



Department of Civil Engineering

Year/Sem	M.Tech	L	T	P	C	COURSE CODE
Regulation Year	V21 / 2022-2023	2	0	0	0	V21PGENT52
Name of the Course	PERSONALITY DEVELOPMENT THROUGH LIFE ENLIGHTENMENTSKILLS					
Branch	CIVIL ENGINEERING					

Course Outcomes:

After successful completion of the course, the students will be able to

CO1	Relate Neetishatakam in developing versatile personality of students.	K1
CO2	Employ Bhagavad Gita to lead the nation and mankind to peace and prosperity.	K3
CO3	Connect students to Bhagavad Gita in order to develop personality and achieve highest goals in life.	K4

Syllabus

Unit	Content	Hours
1	Neetisatakam-Holistic development of personality	8
	• Verses- 19,20,21,22 (wisdom)	
	• Verses- 29,31,32 (pride & heroism)	
	• Verses- 26,28,63,65 (virtue)	
	• Verses- 52,53,59(dont"s)	
	• Verses- 71,73,75,78(do"s)	
2	• Approach to day to day work and duties.	8
	• Shrimad Bhagavad Gita: Chapter 2-Verses 41, 47,48,	
	• Chapter 3-Verses 13, 21, 27, 35, Chapter 6-Verses 5,13,17, 23, 35,	
	• Chapter 18-Verses 45, 46, 48.	
3	• Statements of basic knowledge.	8
	• Shrimad Bhagwad Geeta: Chapter2-Verses 56, 62, 68	
	• Chapter 12 -Verses 13, 14, 15, 16,17, 18	
	• Personality of Role model. Shrimad Bhagwad Geeta: Chapter2-	
	• Verses 17, Chapter 3-Verses 36,37,42,	

	Chapter 4-Verses 18, 38,39	
	Chapter18 – Verses 37,38,63	

References:

1. –Sri mad Bhagavad Gita|| bySwami Swarupananda Advaita Ashram (PublicationDepartment), Kolkata
2. Bhartrihari"s Three Satakam (Niti-sringar-vairagya) by P.Gopinath, RashtriyaSanskrit Sansthanam, New Delhi.

Year/Sem	M.Tech	L	T	P	C	COURSE CODE
Regulation Year	V21 / 2022-2023	2	0	0	0	V21PGENT53
Name of the Course	STRESS MANAGEMENT BY YOGACOURSE					
Branch	CIVIL ENGINEERING					

Course Outcomes:

After successful completion of the course, the students will be able to

CO1	Define 8 parts of Yoga (Ashtanga)	K1
CO2	Discuss Yam and Niyam along with Dos and Don'ts in life. Interpret Ahimsa, satya, astheya, brahmacharya and aparigraha along with other concepts.	K2
CO3	Practice Asan and Pranayam. Examine various yoga poses and their benefits for mind and body.	K3

Syllabus

Unit	Content	Hours
1	Definitions of Eight parts of yoga. (Ashtanga)	8
2	Yam and Niyam. Do's and Don'ts in life. i) Ahimsa, satya, astheya, brahmacharya and aparigraha ii) Shaucha, santosh, tapa, swadhyay, ishwarpranidhan	8
3	<ul style="list-style-type: none"> • Asan and Pranayam 1. Various yog poses and their benefits for mind & body 2. Regularization of breathing techniques and its effects- Types of pranayam 	8

References:

1. Yogic Asanas for Group Training- Part- II : Janardan Swami Yogabhyasi Mandal, Nagpur
2. Rajayog or conquering the Internal Nature by Swami Vivekananda, Advaita Ashrama (Publication Department), Kolkata.

Year/Sem		L	T	P	C	COURSE CODE
Regulation Year	V20 / 2022-2023	2	0	0	0	V20CEMC01
Name of the Course	INTELLECTUAL PROPERTY RIGHTS & PATENTS					
Branch	CIVIL ENGINEERING					

Course Outcomes:

Upon successful completion of this course the student will be able to

- Describe the need of Intellectual Property Rights (K2)
- Generalize different issues regarding Copy Rights (K2)
- Employ the procedure for Patent registration and granting (K3)
- Discuss the importance of Trademark and its related issues (K2)
- Recognize the significance of Trade Secrets in Industry (K2)

SYLLABUS

UNIT I

Introduction to Intellectual Property Rights (IPR): Introduction to IPR, Evolutionary Past, Concept of IPR– Purpose of IPR, Types of IPR, WIPO -TRIPS, Nature of IPR, Patents, Trademarks, Copyrights, Neighboring Rights, Agencies responsible for IPR - Infringement, Use and Misuse of Intellectual Property Rights.

UNIT II

Copyrights: Introduction to Copyrights – Principles of Copyright Protection – Law Relating to Copyrights- Copyright Ownership – Transfer and Duration – Copyright Registration – Limitations – Infringement of Copyright – Relief and Remedy – Semiconductor Chip Protection Act.

UNIT III

Patents: Introduction to Patents - Laws Relating to Patents in India – Patent Requirements – Product Patent and Process Patent - Patent Registration and Granting of Patent - Exclusive Rights – Limitations - Ownership and Transfer — Revocation of Patent – Patent Appellate Board - Infringement of Patent – Compulsory Licensing – Software Protection and Computer related Innovations.

UNIT IV

Trademarks: Introduction to Trademarks – Laws Relating to Trademarks – Functions of Trademark — Trade Mark Registration – Trade Mark Maintenance – Transfer of rights – Deceptive Similarities - Likelihood of Confusion - Dilution of Ownership – Trademarks Claims and Infringement – Remedies – Passing Off Action.

UNIT V

Trade Secrets: Introduction to Trade Secrets – General Principles - Laws Relating to Trade Secrets -Maintaining Trade Secret – Physical Security – Employee Access Limitation – EmployeeConfidentiality Agreements – Breach of Contract –Law of Unfair Competition – Trade Secret Litigation – Applying State Law, Cyber Law and Cyber Crime

TextBooks:

1. Intellectual Property Rights (Patents & Cyber Law), Dr. A. Srinivas. Oxford University Press, New Delhi.
2. PrabhuddhaGanguli: Intellectual Property Rights, Tata Mc-Graw –Hill, New Delhi
3. R.Radha Krishnan, S.Balasubramanian: Intellectual Property Rights, Excel Books. New Delhi.

References:

1. Deborah E.Bouchoux: Intellectual Property, Cengage Learning, New Delhi.
2. Richard Stim: Intellectual Property, Cengage Learning, New Delhi.
3. KompalBansal&ParishitBansal Fundamentals of IPR for Engineers, B. S. Publications (Press).
4. Cyber Law - Texts & Cases, South-Western's Special Topics Collections.
5. M.Ashok Kumar and MohdIqbal Ali: Intellectual Property Rights, Serials Pub.

Year/Sem		L	T	P	C	COURSE CODE
Regulation Year	V18	2	-	-	0	V18ENT11
Name of the Course	CONSTITUTION OF INDIA					
Branch	CIVIL ENGINEERING					

Course Outcomes:

Upon successful completion of this course the student will be able to

- Summarize the evolution and historical importance of the Indian constitution from 1858 to 1947 (K2)
- Explain various stages in the composition of the Indian constitution (K2)
- Develop awareness about their primary rights and duties & build up their civil sense (K3)
- Explain the distribution of powers between the centre and states (K2)
- Summarize and sketch the specific roles of heads of nation and the functioning of legislative bodies (K2)
- Explain the role of local self-government in strengthening democracy (K1)

SYLLABUS

UNIT I

Historical perspective of the Indian constitution: A brief discussion of various Acts i.e., from 1858 to 1947 passed by the British Government.

UNIT II

Constitution of India:

- a) Preparation of Indian constitution by constituent Assembly of India
- b) Preamble or philosophy of the Indian constitution
- c) Salient features of the Indian constitution

UNIT III

- a) Fundamental Rights - their importance & Limitations
- b) fundamental duties and their importance
- c) Directive principles of the state policy and their implementation

UNIT IV

Indian Federalism:

- a) Distribution of powers between Union and State Governments
- b) Legislative, Executive and Financial relations between Union and State Governments

UNIT V

Parliamentary form of Government of India

1. Union Executive

- a) President of India - Powers and functions
- b) Vice Present - Powers and functions
- c) Prime Minister and council of Minister - Powers and functions

2. Union Legislature

- a) Rajya sabha - Powers and functions
- b) Lok Sabha - Powers and functions
- c) Amending Procedure - Important Constitutional Amendments - 42nd , 44
Constitutional Amendments Acts.
- d) Judiciary - Supreme Court of India - Powers and functions

UNIT VI

Local Self - Government in India 73rd & 74th Constitutional Amendments Acts.

REFERENCE BOOKS

1. D D Basu - Introduction to the Constitution of India - 18th Edition. Prentice - Hall of India Private Limited - New Delhi -1998
2. Granville Austin (1972) the Indian constitution, Cornerstone of a nation, Oxford university Press, New Delhi
3. Madhavkhosla (2012) the Indian constitution, Oxford university Press, New Delhi
4. Granville Austin (1999) working a Democratic Constitution; A History of the Indian Experience, Oxford university Press, New Delhi
5. Zoya Hasan, Sridharan E and Sudharshan R (Eds) 2002 India's living Constitution, Permanent black, New Delhi
6. Baxi Upendra (1980) the Indian Supreme Court and Politics, Eastern Book Co, Lucknow.

Semester	II	L	T	P	C	COURSE CODE
Regulation	V20	2	0	0	0	V20CHT02
Name of the Course	Environmental Studies					
Branch	Common to All Branches					

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Recognise the importance of environment and ecosystem services. (K2)

CO2: Identify the characteristic features, uses and impact of overutilization of natural resources. (K2)

CO3: Explain biodiversity, biodiversity services and conservation of biodiversity. (K2)

CO4: Report the causes and impacts of various pollutions. (K2)

CO5: Illustrate social and global environmental issues; sustainable development practices. (K2)

UNIT-I: MULTIDISCIPLINARY NATURE OF ENVIRONMENT & ECOSYSTEM:

Definition, Scope and importance of environment, Types of environment, Multidisciplinary nature of Environmental Studies, Components of environment. Ecosystem –Concept of an Ecosystem, Structure and function of an Ecosystem, Food chain & food web, Ecological Pyramids, Structure and function of Forest, Desert, Pond and Marine ecosystem.

UNIT-II: NATURAL RESOURCES: Forest Resources: Uses, Overexploitation, Deforestation. Water resources: Aquifers, Dams and benefits, Conflicts over water. Mineral resources: Uses, Overexploitation, Environmental impact of extraction and use of mineral resources. Land resources: Degradation, Soil erosion and desertification, Landslides. Renewable Energy resources: Solar energy, Geo thermal energy, Tidal Energy.

UNIT-III: BIODIVERSITY AND ITS CONSERVATION: Definition, Levels of Biodiversity, Values of Biodiversity, Hotspots of Biodiversity, Threats to Biodiversity, Endangered and Endemic species of India, In- situ and Ex-situ Conservation.

UNIT-IV: ENVIRONMENTAL POLLUTION : Definition of pollution, Air pollution- Types of Air pollutants, Effects and control measures; Water pollution- Causes, Effects and control measures; Soil pollution; Biomedical waste; Industrial waste- Process of waste management, Sanitary land fill, Incineration, 3R strategy;E- Waste and its management.

UNIT-V: SOCIAL AND GLOBAL ENVIRONMENTAL ISSUES & ACTS : Women Education, Value education, Role of information technology on environment and human health, Acid rains, Global warming, Ozone layer depletion. Population growth. Importance of environmental legislation, Environmental Protection Act, Air Act (Prevention and control of pollution), Water Act.

Text Books:

1. Environmental Studies, Fourth Edition, ANubhaKaushik, C P Kaushik, New Age International Publishers.
2. A Textbook of Environmental Studies, ShashiChawla, TMH, NewDelhi.
3. Fundamentals of Environmental Studies, DD Mishra, S Chand & Co.Ltd.
4. Textbook of Environmental Science, DR M. Anjireddy, B.S Publications, Hyderabad.

I-I	Research Methodology and IPR	Course Code: V21MBT55	L	T	P	C
			2	0	0	2

Course Outcomes: After completion of course, students would be able to

- CO1:** Discuss different methodologies and techniques used in research work. (K2)
CO2: Explain basic computer skills necessary for the conduct of research. (K2)
CO3: Assess the basic function and working of analytical instruments used in research. (K3)
CO4: Practice the required numerical skills necessary to carry out research. (K3)
CO5: Demonstrate a capacity to identify, apply and assess ownership rights and marketing protection under intellectual property law as applicable to information, ideas, new products and product marketing. (K3)

UNIT 1: Meaning of research problem, Sources of research problem, Criteria Characteristics of a good research problem, Errors in selecting a research problem, Scope and objectives of research problem. Approaches of investigation of solutions for research problem, data collection, analysis, interpretation, Necessary instrumentations

UNIT 2: Effective literature studies approaches, analysis Plagiarism, Research ethics, Effective technical writing, how to write report, Paper Developing a Research Proposal, Format of research proposal, a presentation and assessment by a review committee

UNIT 3: Nature of Intellectual Property: Patents, Designs, Trade and Copyright. Process of Patenting and Development: technological research, innovation, patenting, development. International Scenario: International cooperation on Intellectual Property. Procedure for grants of patents, Patenting under PCT.

UNIT 4: Patent Rights: Scope of Patent Rights. Licensing and transfer of technology. Patent information and databases. Geographical Indications.

UNIT 5: New Developments in IPR: Administration of Patent System. New developments in IPR; IPR of Biological Systems, Computer Software etc. Traditional knowledge Case Studies, IPR and IITs.

REFERENCES:

- (1) Stuart Melville and Wayne Goddard, "Research methodology: an introduction for science & engineering students"
- (2) Wayne Goddard and Stuart Melville, "Research Methodology: An Introduction"
- (3) Ranjit Kumar, 2nd Edition, "Research Methodology: A Step by Step Guide for beginners"
- (4) Halbert, "Resisting Intellectual Property", Taylor & Francis Ltd, 2007.
- (5) Mayall, "Industrial Design", McGraw Hill, 1992.
- (6) Niebel, "Product Design", McGraw Hill, 1974.
- (7) Asimov, "Introduction to Design", Prentice Hall, 1962.
- (8) Robert P. Merges, Peter S. Menell, Mark A. Lemley, "Intellectual Property in New Technological Age", 2016.
- (9) T. Ramappa, "Intellectual Property Rights Under WTO", S. Chand, 2008

Year/Sem		L	T	P	C	COURSE CODE
Regulation Year	V21 / 2021-2022	3	0	0	3	V21STEAC1
Name of the Course	DISASTER MANAGEMENT					
Branch	Common to all					

Course Outcomes:

Upon successful completion of this course the student will be able to

- Describe to student to have a idea on different natural hazards and disaster management (K2)
- Develop the student to understand manmade disaster and their management (K3)
- Prepare the student in such a way inorder to understand building codes and vulnerability of disaster (K3)
- Illustrate to student about role of technology in disaster management (K2)
- Assess the importance of education and community preparedness in disaster management to student (K3)

SYLLABUS

UNIT I

Natural Hazards and Disaster Management: Introduction of DM Disaster Management cycle – Five priorities for action- Case study methods of the following: floods, droughts – Earthquakes – global warming, cyclones & Tsunamis – Post Tsunami hazards along the Indian coast – landslides.

UNIT II

Man Made Disaster And Their Management Along With Case Study Methods Of The Following: Fire hazards – transport hazard dynamics – solid waste management – post disaster – bio terrorism - rail and air craft's accidents-Management of these disasters

UNIT III

Risk And Vulnerability: – Building codes and land use planning – social vulnerability – environmental vulnerability -Financial management of disaster.

UNIT IV

Role Of Technology In Disaster Managements: Disaster management for infra structures, taxonomy of infra structure - mitigation programme for earth quakes –geospatial information in agriculture drought assessment-multimedia technology in disaster risk management and training- transformable indigenous knowledge in disaster reduction.

UNIT V

Education And Community Preparedness: Education in disaster risk reduction-Essentials of school disaster education-Community capacity and disaster resilience-Community based disaster recovery - Community based disaster management and social capital-Designing resilience- building.

Text Books:

1. Disaster Management – Global Challenges and Local Solutions' by Rajib shah & R R Krishnamurthy(2009),Universities press.
2. Disaster Science & Management' by Tushar Bhattacharya, Tata McGraw Hill Education Pvt. Ltd., New Delhi.
3. Disaster Management – Future Challenges and Opportunities' by Jagbir Singh (2007), I K International Publishing House Pvt. Ltd.

Reference Books:

1. 'Disaster Management' edited by H K Gupta (2003), Universities press.
2. Natural Hazards and Disaster Management, Vulnerability and Mitigation by RB Singh
3. Disaster Management by Harish K.Gupta

V21PGENT55	VALUE EDUCATION	L	T	P	C
		0	2	0	0

		Knowledge Level
CO1	Enumerate the societal values and Individual attitudes that lead to value based judgments	K1
CO2	Explain the need for value education that incorporates self-discipline, confidence, honesty and patriotism	K2
CO3	Develop the inner and external personality that transforms individual into a man of character	K3
CO4	Distinguish between character and competence, self-management and good health, mind your mind and self-control	K4

Syllabus

Unit I : Values and self-development –Social values and individual attitudes.

Work ethics, Indian vision of humanism. Moral and non- moral valuation. Standards and principles. Value judgements

Unit II : Importance of cultivation of values. Sense of duty. Devotion, Self-reliance. Confidence, Concentration. Truthfulness, Cleanliness. Honesty, Humanity. Power of faith, National Unity. Patriotism.Love for nature ,Discipline

Unit III : Personality and Behavior Development - Soul and Scientific attitude.

Positive Thinking. Integrity and discipline. Punctuality, Love and Kindness.

Avoid fault Thinking. Free from anger, Dignity of labour. Universal brotherhood and religious tolerance. True friendship. Happiness Vs suffering, love for truth.

Aware of self-destructive habits. Association and Cooperation. Doing best for saving nature

Unit IV : Character and Competence –Holy books vs Blind faith. Self-management and Good health.

Science of reincarnation. Equality, Nonviolence ,Humility, Role of Women. All religions and same message. Mind your Mind, Self-control. Honesty, Studying effectively

Suggested reading

1 Chakraborty, S.K. “Values and Ethics for organizations Theory and practice”, Oxford University Press, New Delhi

Semester	VIII SEM	L	T	P	C	Course Code
Regulation	V18	3	-	-	3	V18EET39
Name of the Course	Electrical and Hybrid Vehicles (Professional Elective - V)					
Branches	EEE					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Differentiate between Electric vehicles and Hybrid Electric Vehicles	K2
CO2	Discriminate between various Drive-Train Topologies	K2
CO3	Identify different motors used for hybrid electric vehicles.	K2
CO4	Explain the Sizing of Drive Train	K2
CO5	Illustrate different batteries and other energy storage systems.	K3
CO6	Discuss Various issues of energy management strategies	K2

UNIT-I: INTRODUCTION TO ELECTRIC VEHICLES

Conventional Vehicles: Basics of vehicle performance, vehicle power source characterization, transmission characteristics-Social and environmental importance of hybrid and electric vehicles, impact of modern drive-trains on energy supplies.

UNIT-II: DRIVE TRAINS

Hybrid Electric Drive-trains: Basic concept of hybrid traction, introduction to various hybrid drive-train topologies, power flow control in hybrid drive-train.

Electric Drive-trains: Basic concept of electric traction, introduction to various electric drive-train topologies, power flow control in electric drive-train.

UNIT-III: ELECTRIC PROPULSION UNIT

Introduction to electric components used in hybrid and electric vehicles, control of DC Motor drives, Control of Permanent Magnet Motor drives, control of Switch Reluctance Motor drives, drive system efficiency.

UNIT-IV: ENERGY STORAGE

Introduction to Energy Storage Requirements in Hybrid and Electric Vehicles, Battery based energy storage, Fuel Cell based energy storage - Super Capacitor based energy storage - Flywheel based energy storage

UNIT-V: SIZING THE DRIVE SYSTEM

Matching the electric machine and the internal combustion engine (ICE), Sizing the propulsion motor, sizing the power electronics, selecting the energy storage technology, Communications, supporting subsystems

UNIT-VI: ENERGY MANAGEMENT STRATEGIES

Introduction to energy management strategies used in hybrid and electric vehicles, classification of different energy management strategies, implementation issues of energy management strategies.

TEXT BOOKS:

1. Ali Emadi, Advanced Electric Drive Vehicles, CRC Press, 2014.
2. Iqbal Hussein, Electric and Hybrid Vehicles: Design Fundamentals, CRC Press, 2003.

REFERENCE BOOKS:

1. Mehrdad Ehsani, Yimin Gao, Ali Emadi, "Modern Electric, Hybrid Electric, and Fuel Cell Vehicles:
2. Sandeep Dhameja, "Electric Vehicle Battery Systems", Newnes, 2000
<http://nptel.ac.in/courses/108103009/>

Semester	VII SEM	L	T	P	C	Course Code
Regulation	V18	3	-	-	3	V18EET35
Name of the Course	Control of Grid Connected Converters for PV and Wind Energy Systems (Professional Elective - IV)					
Branches	EEE					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Understand the basic requirements of grid for connecting PV and WT converters.	K2
CO2	Describe various grid synchronization techniques for single phase power converters.	K2
CO3	Describe various grid synchronization techniques for three phase power converters.	K2
CO4	Illustrate various filter topologies and control techniques for grid connected converters.	K2
CO5	Explain different MPPT Control Methods and limitations of standard MPPT.	K2
CO6	Illustrate the control of grid converter for renewable energy interface	K2

UNIT-I: GRID REQUIREMENT FOR PV AND WT SYSTEM

Introduction, International Regulations, Response to Abnormal Grid Conditions, Power Quality. Grid Code Evolution for WT system, Frequency and Voltage Deviation under Normal Operation, Active Power Control in Normal Operation, Reactive Power Control in Normal Operation.

UNIT-II: GRID SYNCHRONIZATION FOR SINGLE-PHASE POWER CONVERTERS

Grid Synchronization Techniques for Single-Phase Systems, Phase Detection Based on In-Quadrature Signals, Some PLLs Based on In-Quadrature Signal Generation.

UNIT-III: GRID SYNCHRONIZATION FOR THREE-PHASE POWER CONVERTERS

The Three-Phase Voltage Vector under Grid Faults, Synchronous Reference Frame PLL under Unbalanced and Distorted Grid Conditions, Decoupled Double Synchronous Reference Frame PLL (DDSRF-PLL), Double Second-Order Generalized Integrator FLL (DSOGI-FLL).

UNIT-IV: INTRODUCTION TO CONTROL STRATEGY OF CONVERTERS WITH DIFFERENT FILTER CONFIGURATIONS

Filter Topologies, Design Considerations, Practical Examples of LCL Filters and Grid Interactions, Resonance Problem and Damping Solutions, Nonlinear Behavior of the Filter. Converter configurations, Different current Control techniques- PI control, PR control, HCC, Model Predictive control.

UNIT-V: MPPT CONTROL FOR PV AND WT SYSTEM

The Dynamic Optimization Problem, Fractional Open-Circuit Voltage and Short-Circuit Current, MPPT Control Methods, The Perturb and Observe Approach, Improvements of the P&O Algorithm, The Incremental Conductance Method, MPPT Efficiency, Limitation of standard MPPT. Charge controller for off grid PV system.

UNIT-VI: GRID CONVERTER CONTROL FOR RENEWABLE ENERGY INTERFACE

Model of the Converter-Mathematical Model of the L-Filter Inverter; AC Voltage and DC Voltage Control-Management of the DC Link Voltage, Cascaded Control of the DC Voltage through the AC Current, Tuning Procedure of the PI Controller, PI-Based Voltage Control; Voltage Oriented Control (VOC) and Direct Power Control (DPC): Synchronous Frame VOC: PQ Open-Loop Control, PQ Closed-Loop Control, Direct Power Control, Stand-alone.

REFERENCES BOOKS:

1. Grid Converters for Photovoltaic and Wind Power systems, IEEE, A John Wiley and Sons, Ltd, Publication
2. Power Electronics and Control Techniques for Maximum Energy Harvesting in Photovoltaic systems, CRC Press, Taylor and Francis Group.
3. Photovoltaic Power System: Modeling, Design, and Control by Weidong Xiao, Wiley Publication.
4. Modern MPPT Techniques for Photovoltaic Energy Systems by Ali M. Eltamaly, Almoataz Y. Abdelaziz, Springer International Publishing.

Semester	VIII SEM	L	T	P	C	Course Code
Regulation	V18	3	-	-	3	V18EET41
Name of the Course	Energy Storage and Battery Management (Professional Elective - VI)					
Branches	EEE					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
C01	Understand need of energy storage systems	K3
C02	Determine various types of energy storage and various devices used for the purpose	K3
C03	Examine various real time applications	K3
C04	Interpret the role of battery management system	K3
C05	Illustrate the requirements of Battery Management System	K3
C06	Interpret the concept associated with battery charging / discharging process	K3

UNIT-I: INTRODUCTION TO ENERGY STORAGE

Necessity of energy storage, different types of energy storage, mechanical, chemical, electrical, electrochemical, biological, magnetic, electromagnetic, thermal, comparison of energy storage technologies.

UNIT-II: NEEDS FOR ELECTRICAL ENERGY STORAGE

Emerging needs for EES, More renewable energy, less fossil fuel, Smart Grid uses, the roles of electrical energy storage technologies, the roles from the viewpoint of a utility, the roles from the viewpoint of consumers, the roles from the viewpoint of generators of renewable energy.

UNIT- III: FEATURES OF ENERGY STORAGE SYSTEMS

Classification of EES systems , Mechanical storage systems, Pumped hydro storage (PHS), Compressed air energy storage (CAES), Flywheel energy storage (FES), Electrochemical storage systems, Secondary batteries, Flow batteries, Chemical energy storage, Hydrogen (H₂), Synthetic natural gas (SNG).

UNIT- IV: INTRODUCTION TO BATTERY MANAGEMENT SYSTEM

Introduction to Battery Management System, Cells & Batteries, Nominal voltage and capacity, C rate, Energy and power, Cells connected in series, Cells connected in parallel, Electrochemical and lithium-ion cells, Rechargeable cell, Charging and Discharging Process, Overcharge and Undercharge, Modes of Charging.

UNIT- V: BATTERY MANAGEMENT SYSTEM REQUIREMENT

Introduction and BMS functionality, Battery pack topology, BMS Functionality, Voltage Sensing, Temperature Sensing, Current Sensing, BMS Functionality, High-voltage contactor control, Isolation sensing, Thermal control, Protection, Communication Interface, Range estimation, State-of charge estimation, Cell total energy and cell total power.

UNIT- VI: BATTERY STATE OF CHARGE AND STATE OF HEALTH ESTIMATION, CELL BALANCING

Battery state of charge estimation (SOC), voltage-based methods to estimate SOC, Model-based state estimation, Battery Health Estimation, Lithium-ion aging: Negative electrode, Lithium ion aging: Positive electrode, Cell Balancing, Causes of imbalance, Circuits for balancing

TEXT BOOKS:

1. "James M. Eyer, Joseph J. Iannucci and Garth P. Corey ", "Energy Storage Benefits and Market Analysis", Sandia National Laboratories, 2004.
2. The Electrical Energy Storage by IEC Market Strategy Board.

REFERENCE BOOK:

1. "Jim Eyer, Garth Corey", Energy Storage for the Electricity Grid: Benefits and Market Potential Assessment Guide, Report, Sandia National Laboratories, Feb 2010.
2. Plett, Gregory L. Battery management systems, Volume I: Battery modeling. Artech House, 2015.
3. Plett, Gregory L. Battery management systems, Volume II: Equivalent-circuit methods. Artech House, 2015.
4. Bergveld, H.J., Kruijt, W.S., Notten, P.H.L "Battery Management Systems -Design by Modelling" Philips Research Book Series 2002.



SRI VASAVI ENGINEERING COLLEGE

(AUTONOMOUS)

(Sponsored by Sri Vasavi Educational Society)

(Approved by AICTE, New Delhi & Recognized by UGC under section 2(f) & 12(B))

(Permanently affiliated to JNTUK, Kakinada, Accredited by NBA and NAAC with 'A' Grade)

Pedatadepalli, TADEPALLIGUDEM-534 101.W.G.Dist. (A.P)

Department of Electrical & Electronics Engineering (NBA Accredited)

UNIT IV

Trademarks: Introduction to Trademarks – Laws Relating to Trademarks – Functions of Trademark – Trade Mark Registration – Trade Mark Maintenance – Transfer of rights – Deceptive Similarities - Likelihood of Confusion - Dilution of Ownership – Trademarks Claims and Infringement – Remedies – Passing Off Action.

UNIT V

Trade Secrets: Introduction to Trade Secrets – General Principles - Laws Relating to Trade Secrets - Maintaining Trade Secret – Physical Security – Employee Access Limitation – Employee Confidentiality Agreements – Breach of Contract – Law of Unfair Competition – Trade Secret Litigation – Applying State Law, Cyber Law and Cyber Crime

Text Books:

1. Intellectual Property Rights (Patents & Cyber Law), Dr. A. Srinivas. Oxford University Press, New Delhi.
2. PrabhuddhaGanguli: Intellectual Property Rights, Tata Mc-Graw –Hill, New Delhi
3. R.Radha Krishnan, S.Balasubramanian: Intellectual Property Rights, Excel Books. New Delhi.

References:

1. Deborah E.Bouchoux: Intellectual Property, Cengage Learning, New Delhi.
2. Richard Stim: Intellectual Property, Cengage Learning, New Delhi.
3. Kompal Bansal & Parishit Bansal Fundamentals of IPR for Engineers, B. S. Publications (Press).
4. Cyber Law - Texts & Cases, South-Western's Special Topics Collections.
5. M.Ashok Kumar and Mohd Iqbal Ali: Intellectual Property Rights, SerialsPub.

Department Vision:

- To evolve as a centre of excellence in Electrical and Electronics Engineering that produces graduates of high quality with ethical values.

Department Mission:

- To impart technical knowledge through learner-centric education supplemented with practical exposure.
- To provide opportunities that promote personality development through co-curricular and extra-curricular activities.
- To inculcate human values & team spirit that enables the Electrical and Electronics Engineers to face the future challenges.



SRI VASAVI ENGINEERING COLLEGE

(AUTONOMOUS)

(Sponsored by Sri Vasavi Educational Society)

(Approved by AICTE, New Delhi & Recognized by UGC under section 2(f) & 12(B))
(Permanently affiliated to JNTUK, Kakinada, Accredited by NBA and NAAC with 'A' Grade)

Pedatadepalli, TADEPALLIGUDEM-534 101.W.G.Dist. (A.P)

Department of Electrical & Electronics Engineering (NBA Accredited)

Semester	VI SEM	L	T	P	C	Course Code
Regulation	V20	3	-	-	3	V20EET17
Name of the Course	Energy Audit & Demand Side Management (Professional Elective -I)					
Branches	EEE					

Course Outcomes

After Successful completion of this course, students will be able to

CO No.	Course Outcome	Knowledge Level
C01	Describe the concepts and procedures for Energy Audit & Management.	(K2)
C02	Understand the necessity of Energy efficient lighting systems.	(K2)
C03	Understand the operation of Energy instruments and their use in energy audit.	(K2)
C04	Explain Energy Conservation measures in HVAC system	(K2)
C05	Apply various economic aspects of Energy systems and life cycle costing analysis for various system	(K3)

UNIT-I: BASIC PRINCIPLES OF ENERGY AUDIT AND MANAGEMENT ENERGY AUDIT

Definitions – Concept – Types of audit – Energy index – Cost index – Pie charts –Sankey diagrams – Load profiles – Energy conservation schemes and energy saving potential – Numerical problems – Principles of energy management – Initiating, planning, controlling, promoting, monitoring, reporting – Energy manager – Qualities and functions – Language.

UNIT-II: LIGHTING MODIFICATION OF EXISTING SYSTEMS – REPLACEMENT OF EXISTING SYSTEMS – PRIORITIES:

Definition of terms and units – Luminous efficiency – Polar curve – Calculation of illumination level – Illumination of inclined surface to beam – Luminance or brightness – Types of lamps – Electric lighting fittings (luminaries) –Flood lighting – White light LED – Energy conservation measures.

Department Vision:

- To evolve as a centre of excellence in Electrical and Electronics Engineering that produces graduates of high quality with ethical values.

Department Mission:

- To impart technical knowledge through learner-centric education supplemented with practical exposure.
- To provide opportunities that promote personality development through co-curricular and extra-curricular activities.
- To inculcate human values & team spirit that enables the Electrical and Electronics Engineers to face the future challenges.



SRI VASAVI ENGINEERING COLLEGE

(AUTONOMOUS)

(Sponsored by Sri Vasavi Educational Society)

(Approved by AICTE, New Delhi & Recognized by UGC under section 2(f) & 12(B))

(Permanently affiliated to JNTUK, Kakinada, Accredited by NBA and NAAC with 'A' Grade)

Pedatadepalli, TADEPALLIGUDEM-534 101.W.G.Dist. (A.P)

Department of Electrical & Electronics Engineering (NBA Accredited)

UNIT-III: POWER FACTOR IMPROVEMENT AND ENERGY INSTRUMENTS

Power factor – Methods of improvement – Location of capacitors – Power factor with non linear loads – Effect of harmonics on Power factor – Numerical problems. Energy Instruments – Watt-hour meter – Data loggers – Thermocouples – Pyrometers – Lux meters – Tong testers – Power analyzer.

UNIT-IV: SPACE HEATING AND VENTILATION

Ventilation – Air-Conditioning (HVAC) and Water Heating: Introduction – Heating of buildings – Transfer of Heat-Space heating methods – Ventilation and air-conditioning – Insulation-Electric water heating systems – Energy conservation methods.

UNIT-V FINANCIAL ANALYSIS AND COMPUTATION OF ECONOMIC ASPECTS

Economics Analysis – Depreciation Methods – Time value of money – Rate of return – Present worth method – Replacement analysis – Life cycle costing analysis – Energy efficient motors (basic concepts) – Economics of energy efficient motors and systems. Need of investment, appraisal and criteria - Calculation of simple payback period-Return on investment – Net present value -Numerical examples.

TEXT BOOKS:

1. Hand Book of Energy Audit by Sonal Desai- Tata McGraw hill, 2015.
2. Energy efficient electric motors by John .C. Andreas, Marcel Dekker Inc Ltd-2nd edition, 1995.

REFERENCE BOOKS:

1. Energy management by W.R. Murphy & G. Mckay Butter worth, Elsevier publications, 2012.
2. Electric Energy Utilization and Conservation by S C Tripathy, Tata McGraw hill publishing company Ltd. New Delhi, 1991.
3. Energy management by Paul o' Callaghan, Mc-Graw Hill Book company-1st edition, 1998.
4. Energy management hand book by W.C.Turner, John wiley and sons, 6th Edition, 2006.
5. Energy management and conservation –k v Sharma and pvenkatasshaiah-I K International Publishing House pvt.ltd,2011.
6. http://www.energymanagertraining.com/download/Gazette_of_IndiaPartIISecl-37_25-08-2010.pdf

Department Vision:

- To evolve as a centre of excellence in Electrical and Electronics Engineering that produces graduates of high quality with ethical values.

Department Mission:

- To impart technical knowledge through learner-centric education supplemented with practical exposure.
- To provide opportunities that promote personality development through co-curricular and extra-curricular activities.
- To inculcate human values & team spirit that enables the Electrical and Electronics Engineers to face the future challenges.

Year/Sem	VII	L	T	P	C	COURSE CODE
Regulation Year	V18 / 2021-2022	3	0	0	3	V18CEOE03
Name of the Course	ENVIRONMENTAL POLLUTION AND CONTROL					
Branch	CIVIL ENGINEERING					

Course Outcomes:

Upon successful completion of this course the student will be able to

- Describe about air pollution and its control methods to students(K2)
- Develop the student to understand about industrial wastewater and ways to control it (K3)
- Describe student to understand about solid waste and methods to control it(K2)
- Express to student about importance of Environmental sanitation(K2)
- Prepare student to understand about Hazardous waste and ways to control it(K3)
- Illustrate the importance of Sustainable development to student(K3)

SYLLABUS

UNIT I

Air Pollution: Air pollution Control Methods–Particulate control devices – Methods of Controlling Gaseous Emissions – Air quality standards.Noise Pollution: Noise standards, Measurement and control methods –Reducing residential and industrial noise – ISO14000.

UNIT II

Industrial wastewater Management: – Strategies for pollution control -Volume and Strength reduction – Neutralization – Equalization –Proportioning – Common Effluent Treatment Plants - Recirculation of industrial wastes – Effluent standards.

UNIT III

Solid Waste Management: solid waste characteristics – basics of on-site handling and collection – separation and processing – Incineration Composting-Solid waste disposal methods – fundamentals of Land filling.

UNIT IV

Environmental Sanitation: Environmental Sanitation Methods for Hostels and Hotels, Hospitals, Swimming pools and public bathing places, social gatherings (melas and fares), Schools and Institutions, Rural Sanitation-low cost waste disposal methods.

UNIT V

Hazardous Waste: Characterization - Nuclear waste – Biomedical wastes – Electronic wastes - Chemical wastes – Treatment and management of hazardous waste-Disposal and Control methods.

UNIT VI

Sustainable Development: Definition- elements of sustainable developments-Indicators of sustainable development- Sustainability Strategies- Barriers to Sustainability-Industrialization and sustainable development – Cleaner production in achieving sustainability- sustainable development.

Text Books:

1. Environmental Engineering, by Ruth F. Weiner and Robin Matthews – 4th Edition Elsevier, 2003.
2. Environmental Science and Engineering by J.G. Henry and G.W. Heinke – Pearson Education.
3. Environmental Engineering by Mackenzie L Davis & David A Cornwell. McGraw Hill Publishing.

References:

1. Air Pollution and Control by M.N. Rao & H.N. Rao
2. Solid Waste Management by K. Sasi Kumar, S.A. Gopi Krishna. PHI New Delhi.
3. Environmental Engineering by Gerard Kiley, Tata McGraw Hill.
4. Environmental Sanitation by KVSG Murali Krishna, Reem Publications, New Delhi.
5. Industrial Water Pollution Control by Nemerow Jr., McGraw Hill Publishing.
6. Unit Operations and Processes in Environmental Engineering by Reynolds. Richard – Cengage Learning.
7. Environmental Engineering by D. Srinivasan, PHI Learning Private Limited, New Delhi, 2011.
8. Environmental Engineering – Howard S. Peavy, Donald R. Rowe, Teorge George Tchobanoglous – Mc-Graw-Hill Book Company, New Delhi, 1985.



SRI VASAVI ENGINEERING COLLEGE

(AUTONOMOUS)

(Sponsored by Sri Vasavi Educational Society)

(Approved by AICTE, New Delhi & Recognized by UGC under section 2(f) & 12(B))
(Permanently affiliated to JNTUK, Kakinada, Accredited by NBA and NAAC with 'A' Grade)

Pedatadepalli, TADEPALLIGUDEM-534 101.W.G.Dist. (A.P)

Department of Electrical & Electronics Engineering (NBA Accredited)

Semester	V SEM	L	T	P	C	Course Code
Regulation	V20	3	-	-	3	V20EET15
Name of the Course	Renewable Energy Systems (Professional Elective -I)					
Branches	EEE					

Course Outcomes

After Successful completion of this course, students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Understand the solar radiation and calculate geometric angle.	(K2)
CO2	Understand the working of solar thermal collectors.	(K2)
CO3	Understand the working of solar photo voltaic systems and develop the maximum power point techniques.	(K2)
CO4	Understand the wind energy conversion systems, Betz coefficient and tip speed ratio.	(K2)
CO5	Understand the basic principle and working of tidal, fuel cell and geothermal energy systems.	(K2)

UNIT-I: FUNDAMENTALS OF ENERGY SYSTEMS AND SOLAR ENERGY CONSERVATION PRINCIPLE

Energy scenario (world and India) – various forms of renewable energy - Solar radiation: Outside earth's atmosphere – Earth surface – Analysis of solar radiation data – Geometry – Radiation on tilted surfaces – Numerical problems.

UNIT-II: SOLAR THERMAL SYSTEMS

Liquid flat plate collectors: Performance analysis –Transmissivity– Absorptivity product collector efficiency factor – Numerical problems. Introduction to solar air heaters – Concentrating collectors, solar pond and solar still – solar thermal plants.

UNIT-III: SOLAR PHOTOVOLTAIC SYSTEMS

Solar photovoltaic cell, module, array – construction – Efficiency of solar cells – Developing technologies – Cell I-V characteristics – Equivalent circuit of solar cell – Series

Department Vision:

- To evolve as a centre of excellence in Electrical and Electronics Engineering that produces graduates of high quality with ethical values.

Department Mission:

- To impart technical knowledge through learner-centric education supplemented with practical exposure.
- To provide opportunities that promote personality development through co-curricular and extra-curricular activities.
- To inculcate human values & team spirit that enables the Electrical and Electronics Engineers to face the future challenges.



SRI VASAVI ENGINEERING COLLEGE

(AUTONOMOUS)

(Sponsored by Sri Vasavi Educational Society)

(Approved by AICTE, New Delhi & Recognized by UGC under section 2(f) & 12(B))

(Permanently affiliated to JNTUK, Kakinada, Accredited by NBA and NAAC with 'A' Grade)

Pedatadepalli, TADEPALLIGUDEM-534 101.W.G.Dist. (A.P)

Department of Electrical & Electronics Engineering (NBA Accredited)

resistance – Shunt resistance – Applications and systems - System design: storage sizing – PV system sizing – Maximum power point techniques: Perturb and observe (P&O) technique.

UNIT-IV: WIND ENERGY

Sources of wind energy - Wind patterns – Types of turbines –Horizontal axis and vertical axis machines - Kinetic energy of wind – Betz coefficient – Tip-speed ratio – Efficiency – Power output of wind turbine – Selection of generator (synchronous, induction) – Maximum power point tracking – wind farms.

UNIT-V: TIDAL, FUEL CELL AND GEOTHERMAL ENERGY SYSTEMS

Tidal power – Basics – Kinetic energy equation – Turbines for tidal power - Numerical problems – Wave power – Basics – Kinetic energy equation – Wave power devices. Fuel classification, Fuel cell: Classification of fuel for fuel cells – Fuel cell voltage– Efficiency – V-I characteristics. Geothermal: Classification – Dry rock and hot aquifer – Energy analysis – Geothermal based electric power generation.

TEXT BOOKS:

1. Solar Energy: Principles of Thermal Collection and Storage, S. P. Sukhatme and J. K. Nayak, TMH, New Delhi, 3rd Edition, 2013.
2. Renewable Energy Resources, John Twidell and Tony Weir, Taylor and Francis - second edition, 2013.

REFERENCE BOOKS:

1. Energy Science: Principles, Technologies and Impacts, John Andrews and Nick Jelly, Oxford University Press, 2nd edition, 2013.
2. Renewable Energy- Edited by Godfrey Boyle-oxford university.press,3rd edition, 2013.
3. Handbook of renewable technology Ahmed and Zobaa, Ramesh C Bansal, World scientific, Singapore, 2011.
4. Renewable Energy Technologies /Ramesh & Kumar /Narosa.
5. Renewable energy technologies – A practical guide for beginners – Chetong Singh Solanki, PHI, 2008.
6. Non conventional energy source –B.H.khan- TMH-2nd edition, 2017.
7. <https://archive.nptel.ac.in/courses/115/105/115105127/>
8. https://mrcet.com/downloads/digital_notes/ECE/III%20Year/INSTRUMENTATION%20ENGINEERING.pdf

Department Vision:

- To evolve as a centre of excellence in Electrical and Electronics Engineering that produces graduates of high quality with ethical values.

Department Mission:

- To impart technical knowledge through learner-centric education supplemented with practical exposure.
- To provide opportunities that promote personality development through co-curricular and extra-curricular activities.
- To inculcate human values & team spirit that enables the Electrical and Electronics Engineers to face the future challenges.

VII Sem	Non-Conventional Energy Sources (Open Elective-II)	Course Code: V18EETOE4	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

- | | | |
|-------------|---|-----------|
| CO1: | Understand the solar radiation and calculate geometric angle. | K3 |
| CO2: | Understand the working of solar thermal collectors. | K2 |
| CO3: | Understand the working of solar photo voltaic systems and develop the maximum power point techniques. | K3 |
| CO4: | Understand the wind energy conversion systems, Betz coefficient and tip speed ratio. | K2 |
| CO5: | Understand the basic principle and working of hydro and tidal systems. | K2 |
| CO6: | Understand the basic principle and working of, biomass, fuel cell and geothermal systems. | K2 |

UNIT-I: FUNDAMENTALS OF SOLAR ENERGY AND ENERGY CONSERVATION

PRINCIPLE:Energy scenario (world and India) – various forms of renewable energy - Solar radiation: Outside earth's atmosphere –Earth surface– Analysis of solar radiation data –Geometry–Radiation on tilted surfaces– Numerical problems.

UNIT-II: SOLAR THERMAL SYSTEMS:Liquid flat plate collectors: Performance analysis – Transmissivity– Absorptivity product collector efficiency factor –Collector heat removal factor – Numerical problems. Introduction to solar air heaters – Concentrating collectors, solar pond and solar still–solar thermal plants.

UNIT-III: SOLAR PHOTOVOLTAIC SYSTEMS:Solar photovoltaic cell, module, array – construction – Efficiency of solar cells – Developing technologies – Cell I-V characteristics – Equivalent circuit of solar cell – Series resistance – Shunt resistance – Applications and systems –Balance of system components - System design: storage sizing – PV system sizing – Maximum power point techniques: Perturb and observe(P&O)technique–Hill climbing technique.

UNIT-IV: WIND ENERGY:Sources of wind energy - Wind patterns – Types of turbines –Horizontal axis and vertical axis machines - Kinetic energyofwind–Betzcoefficient–Tip–speedratio–Efficiency– Poweroutputofwindturbine–Selection of generator(synchronous,induction) –Maximum power point tracking – wind farms–Power generation for utility grids.

UNIT-V: HYDRO AND TIDAL POWER SYSTEMS:Basic working principle – Classification of hydro systems: Large, small, micro–measurement of head and flow–Energy equation – Types of turbines – Numerical problems. Tidal power – Basics – Kinetic energy equation – Turbines for tidal power - Numerical problems – Wave power – Basics – Kinetic energy equation – Wave power devices – Linear generators.

UNIT-VI: BIOMASS AND GEOTHERMALSYSTEMS:Fuel classification – Pyrolysis – Direct combustion of heat– Different digesters and sizing. Geothermal: Classification – Dry rock and hot aquifer– Energy analysis–Geothermal based electric power generation

TEXT BOOKS:

1. Solar Energy: Principles of Thermal Collection and Storage, S.P. Sukhatme and J.K. Nayak, TMH, New Delhi, 3rd edition, 2013.
2. Renewable Energy Resources, John Twidell and Tony Weir, Taylor and Francis-2nd edition, 2013.

REFERENCE BOOKS:

1. Energy Science: Principles, Technologies and Impacts, John Andrews and Nick Jelly, Oxford University Press, 2nd edition, 2013.
2. Renewable Energy-Edited by Godfrey Boyle- oxford University. Press, 3rd edition, 2013.
3. Hand book of renewable technology Ahmed and Zobaa, Ramesh C Bansal, World scientific, Singapore, 1st edition, 2011.
4. Renewable Energy Technologies, Ramesh & Kumar, Narosa, 1st edition, 1997.
5. Renewable energy technologies– A practical guide for beginners –Chetong Singh Solanki, PHI, 1st edition, 2008.
6. Non-conventionalenergysource–B.H.khan-TMH-2nd edition, 2017.

Semester	VI	L	T	P	C	COURSE CODE
Regulation	V20	2	0	0	0	V20CEMC02
Name of the Course	Professional Ethics & Human Values					
Branch	Common to All Branches					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

- CO1:** Discuss the importance of human values and their context. (K2)
CO2: Generalize the professional ethics and norms of engineering practice. (K2)
CO3: Review the contextual knowledge of engineering as social experimentation. (K2)
CO4: Identify the engineer's responsibility for Safety & Risks. (K2)
CO5: Clarify the professional rights & responsibilities at global level. (K2)

UNIT I: Human Values: Morals, Values and Ethics – Integrity – Work Ethics – Service Learning –Civic Virtue – Respect for others – Living Peacefully – Caring – Sharing –Honesty –Courage – Value time – Co-operation – Commitment – Empathy –Self-confidence–Spirituality-Character.

UNIT II: Engineering Ethics: The History of Ethics, Purposes for Engineering Ethics, Consensus and Controversy, Professional and Professionalism, Professional Roles to be played by an Engineer –Self Interest, Customs and Religion, Uses of Ethical Theories, Professional Ethics, Types of Inquiry in Engineering Ethics.

UNIT III: Engineering as Social Experimentation: Comparison with Standard Experiments –now ledge gained–Conscientiousness–Relevant Information– Learning from the Past–Engineers as Managers, Consultants, and Leaders – Accountability – Role of Codes– odes and Experimental Nature of Engineering.

UNIT IV: Engineers' Responsibility for Safety and Risk: Safety and Risk, Concept of Safety – Types of Risks – Voluntary v/s Involuntary Risk- Short term v/s long term Consequences, Delayed v/s Immediate Risk- Safety and the Engineer – Designing for Safety – Risk-Benefit Analysis-Accidents.

UNIT V: Engineers' Responsibilities, Rights & Global Issues: Collegiality, Senses of Loyalty, professionalism and Loyalty, Professional Rights & Responsibilities–confidential and proprietary information, Bribes/Gifts, Whistle Blowing. Globalization- Cross-culture Issues, Environmental Ethics, Computer Ethics, Weapons Development Ethicsand Research Ethics, Intellectual Property Rights.

Text Books:

1. "Engineering Ethics and Human Values" by M. Govindarajan, S.Natarajan and V.S.Senthil Kumar-PHILearningPvt.Ltd-2009.
2. "Professional Ethics and Morals" by Prof.A.R.Aryasri, Dharanikota Suyodhana-Maruthi Publications.
3. "Professional Ethics and Human Values" by A.Alavudeen, R.Kalil Rahman and M.Jayakumaran-Laxmi Publications.

References:

1. "Professional Ethics and Human Values"by Prof.D.R.Kiran.
2. "Indian Culture,Values and Professional Ethics"by PSRMurthy-BS Publication.
3. "Ethics in Engineering" by Mike W.Martin and Roland Schinzinger–TMH.

VIII Sem	Basics of Electrical Power Generation (Open Elective-III)	Course Code: V18EETOES	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

- CO1** Understand the various energy sources, substations and switchgear devices. (K2)
CO2 Understand the principle of operation of different components of thermal power stations. (K2)
CO3 Understand the principle of different components of a Nuclear power stations. (K2)
CO4 Understand the principle of operation of different components of hydro power stations. (K2)
CO5 Understand the working of solar photo voltaic systems and applications. (K3)
CO6 Understand the wind energy conversion systems, efficiency and power generation. (K2)

UNIT-I: FUNDAMENTALS OF ELECTRICAL POWER SYSTEM:Energy scenario (world and India) – various Conventional and non-conventional energy sources–structure of electric power system: generation, transmission, distribution- classification of substations-switchgear devices: switches, fuses, relay, MCB.

UNIT-II: THERMAL POWER STATIONS:Schematic arrangement- Selection of site-general layout of a thermal power plant showing paths of coal, steam, water, air, ash handling system: generation, transmission, distribution and flue gasses, ash handling system- Brief description of components: Boilers, Super heaters, Economizers, electrostatic precipitators Condensers, feed water circuit, Cooling towers and Chimney.

UNIT-III: NUCLEAR POWER STATIONS:Location of nuclear power plant, Working principle, Nuclear fission, Nuclear fuels, Nuclear chain reaction, nuclear reactor Components: Moderators, Control rods, Reflectors and Coolants. Types of Nuclear reactors, Radiation: Radiation hazards and Shielding, nuclear waste disposal.

UNIT-IV: HYDRO POWER STATIONS:Schematic arrangement, advantages and disadvantages, choice of site constituents of hydro power plant, Hydro turbine. Environmental aspects for selecting the sites and locations of hydro power stations.

UNIT-V: SOLAR POWER PLANT:Solar photovoltaic cell, module, array – construction of power plant– Efficiency of solar cells – Cell I-V characteristics – Equivalent circuit of solar cell – Series resistance – Shunt resistance – Applications and systems - System design: storage sizing – PV system sizing.

UNIT-VI: WIND POWER PLANT:Sources of wind energy - Wind patterns – Types of turbines –Horizontal axis and vertical axis machines - construction of power plant –Efficiency– Poweroutputofwindturbine–Selectionofgenerator(synchronous,induction) –Power generation for utility grids.

TEXT BOOKS:

1. A Text Book on Power System Engineering by M. L. Soni, P. V. Gupta, U. S. Bhatnagar and A. Chakrabarti, Dhanpat Rai & Co. Pvt. Ltd.- 2nd edition, 2013.
2. Renewable Energy Resources, John Twidell and Tony Weir, Taylor and Francis-2nd edition, 2013.

REFERENCE BOOKS:

1. Elements of Electrical Power Station Design by – M V Deshpande, PHI, New Delhi- 3rd edition, 2010.
2. Renewable Energy – Edited by Godfrey Boyle – oxford university Press, 3rd edition, 2013.
3. Electrical Power Systems by C. L. Wadhwa, 6th Edition, New Age International Publishers, 2018.
4. Non-conventional energy source – B.H.khan-TMH-2nd edition, 2017.
5. [https://nptel.ac.in/content/storage2/courses/108105053/pdf/L02\(TB\)\(ET\)%20\(\(EE\)NPTEL\).pdf](https://nptel.ac.in/content/storage2/courses/108105053/pdf/L02(TB)(ET)%20((EE)NPTEL).pdf)

Semester	I	L	T	P	C	COURSE CODE
Regulation	V20	3	0	0	3	V20CHT01
Name of the Course	Engineering Chemistry					
Branch	Common to All Branches					

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

CO1: Solve boiler troubles originated due to poor water quality and suggest suitable water treatment methods. **(K3)**

CO2: Choose plastics and rubbers for engineering applications. **(K3)**

CO3: Associate concepts of Electro Chemistry in designing electrochemical energy systems. **(K2)**

CO4: Assess the quality of fuels. **(K3)**

CO5: Apply corrosion principles for protection of metallic structures. **(K3)**

UNIT-I: WATER TECHNOLOGY: Sources of water; Impurities in water, Hardness of water, Types of Hardness, Units of hardness, Determination of hardness of water, Numerical problems on temporary and permanent hardness. Boiler troubles: Priming and Foaming, Sludge and Scale formation, Boiler corrosion, Caustic embrittlement. Softening of hard water- Zeolite process and Ion exchange process; Water for drinking purpose, BSI standards of drinking water, Disinfection: Chlorination, Breakpoint chlorination. Desalination - Reverse Osmosis and Electro dialysis.

UNIT-II: POLYMER TECHNOLOGY : Introduction, Polymerization, Mechanism of Free radical addition polymerization; Plastics as engineering materials; Advantages and limitations, Thermoplastics and Thermosetting plastics, Fabrication of plastics (Compression, Injection, Transfer, and Extrusion Moulding) -Preparation, properties and applications of Polythene (HDPE and LDPE), PVC, Bakelite. Elastomers: Disadvantages of natural rubber, Vulcanization of rubber, Advantages of vulcanized rubber, Preparation, properties and applications of Buna -S and Buna-N.

UNIT-III: ELECTRO CHEMISTRY : Galvanic cell, Electrode potential and EMF-Reference electrodes (Calomel and Glass electrodes), Determination of pH of a solution using glass electrode, Conductometric titration (Strong Acid – Strong Base). Batteries: Types, Primary battery - Li-MnO₂ battery, Secondary batteries - Lead acid battery, Lithium ion battery. Fuel cells: Definition, H₂ - O₂ fuel cell

UNIT-IV: FUEL TECHNOLOGY: Fuels – Characteristics of a good fuel, Classification of fuels, Calorific value (HCV and LCV), Dulong's formula, Numerical problems on HCV and LCV.

Solid fuels: Coal – Proximate and ultimate analysis, Significance of the analyses.

Liquid fuels: Petroleum composition, Classification, Synthetic petrol (Fischer Tropsch and Bergius process), Knocking, Anti knocking agents, Octane and Cetane ratings.

Gaseous fuels – Natural gas, LPG and CNG Biofuels - Biogas, Biodiesel.

UNIT-V : Corrosion: Definition, Theories of Corrosion (Chemical & Electrochemical), Pilling-Bedworth Rule, Galvanic corrosion and Pitting corrosion, Factors which influence the rate of corrosion. Protection from corrosion - Design & Selection of metals, Cathodic protection, Protective coatings – Metallic coatings (Anodic and cathodic coatings), Methods of application of coatings on metals (Galvanizing & Tinning). Nano materials: Introduction, Carbon nanotubes - preparation (Arc discharge, Laserablation and CVD Method) - Properties and applications of carbon nanotubes.

Text Books:

1. Engineering Chemistry by Jain and Jain; Dhanpat Rai Publications & Co.
2. A Text book of Engineering Chemistry by S. S. Dara; S. Chand & Co Ltd.

Reference Books:

1. Engineering Chemistry by Vajiram and others. Wiley India Pvt. Ltd.,
2. Engineering Chemistry by Prasanth Rath, Cengage Learning.
3. Engineering Chemistry by Shikha Agarwal; Cambridge University Press.
4. Engineering Chemistry, by B. Sivasankar, McGraw-Hill.

**Department of Civil Engineering**

Year/Sem		L	T	P	C	COURSE CODE
Regulation Year	V18	2	-	-	0	V18ENT11
Name of the Course	CONSTITUTION OF INDIA					
Branch	CIVIL ENGINEERING					

Course Outcomes:

Upon successful completion of this course the student will be able to

- Summarize the evolution and historical importance of the Indian constitution from 1858 to 1947 (K2)
- Explain various stages in the composition of the Indian constitution (K2)
- Develop awareness about their primary rights and duties & build up their civil sense (K3)
- Explain the distribution of powers between the centre and states (K2)
- Summarize and sketch the specific roles of heads of nation and the functioning of legislative bodies (K2)
- Explain the role of local self-government in strengthening democracy (K1)

SYLLABUS**UNIT I**

Historical perspective of the Indian constitution: A brief discussion of various Acts i.e., from 1858 to 1947 passed by the British Government.

UNIT II**Constitution of India:**

- a) Preparation of Indian constitution by constituent Assembly of India
- b) Preamble or philosophy of the Indian constitution
- c) Salient features of the Indian constitution

UNIT III

- a) Fundamental Rights - their importance & Limitations
- b) fundamental duties and their importance
- c) Directive principles of the state policy and their implementation

UNIT IV

Indian Federalism:

- a) Distribution of powers between Union and State Governments
- b) Legislative, Executive and Financial relations between Union and State Governments

UNIT V

Parliamentary form of Government of India

1. Union Executive

- a) President of India - Powers and functions
- b) Vice Present - Powers and functions
- c) Prime Minister and council of Minister - Powers and functions

2. Union Legislature

- a) Rajya sabha - Powers and functions
- b) Lok Sabha - Powers and functions
- c) Amending Procedure - Important Constitutional Amendments - 42nd , 44 Constitutional Amendments Acts.
- d) Judiciary - Supreme Court of India - Powers and functions

UNIT VI

Local Self - Government in India 73rd & 74th Constitutional Amendments Acts.

REFERENCE BOOKS

1. D D Basu - Introduction to the Constitution of India - 18th Edition. Prentice - Hall of India Private Limited - New Delhi -1998
2. Granville Austin (1972) the Indian constitution, Cornerstone of a nation, Oxford university Press, New Delhi
3. Madhavkhosla (2012) the Indian constitution, Oxford university Press, New Delhi
4. Granville Austin (1999) working a Democratic Constitution; A History of the Indian Experience, Oxford university Press, New Delhi
5. Zoya Hasan, Sridharan E and Sudharshan R (Eds) 2002 India's living Constitution, Permanent black, New Delhi
6. Baxi Upendra (1980) the Indian Supreme Court and Politics, Eastern Book Co, Lucknow.

V18MET46	INTELLECTUAL PROPERTY RIGHTS AND PATENTS	L	T	P	C
		2	0	0	MNC

Course Outcomes:

	After successful completion of the course, the student will be able to	Knowledge Level
CO1	Understand the different types & basics of Intellectual Property Rights .	K2
CO2	Understand the principle and registration of copyrights.	K2
CO3	Understand the principle and registration of patents.	K2
CO4	Understand the principle and registration of trademark.	K2
CO5	Understand the principle and registration of trade secrets.	K2
CO6	Understand IT Act and Cyber Law.	K2

UNIT – I

Introduction to Intellectual Property Law, Intellectual Property Law Basics, Types of Intellectual Property, Innovations and Inventions of Trade related Intellectual Property Rights, Agencies Responsible for Intellectual Property Registration, Infringement, Over use or Misuse of Intellectual Property Rights.

UNIT – II

Introduction to Copyrights, Principles of Copyright, Rights Afforded by Copyright Law –Copyright Ownership, Transfer and Duration, Rights of Distribution, Rights of performers, Copyright Formalities and Registration, International Copyright Law.

UNIT – III

Introduction to Patent Law, Rights and Limitations, Patent Requirements, Ownership and Transfer , Patent Application Process and Granting of Patent, Patent Infringement and Litigation, International Patent Law Patent Cooperation Treaty.

UNIT – IV

Introduction to Trade Mark , Trade Mark Registration Process, Post registration procedures, Trade Mark maintenance, Transfer of rights, Dilution of Ownership of Trade Mark, Likelihood of confusion , Trade Marks Litigation , International Trade Mark Law.

UNIT – V

Introduction to Trade Secrets, Maintaining Trade Secret ,Employee Access Limitation, Employee Confidentiality Agreement , Trade Secret Law, Trade Secret Litigation, Breach of Contract .

UNIT – VI

Introduction to Cyber Law, Information Technology Act, Cyber Crime and E-commerce, Data Security, Confidentiality, Privacy, International aspects of Computer and Online Crime.

TEXT BOOKS:

1. Deborah E.Bouchoux: Intellectual Property. Cengage learning ,New Delhi.
2. PrabhuddhaGanguli: Intellectual Property Rights Tata Mc-GrawHill, New Delhi.
3. Cyber Law. Texts & Cases, South-Western's Special Topics Collections.

REFERENCE BOOKS:

1. Kompal Bansal & Parishit Bansal, Fundamentals of IPR for Engineers, BS Publications.
2. R. Radha Krishnan, S. Balasubramanian: Intellectual Property Rights, Excel Books. New Delhi.
3. M.Ashok Kumar and Mohd.Iqbal Ali: Intellectual Property Right, Serials Pub.

I-I	Research Methodology and IPR	Course Code: V21MBT55	L	T	P	C
			2	0	0	2

Course Outcomes: After completion of course, students would be able to

- CO1:** Discuss different methodologies and techniques used in research work. (K2)
CO2: Explain basic computer skills necessary for the conduct of research. (K2)
CO3: Assess the basic function and working of analytical instruments used in research. (K3)
CO4: Practice the required numerical skills necessary to carry out research. (K3)
CO5: Demonstrate a capacity to identify, apply and assess ownership rights and marketing protection under intellectual property law as applicable to information, ideas, new products and product marketing. (K3)

UNIT 1: Meaning of research problem, Sources of research problem, Criteria Characteristics of a good research problem, Errors in selecting a research problem, Scope and objectives of research problem. Approaches of investigation of solutions for research problem, data collection, analysis, interpretation, Necessary instrumentations

UNIT 2: Effective literature studies approaches, analysis Plagiarism, Research ethics, Effective technical writing, how to write report, Paper Developing a Research Proposal, Format of research proposal, a presentation and assessment by a review committee

UNIT 3: Nature of Intellectual Property: Patents, Designs, Trade and Copyright. Process of Patenting and Development: technological research, innovation, patenting, development. International Scenario: International cooperation on Intellectual Property. Procedure for grants of patents, Patenting under PCT.

UNIT 4: Patent Rights: Scope of Patent Rights. Licensing and transfer of technology. Patent information and databases. Geographical Indications.

UNIT 5: New Developments in IPR: Administration of Patent System. New developments in IPR; IPR of Biological Systems, Computer Software etc. Traditional knowledge Case Studies, IPR and IITs.

REFERENCES:

- (1) Stuart Melville and Wayne Goddard, "Research methodology: an introduction for science & engineering students"
- (2) Wayne Goddard and Stuart Melville, "Research Methodology: An Introduction"
- (3) Ranjit Kumar, 2nd Edition, "Research Methodology: A Step by Step Guide for beginners"
- (4) Halbert, "Resisting Intellectual Property", Taylor & Francis Ltd, 2007.
- (5) Mayall, "Industrial Design", McGraw Hill, 1992.
- (6) Niebel, "Product Design", McGraw Hill, 1974.
- (7) Asimov, "Introduction to Design", Prentice Hall, 1962.
- (8) Robert P. Merges, Peter S. Menell, Mark A. Lemley, "Intellectual Property in New Technological Age", 2016.
- (9) T. Ramappa, "Intellectual Property Rights Under WTO", S. Chand, 2008

Year/Sem		L	T	P	C	COURSE CODE
Regulation Year	V21 / 2021-2022	3	0	0	3	V21STEAC1
Name of the Course	DISASTER MANAGEMENT					
Branch	Common to all					

Course Outcomes:

Upon successful completion of this course the student will be able to

- Describe to student to have a idea on different natural hazards and disaster management (K2)
- Develop the student to understand manmade disaster and their management (K3)
- Prepare the student in such a way inorder to understand building codes and vulnerability of disaster (K3)
- Illustrate to student about role of technology in disaster management (K2)
- Assess the importance of education and community preparedness in disaster management to student (K3)

SYLLABUS

UNIT I

Natural Hazards and Disaster Management: Introduction of DM Disaster Management cycle – Five priorities for action- Case study methods of the following: floods, droughts – Earthquakes – global warming, cyclones & Tsunamis – Post Tsunami hazards along the Indian coast – landslides.

UNIT II

Man Made Disastar And Their Management Along With Case Study Methods Of The Following: Fire hazards – transport hazard dynamics – solid waste management – post disaster – bio terrotirism - rail and air craft's accidents-Management of these disasters

UNIT III

Risk And Vulnerability: – Building codes and land use planning – social vulnerability – environmental vulnerability -Financial management of disaster.

UNIT IV

Role Of Technology In Disaster Managements: Disaster management for infra structures, taxonomy of infra structure - mitigation programme for earth quakes –geospatial information in agriculture drought assessment-multimedia technology in disaster risk management and training- transformable indigenous knowledge in disaster reduction.

UNIT V

Education And Community Preparedness: Education in disaster risk reduction-Essentials of school disaster education-Community capacity and disaster resilience-Community based disaster recovery - Community based disaster management and social capital-Designing resilience- building.

Text Books:

1. Disaster Management – Global Challenges and Local Solutions’ by Rajib shah & R R Krishnamurthy(2009),Universities press.
2. Disaster Science & Management’ by Tushar Bhattacharya, Tata McGraw Hill Education Pvt. Ltd., New Delhi.
3. Disaster Management – Future Challenges and Opportunities’ by Jagbir Singh (2007), I K International Publishing House Pvt. Ltd.

Reference Books:

1. ‘Disaster Management’ edited by H K Gupta (2003), Universities press.
2. Natural Hazards and Disaster Management, Vulnerability and Mitigation by RB Singh
3. Disaster Management by Harish K.Gupta

V21PGENT55	VALUE EDUCATION	L	T	P	C
		0	2	0	0

		Knowledge Level
CO1	Enumerate the societal values and Individual attitudes that lead to value based judgments	K1
CO2	Explain the need for value education that incorporates self-discipline, confidence, honesty and patriotism	K2
CO3	Develop the inner and external personality that transforms individual into a man of character	K3
CO4	Distinguish between character and competence, self-management and good health, mind your mind and self-control	K4

Syllabus

Unit I : Values and self-development –Social values and individual attitudes.

Work ethics, Indian vision of humanism. Moral and non- moral valuation. Standards and principles. Value judgements

Unit II : Importance of cultivation of values. Sense of duty. Devotion, Self-reliance. Confidence, Concentration. Truthfulness, Cleanliness. Honesty, Humanity. Power of faith, National Unity. Patriotism.Love for nature ,Discipline

Unit III : Personality and Behavior Development - Soul and Scientific attitude.

Positive Thinking. Integrity and discipline. Punctuality, Love and Kindness.

Avoid fault Thinking. Free from anger, Dignity of labour. Universal brotherhood and religious tolerance.

True friendship. Happiness Vs suffering, love for truth.

Aware of self-destructive habits. Association and Cooperation. Doing best for saving nature

Unit IV : Character and Competence –Holy books vs Blind faith. Self-management and Good health.

Science of reincarnation. Equality, Nonviolence ,Humility, Role of Women. All religions and same message. Mind your Mind, Self-control. Honesty, Studying effectively

Suggested reading

1 Chakroborty, S.K. “Values and Ethics for organizations Theory and practice”, Oxford University Press, New Delhi

Programme : B. Tech - Electrical & Electronics Engineering **Semester: VI**
Course Code : V18EET20
Course Name : Renewable Energy Systems **[L : 3; T:0; P : 0 (3 credits)]**
Course Outcomes

After Successful completion of this course, students will be able to

CO No.	Course Outcome	Knowledge Level
C311.1	Understand the solar radiation and calculate geometric angle	(K3)
C311.2	Understand the working of solar thermal collectors	(K2)
C311.3	Understand the working of solar photo voltaic systems and develop the maximum power point techniques	(K3)
C311.4	Understand the wind energy conversion systems ,Betz coefficient and tip speed ratio	(K2)
C311.5	Understand the basic principle and working of hydro and tidal systems.	(K2)
C311.6	Understand the basic principle and working of, biomass, fuel cell and geothermal systems.	(K2)

UNIT-I: FUNDAMENTALS OF ENERGY SYSTEMS AND SOLAR ENERGY ENERGY CONSERVATION PRINCIPLE

Energy scenario (world and India) – various forms of renewable energy - Solar radiation: Outside earth’s atmosphere – Earth surface – Analysis of solar radiation data – Geometry – Radiation on tilted surfaces – Numerical problems.

UNIT-II: SOLAR THERMAL SYSTEMS

Liquid flat plate collectors: Performance analysis –Transmissivity– Absorptivity product collector efficiency factor – Collector heat removal factor – Numerical problems. Introduction to solar air heaters – Concentrating collectors, solar pond and solar still – solar thermal plants.

UNIT-III: SOLAR PHOTOVOLTAIC SYSTEMS

Solar photovoltaic cell, module, array – construction – Efficiency of solar cells – Developing technologies – Cell I-V characteristics – Equivalent circuit of solar cell – Series resistance – Shunt resistance – Applications and systems – Balance of system components - System design: storage sizing – PV system sizing – Maximum power point techniques: Perturb and observe (P&O) technique – Hill climbing technique.

UNIT-IV: WIND ENERGY

Sources of wind energy - Wind patterns – Types of turbines –Horizontal axis and vertical axis machines - Kinetic energy of wind – Betz coefficient – Tip–speed ratio – Efficiency – Power output of wind turbine – Selection of generator(synchronous, induction) – Maximum power point tracking – wind farms – Power generation for utility grids.

UNIT-V: HYDRO AND TIDAL POWER SYSTEMS

Basic working principle – Classification of hydro systems: Large, small, micro – measurement of head and flow – Energy equation – Types of turbines – Numerical problems. Tidal power – Basics – Kinetic energy equation – Turbines for tidal power - Numerical problems – Wave power – Basics – Kinetic energy equation – Wave power devices – Linear generators.

UNIT-VI: BIOMASS, FUEL CELLS AND GEOTHERMAL SYSTEMS BIOMASS ENERGY

Fuel classification – Pyrolysis – Direct combustion of heat – Different digesters and sizing. Fuel cell: Classification of fuel for fuel cells – Fuel cell voltage– Efficiency – V-I characteristics. Geothermal: Classification – Dry rock and hot aquifer – Energy analysis – Geothermal based electric power generation

TEXT BOOKS:

1. Solar Energy: Principles of Thermal Collection and Storage, S. P. Sukhatme and J. K. Nayak, TMH, New Delhi, 3rd Edition, 2013.
2. Renewable Energy Resources, John Twidell and Tony Weir, Taylor and Francis - second edition,2013.

REFERENCE BOOKS:

1. Energy Science: Principles, Technologies and Impacts, John Andrews and Nick Jelly, Oxford University Press, 2nd edition, 2013.
2. Renewable Energy- Edited by Godfrey Boyle-oxford university.press,3rd edition,2013.
3. Handbook of renewable technology Ahmed and Zobaa, Ramesh C Bansal, World scientific, Singapore, 2011.
4. Renewable Energy Technologies /Ramesh & Kumar /Narosa.
5. Renewable energy technologies – A practical guide for beginners – Chetong Singh Solanki, PHI, 2008.
6. Non conventional energy source –B.H.khan- TMH-2nd edition, 2017.

Programme : B. Tech - Electrical & Electronics Engineering **Semester: VI**
Course Code : V18EET24
Course Name : Electrical Energy Conservation, Management **[L : 3; T:0; P : 0 (3 credits)]**
 & Auditing

Course Outcomes

After Successful completion of this course, students will be able to

CO No.	Course Outcome	Knowledge Level
C312.1	Describe the concepts and procedures for Energy Audit & Management	(K2)
C312.2	Understand the necessity of Energy efficient lighting systems	(K2)
C312.3	Understand the operation of Energy instruments and their use in energy audit	(K2)
C312.4	Explain Energy Conservation measures in HVAC system	(K2)
C312.5	Understand various economic aspects of Energy systems	(K2)
C312.6	Apply life cycle costing analysis for various system or organizations	(K3)

UNIT-I: BASIC PRINCIPLES OF ENERGY AUDIT AND MANAGEMENT ENERGY AUDIT

Definitions – Concept – Types of audit – Energy index – Cost index – Pie charts –Sankey diagrams – Load profiles – Energy conservation schemes and energy saving potential – Numerical problems – Principles of energy management – Initiating, planning, controlling, promoting, monitoring, reporting – Energy manager – Qualities and functions – Language – Questionnaire – Check list for top management.

UNIT-II: LIGHTING MODIFICATION OF EXISTING SYSTEMS – REPLACEMENT OF EXISTING SYSTEMS – PRIORITIES:

Definition of terms and units – Luminous efficiency – Polar curve – Calculation of illumination level – Illumination of inclined surface to beam – Luminance or brightness – Types of lamps – Types of lighting – Electric lighting fittings (luminaries) – Flood lighting – White light LED and conducting Polymers – Energy conservation measures.

UNIT-III: POWER FACTOR AND ENERGY INSTRUMENTS

Power factor – Methods of improvement – Location of capacitors – Power factor with non linear loads – Effect of harmonics on Power factor – Numerical problems. Energy Instruments – Watt-hour meter – Data loggers – Thermocouples – Pyrometers – Lux meters – Tong testers – Power analyzer.

UNIT–IV: SPACE HEATING AND VENTILATION

Ventilation – Air–Conditioning (HVAC) and Water Heating: Introduction – Heating of buildings – Transfer of Heat– Space heating methods – Ventilation and air–conditioning – Insulation–Cooling load – Electric water heating systems – Energy conservation methods.

UNIT–V ECONOMIC ASPECTS AND FINANCIAL ANALYSIS

Understanding energy cost - Economics Analysis – Depreciation Methods – Time value of money – Rate of return – Present worth method – Replacement analysis – Life cycle costing analysis – Energy efficient motors (basic concepts) – Economics of energy efficient motors and systems.

UNIT–VI: COMPUTATION OF ECONOMIC ASPECTS

Need of investment, appraisal and criteria - Calculation of simple payback period–Return on investment – Net present value – Internal rate of return – numerical examples – Power factor correction – Lighting – Applications of life cycle costing analysis – Return on investment – Numerical examples.

TEXT BOOKS:

1. Hand Book of Energy Audit by Sonal Desai- Tata McGraw hill, 2015.
2. Energy efficient electric motors by John .C. Andreas, Marcel Dekker Inc Ltd–2nd edition, 1995.

REFERENCE BOOKS:

1. Energy management by W.R. Murphy & G. McKay Butter worth, Elsevier publications, 2012.
2. Electric Energy Utilization and Conservation by S C Tripathy, Tata McGraw hill publishing company Ltd. New Delhi, 1991.
3. Energy management by Paul o' Callaghan, Mc–Graw Hill Book company–1st edition, 1998.
4. Energy management hand book by W.C.Turner, John wiley and sons, 6th Edition, 2006.
5. Energy management and conservation –k v Sharma and pvenkataseshaiiah-I K International Publishing House pvt.ltd,2011.
6. http://www.energymanagertraining.com/download/Gazette_of_IndiaPartIISecl-37_25-08-2010.pdf

Semester	VIII SEM	L	T	P	C	Course Code
Regulation	V18	3	-	-	3	V18EET39
Name of the Course	Electrical and Hybrid Vehicles (Professional Elective - V)					
Branches	EEE					

Course Outcomes:

After successful completion of this course, the students will be able to

CO No.	Course Outcome	Knowledge Level
CO1	Differentiate between Electric vehicles and Hybrid Electric Vehicles	K2
CO2	Discriminate between various Drive-Train Topologies	K2
CO3	Identify different motors used for hybrid electric vehicles.	K2
CO4	Explain the Sizing of Drive Train	K2
CO5	Illustrate different batteries and other energy storage systems.	K3
CO6	Discuss Various issues of energy management strategies	K2

UNIT-I: INTRODUCTION TO ELECTRIC VEHICLES

Conventional Vehicles: Basics of vehicle performance, vehicle power source characterization, transmission characteristics-Social and environmental importance of hybrid and electric vehicles, impact of modern drive-trains on energy supplies.

UNIT-II: DRIVE TRAINS

Hybrid Electric Drive-trains: Basic concept of hybrid traction, introduction to various hybrid drive-train topologies, power flow control in hybrid drive-train.

Electric Drive-trains: Basic concept of electric traction, introduction to various electric drive-train topologies, power flow control in electric drive-train.

UNIT-III: ELECTRIC PROPULSION UNIT

Introduction to electric components used in hybrid and electric vehicles, control of DC Motor drives, Control of Permanent Magnet Motor drives, control of Switch Reluctance Motor drives, drive system efficiency.

UNIT-IV: ENERGY STORAGE

Introduction to Energy Storage Requirements in Hybrid and Electric Vehicles, Battery based energy storage, Fuel Cell based energy storage - Super Capacitor based energy storage - Flywheel based energy storage

UNIT-V: SIZING THE DRIVE SYSTEM

Matching the electric machine and the internal combustion engine (ICE), Sizing the propulsion motor, sizing the power electronics, selecting the energy storage technology, Communications, supporting subsystems

UNIT-VI: ENERGY MANAGEMENT STRATEGIES

Introduction to energy management strategies used in hybrid and electric vehicles, classification of different energy management strategies, implementation issues of energy management strategies.

TEXT BOOKS:

1. Ali Emadi, Advanced Electric Drive Vehicles, CRC Press, 2014.
2. Iqbal Hussein, Electric and Hybrid Vehicles: Design Fundamentals, CRC Press, 2003.

REFERENCE BOOKS:

1. Mehrdad Ehsani, Yimin Gao, Ali Emadi, "Modern Electric, Hybrid Electric, and Fuel Cell Vehicles:
2. Sandeep Dhameja, "Electric Vehicle Battery Systems", Newnes, 2000
<http://nptel.ac.in/courses/108103009/>

The Dynamic Optimization Problem, Fractional Open-Circuit Voltage and Short-Circuit Current, MPPT Control Methods, The Perturb and Observe Approach, Improvements of the P&O Algorithm, The Incremental Conductance Method, MPPT Efficiency, Limitation of standard MPPT. Charge controller for off grid PV system.

UNIT-VI: GRID CONVERTER CONTROL FOR RENEWABLE ENERGY INTERFACE

Model of the Converter-Mathematical Model of the L-Filter Inverter; AC Voltage and DC Voltage Control-Management of the DC Link Voltage, Cascaded Control of the DC Voltage through the AC Current, Tuning Procedure of the PI Controller, PI-Based Voltage Control; Voltage Oriented Control (VOC) and Direct Power Control (DPC): Synchronous Frame VOC: PQ Open-Loop Control, PQ Closed-Loop Control, Direct Power Control, Stand-alone.

REFERENCES BOOKS:

1. Grid Converters for Photovoltaic and Wind Power systems, IEEE, A John Wiley and Sons, Ltd, Publication
2. Power Electronics and Control Techniques for Maximum Energy Harvesting in Photovoltaic systems, CRC Press, Taylor and Francis Group.
3. Photovoltaic Power System: Modeling, Design, and Control by Weidong Xiao, Wiley Publication.
4. Modern MPPT Techniques for Photovoltaic Energy Systems by Ali M. Eltamaly, Almoataz Y. Abdelaziz, Springer International Publishing.

Introduction and BMS functionality, Battery pack topology, BMS Functionality, Voltage Sensing, Temperature Sensing, Current Sensing, BMS Functionality, High-voltage contactor control, Isolation sensing, Thermal control, Protection, Communication Interface, Range estimation, State-of charge estimation, Cell total energy and cell total power.

UNIT- VI: BATTERY STATE OF CHARGE AND STATE OF HEALTH ESTIMATION, CELL BALANCING

Battery state of charge estimation (SOC), voltage-based methods to estimate SOC, Model-based state estimation, Battery Health Estimation, Lithium-ion aging: Negative electrode, Lithium ion aging: Positive electrode, Cell Balancing, Causes of imbalance, Circuits for balancing

TEXT BOOKS:

1. "James M. Eyer, Joseph J. Iannucci and Garth P. Corey ", "Energy Storage Benefits and Market Analysis", Sandia National Laboratories, 2004.
2. The Electrical Energy Storage by IEC Market Strategy Board.

REFERENCE BOOK:

1. "Jim Eyer, Garth Corey", Energy Storage for the Electricity Grid: Benefits and Market Potential Assessment Guide, Report, Sandia National Laboratories, Feb 2010.
2. Plett, Gregory L. Battery management systems, Volume I: Battery modeling. Artech House, 2015.
3. Plett, Gregory L. Battery management systems, Volume II: Equivalent-circuit methods. Artech House, 2015.
4. Bergveld, H.J., Kruijt, W.S., Notten, P.H.L "Battery Management Systems -Design by Modelling" Philips Research Book Series 2002.

UNIT VI

Sustainable Development: Definition- elements of sustainable developments-Indicators of sustainable development- Sustainability Strategies- Barriers to Sustainability-Industrialization and sustainable development – Cleaner production in achieving sustainability- sustainable development.

Text Books:

1. Environmental Engineering, by Ruth F. Weiner and Robin Matthews – 4th Edition Elsevier, 2003.
2. Environmental Science and Engineering by J.G. Henry and G.W. Heinke – Pearson Education.
3. Environmental Engineering by Mackenzie L Davis & David A Cornwell. McGraw Hill Publishing.

References:

1. Air Pollution and Control by M.N. Rao & H.N. Rao
2. Solid Waste Management by K. Sasi Kumar, S.A. Gopi Krishna. PHI New Delhi.
3. Environmental Engineering by Gerard Kiley, Tata McGraw Hill.
4. Environmental Sanitation by KVSG Murali Krishna, Reem Publications, New Delhi.
5. Industrial Water Pollution Control by Nemerow Jr., McGraw Hill Publishing.
6. Unit Operations and Processes in Environmental Engineering by Reynolds. Richard – Cengage Learning.
7. Environmental Engineering by D. Srinivasan, PHI Learning Private Limited, New Delhi, 2011.
8. Environmental Engineering – Howard S. Peavy, Donald R. Rowe, Teorge George Tchobanoglous – Mc-Graw-Hill Book Company, New Delhi, 1985.

VIII Sem	Basics of Electrical Power Generation (Open Elective-III)	Course Code: V18EETOES	L	T	P	C
			3	0	0	3

Syllabus Details

Course Outcomes: After Successful completion of the Course, the student will be able to:

- CO1** Understand the various energy sources, substations and switchgear devices. (K2)
CO2 Understand the principle of operation of different components of thermal power stations. (K2)
CO3 Understand the principle of different components of a Nuclear power stations. (K2)
CO4 Understand the principle of operation of different components of hydro power stations. (K2)
CO5 Understand the working of solar photo voltaic systems and applications. (K3)
CO6 Understand the wind energy conversion systems, efficiency and power generation. (K2)

UNIT-I: FUNDAMENTALS OF ELECTRICAL POWER SYSTEM:Energy scenario (world and India) – various Conventional and non-conventional energy sources–structure of electric power system: generation, transmission, distribution- classification of substations-switchgear devices: switches, fuses, relay, MCB.

UNIT-II: THERMAL POWER STATIONS:Schematic arrangement- Selection of site-general layout of a thermal power plant showing paths of coal, steam, water, air, ash handling system: generation, transmission, distribution and flue gasses, ash handling system- Brief description of components: Boilers, Super heaters, Economizers, electrostatic precipitators Condensers, feed water circuit, Cooling towers and Chimney.

UNIT-III: NUCLEAR POWER STATIONS:Location of nuclear power plant, Working principle, Nuclear fission, Nuclear fuels, Nuclear chain reaction, nuclear reactor Components: Moderators, Control rods, Reflectors and Coolants. Types of Nuclear reactors, Radiation: Radiation hazards and Shielding, nuclear waste disposal.

UNIT-IV: HYDRO POWER STATIONS:Schematic arrangement, advantages and disadvantages, choice of site constituents of hydro power plant, Hydro turbine. Environmental aspects for selecting the sites and locations of hydro power stations.

UNIT-V: SOLAR POWER PLANT:Solar photovoltaic cell, module, array – construction of power plant– Efficiency of solar cells – Cell I-V characteristics – Equivalent circuit of solar cell – Series resistance – Shunt resistance – Applications and systems - System design: storage sizing – PV system sizing.

UNIT-VI: WIND POWER PLANT:Sources of wind energy - Wind patterns – Types of turbines –Horizontal axis and vertical axis machines - construction of power plant –Efficiency– Poweroutputofwindturbine–Selectionofgenerator(synchronous,induction) –Power generation for utility grids.

TEXT BOOKS:

1. A Text Book on Power System Engineering by M. L. Soni, P. V. Gupta, U. S. Bhatnagar and A. Chakrabarti, Dhanpat Rai & Co. Pvt. Ltd.- 2nd edition, 2013.
2. Renewable Energy Resources, John Twidell and Tony Weir, Taylor and Francis-2nd edition, 2013.

REFERENCE BOOKS:

1. Elements of Electrical Power Station Design by – M V Deshpande, PHI, New Delhi- 3rd edition, 2010.
2. Renewable Energy – Edited by Godfrey Boyle – oxford university Press, 3rd edition, 2013.
3. Electrical Power Systems by C. L. Wadhwa, 6th Edition, New Age International Publishers, 2018.
4. Non-conventional energy source – B.H.khan-TMH-2nd edition, 2017.
5. [https://nptel.ac.in/content/storage2/courses/108105053/pdf/L02\(TB\)\(ET\)%20\(\(EE\)NPTEL\).pdf](https://nptel.ac.in/content/storage2/courses/108105053/pdf/L02(TB)(ET)%20((EE)NPTEL).pdf)

**Department of Civil Engineering**

Year/Sem		L	T	P	C	COURSE CODE
Regulation Year	R16 / 2021-2022	2	0	0	0	R1641019
Name of the Course	INTELLECTUAL PROPERTY RIGHTS & PATENTS					
Branch	CIVIL ENGINEERING					

Course Outcomes:

Upon successful completion of this course the student will be able to

- Describe the need of Intellectual Property Rights (K2)
- Generalize different issues regarding Copy Rights (K2)
- Employ the procedure for Patent registration and granting (K3)
- Discuss the importance of Trademark and its related issues (K2)
- Recognize the significance of Trade Secrets in Industry (K2)

SYLLABUS**UNIT I**

Introduction to Intellectual Property Rights (IPR): Introduction to IPR, Evolutionary Past, Concept of IPR– Purpose of IPR, Types of IPR, WIPO -TRIPS, Nature of IPR, Patents, Trademarks, Copyrights, Neighboring Rights, Agencies responsible for IPR - Infringement, Use and Misuse of Intellectual Property Rights.

UNIT II

Copyrights: Introduction to Copyrights – Principles of Copyright Protection – Law Relating to Copyrights- Copyright Ownership – Transfer and Duration – Copyright Registration – Limitations – Infringement of Copyright – Relief and Remedy – Semiconductor Chip Protection Act.

UNIT III

Patents: Introduction to Patents - Laws Relating to Patents in India – Patent Requirements – Product Patent and Process Patent - Patent Registration and Granting of Patent - Exclusive Rights – Limitations - Ownership and Transfer — Revocation of Patent – Patent Appellate Board - Infringement of Patent – Compulsory Licensing – Software Protection and Computer related Innovations.

UNIT IV

Trademarks: Introduction to Trademarks – Laws Relating to Trademarks – Functions of Trademark — Trade Mark Registration – Trade Mark Maintenance – Transfer of rights – Deceptive Similarities - Likelihood of Confusion - Dilution of Ownership – Trademarks Claims and Infringement – Remedies – Passing Off Action.

UNIT V

Trade Secrets: Introduction to Trade Secrets – General Principles - Laws Relating to Trade Secrets -Maintaining Trade Secret – Physical Security – Employee Access Limitation – Employee Confidentiality Agreements – Breach of Contract –Law of Unfair Competition – Trade Secret Litigation – Applying State Law, Cyber Law and Cyber Crime

TextBooks:

1. Intellectual Property Rights (Patents & Cyber Law), Dr. A. Srinivas. Oxford University Press, New Delhi.
2. PrabhuddhaGanguli: Intellectual Property Rights, Tata Mc-Graw –Hill, New Delhi
3. R.Radha Krishnan, S.Balasubramanian: Intellectual Property Rights, Excel Books. New Delhi.

References:

1. Deborah E.Bouchoux: Intellectual Property, Cengage Learning, New Delhi.
2. Richard Stim: Intellectual Property, Cengage Learning, New Delhi.
3. KompalBansal&ParishitBansal Fundamentals of IPR for Engineers, B. S. Publications (Press).
4. Cyber Law - Texts & Cases, South-Western's Special Topics Collections.
5. M.Ashok Kumar and MohdIqbal Ali: Intellectual Property Rights, Serials Pub.

Year/Sem		L	T	P	C	COURSE CODE
Regulation Year	V18	2	-	-	0	V18ENT11
Name of the Course	CONSTITUTION OF INDIA					
Branch	CIVIL ENGINEERING					

Course Outcomes:

Upon successful completion of this course the student will be able to

- Summarize the evolution and historical importance of the Indian constitution from 1858 to 1947 (K2)
- Explain various stages in the composition of the Indian constitution (K2)
- Develop awareness about their primary rights and duties & build up their civil sense (K3)
- Explain the distribution of powers between the centre and states (K2)
- Summarize and sketch the specific roles of heads of nation and the functioning of legislative bodies (K2)
- Explain the role of local self-government in strengthening democracy (K1)

SYLLABUS

UNIT I

Historical perspective of the Indian constitution: A brief discussion of various Acts i.e., from 1858 to 1947 passed by the British Government.

UNIT II

Constitution of India:

- a) Preparation of Indian constitution by constituent Assembly of India
- b) Preamble or philosophy of the Indian constitution
- c) Salient features of the Indian constitution

UNIT III

- a) Fundamental Rights - their importance & Limitations
- b) fundamental duties and their importance
- c) Directive principles of the state policy and their implementation

UNIT IV

Indian Federalism:

- a) Distribution of powers between Union and State Governments
- b) Legislative, Executive and Financial relations between Union and State Governments

UNIT V

Parliamentary form of Government of India

1. Union Executive

- a) President of India - Powers and functions
- b) Vice Present - Powers and functions
- c) Prime Minister and council of Minister - Powers and functions

2. Union Legislature

- a) Rajya sabha - Powers and functions
- b) Lok Sabha - Powers and functions
- c) Amending Procedure - Important Constitutional Amendments - 42nd , 44
Constitutional Amendments Acts.
- d) Judiciary - Supreme Court of India - Powers and functions

UNIT VI

Local Self - Government in India 73rd & 74th Constitutional Amendments Acts.

REFERENCE BOOKS

1. D D Basu - Introduction to the Constitution of India - 18th Edition. Prentice - Hall of India Private Limited - New Delhi -1998
2. Granville Austin (1972) the Indian constitution, Cornerstone of a nation, Oxford university Press, New Delhi
3. Madhavkhosla (2012) the Indian constitution, Oxford university Press, New Delhi
4. Granville Austin (1999) working a Democratic Constitution; A History of the Indian Experience, Oxford university Press, New Delhi
5. Zoya Hasan, Sridharan E and Sudharshan R (Eds) 2002 India's living Constitution, Permanent black, New Delhi
6. Baxi Upendra (1980) the Indian Supreme Court and Politics, Eastern Book Co, Lucknow.

V18MET46	INTELLECTUAL PROPERTY RIGHTS AND PATENTS	L	T	P	C
		2	0	0	MNC

Course Outcomes:

	After successful completion of the course, the student will be able to	Knowledge Level
CO1	Understand the different types & basics of Intellectual Property Rights .	K2
CO2	Understand the principle and registration of copyrights.	K2
CO3	Understand the principle and registration of patents.	K2
CO4	Understand the principle and registration of trademark.	K2
CO5	Understand the principle and registration of trade secrets.	K2
CO6	Understand IT Act and Cyber Law.	K2

UNIT – I

Introduction to Intellectual Property Law, Intellectual Property Law Basics, Types of Intellectual Property, Innovations and Inventions of Trade related Intellectual Property Rights, Agencies Responsible for Intellectual Property Registration, Infringement, Over use or Misuse of Intellectual Property Rights.

UNIT – II

Introduction to Copyrights, Principles of Copyright, Rights Afforded by Copyright Law –Copyright Ownership, Transfer and Duration, Rights of Distribution, Rights of performers, Copyright Formalities and Registration, International Copyright Law.

UNIT – III

Introduction to Patent Law, Rights and Limitations, Patent Requirements, Ownership and Transfer , Patent Application Process and Granting of Patent, Patent Infringement and Litigation, International Patent Law Patent Cooperation Treaty.

UNIT – IV

Introduction to Trade Mark , Trade Mark Registration Process, Post registration procedures, Trade Mark maintenance, Transfer of rights, Dilution of Ownership of Trade Mark, Likelihood of confusion , Trade Marks Litigation , International Trade Mark Law.

UNIT – V

Introduction to Trade Secrets, Maintaining Trade Secret ,Employee Access Limitation, Employee Confidentiality Agreement , Trade Secret Law, Trade Secret Litigation, Breach of Contract .

UNIT – VI

Introduction to Cyber Law, Information Technology Act, Cyber Crime and E-commerce, Data Security, Confidentiality, Privacy, International aspects of Computer and Online Crime.

TEXT BOOKS:

1. Deborah E.Bouchoux: Intellectual Property. Cengage learning ,New Delhi.
2. PrabhuddhaGanguli: Intellectual Property Rights Tata Mc-GrawHill, New Delhi.
3. Cyber Law. Texts & Cases, South-Western’s Special Topics Collections.

REFERENCE BOOKS:

1. Kompal Bansal & Parishit Bansal, Fundamentals of IPR for Engineers, BS Publications.
2. R. Radha Krishnan, S. Balasubramanian: Intellectual Property Rights, Excel Books. New Delhi.
3. M.Ashok Kumar and Mohd.Iqbal Ali: Intellectual Property Right, Serials Pub.

Programme : B. Tech - Electrical & Electronics Engineering **Semester: VI**
Course Code : V18EET24
Course Name : Electrical Energy Conservation, Management **[L : 3; T:0; P : 0 (3 credits)]**
 & Auditing

Course Outcomes

After Successful completion of this course, students will be able to

CO No.	Course Outcome	Knowledge Level
C312.1	Describe the concepts and procedures for Energy Audit & Management	(K2)
C312.2	Understand the necessity of Energy efficient lighting systems	(K2)
C312.3	Understand the operation of Energy instruments and their use in energy audit	(K2)
C312.4	Explain Energy Conservation measures in HVAC system	(K2)
C312.5	Understand various economic aspects of Energy systems	(K2)
C312.6	Apply life cycle costing analysis for various system or organizations	(K3)

UNIT-I: BASIC PRINCIPLES OF ENERGY AUDIT AND MANAGEMENT ENERGY AUDIT

Definitions – Concept – Types of audit – Energy index – Cost index – Pie charts –Sankey diagrams – Load profiles – Energy conservation schemes and energy saving potential – Numerical problems – Principles of energy management – Initiating, planning, controlling, promoting, monitoring, reporting – Energy manager – Qualities and functions – Language – Questionnaire – Check list for top management.

UNIT-II: LIGHTING MODIFICATION OF EXISTING SYSTEMS – REPLACEMENT OF EXISTING SYSTEMS – PRIORITIES:

Definition of terms and units – Luminous efficiency – Polar curve – Calculation of illumination level – Illumination of inclined surface to beam – Luminance or brightness – Types of lamps – Types of lighting – Electric lighting fittings (luminaries) – Flood lighting – White light LED and conducting Polymers – Energy conservation measures.

UNIT-III: POWER FACTOR AND ENERGY INSTRUMENTS

Power factor – Methods of improvement – Location of capacitors – Power factor with non linear loads – Effect of harmonics on Power factor – Numerical problems. Energy Instruments – Watt-hour meter – Data loggers – Thermocouples – Pyrometers – Lux meters – Tong testers – Power analyzer.

UNIT–IV: SPACE HEATING AND VENTILATION

Ventilation – Air–Conditioning (HVAC) and Water Heating: Introduction – Heating of buildings – Transfer of Heat– Space heating methods – Ventilation and air–conditioning – Insulation–Cooling load – Electric water heating systems – Energy conservation methods.

UNIT–V ECONOMIC ASPECTS AND FINANCIAL ANALYSIS

Understanding energy cost - Economics Analysis – Depreciation Methods – Time value of money – Rate of return – Present worth method – Replacement analysis – Life cycle costing analysis – Energy efficient motors (basic concepts) – Economics of energy efficient motors and systems.

UNIT–VI: COMPUTATION OF ECONOMIC ASPECTS

Need of investment, appraisal and criteria - Calculation of simple payback period–Return on investment – Net present value – Internal rate of return – numerical examples – Power factor correction – Lighting – Applications of life cycle costing analysis – Return on investment – Numerical examples.

TEXT BOOKS:

1. Hand Book of Energy Audit by Sonal Desai- Tata McGraw hill, 2015.
2. Energy efficient electric motors by John .C. Andreas, Marcel Dekker Inc Ltd–2nd edition, 1995.

REFERENCE BOOKS:

1. Energy management by W.R. Murphy & G. McKay Butter worth, Elsevier publications, 2012.
2. Electric Energy Utilization and Conservation by S C Tripathy, Tata McGraw hill publishing company Ltd. New Delhi, 1991.
3. Energy management by Paul o' Callaghan, Mc–Graw Hill Book company–1st edition, 1998.
4. Energy management hand book by W.C.Turner, John wiley and sons, 6th Edition, 2006.
5. Energy management and conservation –k v Sharma and pvenkataseshaiiah-I K International Publishing House pvt.ltd,2011.
6. http://www.energymanagertraining.com/download/Gazette_of_IndiaPartIISecl-37_25-08-2010.pdf

Programme : B. Tech - Electrical & Electronics Engineering **Semester: VI**
Course Code : V18EET20
Course Name : Renewable Energy Systems **[L : 3; T:0; P : 0 (3 credits)]**
Course Outcomes

After Successful completion of this course, students will be able to

CO No.	Course Outcome	Knowledge Level
C311.1	Understand the solar radiation and calculate geometric angle	(K3)
C311.2	Understand the working of solar thermal collectors	(K2)
C311.3	Understand the working of solar photo voltaic systems and develop the maximum power point techniques	(K3)
C311.4	Understand the wind energy conversion systems ,Betz coefficient and tip speed ratio	(K2)
C311.5	Understand the basic principle and working of hydro and tidal systems.	(K2)
C311.6	Understand the basic principle and working of, biomass, fuel cell and geothermal systems.	(K2)

UNIT-I: FUNDAMENTALS OF ENERGY SYSTEMS AND SOLAR ENERGY ENERGY CONSERVATION PRINCIPLE

Energy scenario (world and India) – various forms of renewable energy - Solar radiation: Outside earth’s atmosphere – Earth surface – Analysis of solar radiation data – Geometry – Radiation on tilted surfaces – Numerical problems.

UNIT-II: SOLAR THERMAL SYSTEMS

Liquid flat plate collectors: Performance analysis –Transmissivity– Absorptivity product collector efficiency factor – Collector heat removal factor – Numerical problems. Introduction to solar air heaters – Concentrating collectors, solar pond and solar still – solar thermal plants.

UNIT-III: SOLAR PHOTOVOLTAIC SYSTEMS

Solar photovoltaic cell, module, array – construction – Efficiency of solar cells – Developing technologies – Cell I-V characteristics – Equivalent circuit of solar cell – Series resistance – Shunt resistance – Applications and systems – Balance of system components - System design: storage sizing – PV system sizing – Maximum power point techniques: Perturb and observe (P&O) technique – Hill climbing technique.

UNIT-IV: WIND ENERGY

Sources of wind energy - Wind patterns – Types of turbines –Horizontal axis and vertical axis machines - Kinetic energy of wind – Betz coefficient – Tip–speed ratio – Efficiency – Power output of wind turbine – Selection of generator(synchronous, induction) – Maximum power point tracking – wind farms – Power generation for utility grids.

UNIT-V: HYDRO AND TIDAL POWER SYSTEMS

Basic working principle – Classification of hydro systems: Large, small, micro – measurement of head and flow – Energy equation – Types of turbines – Numerical problems. Tidal power – Basics – Kinetic energy equation – Turbines for tidal power - Numerical problems – Wave power – Basics – Kinetic energy equation – Wave power devices – Linear generators.

UNIT-VI: BIOMASS, FUEL CELLS AND GEOTHERMAL SYSTEMS BIOMASS ENERGY

Fuel classification – Pyrolysis – Direct combustion of heat – Different digesters and sizing. Fuel cell: Classification of fuel for fuel cells – Fuel cell voltage– Efficiency – V-I characteristics. Geothermal: Classification – Dry rock and hot aquifer – Energy analysis – Geothermal based electric power generation

TEXT BOOKS:

1. Solar Energy: Principles of Thermal Collection and Storage, S. P. Sukhatme and J. K. Nayak, TMH, New Delhi, 3rd Edition, 2013.
2. Renewable Energy Resources, John Twidell and Tony Weir, Taylor and Francis - second edition,2013.

REFERENCE BOOKS:

1. Energy Science: Principles, Technologies and Impacts, John Andrews and Nick Jelly, Oxford University Press, 2nd edition, 2013.
2. Renewable Energy- Edited by Godfrey Boyle-oxford university.press,3rd edition,2013.
3. Handbook of renewable technology Ahmed and Zobaa, Ramesh C Bansal, World scientific, Singapore, 2011.
4. Renewable Energy Technologies /Ramesh & Kumar /Narosa.
5. Renewable energy technologies – A practical guide for beginners – Chetong Singh Solanki, PHI, 2008.
6. Non conventional energy source –B.H.khan- TMH-2nd edition, 2017.

S.No	Course Code	Course Name	L	T	P	C
1	V18ENT12	Professional Ethics & Human Values	4	-	-	MNC

COURSE OUTCOMES:

After successful completion of the course, the student will be able to:

CO No.	Course Outcome	Knowledge Level
C212.1	Understand and assimilate human values to grow as responsible human beings with proper personality.	K2
C212.2	Understand different ethical theories	K2
C212.3	Interpret engineering as social experiment	K2
C212.4	Explain Engineers' responsibilities towards Safety and Risk	K2
C212.5	Understand ethical conduct and discharge their professional duties	K2
C212.6	Understand ethics in view of globalization	K2

Module 1: Human Values

Morals, Values and Ethics, Integrity, Trustworthiness, Work Ethics, Service Learning, Civic Virtue, Respect for others, Living Peacefully, Caring, Sharing, Honesty, Courage, Value Time, Co-operation, Commitment, Empathy, Self-confidence, Spirituality, Character, Discrimination.

Module 2: Engineering Ethics

Need of Engineering Ethics, Senses of Engineering Ethics, Variety of moral issues, Types of Inquiry, Moral dilemma, Moral Autonomy, Moral development (theories), Kohlberg's Theory, Gilligan's Theory, Profession and Professionalism, Self Interest, Theories about right action (Ethical theories), Uses of Ethical Theories, Utilitarian theory, Learning from the Past, Self-interest, Customs, Religion, Self-respect.

Module 3: Engineering as Social Experiment

Experimental Nature of Engineering, Comparison with Standard Experiments, Engineer as responsible experimenters, Codes of ethics industrial standards.

Module 4: Engineers' Responsibilities towards Safety and Risk

Definitions of Safety and Risk, Types of Risks, Risk analysis, Scenario Analysis, Failure mode and effect analysis, Fault-tree Analysis, Assessment of Risk, Assessment of safety, Safe Exit, Risk-Benefit Analysis.

Module 5: Engineers' Duties and Rights

Confidentiality, Types of Confidential Information, Conflict of Interests, Occupational Crimes, Industrial Espionage, Price Fixing, Whistle Blowing, Collegiality, Loyalty, Collective Bargaining, Concept of Duty, Professional Duties, Human Rights, Employee Rights.

Module 6: Global Issues

Globalization, MNCs, Environmental Ethics, Computer Ethics, Weapon development, Business Ethics, Media Ethics, Research Ethics, Intellectual Property Rights.

Text Books

1. Professional Ethics by R. Subramaniam – Oxford Publications, New Delhi
2. Professional Ethics and Human Values by Prof. R.Naagarazan

Reference Books

1. Professional Ethics and Human Values by Prof.D.R.Kiran-Tata McGraw-Hill - 2013
2. Engineering Ethics & Human Values by M.Govindarajan, S.Natarajan and V.S.SenthilKumar-PHI Learning Pvt. Ltd – 2009.



SRI VASAVI ENGINEERING COLLEGE (AUTONOMOUS)

(Sponsored by Sri Vasavi Educational Society)
Approved by AICTE, New Delhi and Permanently Affiliated to JNTUK, Kakinada
Pedatadepalli, **TADEPALLIGUDEM – 534 101**, W.G. Dist, (A.P.)

Department of Electrical and Electronics Engineering

Programme : B. Tech - Electrical & Electronics Engineering **Semester: IV**
Course Code : V18EET56
Course Name : Electrical Safety & IE Rules **[L : 2; T:0; P : 0 (MNC)]**

Course Outcomes

After successful completion of this course, students will be able to

CO No.	Course Outcome	Knowledge Level
C218.1	Understand the types of electrical hazards and its impact on human body	K2
C218.2	Identify various electrical safety equipment required in power industries.	K2
C218.3	Explain different types of safety methods needed for safe operation of power system	K2
C218.4	Demonstrate the electrical accident rescue techniques and required first aid	K3
C218.5	Understand the departmental procedure for obtaining service connection	K2
C218.6	Describe various IE rules in Indian Electricity Act	K2

Unit-I: Hazards of Electricity

Introduction, Hazard Analysis, Shock, Arc, Blast, Affected Body Parts, Summary Of Causes—Injury And Death, Protective Strategies.

Unit-II: Electrical Safety Equipment

Introduction, General Inspection and Testing Requirements for Electrical Safety Equipment, Flash And Thermal Protection, Head and Eye Protection, Rubber Insulating Equipment, Hot Sticks, Insulated Tools, Barriers And Signs Safety Tags, Locks, and Locking Devices , The Electrician's Safety Kit

Unit-III: Safety Procedures and Methods

Introduction, The Six-Step Safety Method, Job Briefings, Energized Or De-Energized?, Safe Switching Of Power Systems, Energy Control Programs, Lockout-Tagout, Placement Of Safety Grounds, Barriers And Warning Signs, Tools And Test Equipment, The One-Minute Safety Audit.

Unit-IV: Accident Prevention, Rescue, and First Aid

Department Vision:

- To evolve as a centre of excellence in Electrical and Electronics Engineering that produces graduates of high quality with ethical values.

Department Mission:

- To impart technical knowledge through learner-centric education supplemented with practical exposure.
- To provide opportunities that promote personality development through co-curricular and extra-curricular activities.
- To inculcate human values & team spirit that enables the Electrical and Electronics Engineers to face the future challenges.



SRI VASAVI ENGINEERING COLLEGE (AUTONOMOUS)

(Sponsored by Sri Vasavi Educational Society)
Approved by AICTE, New Delhi and Permanently Affiliated to JNTUK, Kakinada
Pedatadepalli, **TADEPALLIGUDEM – 534 101**, W.G. Dist, (A.P.)

Department of Electrical and Electronics Engineering

Accident Prevention, Individual Responsibility, Installation Safety, First Aid , Resuscitation (Artificial Respiration), Heart-Lung Resuscitation, Rescue Techniques, General Rescue Procedures, Accident Investigation

Unit-V: Departmental Procedures and Tests

Departmental procedure for obtaining service connection, Insulation resistance and Earth resistance, testing of electrical installation, Insulation resistance between conductor and earth, load survey.

Unit-VI: REC and Indian Electricity Act

Introduction, Rural Electrification, Indian Electricity Rules, National Electrical Code.

Textbooks:

1. Electrical Safety hand book by John Cadick, Mary Capelli-Schellpfeffer, Dennis K. Neitzel, 3rd edition, McGraw-Hill Publications.

References:

1. Indian Electricity Act 2003
2. The Indian Electricity Rules, 1956
3. A Study Guide on Electrical Safety Hazards Awareness by EFCOG Electrical Safety Improvement Project.

Department Vision:

- To evolve as a centre of excellence in Electrical and Electronics Engineering that produces graduates of high quality with ethical values.

Department Mission:

- To impart technical knowledge through learner-centric education supplemented with practical exposure.
- To provide opportunities that promote personality development through co-curricular and extra-curricular activities.
- To inculcate human values & team spirit that enables the Electrical and Electronics Engineers to face the future challenges.

**Department of Civil Engineering**

Year/Sem		L	T	P	C	COURSE CODE
Regulation Year	R16	2	0	0	0	R1641019
Name of the Course	INTELLECTUAL PROPERTY RIGHTS & PATENTS					
Branch	CIVIL ENGINEERING					

Course Outcomes:

Upon successful completion of this course the student will be able to

- Describe the need of Intellectual Property Rights (K2)
- Generalize different issues regarding Copy Rights (K2)
- Employ the procedure for Patent registration and granting (K3)
- Discuss the importance of Trademark and its related issues (K2)
- Recognize the significance of Trade Secrets in Industry (K2)

SYLLABUS**UNIT I**

Introduction to Intellectual Property Rights (IPR): Introduction to IPR, Evolutionary Past, Concept of IPR– Purpose of IPR, Types of IPR, WIPO -TRIPS, Nature of IPR, Patents, Trademarks, Copyrights, Neighboring Rights, Agencies responsible for IPR - Infringement, Use and Misuse of Intellectual Property Rights.

UNIT II

Copyrights: Introduction to Copyrights – Principles of Copyright Protection – Law Relating to Copyrights- Copyright Ownership – Transfer and Duration – Copyright Registration – Limitations – Infringement of Copyright – Relief and Remedy – Semiconductor Chip Protection Act.

UNIT III

Patents: Introduction to Patents - Laws Relating to Patents in India – Patent Requirements – Product Patent and Process Patent - Patent Registration and Granting of Patent - Exclusive Rights – Limitations - Ownership and Transfer — Revocation of Patent – Patent Appellate Board - Infringement of Patent – Compulsory Licensing – Software Protection and Computer related Innovations.

UNIT IV

Trademarks: Introduction to Trademarks – Laws Relating to Trademarks – Functions of Trademark — Trade Mark Registration – Trade Mark Maintenance – Transfer of rights – Deceptive Similarities - Likelihood of Confusion - Dilution of Ownership – Trademarks Claims and Infringement – Remedies – Passing Off Action.

UNIT V

Trade Secrets: Introduction to Trade Secrets – General Principles - Laws Relating to Trade Secrets -Maintaining Trade Secret – Physical Security – Employee Access Limitation – Employee Confidentiality Agreements – Breach of Contract –Law of Unfair Competition – Trade Secret Litigation – Applying State Law, Cyber Law and Cyber Crime

TextBooks:

1. Intellectual Property Rights (Patents & Cyber Law), Dr. A. Srinivas. Oxford University Press, New Delhi.
2. PrabhuddhaGanguli: Intellectual Property Rights, Tata Mc-Graw –Hill, New Delhi
3. R.Radha Krishnan, S.Balasubramanian: Intellectual Property Rights, Excel Books. New Delhi.

References:

1. Deborah E.Bouchoux: Intellectual Property, Cengage Learning, New Delhi.
2. Richard Stim: Intellectual Property, Cengage Learning, New Delhi.
3. KompalBansal&ParishitBansal Fundamentals of IPR for Engineers, B. S. Publications (Press).
4. Cyber Law - Texts & Cases, South-Western's Special Topics Collections.
5. M.Ashok Kumar and MohdIqbal Ali: Intellectual Property Rights, Serials Pub.

I M.TECH-II SEMESTER

Course Code : V18PST15

SOLAR & WIND ENERGY

[L: 3; T: 0; P: 0 (3 credits)]

UNIT-I

SOLAR RESOURCES : Solar Energy - Availability - Solar radiation data and measurement - Estimation of average solar radiation - Solar water heater types – Heat balance – Flat plate collector efficiency – Efficiency of heat removal - Thermo siphon flow calculation - Forced circulation calculation - Evacuated collectors - Basics of solar concentrators- Solar Energy Applications - Solar air heaters – Solar Chimney - Crop driers – Passive solar system - Active solar systems - Water desalination – Principle of solar ponds.

UNIT-II

SOLAR PHOTOVOLTAICS: The Photo Voltaic effect- p-n junction-different types of photovoltaic cells- PV cell characteristics- Effect of variation of temperature, insolation level & tilt angle on the characteristics- equivalent circuits- temperature effects on conversion efficiency- Fabrication and costs of PV cell.

PV SYSTEMS : Photovoltaic modules- module specifications- bypass diodes-PV arrays and PV systems- cabling, earthing and lightning protection- Battery storage: Lead and Nickel cadmium batteries- Charge regulators-LVD circuit-Voltage and current Source Inverters. Tracking Systems-Maximum power point tracking.

UNIT-III

WIND ENERGY-I: Nature of wind – Characteristics – Variation with height and time – Power in wind – Aerodynamics of Wind turbine – Momentum theory – Basics of aerodynamics – Aero foils and their characteristics– Wind turbine loads – Aerodynamic loads in steady operation – Yawed operation and tower shadow.

UNIT-IV

WIND ENERGY-II: Siting – Rotor selection –Annual energy output – Horizontal axis wind turbine (HAWT) – Vertical axis wind turbine (VAWT) – Rotor design considerations – Number of blades – Solidity - Blade profile – Upwind/Downwind – Yaw system – Tower – Braking system - Synchronous and asynchronous generators and loads – Integration of wind energy converters to electrical networks – Inverters – Control system – Requirement and strategies

UNIT-V

PV&WIND SYSTEM APPLICATIONS: Autonomous system; Grid Linked systems; Remote applications, System sizing; System Performance; Economics and future prospects.

Text Books

1. John Twidell and Tony Weir, "Renewable Energy Resources", E &F.N.Spon
2. G.N.Tiwari and M.K.Ghosal, "Renewable Energy Resources Basic Principles and Applications", Narosa

References Books

1. S.P.Sukhatme, "Solar Energy - Principles of thermal collection and storage", TMH
2. Duffie& Beckman, "Solar Energy Thermal Processes", Wiley
3. Tony Burton, David Sharpe, Nick Jenkins and Ervin Bossanyi / WileyWind Electrical Systems / S.N.Bhadra, D.Kastha and S.Banerjee, "Wind Energy Handbook", Oxford

Text Books

1. Professional Ethics by R. Subramaniam – Oxford Publications, New Delhi
2. Professional Ethics and Human Values by Prof. R.Naagarazan

Reference Books

1. Professional Ethics and Human Values by Prof.D.R.Kiran-Tata McGraw-Hill - 2013
2. Engineering Ethics & Human Values by M.Govindarajan, S.Natarajan and V.S.SenthilKumar-PHI Learning Pvt. Ltd – 2009.

III Year – I Semester

L	T	P	C
0	3	0	0

PROFESSIONAL ETHICS AND HUMAN VALUES

Course Objectives:

***To give basic insights and inputs to the student to inculcate Human values to grow as a responsible human beings with proper personality.**

***Professional Ethics instills the student to maintain ethical conduct and discharge their professional duties.**

UNIT I: Human Values:

Morals, Values and Ethics – Integrity –Trustworthiness - Work Ethics – Service Learning – Civic Virtue – Respect for others – Living Peacefully – Caring – Sharing – Honesty –Courage – Value Time – Co-operation – Commitment – Empathy – Self-confidence – Spirituality-Character.

UNIT: II: Principles for Harmony:

Truthfulness – Customs and Traditions -Value Education – Human Dignity – Human Rights – Fundamental Duties - Aspirations and Harmony (I, We & Nature) – Gender Bias - Emotional Intelligence – Salovey – Mayer Model – Emotional Competencies – Conscientiousness.

UNIT III: Engineering Ethics and Social Experimentation:

History of Ethics - Need of Engineering Ethics - Senses of Engineering Ethics- Profession and Professionalism —Self Interest - Moral Autonomy – Utilitarianism – Virtue Theory - Uses of Ethical Theories - Deontology- Types of Inquiry –Kohlberg’s Theory - Gilligan’s Argument – Heinz’s Dilemma - Comparison with Standard Experiments — Learning from the Past – Engineers as Managers – Consultants and Leaders – Balanced Outlook on Law - Role of Codes – Codes and Experimental Nature of Engineering.

UNIT IV: Engineers’ Responsibilities towards Safety and Risk:

Concept of Safety - Safety and Risk – Types of Risks – Voluntary v/sInvoluntary Risk – Consequences - Risk Assessment – Accountability – Liability - Reversible Effects - Threshold Levels of Risk - Delayed v/sImmediate Risk - Safety and the Engineer – Designing for Safety – Risk-Benefit Analysis-Accidents.

UNIT V: Engineers' Duties and Rights:

Concept of Duty - Professional Duties – Collegiality - Techniques for Achieving Collegiality – Senses of Loyalty - Consensus and Controversy - Professional and Individual Rights – Confidential and Proprietary Information - Conflict of Interest-Ethical egoism - Collective Bargaining – Confidentiality - Gifts and Bribes - Problem solving-Occupational Crimes-Industrial Espionage- Price Fixing-Whistle Blowing.

UNIT VI: Global Issues:

Globalization and MNCs –Cross Culture Issues - Business Ethics – Media Ethics - Environmental Ethics – Endangering Lives - Bio Ethics - Computer Ethics - War Ethics – Research Ethics -Intellectual Property Rights.

- Related Cases Shall be dealt where ever necessary.

Outcome:

***It gives a comprehensive understanding of a variety issues that are encountered by every professional in discharging professional duties.**

***It provides the student the sensitivity and global outlook in the contemporary world to fulfill the professional obligations effectively.**

References:

1. Professional Ethics by R. Subramaniam – Oxford Publications, New Delhi.
2. Ethics in Engineering by Mike W. Martin and Roland Schinzinger - Tata McGraw-Hill – 2003.
3. Professional Ethics and Morals by Prof.A.R.Aryasri, DharanikotaSuyodhana - Maruthi Publications.
4. Engineering Ethics by Harris, Pritchard and Rabins, Cengage Learning, New Delhi.
5. Human Values & Professional Ethics by S. B. Gogate, Vikas Publishing House Pvt. Ltd., Noida.
6. Engineering Ethics & Human Values by M.Govindarajan, S.Natarajan and V.S.SenthilKumar-PHI Learning Pvt. Ltd – 2009.
7. Professional Ethics and Human Values by A. Alavudeen, R.Kalil Rahman and M. Jayakumaran – University Science Press.
8. Professional Ethics and Human Values by Prof.D.R.Kiran-Tata McGraw-Hill - 2013
9. Human Values And Professional Ethics by Jayshree Suresh and B. S. Raghavan, S.Chand Publications



Department of Civil Engineering

Year/Sem		L	T	P	C	COURSE CODE
Regulation Year	R16	0	3	0	0	R1641019
Name of the Course	PROFESSIONAL ETHICS AND HUMAN VALUES					
Branch	CIVIL ENGINEERING					

Course Objectives:

*To give basic insights and inputs to the student to inculcate Human values to grow as a responsible human beings with proper personality.

*Professional Ethics instills the student to maintain ethical conduct and discharge their professional duties.

Outcome:

*It gives a comprehensive understanding of a variety issues that are encountered by every professional in discharging professional duties.

*It provides the student the sensitivity and global outlook in the contemporary world to fulfill the professional obligations effectively.

UNIT I: Human Values: Morals, Values and Ethics – Integrity –Trustworthiness - Work Ethics – Service Learning – Civic Virtue – Respect for others – Living Peacefully – Caring – Sharing – Honesty –Courage – Value Time – Co-operation – Commitment – Empathy – Self-confidence – Spirituality- Character.

UNIT: II: Principles for Harmony: Truthfulness – Customs and Traditions -Value Education – Human Dignity – Human Rights – Fundamental Duties - Aspirations and Harmony (I, We & Nature) – Gender Bias - Emotional Intelligence – Salovey – Mayer Model – Emotional Competencies – Conscientiousness.

UNIT III: Engineering Ethics and Social Experimentation:

History of Ethics - Need of Engineering Ethics - Senses of Engineering Ethics- Profession and Professionalism —Self Interest - Moral Autonomy – Utilitarianism – Virtue Theory - Uses of Ethical Theories - Deontology- Types of Inquiry –Kohlberg’s Theory - Gilligan’s Argument –Heinz’s Dilemma - Comparison with Standard Experiments — Learning from the Past –Engineers as Managers – Consultants and Leaders – Balanced Outlook on Law - Role of Codes – Codes and Experimental Nature of Engineering.

UNIT IV: Engineers’ Responsibilities towards Safety and Risk:

Concept of Safety - Safety and Risk – Types of Risks – Voluntary v/sInvoluntary Risk – Consequences - Risk Assessment – Accountability – Liability - Reversible Effects - Threshold Levels of Risk - Delayed v/sImmediate Risk - Safety and the Engineer – Designing for Safety – Risk-Benefit Analysis-Accidents.

UNIT V: Engineers' Duties and Rights:

Concept of Duty - Professional Duties – Collegiality - Techniques for Achieving Collegiality – Senses of Loyalty - Consensus and Controversy - Professional and Individual Rights – Confidential and Proprietary Information - Conflict of Interest-Ethical egoism - Collective Bargaining – Confidentiality - Gifts and Bribes - Problem solving-Occupational Crimes-Industrial Espionage- Price Fixing-Whistle Blowing.

UNIT VI: Global Issues:

Globalization and MNCs –Cross Culture Issues - Business Ethics – Media Ethics - Environmental Ethics – Endangering Lives - Bio Ethics - Computer Ethics - War Ethics – Research Ethics -Intellectual Property Rights.

References:

1. Professional Ethics, R. Subramaniam – Oxford Publications, New Delhi.
2. Ethics in Engineering, Mike W. Martin and Roland Schinzinger - Tata McGraw-Hill – 2003.
3. Professional Ethics and Morals, A. R. Aryasri, Dharanikota Suyodhana - Maruthi Publications.
4. Engineering Ethics, Harris, Pritchard and Rabins, Cengage Learning, New Delhi.
5. Human Values & Professional Ethics, S. B. Gogate, Vikas Publishing House Pvt. Ltd., Noida.
6. Engineering Ethics & Human Values, M. Govindarajan, S. Natarajan and V. S. SenthilKumar-PHI Learning Pvt. Ltd – 2009.
7. Professional Ethics and Human Values, A. Alavudeen, R.Kalil Rahman and M. Jayakumar – University Science Press.
8. Professional Ethics and Human Values, D. R. Kiran-Tata McGraw-Hill - 2013
9. Human Values And Professional Ethics, Jayshree Suresh and B. S. Raghavan, S.Chand Publications