

UNIT - II

Extensibility of Blockchain concepts, Digital Identity verification, Block chain Neutrality, Digital art, Blockchain Environment.

UNIT - III

Blockchain Science: Gridcoin, Folding coin, Blockchain Genomics, Bitcoin MOOCs.

UNIT - IV

Currency, Token, Tokenizing, Campuscoin, Coindrop as a strategy for Public adoption, Currency Multiplicity, Demurrage currency.

UNIT - V

Technical challenges, Business model challenges, Scandals and Public perception, Government Regulations.

TEXT BOOK:

1. Melanie Swan, Blockchain Blueprint for Economy, O'reilly.

REFERENCE BOOKS:

1. Building Blockchain Apps, Michael Juntao Yuan, Pearson Education
2. Daniel Drescher, Blockchain Basics: A Non-Technical Introduction in 25 Steps 1st Edition
3. Bradley Lakeman, Blockchain Revolution: Understanding the Crypto Economy of the Future. ANon-Technical Guide to the Basics of Cryptocurrency Trading and Investing, ISBN: 1393889158.

CD815PE: PARALLEL AND DISTRIBUTED COMPUTING
(Professional Elective – VI)

B.Tech. IV Year II Sem.

L	T	P	C
3	0	0	3

Course Objectives:

1. To learn core ideas behind parallel and distributed computing.
2. To explore the methodologies adopted for parallel and distributed environments.
3. To understand the networking aspects of parallel and distributed computing.
4. To provide an overview of the computational aspects of parallel and distributed computing.
5. To learn parallel and distributed computing models.

Course Outcomes:

1. Explore the methodologies adopted for parallel and distributed environments.
2. Analyze the networking aspects of Distributed and Parallel Computing.
3. Explore the different performance issues and tasks in parallel and distributed computing.
4. Tools usage for parallel and distributed computing.
5. Understanding high performance computing techniques.

UNIT - I

Parallel and Distributed Computing— Introduction- Benefits and Needs- Parallel and Distributed Systems- Programming Environment- Theoretical Foundations - Parallel Algorithms— Introduction- Parallel Models and Algorithms- Sorting - Matrix Multiplication- Convex Hull- Pointer Based Data Structures.

UNIT - II

Synchronization- Process Parallel Languages- Architecture of Parallel and Distributed Systems- Consistency and Replication- Security- Parallel Operating Systems.

UNIT - III

Management of Resources in Parallel Systems- Tools for Parallel Computing- Parallel Database Systems and Multimedia Object Servers.

UNIT - IV

Networking Aspects of Distributed and Parallel Computing- Process- Parallel and Distributed Scientific Computing.

UNIT - V

High-Performance Computing in Molecular Sciences- Communication Multimedia Applications for Parallel and Distributed Systems- Distributed File Systems.

TEXT BOOKS:

1. Jacek Błażewicz, et al., “Handbook on parallel and distributed processing”, Springer Science & Business Media, 2013.
2. Andrew S. Tanenbaum, and Maarten Van Steen, “Distributed Systems: Principles andParadigms”. Prentice-Hall, 2007.

REFERENCE BOOKS:

1. George F.Coulouris, Jean Dollimore, and Tim Kindberg, “Distributed systems: concepts anddesign”, Pearson Education, 2005.
2. Gregor Kosec and Roman Trobec, “Parallel Scientific Computing: Theory, Algorithms, andApplications of Mesh Based and Meshless Methods”, Springer, 2015.

CE800OE: ENVIRONMENTAL IMPACT ASSESSMENT
(Open Elective - III)

B.Tech. Civil Engg. IV Year II Sem. **L T/P/D C**
3 0/0/0 3

Course Objectives: The objectives of the course are to

- **Define and Classify** Environmental Impacts and the terminology
- **Understands** the environmental Impact assessment procedure
- **Explain** the EIA methodology
- **List and describe** environmental audits

Course Outcomes: At the end of the course the student will be able to

- Identify the environmental attributes to be considered for the EIA study
- Formulate objectives of the EIA studies
- Identify the methodology to prepare rapid EIA
- Prepare EIA reports and environmental management plans

UNIT- I

Introduction: The Need for EIA, Indian Policies Requiring EIA, The EIA Cycle and Procedures, Screening, Scoping, Baseline Data, Impact Prediction, Assessment of Alternatives, Delineation of Mitigation Measure and EIA Report, Public Hearing, Decision Making, Monitoring the Clearance Conditions, Components of EIA, Roles in the EIA Process. Government of India Ministry of Environment and Forest Notification (2000), List of projects requiring Environmental clearance, Application form, Composition of Expert Committee, Ecological sensitive places, International agreements.

UNIT- II

EIA Methodologies: Environmental attributes -Criteria for the selection of EIA methodology, impact identification, impact measurement, impact interpretation & Evaluation, impact communication, Methods-Adhoc methods, Checklists methods, Matrices methods, Networks methods, Overlays methods. EIA review- Baseline Conditions - Construction Stage Impacts, post project impacts.

UNIT- III

Environmental Management Plan: EMP preparation, Monitoring Environmental Management Plan, Identification of Significant or Unacceptable Impacts Requiring Mitigation, Mitigation Plans and Relief & Rehabilitation, Stipulating the Conditions, Monitoring Methods, Pre- Appraisal and Appraisal.

UNIT- IV

Environmental Legislation and Life cycle Assessment: Environmental laws and protection acts, Constitutional provisions-powers and functions of Central and State government, The Environment (Protection) Act 1986, The Water Act 1974, The Air act 1981, Wild Life act 1972, Guidelines for control of noise, loss of biodiversity, solid and Hazardous waste management rules.

Life cycle assessment: Life cycle analysis, Methodology, Management, Flow of materials-cost criteria-case studies.

UNIT- V

Case Studies: Preparation of EIA for developmental projects- Factors to be considered in making assessment decisions, Water Resources Project, Pharmaceutical industry, thermal plant, Nuclear fuel complex, Highway project, Sewage treatment plant, Municipal Solid waste processing plant, Air ports.

TEXT BOOKS:

1. Anjaneyulu. Y and Manickam. V., Environmental Impact Assessment Methodologies, B.S. Publications, Hyderabad, 2007
2. Barthwal, R. R., Environmental Impact Assessment, New Age International Publishers, 2002

REFERENCE BOOKS:

1. Jain, R.K., Urban, L.V., Stracy, G.S., Environmental Impact Analysis, Van Nostrand ReinholdCo., New York, 1991.
2. Rau, J.G. and Wooten, D.C., Environmental Impact Assessment, McGraw Hill Pub. Co., New York, 1996.

EC800OE: MEASURING INSTRUMENTS
(Open Elective - III)

B.Tech. ECE IV Year II Semester **L T P C**
3 0 0 3

Course Objectives

- To provide basic knowledge in transduction principles, sensors and transducer technology and measurement systems.
- To provide better familiarity with the concepts of Sensors and Measurements.
- To provide the knowledge of various measurement methods of physical parameters like velocity, acceleration, force, pressure and viscosity.

Course Outcomes: After Completion of the course the student is able to

- Able to identify suitable sensors and transducers for real time applications.
- Able to translate theoretical concepts into working models.
- Able to understand the basic of measuring device and use them in relevant situation.

UNIT - I

Introduction to measurements. Physical measurement. Forms and methods of measurements. Measurement errors. Statistical analysis of measurement data. Probability of errors. Limiting errors.

Standards. Definition of standard units. International standards. Primary standards. Secondary standards. Working standards. Voltage standard. Resistance standard. Current standard. Capacitance standard. Time and frequency standards.

UNIT - II

Passive Sensors

Resistive Sensors: Potentiometers, Strain Gages, Resistive Temperature Detectors (RTDs), Thermistors, Light-dependent Resistors (LDRs), Resistive Hygrometers, **Capacitive Sensors:** Variable capacitor, Differential capacitor, **Inductive Sensors:** Reluctance variation sensors, Eddy current sensors

UNIT - III

Metrology: Measurement of length – Plainness – Area – Diameter – Roughness – Angle – Comparators – Gauge Blocks. Optical Methods for length and distance measurements.

Velocity and Acceleration Measurement: Relative velocity – Translational and Rotational velocity measurements – Revolution counters and Timers - Magnetic and Photoelectric

pulse counting stroboscopic methods. Accelerometers- different types, Gyroscopes- applications.

UNIT - IV

Force and Pressure Measurement: Gyroscopic Force Measurement – Vibrating wire Force transducer. Basics of Pressure measurement –Manometer types – Force-Balance and Vibrating Cylinder Transducers – High- and Low-Pressure measurement

UNIT - V

Flow, Density and Viscosity Measurements: Flow Meters- Head type, Area type (Rota meter), electromagnetic type, Positive displacement type, Density measurements – Strain Gauge load cell method – Buoyancy method.
Units of Viscosity, Two float viscorator –Industrial consistency meter

TEXT BOOKS:

1. Measurement Systems – Applications and Design – by Doeblin E.O., 4/e, McGraw Hill International, 1990.
2. Principles of Industrial Instrumentation – Patranabis D. TMH. End edition 1997

REFERENCE BOOKS:

1. Sensor Technology Hand Book – Jon Wilson, Newne 2004.
2. Instrument Transducers – An Introduction to their Performance and design – by Herman K.P.Neubrat, Oxford University Press.
3. Measurement system: Applications and Design – by E.O. Doeblin, McGraw Hill Publications.
4. Electronic Instrumentation by H.S. Kalsi.2004

EE800OE: BASICS OF POWER PLANT ENGINEERING
(Open Elective - III)

B.Tech. EEE IV Year II-Sem **L T P C**
3 0 0 3

Prerequisite: Power System

Course Objectives: To provide an overview of power plants and the associated energy conversion issues

Course Outcomes: Upon completion of the course, the students can understand the principles of operation for different power plants and their economics

UNIT - I

Coal Based Thermal Power Plants: Basic Rankine cycle and its modifications, layout of modern coal power plant, super critical boilers, FBC boilers, turbines, condensers, steam and heating rates, subsystems of thermal power plants, fuel and ash handling, draught system, feed water treatment, binary cycles and cogeneration systems.

UNIT - II

Gas Turbine and Combined Cycle Power Plants: Brayton cycle analysis and optimization, components of gas turbine power plants, combined cycle power plants, Integrated Gasifier based Combined Cycle (IGCC) systems.

UNIT - III

Basics of Nuclear Energy Conversion: Layout and subsystems of nuclear power plants, Boiling Water Reactor (BWR), Pressurized Water Reactor (PWR), CANDU Reactor, Pressurized Heavy Water Reactor (PHWR), Fast Breeder Reactors (FBR), gas cooled and liquid metal cooled reactors, safety measures for nuclear power plants.

UNIT - IV

Hydroelectric Power Plants: Classification, typical layout and components, principles of wind, tidal, solar PV and solar thermal, geothermal, biogas and fuel cell power systems

UNIT - V

Energy, Economic and Environmental Issues: Power tariffs, load distribution parameters, load curve, capital and operating cost of different power plants, pollution control technologies including waste disposal options for coal and nuclear plants.

TEXT BOOKS:

1. Nag P.K., Power Plant Engineering, 3rd ed., Tata McGraw Hill, 2008.
2. El Wakil M.M., Power Plant Technology, Tata McGraw Hill, 2010.

REFERENCE BOOK:

1. Elliot T.C., Chen K and Swanekamp R.C., Power Plant Engineering, 2nd ed., McGraw Hill, 1998.

EE801OE: ENERGY SOURCES AND APPLICATIONS
(Open Elective - III)

B.Tech. EEE IV Year II-Sem **L T P C**
3 0 0 3

Pre-requisites: None

Course Objectives:

- To introduce various types of energy sources available.
- The technologies of energy conversion from these resources and their quantitative analysis.
- To know the applications of various energy sources

Course Outcomes: At the end of the course, the student will be able to

- List and generally explain the main sources of energy and their primary applications nationallyand internationally
- Understand the energy sources and scientific concepts/principles behind them
- Understand effect of using these sources on the environment and climate
- Describe the challenges and problems associated with the use of various energy sources, including fossil fuels, with regard to future supply and the impact on the environment.
- List and describe the primary renewable energy resources and technologies.
- To quantify energy demands and make comparisons among energy uses, resources, and technologies.
- Collect and organize information on renewable energy technologies as a basis for further analysis and evaluation.
- Understand the Engineering involved in projects utilizing these sources

UNIT - I

Introduction to Energy Science: Scientific principles and historical interpretation to place energy use in the context of pressing societal, environmental and climate issues Introduction to energy systems and resources; Introduction to Energy, sustainability & the environment

UNIT - II

Energy Sources: Overview of energy systems, sources, transformations efficiency, and storage. Fossilfuels (coal, oil, oil-bearing shale and sands, coal gasification) -past, present & future, Remedies & alternatives for fossil fuels - biomass, wind, solar nuclear, wave, tidal and hydrogen;

UNIT - III

Sustainability and Environmental Trade-Offs Of Difference Energy Systems: Possibilities for

energy storage or regeneration (Ex. Pumped storage hydro Power projects, superconductor-based energy storages, high efficiency batteries)

UNIT - IV

Energy & Environment: Energy efficiency and conservation; introduction to clean energy technologies and its importance in sustainable development; Carbon footprint, energy consumption and sustainability; introduction to the economics of energy; How the economic system determines production and consumption; linkages between economic and environmental outcomes; How future energy use can be influenced by economic environmental, trade, and research policy.

UNIT - V:

Engineering for Energy Conservation: Concept of Green Building and Green Architecture; Green building concepts (Green building encompasses everything from the choice of building materials to where a building is located, how it is designed and operated) *LEED ratings;* Identification of energy related enterprises that represent the breath of the industry and prioritizing these as candidates; Embodied energy analysis and use as a tool for measuring sustainability. Energy Audit of Facilities andoptimization of energy consumption

TEXT BOOKS:

1. Boyle, Godfrey (2004), Renewable Energy (2nd edition). Oxford University Press
2. Boyle, Godfrey, Bob Everett, and Janet Ramage (Eds.) (2004), Energy Systems and Sustainability: Power for a Sustainable Future. Oxford University Press.

REFERENCE BOOKS:

1. Schaeffer, John (2007), Real Goods Solar Living Sourcebook: The Complete Guide to Renewable Energy Technologies and Sustainable Living, Gaiam.
2. Jean-Philippe; Zaccour, Georges (Eds.), (2005), Energy and Environment Set: Mathematics of Decision Making, Loulou, Richard; Waaub, XVIII.
3. Ristinen, Robert A. Kraushaar, Jack J. A Kraushaar, Jack P. Ristinen, Robert A. (2006) Energy and the Environment, 2nd Edition, John Wiley UNDP (2000), Energy and the Challenge of Sustainability, World Energy assessment.
4. E H Thorndike (1976), Energy & Environment: A Primer for Scientists and Engineers, Addison-Wesley Publishing Company.
5. Related papers published in international journals.

ME800OE: NON-CONVENTIONAL SOURCES OF ENERGY
(Open Elective – III)

B.Tech. Mech. Engg. IV Year II Sem. **L T P C**
3 0 0 3

Pre-requisites: None

Course Outcomes: At the end of the course, the student will be able to:

- Identify renewable energy sources and their utilization. Understand the basic concepts of solar radiation and analyze the working of solar and thermal systems.
- Understand principles of energy conversion from alternate sources including wind, geothermal,ocean, biomass, biogas and hydrogen.
- Understand the concepts and applications of fuel cells, thermoelectric convertor and MHD generator.
- Identify methods of energy storage for specific applications

UNIT – I

Principles of Solar Radiation: Role and potential of new and renewable source, the solar energy option, Environmental impact of solar power - Physics of the sun, the solar constant, extra-terrestrial and terrestrial solar radiation, Solar radiation on titled surface, Instruments for measuring solar radiationand sun shine, solar radiation data.

Solar Energy Collection: Flat plate and concentrating collectors, classification of concentrating collectors, orientation and thermal analysis, advanced collectors.

UNIT - II

Solar Energy Storage and Applications: Different methods, sensible, latent heat and stratified storage, solar ponds. Solar applications - solar heating/cooling techniques, solar distillation and drying,photovoltaic energy conversion.

Wind Energy: Sources and potentials, horizontal and vertical axis windmills, performance characteristics, Betz criteria

UNIT - III

Bio-Mass: Principles of Bio-Conversion, Anaerobic /aerobic digestion, types of Bio-gas digesters, gas yield, combustion characteristics of biogas, utilization for cooking, I.C. Engine operation, and economicaspects.

UNIT - IV

Geothermal Energy: Resources, types of wells, methods of harnessing the energy, potential in India. **Ocean Energy** – OTEC, Principles, utilization, setting of OTEC plants, thermodynamic cycles. Tidal and Wave energy: Potential and conversion techniques, mini-hydel power plants, their economics.

UNIT –V

Direct Energy Conversion: Need for DEC, Carnot cycle, limitations, Principles of DEC. Thermo- electric generators, Seebeck, Peltier and Joule Thompson effects, figure of merit, materials, applications, MHD generators, principles, dissociation and ionization, hall effect, magnetic flux, MHD accelerator, MHD engine, power generation systems, electron gas dynamic conversion, economic aspects. Fuel cells, principle, faraday's laws, thermodynamic aspects, selection of fuels and operating conditions.

TEXT BOOKS:

1. Renewable Energy Resources / Tiwari and Ghosal / Narosa
2. Non- conventional Energy Sources / G.D. Rai/ Khanna Publishers
3. Biological Energy Resources/ Malcolm Fleischer & Chris Lawis/ E&FN Spon.

REFERENCE BOOKS:

1. Renewable Energy Sources / Twidell & Weir
2. Solar Power Engineering / B.S. Magal Frank Kreith & J.F. Kreith
3. Principles of Solar Energy / Frank Krieth & John F Kreider
4. Non-Conventional Energy / Ashok V Desai / Wiley Eastern
5. Non-Conventional Energy Systems / K Mittal / Wheeler
6. Renewable Energy Technologies / Ramesh & Kumar / Narosa