

### 1.3.1 Courses relevant to Professional Ethics, Gender, Human Values, Environment and Sustainability into the Curriculum

#### List of Courses

S. No.	Course Code	Course Title
1	16CE802	Professional Ethics in Civil Engineering
2	16CE009	Environmental Pollution and Solid Waste Management
3	16CE021	Green Buildings
4	19CE502	Environmental Engineering
5	19CE507	Environmental Engineering Laboratory
6	19CE001	Disaster Management
7	19CH001	Energy Conversion and Storage
8	19CE002	Air Pollution and Environmental Impact Assessment
9	19EE002	Renewable Energy Sources
10	19ME002	Principles of Entrepreneurship
11	19AT001	Communication Etiquette in Workplaces
12	19AT004	Ethics and Integrity
13	19AT005	Indian Heritage and Culture
14	19AT006	Human Values and Professional Ethics
15	19AT007	Intellectual Property Rights and Patents
16	19AT011	Social Responsibility
17	19AT013	Gender Equality for Sustainability
18	19AT014	Women in Leadership
19	19AT016	Climate Change and Circular Economy
20	20BEA01	Environmental Studies
21	16EE004	Renewable Energy Sources
22	16AT002	Indian Heritage and Culture
23	19EE017	Sustainable Energy
24	20EE002	Renewable Energy Sources
25	20EE017	Sustainable Energy
26	20AT005	Indian Heritage and Culture
27	20AT006	Human Values and Professional Ethics
28	16ME015	Energy and Environmental Engineering
29	16ME019	Professional Ethics in Engineering
30	19ME004	Alternate fuels and Emission controls in Automotives
31	19MEC33	Quality Assurance & Reliability Engineering for Sustainability
32	20AT003	Design The Thinking
33	20AT007	Intellectual Property Rights and Patents
34	20AT008	Introduction to Journalism
35	16IT802	Professional Ethics
36	20AT009	Mass Media Communication
37	20AT012	The Art of Photography and Film Making
38	20AT014	Women in Leadership

**Description of Courses**

<b>S.No.</b>	<b>Course Code</b>	<b>Course Name</b>	<b>Description</b>
1	16CE802	Professional Ethics in Civil Engineering	The course is intended to introduce the basic concepts of Human Values, Professional Ethics, Engineering Ethics, Risk Management and Global Issues on Professional Services. The Course content details the attributes of professionals and professionalism, and the social of impact of professions.
2	16CE009	Environmental Pollution and Solid Waste Management	Ever increase in industrialization activities and increase in population resulted in many types of pollutants that are affecting our environment. It is becoming mandatory to treat these emerging pollutants before they are getting mixed within the environment. The main pollution that is harming the environment or air pollution, water pollution, and solid waste management is the emerging challenge in many countries. This course gives basic information about air pollution, noise pollution, solid waste management, handling of hazardous waste, and preparation of EIA report.
3	16CE021	Green Buildings	This course deals with green building concept with effective usage of use of natural resources to the minimal at the time of construction as well as operation. Green buildings emphasize on the resource usage efficiency and also press upon the three R's – Reduce, Reuse and Recycle. The objectives of this course is to expose the students to the concepts of sustainability in the context of building and conventional engineered building materials, such as concrete, bricks, and achieving the same through lower carbon cements, superior brick kilns and recycled aggregate minimizing consumption of natural resources
4	19CE502	Environmental Engineering	This course is a subfield of engineering that is concerned with the protection and preservation of the environment and environmental resources as well as the protection of populations from environmental threats. The course deals with population growth and scientific solutions for environmental problems

			like air pollution, water pollution and finding renewable energy sources.
5	19CE507	Environmental Engineering Laboratory	This course provides a scientific and engineering basis for understanding environmental issues and problems. The Environmental Engineering laboratory practical provides good insight into different experimental methods relevant to Environmental Engineering. In this laboratory various test on potable water and sewage samples to check pH value, total dissolved solids, BOD and COD, total suspended particles etc. will be performed
6	19CE001	Disaster Management	This course will take an Indian perspective and, at times, consider also National Disaster Management Authority and disaster history. To be a modern and effective disaster manager, a student will need to gain knowledge in four critical areas of knowledge: Natural Environment, Engineered Environment, Socio-Demographics, and Emergency Management. Although understanding these areas of knowledge will give a student a multidisciplinary perspective, the objective is to become an interdisciplinary hazards manager, knowing how to assess hazards through a variety of perspectives. Hazards managers wear two hats, that of a hazard mitigation generalist addressing three of these critical areas of knowledge (natural environment, engineered environment, and socio-demographics, but, also, be specifically knowledgeable in emergency management responsibilities in hazards management. The hazards manager must be able to communicate with a broad spectrum of government officials and professionals (mayors, city council, city managers, public works and utility directors, planners, law enforcement, fire (structure and wildfire), medical, public health, environmental scientists, geologists, engineers, relief workers, volunteer groups, and many others. The hazards manager must also represent specialized knowledge in hazard and risk assessment and mitigation planning

			and implementation.
7	19CH001	Energy Conversion and Storage	The course contents aimed to impart knowledge on energy conversion systems and various fuel / energy storage devices. By the end of the course, students will be able to learn the importance of energy storage devices for electric vehicles, batteries, and hybrid systems.
8	19CE002	Air Pollution and Environmental Impact Assessment	Air Pollution and Environmental Impact Assessment helps to overcome the problems of environmental degradation and to plan the development process in a sustainable manner so that control and mitigation measures can be undertaken prior to occurrence of degradation. This course addresses the need and concept of environmental impact assessments.
9	19EE002	Renewable Energy Sources	Renewable energy is dependable and abundant, and it has the potential to be very inexpensive once technology and infrastructure improve. It includes solar, wind, geothermal, hydropower, and tidal energy, as well as biofuels grown and harvested without the use of fossil fuels. Renewable energy emits very little carbon dioxide and thus contributes to the fight against climate change caused by the use of fossil fuels.
10	19ME002	Principles of Entrepreneurship	This course is designed to Impart various principles of entrepreneurship in enhancing the entrepreneur skills in students in addition to the classical management concepts and design of organizational structures. Students gain knowledge about Project Management techniques and understand the relation between market demands and production capability for maximum effectiveness in an economic manner of all the production activities.
11	19AT001	Communication Etiquette in Workplaces	This course aims to equip the students with all the communication etiquette and protocol knowledge that are needed to conduct business efficiently. The course will address appropriate communication etiquette to be followed through e-mail, mobile phone, social media, etc. in the work places.
12	19AT004	Ethics and Integrity	This course is aimed to provide a

			<p>common understanding of best ethical practices and standards of integrity that are appropriate for work places. The course deals with importance of ethical decision making that employee can adopt when faced with an ethical dilemma. The intent is to demonstrate the breadth of responsibility of the individual manager, organization, and corporation in making “ethical” decisions.</p>
13	19AT005	Indian Heritage and Culture	<p>This course tailored for UG students, delving into the rich tapestry of India's history, art, architecture, and traditions. Through interdisciplinary study, students explore the evolution of Indian civilization, its cultural diversity, and its enduring influence on contemporary society. The course fosters cultural appreciation and awareness, enriching students' understanding of India's heritage while promoting cross-cultural dialogue and global citizenship.</p>
14	19AT006	Human Values and Professional Ethics	<p>This course helps students understand and learn professional ethics, professional responsibilities, rights, and global issues pertinent to cyber, weapons development, and environment.</p>
15	19AT007	Intellectual Property Rights and Patents	<p>The course gives a brief overview of the Intellectual Property (IP) landscape in India and the role of IP in the modern intangible economy. This course will help the students to understand the types of patents, trademarks &amp; copy rights, enforcement of IP and IP for business.</p>
16	19AT011	Social Responsibility	<p>Business makes up a significant portion of society. Hence, companies should have a responsibility towards society. For a business to operate efficiently, it must balance pursuing profit with a responsibility towards society. The objective of this course is to introduce the concepts of ethics and moral development and examine the application of these concepts as they relate to business and social responsibility.</p>
17	19AT013	Gender Equality for	<p>The aim of the course is to provide</p>

		Sustainability	knowledge on equal rights for everyone, dimensions of gender equality, public policies for promoting gender equality, and empowering the weaker sections.
18	19AT014	Women in Leadership	The objective of this course is to inspire and empower women across the world to engage in purposeful career development and take on leadership for important causes. The opportunities, challenges, trade-offs, and organizational dynamics experienced by women in work organizations, as well as reflect on and practice effective individual behaviors will be addressed.
19	19AT016	Climate Change and Circular Economy	Study on global warming, and issues associated with global warming are the primary concerns in the recent times. Climate change is one of the impacts of global warming and it also affects the economy. The aim of the course is to provide knowledge on climate change and issues related to climate change, and impact of climate change on circular economy at national, international, and global levels.
20	20BEA01	Environmental Studies	The need for sustainable development is a key to the future of mankind. This course provides an understanding about continuing problems of pollution, loss of forest, solid waste disposal, degradation of environment, issues like economic productivity and national security, Global warming, the depletion of ozone layer and loss of biodiversity.
21	16EE004	Renewable Energy Sources	This course provides a comprehensive overview of sustainable energy technologies like solar, wind, and hydro power. Students learn about their design, implementation, and impact on environmental sustainability, preparing them for careers in the burgeoning renewable energy sector. The course integrates theoretical knowledge to equip students with the skills needed to address global energy challenges.
22	16AT002	Indian Heritage and Culture	This course tailored for UG students, delving into the rich tapestry of India's history, art, architecture, and traditions. Through interdisciplinary study, students explore the evolution of Indian civilization,



			its cultural diversity, and its enduring influence on contemporary society. The course fosters cultural appreciation and awareness, enriching students' understanding of India's heritage while promoting cross-cultural dialogue and global citizenship.
23	19EE017	Sustainable Energy	This course designed for UG students, focusing on sustainable practices. Students delve into the principles of clean energy generation, storage, and distribution, equipping them with the knowledge to address global energy challenges. Through case studies, students develop innovative solutions for a sustainable future, preparing them for careers in the green energy sector.
24	20EE002	Renewable Energy Sources	This course provides a comprehensive overview of sustainable energy technologies like solar, wind, and hydro power. Students learn about their design, implementation, and impact on environmental sustainability, preparing them for careers in the burgeoning renewable energy sector. The course provides theoretical knowledge to equip students with the skills needed to address global energy challenges.
25	20EE017	Sustainable Energy	This course designed for UG students, focusing on sustainable practices. Students delve into the principles of clean energy generation, storage, and distribution, equipping them with the knowledge to address global energy challenges. Through case studies, students develop innovative solutions for a sustainable future, preparing them for careers in the green energy sector.
26	20AT005	Indian Heritage and Culture	This course tailored for UG students, delving into the rich tapestry of India's history, art, architecture, and traditions. Through interdisciplinary study, students explore the evolution of Indian civilization, its cultural diversity, and its enduring influence on contemporary society. The course fosters cultural appreciation and awareness, enriching students' understanding of India's heritage while promoting cross-cultural dialogue and global citizenship.

27	20AT006	Human Values and Professional Ethics	This course is an essential UG course to emphasize the ethical decision-making, integrity, and social responsibility in professional practice. Through case studies and interactive discussions, students explore ethical dilemmas in engineering and learn to apply moral principles to real-world situations. The course fosters ethical leadership and cultivates a sense of accountability, preparing students to uphold ethical standards and contribute positively to society as future engineers.
28	16ME015	Energy and Environmental Engineering	This course is designed to provide students with a comprehensive understanding of the interplay between energy systems and environmental considerations. It explores the principles, technologies, and methodologies involved in the engineering of sustainable and environmentally responsible energy solutions. The course covers a range of topics, including renewable energy sources, energy efficiency, environmental impact assessment, and the integration of environmental considerations into engineering design.
29	16ME019	Professional Ethics in Engineering	This course is designed to instill a deep understanding of ethical principles and values in engineering practice. It explores the ethical responsibilities of engineers in their professional roles, emphasizing the importance of ethical decision-making, integrity, and social responsibility. Through case studies, discussions, and real-world scenarios, students will develop the ethical framework necessary to navigate the complex moral dilemmas often encountered in the field of engineering.
30	19ME004	Alternate fuels and Emission controls in Automotives	This course is designed to provide students with a comprehensive understanding of the challenges and opportunities associated with the use of alternative fuels and emission control technologies in the automotive industry. The course covers a range of topics related to sustainable transportation and environmental impact mitigation.
31	19MEC33	Quality Assurance &	It focuses on integrating principles of



		Reliability Engineering for Sustainability	quality assurance and reliability engineering with a sustainability perspective. It addresses the need for sustainable practices in product development, manufacturing, and operations.
32	20AT003	Design The Thinking	Design Thinking Fundamentals is an immersive and practical course that introduces students to the principles, methodologies, and applications of design thinking. This course is designed to equip participants with the mindset and skill set necessary to tackle complex problems, foster innovation, and create user-centric solutions across various domains.
33	20AT007	Intellectual Property Rights and Patents	The Intellectual Property Rights (IPR) Fundamentals course is designed to provide participants with a comprehensive understanding of intellectual property laws, principles, and practices. This course aims to familiarize students with the different types of intellectual property rights, their significance in various industries, and the legal framework governing their protection.
34	20AT008	Introduction to Journalism	Being able to critically reflect on the social, political, economic and global contexts in which communication takes place. Knowing the history and the theories underpinning the journalism and communication fields. Demonstrating the cognitive, research, analytical, critical thinking, communication and presentation skills, and communication and presentation skills required for undergraduate study and professional practice, Being able to apply the ethics and regulations which govern modern media and communication practice. The ability to recognize news and to apply critical thinking, analytical skills and ethical practice in the gathering and presentation of news within the context of the professional requirements and demands of the multimedia newsroom.
35	16IT802	Professional Ethics	This course is aimed at providing a common understanding of best ethical practices and standards of integrity that are appropriate for 21st- century

			workplaces characterized by teamwork, intercultural communication, and disruptive technologies. The course deals with the importance of ethical decision making that employees can adopt when faced with an ethical dilemma. The intent is to demonstrate the breadth of responsibility of the individual manager, organization, and the role of the corporation in making “ethical” decisions
36	20AT009	Mass Media Communication	Students will be able to understand and apply knowledge of human communication and language processes as they occur across various contexts, e.g., interpersonal, intrapersonal, small group, organizational, media, gender, family, intercultural communication, technologically mediated communication, etc. from multiple perspectives.
37	20AT012	The Art of Photography and Film Making	Photography and Filmmaking are creative art forms that require aptitude, passion, and a whole lot of professionalism. This course has just the right blend of elements that help groom a student into a market-ready professional. It begins by imbibing the discipline and work ethics that transform you into an individual capable of thinking independently and creatively.
38	20AT014	Women in Leadership	The objective of this course is to inspire and empower women across the world to engage in purposeful career development and take on leadership for important causes. The opportunities, challenges, trade-offs, and organizational dynamics experienced by women in work organizations, as well as reflect on and practice effective individual behaviors will be addressed.

## **16CE802 PROFESSIONAL ETHICS IN CIVIL ENGINEERING**

### **Unit I**

#### **Introduction to Human values & Ethics**

Morals, values and Ethics – Integrity – Work ethic – Service learning – Civic virtue – Respect for others – Living peacefully – Caring – Sharing – Honesty – Courage – Valuing time – Cooperation – Commitment – Empathy – Self confidence – Character – Spirituality  
– Introduction to Yoga and meditation for professional excellence and stress management.  
*Ethics, qualities*

### **Unit II Engineering Ethics**

Senses of ‘Engineering Ethics’ – Variety of moral issues – Types of inquiry – Moral dilemmas – Moral  
Autonomy – Kohlberg’s theory – Gilligan’s theory – Consensus and Controversy – Models of professional roles - Theories about right action – Self-interest – Customs and Religion  
– Uses of Ethical Theories.  
*Communication, Speaking, Work place*

### **Unit III**

#### **Risk Management**

Engineering as Experimentation – Engineers as responsible Experimenters – Codes of Ethics  
– A Balanced Outlook on Law, Safety and Risk – Assessment of Safety and Risk – Risk Benefit  
Analysis and Reducing Risk – Respect for Authority – Collective Bargaining  
– Confidentiality – Conflicts of Interest – Occupational Crime – Professional Rights –  
Employee Rights – Intellectual Property Rights (IPR) – Discrimination.  
*Laws, Risk*

### **Unit IV Global Issues**

Multinational Corporations – Environmental Ethics – Computer Ethics – Weapons  
Development – Engineers as Managers – Consulting Engineers – Engineers as Expert  
Witnesses and Advisors – Moral Leadership – Code of Conduct – Corporate Social  
Responsibility.  
*Consultants, leadership, Profession, Responsibilities*

### **Textbook(s)**

1. R.Subramanian, –Professional Ethics||, Oxford University Press, New Delhi, 2013.
2. Mike W. Martin and Roland Schinzinger, –Ethics in Engineering||, Tata McGraw Hill, New Delhi, 2003.

3. Govindarajan M, Natarajan S, Senthil Kumar V. S, —Engineering Ethics||, Prentice Hall of India, New Delhi, 2004.

**Reference(s)**

1. Charles B. Fleddermann, —Engineering Ethics||, Pearson Prentice Hall, New Jersey, 2004.
2. Charles E. Harris, Michael S. Pritchard and Michael J. Rabins, —Engineering Ethics – Concepts and Cases||, Cengage Learning, 2009.
3. Edmund G Seebauer and Robert L Barry, —Fundamentals of Ethics for Scientists and Engineers||, Oxford University Press, Oxford, 2001

## **16CE009 ENVIRONMENTAL POLLUTION AND SOLID WASTE MANAGEMENT**

### **Unit I**

#### **Air Pollution and Noise Pollution**

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

*Green House Effect - Heat Islands, Traffic Regulations – Zoning*

### **Unit II**

#### **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

*Land farming, waste- to-energy combustion*

### **Unit III Hazardous Waste**

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

*Non- Bio Medical Waste, Integrated waste management (IWM)*

### **Unit IV**

#### **Environmental Impact Assessment**

Impact evaluation and analysis, EIA Methodologies, Assessment of Impacts on surface water, Air and biological Environments - Environmental audit, Preparation of Environmental impact statement - Case studies

*Environmental Pollution Act, Mota Act*

#### **Textbook (s)**

1. Howard S. Peavy, George Tchobanoglous and Donald R. Rowe's, Environmental Engineering, Tata McGraw-Hill Education Publications, New Delhi, 1985.
2. C. S. Rao, Specifications of Environmental Pollution Control Engineering, Second edition, New Age International Publishers, 2006.

#### **Reference (s)**

1. M.N. Rao and H.V.N. Rao, Air Pollution and Control, 29th Reprint, Tata McGraw- Hill, 1988.
2. Gerard Kiley, Environmental Engineering, 1st Ed., Tata McGraw-Hill, 1998.
3. Ruth F. Weiner and Robin Mathews, Environmental Engineering, 4th Ed., Elsevier, 2003.
4. K. Sasi Kumar, S.A. Gopi Krishna, Solid Waste Management, PHI New Delhi, 2013.
5. Harry Freeman, Standard handbook of hazardous waste treatment and disposal, Tata McGraw-Hill, 1998.
6. Y. Anjaneyulu, Environmental Impact Assessment, 2nd Ed., BS Publications, 2010.

## **16CE021 GREEN BUILDINGS**

### **Unit I**

#### **Green Buildings**

Definition of Green Buildings, typical features of green buildings, benefits of Green Buildings, Green building

Principles, Sustainable site selection and planning of buildings to maximize comfort, day lighting, ventilation, planning for storm water drainage

*Smart Buildings*

### **Unit II**

#### **Environmentally Friendly Building Materials and Technologies**

Natural Materials like bamboo, timber, rammed earth, stabilized mud blocks, hollow blocks, lime & limepozzolana cements, materials from agro and industrial waste, ferro-cement, alternative roofing systems, various paints reducing the heat gain of the building, etc.

*Ferro Concrete*

### **Unit III**

#### **Energy and Resource Conservation and Use of Renewable Energy Resources**

Need for energy conservation, various forms of energy used in buildings, embodied energy of materials, energy used in transportation and construction processes- water conservation systems in buildings-water harvesting in buildings – waste to energy management in residential complexes or gated communities. Wind and Solar Energy Harvesting, potential of solar energy in India and world, construction and operation of various solar appliances

*Case studies of fully solar energy based buildings in India.*

### **Unit IV**

#### **Building Resources and Green Building Rating Systems**

Passive energy system design, Building envelope, orientation and components of building fabric and shading, High rise buildings, modular building, Construction of curtain walls, Sourcing and recycling of building materials, alternative calcareous, metallic and non metallic materials. Introduction to Leadership in Energy and Environment Design (LEED), Green Rating systems for Integrated Habitat Assessment – Modular wastewater treatment systems for built environment – Building automation

*Building management systems*

### **Textbook(s)**

1. K.S.Jagadish, B. U. Venkataramareddy, K. S. Nanjundarao, Alternative Building Materials and Technologies, 2nd Ed., New Age International, 2007
2. Osman Attmann, Green Architecture Advanced Technologies and Materials, McGraw Hill, 2010



**Reference(s)**

1. Kibert, C. J, Sustainable Construction:Green Building Design and Delivery, 3 rd Ed., John Wiley & Sons, Inc., 2012
2. G. D. Rai, Non-Conventional Energy Resources,6th Ed., Khanna Publishers.1988
3. Greening Building – Green Congress, US. (Web).
4. Sustainable Building Design Manual. Vol 1 and 2, Teri, New Delhi, 2004.

## 19CE502 ENVIRONMENTAL ENGINEERING

### Unit I

#### **Water Demand and Quality**

Water Demand: Public water supply system, Planning, Objectives, Design period, Population forecasting; Water demand. Water Quality: Development and selection of source, Sources of water, Characteristics of water, Significance, Drinking Water quality standards; intake structures, Functions.

*Laying, jointing and testing of pipes; appurtenances*

### Unit II

#### **Design of Water Treatment Units**

Objectives, Unit operations and processes, Principles, functions, design of water treatment plant units; aerators, flash mixers, Coagulation and flocculation, Clariflocculator, Plate and tube settlers; sand filters; Disinfection; Residue Management; Water softening, Construction, Operation and Maintenance aspects.

*Desalination Process; Membrane Filtration*

### Unit III

#### **Sewage Quality and Design of Sewage Treatment Units**

Objectives, Unit Operations and Processes, Selection of treatment processes, Onsite sanitation, - Septic tank, - Grey water harvesting,

Primary treatment: Principles, functions and design of sewage treatment units, Screens, Grit Chamber, Primary Sedimentation tanks, Construction, Operation and Maintenance aspects. Secondary Treatment: Activated Sludge Process and Extended aeration systems, Trickling filters, Sequencing Batch Reactor (SBR), Membrane Bioreactor, UASB, Waste Stabilization Ponds, Other treatment methods, Reclamation and Reuse of sewage, Recent Advances in Sewage Treatment.

*Construction, Operation and Maintenance aspects; Sewer Appurtenances* **Unit IV**

#### **Design of Ponds and Sludge Disposal**

Effluent Disposal: Standards for Disposal, Methods, dilution, Self-purification of river, Oxygen sag curve, deoxygenation and reaeration, Streeter-Phelps model, Land disposal of Sewage. Sludge Disposal: Sludge characterization, Thickening, Sludge digestion, Standard rate and High rate digester design, Biogas recovery, Sludge Conditioning and Dewatering, Sludge drying beds

*Ultimate residue disposal and recent advances; Soil Dispersion System.*

#### **Text Book (s)**

1. B.C. Punmia, Ashok Jain & Arun Jain, Water Supply Engineering, Vol. 1, Wastewater Engineering, Vol. II, 2nd Ed., Laxmi Publications Pvt. Ltd, New Delhi, 2016
2. G.S. Birdi, Water supply and Sanitary Engineering, Revised Ed., Dhanpat Rai & Sons Publishers, 2015 3.
3. K.N. Duggal, Elements of Environmental Engineering, 3rd Ed., S. Chand Publishers, 2010

**Reference Books (s)**

1. Manual on Sewerage and Sewage Treatment Systems Part A, B and C, CPHEEO, Ministry of Urban Development, Government of India, New Delhi, 2013.
2. Metcalf and Eddy- Wastewater Engineering–Treatment and Reuse, Tata Mc.Graw- Hill Company, New Delhi, 2010.
3. Syed R. Qasim “Wastewater Treatment Plants”, CRC Press, Washington D.C., 2010
4. Gray N.F, “Water Technology”, Elsevier India Pvt. Ltd., New Delhi, 2006.

## **19CE507 ENVIRONMENTAL ENGINEERING LABORATORY**

### **List of Experiments**

1. Determination of pH and Electrical Conductivity
2. Determination and estimation of total Hardness
3. Determination of Calcium and Magnesium hardness
4. Determination of Alkalinity
5. Determination of chlorides in water and soil.
6. Determination and estimation of total solids, dissolved solids
7. Determination of Iron
8. Determination of Optimum Coagulant dosage
9. Determination of dissolved oxygen with D.O Meter & Winkler 's Method
10. Determination of B.O.D
11. Determination of COD
12. Determination of chlorine demand
13. Determination of Flourides
14. Determination of MPN

### **List of Augmented Experiments**

1. pH and Electrical Conductivity value of different samples
2. Estimation of total Hardness of bore water
3. Determination of Calcium and Magnesium hardness of bore water
4. Determination of Alkalinity and Acidity of different samples
5. Determination of chlorides in water and soil.
6. Estimation of total solids, dissolved solids in Surface water and sub-surface water sample
7. Determination of dissolved oxygen of pond water with D.O Meter & Winkler's Method
8. Physical parameters-Temperature, Turbidity
9. B.O.D/COD of different samples
10. Determination of chlorine demand for municipal water

## **19CE001 DISASTER MANAGEMENT**

### **Unit I**

#### **Introduction to Disaster Management**

Components of disaster management-Organizational structure for disaster management- Disaster Risk Reduction –Global Policies and Practices - Basic Strategies and Practices of Disaster Reduction- Disaster Risk Reduction with Global Framework - Integrated disaster management. Role of Government and NGO Bodies,  
*Role of Engineers on Disaster Management.*

### **Unit II**

#### **Natural and Manmade Disasters**

Management of Natural Disasters: Floods, Droughts, Earthquakes, Global Warming, Cyclones, Landslides, Tsunamis Causes, effects, mitigation. Effects on poverty, Climate Change and Human Health. Management of Manmade Disasters: Solid waste, Fire, Bio-terrorism, Emerges infectious diseases, Transportation Accidents, Structural failures Causes, effects, mitigation.  
*Volcanic eruptions, mining.*

### **Unit III**

#### **Science and Technology in Disaster Management**

Implementation of Technology for Infrastructure, Disaster Management for Infrastructure, Geospatial Information in Agriculture Drought Assessment and Monitoring. Multimedia Technology in Disaster Risk Management Training, Disaster Communication System (Early Warning and its Dissemination) - Essentials of School Disaster Education, Community based Disaster Management.  
*Role of IT in Disaster Preparedness, Role of Educational Institute*

### **Unit IV**

#### **Disaster Risk Management in India and Case Studies**

Disaster Management Indian scenario - India's vulnerability profile – Roles and responsibilities of government, community, local institutions, NGOs and other stakeholders, Policies and legislation for disaster risk reduction, DRR programs in India and the activities of National Disaster Management Authority. Cases Studies: Natural Disaster -Floods, Earthquakes, Cyclones, Tsunamis. Manmade Disaster: Industrial Accidents, Transportation Accidents and Terrorism & Bio-terrorism.  
*Droughts, Nuclear Disaster.*

#### **Text Book(s):**

1. Disaster management - Global Challenges and local solution, Edited by Rajibshash and R.R.Krishnamurthy (2009) published by universities press
2. Disaster management - future challenges and opportunities (2007) editor by Jagbirsingh. Published by I K international Publishing house pvt.Ltd.

3. Disaster management, (2021), editor by R. Subramanian, Vikas Publishing, Noida.

**Reference Book(s):**

1. Disaster management edited by H K Gupta (2013) published by universities press.



## 19CH001 ENERGY CONVERSION AND STORAGE DEVICES

### Unit I

#### Introduction to Energy Conversion and Storage Systems

Classification of Energy Sources, Principle fuels for energy conversion, Necessity of energy storage, different types of energy storage, mechanical, chemical, electrical, electrochemical, biological, magnetic, electromagnetic, thermal, comparison of energy storage technologies  
*Fuel cells- Batteries- Super capacitors*

### Unit II

#### Energy Conversion Systems

Fuel cells: Introduction and overview, operating principle, polarization curves, components, types of fuel cell, low and high temperature fuel cells, fuel cell stacks. Fuel cell characterization and analysis of polarization curve and calculate kinetic, ohmic, and transport losses; estimate internal resistance and hydrogen cross-over of the fuel cell  
*Faraday's law, Open circuit voltage, ohmic resistance, limiting current*

### Unit III

#### Energy Storage Devices

Fundamentals and technologies, characteristics and performance comparison: Lead-acid, Nickel-Metal hydride, Lithium Ion; Battery system model, emerging trends in batteries.  
*Hybrid systems for energy storage*

### Unit IV

#### Design and Applications of Energy Storage

Renewable energy storage-Battery sizing and stand-alone applications, stationary (Power Grid application), Small scale application-Portable storage systems and medical devices, Mobile storage Applications- Electric vehicles (EVs), types of EVs, batteries and fuel cells, future technologies, hybrid systems for energy storage  
*Nernst equation- Butler-Volmer theory- Gibbs free energy*

### Textbook(s)

1. O' Hayre R. P., Cha S. W., Colella W., and Prinz F. B., Fuel cell fundamentals, John Wiley, 2008
2. Larminie J., Dicks A. and McDonald M. S., Fuel cell systems explained. Vol. 2, Wiley, 2003
3. Bailie, Richard C, Energy conversion engineering, Wesley, 1978

### Reference (s)

1. Vielstich W., Lamm A., and Gasteiger H. A, Handbook of Fuel Cells: Fundamentals, Technology, Applications, Vol (1-4), Wiley, 2003
2. Gupta R. B, Hydrogen Fuel: Production, Transport and Storage, CRC Press, 2008
3. Bard A. J., Faulkner L. R., Leddy J., and Zoski, C. G, Electrochemical methods: fundamentals and applications (Vol. 2), Wiley, 1980

## **19CE002 AIR POLLUTION AND ENVIRONMENTAL IMPACT ASSESSMENT**

### **Unit I**

#### **Sources and Effects of Air Pollution**

Classification of Air pollutants, Particulates and gaseous pollutants, effects of air pollution on human being, materials, animals and vegetation; global warming- ozone layer depletion, sampling and analysis, basic principle of sampling, source of ambient sampling, analysis of pollutants, principles

*Sampling of air Pollutants; Ambient air quality standards.*

### **Unit II**

#### **Air Pollution Control and Noise Pollution**

Air Pollution Control: Particulate control by gravitational, centrifugal, filtration, scrubbing, electrostatic precipitation- selection criteria for equipment- gaseous pollutant control by adsorption, absorption, condensation, combustion. Noise Pollution: Sources, Effects, Assessments, Standards and Control Methods, Prevention Methods.

*Plume rise behavior ;Measurement of Noise level.*

### **Unit III**

#### **Environmental Impact Assessment**

Impacts of Development on Environment, Environmental Impact Assessment (EIA): Objectives, Historical development, EIA Types, EIA Notification and Legal Framework, Stakeholders and their Role in EIA. Screening and Scoping in EIA: Drafting of Terms of Reference, Baseline monitoring, Prediction and Assessment of Impact on land, water, air, noise and energy, flora and fauna EIA Methods- Matrices – Networks – Checklist Methods.

*Rio Principles of Sustainable Development; Mathematical models for Impact prediction.*

### **Unit IV**

#### **Environmental Management Plan**

Plan for mitigation of adverse impact on water, air and land, water, energy, flora and fauna, Environmental Monitoring Plan, EIA Report Preparation, Review of EIA Reports, and Environmental Clearance. Case Studies: EIA case studies pertaining to Infrastructure Projects, Roads and Bridges, Ports and Harbor, Airports, Dams and Irrigation projects, Power plants, CETPs.

*Public Hearing; Post Project Monitoring.*

### **Text book (s)**

1. M. N. Rao and H. V. N. Rao, Air pollution, Tata McGraw-Hill, New Delhi, 1993
2. D. Nevers, Air Pollution Control Engineering, McGraw-Hill International Ed., 1993
3. Canter, R.L, "Environmental impact Assessment ", 2nd Edition, McGraw Hill Inc, New Delhi, 1995.

4. Lohani, B., J.W. Evans, H. Ludwig, R.R. Everitt, Richard A. Carpenter, and S.L. Tu, "Environmental Impact Assessment for Developing Countries in Asia", Volume 1 – Overview, Asian Development Bank, 1997.
5. Peter Morris, Riki Therivel "Methods of Environmental Impact Assessment", Routledge Publishers, 2009.

**Reference (s)**

1. K. Wark, C. F. Warner, Air Pollution, Its Origin and Control, Harper and Row, New York, 1981
2. C. S. Rao, Environmental Pollution Control Engineering, New Age International, 2005
3. Becker H. A., Frank Vanclay, "The International handbook of social impact assessment" conceptual and methodological advances, Edward Elgar Publishing, 2003.
4. Barry Sadler and Mary McCabe, "Environmental Impact Assessment Training Resource Manual", United Nations Environment Programme, 2002.
5. Judith Petts, "Handbook of Environmental Impact Assessment Vol. I and II", Blackwell Science New York, 1998.
6. Ministry of Environment and Forests EIA Notification and Sectoral Guides, Government of India, New Delhi, 2010.

## **19EE002 RENEWABLE ENERGY SOURCES**

### **Unit I**

#### **Introduction & Solar Energy**

Introduction to renewable energy, advantages of generating power through renewable energy sources – technical & economical, Solar Energy: Physics of sun, the solar constant, extra-terrestrial and terrestrial solar radiation, instruments for measuring solar radiation and sun shine. Flat Plate and Concentrating Collectors, classification of concentrating collectors, thermal analysis of flat plate collectors, Photo voltaic energy conversion, PV cell model and characteristics, Maximum power point tracking for photovoltaic power systems. Types of Maximum power point tracking methods Perturb and Observe.

*Solar applications-solar heating /cooling technique*

### **Unit II**

#### **Wind & Bio-Mass Energy**

Sources and potentials, horizontal and vertical axis windmills, performance characteristics, Betz criteria, Maximum power generation. Principles of Bio-Conversion, Anaerobic/aerobic digestion, Types of Bio-Gas Digesters, gas yield, Combustion characteristics of bio-gas.

*Utilization for cooking, IC Engine operation*

### **Unit III**

#### **Geothermal & Ocean Energy**

Types of Resources (hydrothermal, geo-pressured, hot dry rock), types of wells, and methods of harnessing the energy (Vapour dominated, liquid dominated), Ocean thermal energy conversion, principles, Open loop & closed loop OTEC Cycles. Tidal energy-potential, conversion techniques-single basin, two basin system. Wave energy: conversion techniques.

*Captive power plant*

### **Unit IV**

#### **Direct energy conversion & introduction to Micro-grid**

Fuel cells-Principle of working of various types of fuel cells and their working, Hydrogen generation, battery energy storage system. Magneto-hydrodynamics (MHD) Define grid, microgrid, importance of DG & microgrid, typical structure and configuration of a microgrid, AC and DC microgrids, modes of operations (grid connected & islanded).

*Distributed generation (DG)*

#### **Text Book(s):**

1. G.D. Rai, “Non-Conventional Energy Sources”, Khanna Publishers, 2nd Edition, 2017.

2. B H Khan, "Non-conventional energy resources", Tata McGraw Hill Education Private Limited, 3rd Edition, 2015.
3. Alexis Kwasinski , Wayne Weaver, Robert S. Balog, "Micro grids and other local area power and energy systems", Cambridge University Press, 1st Edition, 2016

**Reference Book(s):**

1. Tiwari and Ghosal, "Renewable energy resources", Narosa Publishing house, 2nd Edition, 2001
2. Ranjan Rakesh, Kothari D. P. & Singal K. C., "Renewable Energy Sources and Emerging Technologies", PHI, 2nd Edition, 2013.
3. Nikos Hatziargyriou, "Micro grids: Architectures and Control", Wiley, 1st Edition.
4. Electricity Act 2003, Renewable Energy Act 2015.
5. Indian Constitution-Articles 51A, 47, 48A.

## **19ME002 PRINCIPLES OF ENTREPRENEURSHIP**

### **Unit I**

Introduction to Entrepreneurship Definition of Entrepreneur, Entrepreneurial Traits, Entrepreneur Vs. Manager, Entrepreneur Vs Entrepreneur. The Entrepreneurial decision process- Role of Entrepreneurship in Economic Developments, Ethics and Social responsibility of entrepreneurs, Woman as entrepreneur.

*Opportunities for entrepreneurs in India and abroad*

### **Unit II**

Creating and starting the venture Sources of new Ideas, Methods of generating ideas, creating problems solving Product planning and development process The business plans Writing Business plan, Evaluating Business plans, Using and implementing business plans, marketing plan, financial plan and the organizational plan launching formalities.

*Nature and scope of business plan*

### **Unit III**

Financing and managing the new venture Source of Capital, record keeping, recruitment, motivating and leading teams, financial controls, Marketing and sales controls. E Commerce and Entrepreneurship New venture expansion strategies and issues Features evaluation of joint ventures, acquisitions, merges, franchising, Public issues, rights issues, bonus issues

*Internet advertising*

### **Unit IV**

Institutional support Entrepreneurship Role of Directorate of Industries, District Industries, Centers (DICS), Industrial development Corporation (IDC), state Financial corporation (SFCs), Small Scale Industries Development Corporations (SSIDCs), Khadi and village Industries Commission (KVIC), Technical Consultancy Organization (TCO), small Industries Service Institute (SISI), National Small Industries Corporation (NSIC), Small Industries Development Bank of India (SIDBI), salient provision under Indian Factories Act, Employees State Insurance Act, Workmen's Compensation Act and payment of Bonus Act.

*Labor legislation*

### **Textbook (s)**

1. Robert Hisrich & Michael Peters, Entrepreneurship, TMH, 5th Edition, 2009.
2. Dollinger, Entrepreneurship, Pearson Education, 4th Edition, 2004.
3. Robert J. Calvin, Entrepreneurial Management, Tata McGraw-Hill Education, 2004
4. Vasant Desai, The Dynamics of Entrepreneurial Development and Management Himalaya publishing House, 5th Edition, 2017.
5. Kaplan, Patterns of Entrepreneurship, Willey, 4th Edition, 2005



**Reference (s)**

1. William A. Sahlman, James Stancill, Arthur Rock, Harvard Business Review on Entrepreneurship, Harvard Business School Press, Revised Edition, 2019.
2. Gurmeet Naroola, The Entrepreneurial Connection: East Meets West in the Silicon Valley, Special edition, TiE, 2001.
3. Bill Bolton & John Thompson, Entrepreneurs Talent, Temperament, Technique, Routledge, 7th Edition, 2016.
4. Agrawal, A.N. & Agarwal, M.K., Indian Economy: Problems of Development and Planning, New Age International, 42nd Edition, 2017.
5. Gaurav Datt & Ashwani Mahajan, Dutt & Sundaram's Indian Economy, S. Chand, 72nd Edition, 2016. 5. Srivastava, Industrial Relations Labour Laws, Vikas Publishing House, 6th Edition, 2005.
6. Aruna Kaulgud, Entrepreneurship Management by Vikas publishing house, 2003.
7. Thomas W. Zimmerer & Norman M. Scalbrorough, Essential of Entrepreneurship and small business management, PHI, 4th Edition, 2005.
8. Mary Coulter, Entrepreneurship in Action, PHI 2nd Edition, 2005. 9. ND Kapoor, Industrial Law, Sultan Chand & Sons, 14th Revised Edition, 2013.

## 19AT001 COMMUNICATION ETIQUETTE IN WORKPLACES

### **Unit- I**

#### **Introduction to Professional Ethics:**

Ethics In Engineering Profession, Roles of Engineers, Professional Ethics of Engineers and other Roles Played.

#### **Ethical Codes**

Need for Ethical Codes, Prominence of ethical codes and benchmarking, Codes from Other Profession, Advertising Standards of India, Corporate Codes, Knowledge of ethical codes.

### **Unit- II**

#### **Workplace Ethics:**

Introduction, Needs, Principles, Development of Personal Ethics, Workplace Ethics for Employees-Ethical behavior in workplace- Professionalism, Ethical violations by employees, Employee Attitude and Ethics, Employee Etiquettes. Benefits of ethics in Workplace employee commitment, investor loyalty, customer satisfaction, profits

#### **Professionalism at Workplace:**

Unethical Conduct for employees and employers. Factors leading to Unethical behaviours. Different unethical behaviors. Measures to control unethical behaviors. Rewarding ethical behavior.

### **Unit- III**

#### **Business Ethics:**

Overview of Business Ethics, Corporate Governance, Ethical issues in human resource management- The principal of ethical hiring, Firing, worker safety, whistle blowing, Equality of opportunity, Discrimination, Ethics and remuneration, Ethics in retrenchment. Ethical Dilemmas at workplace, Ethical issues in global business, corporate responsibility of employers.

#### **Workplace Privacy & Ethics:**

Privacy at workplace, Hardware, Software and Spyware, Plagiarism and Computer Crimes, Convenience and Death of Privacy, Defence of employee privacy rights.

### **Unit- IV**

#### **Teamwork at Workplace:**

Teams, Elements of team, Stages of team development, team meetings, team rules, and teams work and professional responsibility, rules of professional responsibility, ASME code of ethics. Discrimination, sexual harassment, creating awareness about workplace harassment, Vishaka Dutta vs. State of Rajasthan –Supreme Court directions, Compulsory workplace guidelines.

#### **Managing Change in Workplace through Ethics:**

Introduction to Change Management, Models of change, the Ethics of Managing Change, the role of ethics and responsibilities in leading innovation and change, ethics-based model for change management, ethics and risks of change management

**Textbook(s)**

1. R.S. Naagarazan, A Textbook on Professional Ethics and Human Values, New Age International (P) Limited, Publishers, 5th Edition, 2019
2. Kurt Stanberry and Stephen M. Byars, Business Ethics Book, Tata Mc Graw Hill Publisher, 6th Edition 2020
3. Satish Babu Bachu, A Guide to Corporate Business Etiquette: How to Maintain Effective Communication at Work Paperback, 4th Edition, 17 July 2014.
4. Barbara Pachter, The Essentials of Business Etiquette and workplace through ethics, 5th Edition, 2018.

**Reference(s)**

1. The Etiquette Advantage in Business, Third Edition: Personal Skills for Professional Success, Danie l Post Senning, Peter Post, Anna Post, Lizzie Post, Peggy Post, 3rd Edition, 2010
2. Engineering Ethics & Human Values by: M.Govindarajan , S. Natarajan &V.S.Senthilkumar PHI Learning Pvt. Ltd.
3. Professional Ethics by- R. Subramanian
4. Business Etiquette: 101 Ways to Conduct Business with Charm & Savvy Book by Ann Sabath, 2011
5. The Unwritten Rules of Professional Etiquette Book by Ryan Sharma, 4th Edition, 2017

## **19AT004 ETHICS AND INTEGRITY**

### **Unit I**

#### **Ethics and Interface**

Ethics, Determinants and Consequences of Ethics in - Human Actions; Dimensions of Ethics; Ethics -in Private and Public Relationships. Human Values - Lessons from the Lives and Teachings of Great Leaders, Reformers and Administrators; Role of Family Society and Educational Institutions in Inculcating Values, Human interface.

### **Unit II**

#### **Human Values**

Morals, values and Integrity, Service learning, Civic virtue Respect for others, Living peacefully, Caring, Sharing, Honesty, Courage, Valuing time, Cooperation, Commitment, Self-confidence, Character, Spirituality

### **Unit III**

#### **Emotional Intelligence**

Concepts, and their Utilities and Application in Administration and Governance. Contributions of Emotional Thinkers and Philosophers from India and World.

### **Unit IV**

#### **Risk Management and Issues**

Engineering as Experimentation, Codes of Ethics, Assessment of Safety and Risk, Risk Benefit Analysis and Reducing Risk, Intellectual Property Rights (IPR), Discrimination, Multinational Corporations, Moral Leadership, Code of Conduct, Corporate Social Responsibility.

### **Reference Book(s)**

1. R.Subramanian, "Professional Ethics", Oxford University Press, New Delhi, 2013.
2. Mike W. Martin and Roland Schinzinger, "Ethics in Engineering" Tata McGraw Hill, New Delhi, 2003.
3. Edmund G Seebauer and Robert L Barry, "Fundamentals of Ethics for Scientists and Engineers", Oxford University Press, Oxford, 2001.

## **19AT005 INDIAN HERITAGE AND CULTURE**

### **Unit I**

#### **Fundamental Unity of India**

Harappan and Vedic Culture- evolution of Caste system – Jainism and Buddhism Gandhara Art. Political unification of India under Mauryas and Guptas –Cultural achievements. Cultural condition under the Satavahanas – Contribution of Pallavas and Cholas to Art and Letters. Cholas Administrative System. Influence of Islam on the India Culture. The SufiBhakti and Vishnavite movements. Cultural achievements of Vijayanagara rulers Contribution of Shershah and Akbar to the evolution of Administrative system in India- Cultural Developments under Mughals.

### **Unit II**

#### **Western Impact on India**

Introduction of Western Education Social and Cultural awakening and social reform movements. Raja Rama Mohan Roy – Dayananda Saraswathi – Theosophical Society – Ramakrishna Paramahansa and Vivekananda – Iswara Chandra Vidyasagar and Veeresalingam-Enancipation of women and struggle against caste – Rise of Indian Nationalism – Mahatma Gandhi – Nonviolence and Satyagraha – Education of untouchability – Legacy of British Rule.

### **Unit III**

#### **Culture and its salient features**

Meaning, Definition and various inter relations of Culture. The Vedic – Upanishadic Culture and society. Human aspirations in those societies Values – Chaturvidha Purusharthas – Chaturvarna Theory – Cheturasrama Theory. The Culture in Artha Sastra, Kautilyan conception of the function of Philosophy, State, Religion and king.

### **Unit IV**

#### **Culture in Ramayana and Mahabharata**

The Ideal Man and Woman, Concepts Maitri, Karuna, Seela, Vinaya, Kshama, Santi, Anuraga – as exemplified in the stories and anecdotes of the Epics. The Culture of Jainism: Jaina conception of Soul, Karma and liberation, Buddhism as a Humanistic culture. The four Noble truths of Buddhism. Vedanta and Indian Culture. Religion and Ethical Practices: The Hindu View.

#### **Suggested Books:**

1. Indian Heritage and Culture by P R Rao, Sterling Publishers Pvt. Ltd.
2. Indian Heritage and Culture by D. Singh, APH Publishing Corporation.

## **19AT006 HUMAN VALUES AND PROFESSIONAL ETHICS**

### **Unit 1**

#### **Human Values**

Morals, Values and Ethics-Integrity-Work Ethics- Service Learning- Civic Virtues- Respect for Others- Living Peacefully-Caring-Sharing-Honesty-Courage-Valuing Time-Cooperation- Commitment- Empathy- Self Confidence-Spirituality

### **Unit 2**

#### **Professional Ethics**

The History of Ethics-Consensus and Controversy- Professional Roles of an Engineer- Professional and Professionalism- Self Interest, Customs and Religion- Engineering and Ethics-Types of Enquiry

### **Unit 3**

#### **Responsibilities and Rights**

Collegiality- Two Senses of Loyalty- Obligations of Loyalty- Professional Rights- Conflicts of Interest, Solving Conflict Problems- Self Interest, Customs and Religion- Ethical Egoism, Collective Bargaining- Confidentiality- Acceptance of Bribes/Gifts- Interests in other companies- Occupational Crimes- Industrial Espionage- Price Fixing- Endangering Lives- Whistle Blowing.

### **Unit 4**

#### **Global Issues**

Globalization- Environmental Ethics-Computer Ethics- Weapons Development- Intellectual Property Rights (IPR)s

#### **Suggested Books:**

1. A Textbook On Professional Ethics and Human Values by R.S, Naagarazan, New Age International-2007
2. Professional Ethics and Human Values by M.P Raghavan, Scitech Publications- 2013
3. A Foundation Course in Human Values and Professional Ethics by R.R. Gaur, R. Sangal, Excel Books -2010

## **19AT007 INTELLECTUAL PROPERTY RIGHTS AND PATENTS**

### **Unit I**

#### **Intellectual Property**

Introduction to Intellectual Property Law – The Evolutionary Past - The IPR Tool Kit- Para -Legal Tasks in Intellectual Property Law – Ethical obligations in Para Legal Tasks in Intellectual Property Law - Introduction to Cyber Law – Innovations and Inventions Trade related Intellectual Property Right

### **Unit II Trade mark**

Introduction to Trade mark – Trade mark Registration Process – Post registration procedures – Trade mark maintenance - Transfer of Rights - Inter parties Proceeding – Infringement - Dilution Ownership of Trade mark –Likelihood of confusion - Trademarks claims – Trademarks Litigations – International Trade mark Law

### **Unit III Copyrights**

Introduction to Copyrights – Principles of Copyright Principles -The subjects Matter of Copy right – The Rights Afforded by Copyright Law – Copy right Ownership, Transfer and duration – Right to prepare Derivative works – Rights of Distribution – Rights of Perform the work Publicity Copyright Formalities and Registrations - Limitations - Copyright disputes and International Copyright Law – Semiconductor Chip Protection Act.

### **Unit IV Trade Secret**

Introduction to Trade Secret – Maintaining Trade Secret – Physical Security – Employee Limitation - Employee confidentiality agreement - Trade Secret Law - Unfair Competition – Trade Secret Litigation – Breach of Contract – Applying State Law

### **Textbook (s)**

1. Deborah E. Bouchoux: “Intellectual Property”. Cengage learning, New Delhi.
2. Prabhuddha Ganguli: ‘ Intellectual Property Rights” Tata Mc-Graw –Hill, New Delhi.

### **Reference (s)**

1. Richard Stim: “Intellectual Property”, Cengage Learning, New Delhi.
2. R. Radha Krishnan, S. Balasubramanian: “Intellectual Property Rights”, Excel Books. New Delhi



## **19AT011 SOCIAL RESPONSIBILITY**

### **Unit I**

#### **Introduction to Social Responsibility**

Meaning and Definition, History of Social Responsibility, Concepts of Charity, Social philanthropy, Citizenship, Sustainability and Stakeholder Management, Environmental aspects of social responsibility.

### **Unit II**

#### **International framework for Social Responsibility**

Millennium Development Goals, Sustainable Development Goals, Relationship between Corporate Social Responsibility and Millennium Development Goals. OECD corporate social responsibility policy tool.

### **Unit III**

#### **Drivers of Social Responsibility in India**

Market based pressure and incentives, civil society pressure, the regulatory environment in India Counter trends, Review of current trends and opportunities in social responsibility, Review of successful corporate initiatives and challenges of social responsibility.

### **Unit IV**

#### **Identifying key stakeholders of Social Responsibility**

Role of Public Sector in Corporate, government programs, Non-profit and Local Self Governance in implementing Social Responsibility, Global Compact Self-Assessment Tool, National Voluntary Guidelines by Govt. of India, Roles and responsibilities of corporate foundations.

### **Reference Book (s)**

1. William B. Werther Jr. and David Chandler, Strategic Corporate Social Responsibility: Stakeholders in a Global Environment, Second Edition, Sage Publications, 2011
2. Sanjay K Agarwal, Corporate Social Responsibility in India, Sage Publications, 2008
3. Mark S. Schwartz, Corporate Social Responsibility: An Ethical Approach, Broadview Press, 2011

## **19AT0013 GENDER EQUALITY FOR SUSTAINABILITY**

### **Unit I**

#### **Understanding Sustainability**

The UN 2030 Agenda for Sustainable Development Goals (SDGs); Interrelating SDG 5 (Gender equality) with other SDGs; Economics and Gender: Issues and Concerns; Women and Education: Role of Education in enhancing gender equality--A Case Study of Malala Yousafzai; Need for Gender Equality for Ensuring Sustainability: Why gender equality must be integral to sustainable development; Empowering women and promoting gender equality; Technology and gender equality

### **Unit II**

#### **Gender Equality: Dimensions**

Women and Health: Importance of good health for gender equality; Women and Governance: promoting equal rights, opportunities and responsibilities for men and women; Women Empowerment: Inevitable foundation for a peaceful, prosperous and sustainable world; Women and Poverty Reduction: Elimination of socioeconomic inequalities and sustainable production by women; Women and Sustainable Consumption: Strategies to make women play a crucial role for and in a circular economy.

### **Unit III**

#### **Gender and Economic Growth**

Role of Women in Economic Growth: productivity, economic diversification, and income equality; Women and Sustainable Production: Role of women as natural resource managers and in waste management; Women and Poverty Eradication through Government Schemes: National/Government and intergovernmental schemes and frameworks to reduce poverty and enhance socioeconomic status of women; Women and Poverty Eradication through Entrepreneurship: Developing and enabling women to be entrepreneurs; Women and Self-Help Groups: Case Studies.

### **Unit IV**

#### **Gender Equality and Public Policy**

Role of Women in Governance: Gender equality in public employment and decision-making process in governance; United Nations and Gender Inclusiveness: UN General Assembly discussions; Role of Local Self Government in Inclusive Growth: Panchayati Raj system in India and women representation; Gender equality and environmental sustainability: gender equality for sustainable ecosystem management; Project-based Leadership and Gender Equality

#### **Textbooks:**

1. Gender Equality and Sustainable Development by Melissa Leach (ed), 1st Edition, Routledge, 2015.

2. Gender Equality in a Global Perspective, Eds: Anders Ortenblad, Raili Marling, Snjezana Vasiljevic; Routledge; 1st edition (January 24, 2017).
3. Transitioning to Gender Equality by Christa Binswanger and Andrea Zimmermann (Eds.), MDPI, 2021. <https://www.mdpi.com/books/pdfdownload/edition/1296>
4. Gender Equality and Public Policy: Measuring Progress in Europe by Paola Profeta, Cambridge University Press, 2020.
5. Gender and Sustainable Development. OECD: <https://www.oecd.org/social/40881538.pdf>

**Reference Materials:**

1. Gender equality handbook by Swedish Civil Contingencies Agency (MSB);2009; <https://www.msb.se/siteassets/dokument/publikationer/english-publications/gender-equality-handbook.pdf>
2. Turning promises into action: Gender equality in the 2030 Agenda for Sustainable Development, UN Women Headquarters, 2018. <https://www.climateinvestmentfunds.org/sites/default/files/sdg-report-gender-equalityin-the-2030-agenda-for-sustainable-development-2018-en.pdf>
3. GENDER EQUALITY AS AN ACCELERATOR FOR ACHIEVING THE SUSTAINABLE DEVELOPMENT GOALS. Discussion Paper by The United Nations Development Programme (UNDP), 2018.
4. 2021 Report on Gender Equality in the EU. European Commission, 2021. [https://ec.europa.eu/info/sites/default/files/aid\\_development\\_cooperation\\_fundamental\\_rights/annual\\_report\\_ge\\_2021\\_en.pdf](https://ec.europa.eu/info/sites/default/files/aid_development_cooperation_fundamental_rights/annual_report_ge_2021_en.pdf)
5. Global Gender Gap Report 2021. World Economic Forum, 2021. [https://www3.weforum.org/docs/WEF\\_GGGR\\_2021.pdf](https://www3.weforum.org/docs/WEF_GGGR_2021.pdf)

## **19AT014 WOMEN IN LEADERSHIP**

### **Unit-I**

#### **Education, Employment and Empowerment**

Higher education for women, strategies to implement women's education in rural areas – Women's reservation in education sector, Formal and non-formal ways to education, National Literacy Mission, Traditions, maintaining family honour as strategies to curb financial independence

### **Unit-II**

#### **Roles of Women in Family and Society**

Archaeology of the evolution of women's role – Gender roles in the domestic sphere – Kitchen space feminism – Gender roles in the social sphere – Matriarchy and Matrilineal societies

### **Unit-III**

#### **Women in Sports**

Physical and Psychological effects of Sports on women – Socio-cultural and economic factors that deter Women's talent in Sports – Against all the odds- Narratives of Women athletes and Sport Stars – Serena Williams, Saina Nehwal, Sania Mirza, Deepika Palikal, Mary Kom – Gender testing, Drug tests and other issues related to sex determination process in sports

### **UNIT-IV**

#### **Women Entrepreneurship**

Significance of women entrepreneurship, Challenges faced by Women Entrepreneurs, - Relationship between Entrepreneurship and empowerment, Evolution of women entrepreneur development programme, Trends and Patterns of Women Entrepreneurship

#### **Text Books:**

1. Haque, T. 2015. Empowerment of Rural Women in Developing Countries: Challenges and Pathways. New Delhi: Concept Publishing Company. Sen, Amartya. Development and Freedom. New Delhi: Oxford University Press, 2000.
2. Agarwal, Suresh. 2015. Social Problems in India. New Delhi: Rajat Publications. Daly, Mary. Beyond God the Father.

#### **Reference Text Books:**

1. Drinkwater, Barabara, Ed. 2000. Women in Sport. Oxford: Blackwell Science.
2. Hisrich, Robert D., Michael Peters and Dean Shepherded-“ Entrepreneurship “ 9th Tata McGraw Hill 2012.
3. Peter F. Drucker “Innovation and Entrepreneurship”, Reprint Heinemann 2006

## **19AT016 CLIMATE CHANGE AND CIRCULAR ECONOMY**

### **Unit I**

**Introduction:** Climate in the Spotlight, -The Spectrum of Scientific Opinion, -Pundits, Advocates and Apocalypse, - The Earth's Natural Greenhouse Effect -, -Why the Earth is a Nice Place to Live, -The Radioactive Balance, -The Importance of Water-Greenhouse Gases- The Role of Carbon Dioxide, -The Role of Methane, -Major Uncertainties CO<sub>2</sub> Emissions - Human Emissions of CO<sub>2</sub>, -How Much Carbon in the Ground?, -Different Concerns of Rich and Poor Countries, the Earths Carbon Reservoirs -What is Biogeochemistry?, -Why is the Atmospheric Carbon Reservoir so Small?, -Breathing of Gaia, -The Missing CO<sub>2</sub> Sink Carbon Cycling: Some Examples -The Physical Carbon Pump, -The Biological Carbon Pump, -The Marine Carbon Cycle, -The Terrestrial Carbon Cycle Climate and Weather -Climate and Weather: Some Definitions, -The Earth's Climate Machine.

### **Unit II**

**Global Wind Systems:** Trade Winds and the Hadley Cell, -The Highs and Lows of the Westerlies, -The Vital Importance of Monsoon Rains, -Why are there Seasons, Clouds, Storms and Climate -Cloud Formation and Climate, - Hurricanes and Global Warming Global Ocean Circulation -Introduction and Overview, -Strawberries in Norway, - The Icelandic Whirlpool, -Origin of the Gulf Stream, -The Deep Atlantic Conveyor : El Niño and the Southern Oscillation -El Niño and its Effects, -Upwelling and Climate Outlook for the Future -Introduction to Climate Change, - Advances in Computer Modelling, -Physics versus Fudge Factors.

### **Unit III**

**Introduction to circular economy:** Purpose of circular economy, Circular sustainability, Challenges for circular economy Concept of sustainable development, Sustainable processes technologies and Critical assessment on current sustainable technologies. Circular bio economy, Circular Business Models. Circular business models to create economic and social value.

### **Unit IV**

**Circular economy policy framework:** Universal circular economy policy goals, role of governments and networks and how policies and sharing best practices can enable the circular economy. Circular economy towards zero waste: circular economy and waste sector, waste management in the context of circular economy LCA : An Introduction to Sustainability Concepts and Life Cycle Analysis , Environmental Data Collection and LCA Methodology Life Cycle Assessment – Detailed Methodology and ISO Framework Life Cycle Inventory and Impact Assessments, Factors for Good LCA Design for Sustainability.

**Reference Book(s)**

1. Webster, K. Circular Economy: A Wealth of Flows. Ellen MacArthur Foundation, 2nd Edition, 2016.
2. McDonough, William, and Michael Braungart. Cradle to Cradle: Remaking the Way We Make Things. New York: North Point, 2002.
3. Raworth, K. Doughnut Economics. Seven Ways to Think Like a 21st -Century Economist. Random House, 2017. Print.
4. Ellen MacArthur Foundation, "Delivering the Circular Economy: A Toolkit for Policymakers" Ellen MacArthur Foundation. 2015.
5. A. Tukker, et al, "The Impacts of Household Consumption and Options for Change," Journal of Industrial Ecology, Vol. 14: 13-39, 2010

## **20BEA01 ENVIRONMENTAL STUDIES**

### **Unit I**

**Multidisciplinary nature of Environmental Studies and Natural Resources** Definition, Scope and Importance, Multidisciplinary nature of Environmental Studies, Value of Nature - Productive, Aesthetic/Recreation, Option, Need for Public Awareness, Institutions (BNHS, BVIEER, ZSI, BSI) and People in Environment (Medha Patkar, Sundarlal Bahuguna, Indira Gandhi, Rachael Carson). Natural Resources: Renewable and Non-renewable resources – Importance, uses, overexploitation/threats, and conservation of (i) forest (ii) water (iii) mineral (iv) food and (v) energy resources. (The topics include benefits and problems associated with dams, mining and case studies), role of an individual in conservation of natural resources.

### **Unit II**

#### **Ecosystem & Biodiversity**

Ecosystems: Concept of an ecosystem, Structure and function of an ecosystem, Biogeological cycles (Energy flow, Carbon and Nitrogen Cycles), Ecological succession, Food chains, food webs and ecological pyramids. Introduction, types, characteristic features, structures and functions of the following ecosystems: a. Forest Ecosystem b. Aquatic Ecosystem Biodiversity and its Conservation: Definition and levels of biodiversity, Bio-geographical classification of India, hot spots of biodiversity - India as a mega diversity nation, Threats to biodiversity, Endangered and endemic species of India, Conservation of biodiversity: In-situ and Ex-situ conservation.

### **Unit III**

#### **Environmental Pollution & Social Issues**

Environmental Pollution: Definition, Cause, effects, control measures and case studies of: Air pollution b. Water pollution c. Soil pollution Solid waste Management: Causes, effects and control measures of urban and industrial wastes. Disaster management (floods and cyclones) Social Issues and the Environment: Sustainability, Urban problems related to energy, Water conservation and watershed management, Resettlement and rehabilitation of people; Environmental ethics: Issues and possible solutions, global warming, ozone layer depletion, Consumerism and waste products

### **Unit IV**

#### **Human Population and the Environmental Acts**

Human Population and the Environment: Population growth, Affluence, Technology and Environmental Impact (Master Equation), Population explosion and Family Welfare Programme, Value Education, HIV/AIDS, Women and Child Welfare, Role of information Technology in Environment and human health. Environment Protection Acts: Air (Prevention and Control of Pollution) Act, Water (Prevention and control of Pollution) Act, Wildlife Protection Act and Forest Conservation Act. Issues involved in enforcement of environmental legislation



**Text Book(s) and Reading Material (s)**

1. E. Bharucha, Textbook of Environmental Studies, 1st Ed., University Press (India) Pvt. Ltd., 2005.
2. W.P. Cunningham, M.A. Cunningham, Principles of Environmental Science, 6th Ed., Tata McGraw Hill, 2008.
3. A. Kaushik, C.P. Kaushik, Perspectives in Environmental Studies, 4th Ed., New Age International Publishers, 2008.
4. H.S. Peavy, D.R. Rowe, G. Tchobanoglous, Environmental Engineering, 1st Ed., McGraw Hill Int. ed., 1984.
5. T.E. Graedel, B.R. Allenby, Industrial Ecology and Sustainable Engineering, 1st Ed., Pearson Publications, 2009.
6. <http://172.30.1.222/wbc/it/schedule.aspx>.
7. <http://172.30.1.8/wbc/it/coursepage.aspx>.
8. <https://www.edx.org/course/environmental-protection-and-sustainability>

### **Course Outcomes**

1. Summarize the principles of solar energy systems
2. Demonstrate the applications of solar energy system
3. Illustrate the working principles of wind and biomass energy systems
4. Interpret working principles of geothermal energy system
5. Summarize operation and classification of ocean, tidal, fuel cells, small hydro and magneto hydro energy system
6. Extend renewable energy sources to distributed generation & micro grids

### **Unit I**

#### **Introduction & Solar Energy**

Introduction to renewable energy, advantages of generating power through renewable energy sources – technical & economical, **Solar Energy**: Physics of sun, the solar constant, extra-terrestrial and terrestrial solar radiation, instruments for measuring solar radiation and sun shine. Flat Plate and Concentrating Collectors, classification of concentrating collectors, thermal analysis of flat plate collectors, Photo voltaic energy conversion, PV cell model and characteristics, Maximum power point tracking for photovoltaic power systems. Types of Maximum power point tracking methods (Perturb and Observe (hill climbing), Incremental Conductance, Fractional short circuit current, Fractional open circuit voltage) *Solar applications-solar heating /cooling technique*

**12+4 Hours**

### **Unit II**

#### **Wind & Bio-Mass Energy**

Sources and potentials, horizontal and vertical axis windmills, performance characteristics, Betz criteria, maximum power point tracking for wind, types of Maximum power point tracking methods Principles of Bio-Conversion, Anaerobic/aerobic digestion, Types of Bio-Gas Digesters, gas yield, Combustion characteristics of bio-gas, *Utilization for cooking, IC.Engine operation*

**12+4 Hours**

### **Unit III**

#### **Energy Conversion systems**

**Geothermal & Ocean Energy**: Types of Resources (hydrothermal, geo-pressured, hot dry rock), types of wells, and methods of harnessing the energy (vapour dominated, liquid dominated). Ocean thermal energy conversion, principles, Open loop & closed loop OTEC Cycles. Tidal energy- potential, conversion techniques-single basin, two basin system. Wave energy: conversion techniques.

Fuel cells-Principle of working of various types of fuel cells and their working, Magneto-hydrodynamics

(MHD)-Principle of working of MHD Power plant, Hydrogen generation, battery energy storage system.

*Wave, tidal power conversion systems & Small hydro power generation*

**11+3Hours**

#### **Unit IV**

##### **Distributed generation & Micro-grid**

Define grid, distributed generation(DG) & microgrid, importance of DG & microgrid, typical structure and configuration of a microgrid, AC and DC microgrids, modes of operation and control of microgrid: grid connected and islanded mode, anti-islanding schemes: passive, active and communication based techniques.

*HVDC microgrid system*

**10+4 Hours**

**Total: 45+15=60 Hours**

##### **Textbook (s)**

1. G.D. Rai , Non-Conventional Energy Sources, Khanna Publishers, 1stEdition, 2000.
2. B H Khan, Non-conventional energy resources, Tata McGraw Hill Education Private Limited, 2ndEdition, 2001.
3. Alexis Kwasinski , Wayne Weaver, Robert S. Balog, Micro grids and other local area power and energy systems, Cambridge University Press, 1st Edition, 2016

##### **Reference (s)**

1. Tiwari and Ghosal, Renewable energy resources, Narosa Publishing house, 2ndEdition, 2001
2. Ranjan Rakesh, Kothari D. P. & Singal K. C., Renewable Energy Sources And Emerging Technologies, PHI, 2ndEdition, 2013.
3. Nikos Hatziaargyriou, Micro grids: Architectures and Control, wiley, 1st Edition.
4. Electricity Act 2003, Renewable Energy Act 2015.
5. Indian Constitution-Articles 51A, 47, 48A.

## **16AT002 Indian Heritage and Culture**

### **Unit I**

#### **Fundamental Unity of India**

Harappan and Vedic Culture- evolution of Caste system – Jainism and Buddhism Gandhara Art. Political unification of India under Mauryas and Guptas –Cultural achievements. Cultural condition under the Satavahanas – Contribution of Pallavas and Cholas to Art and Letters. Cholas Administrative System. Influence of Islam on the India Culture. The SufiBhakti and Vishnavite movements. Cultural achievements of Vijayanagara rulers Contribution of Shershah and Akbar to the evolution of Administrative system in India- Cultural Developments under Mughals.

### **Unit II**

#### **Westren Impact on India**

Introduction of Western Education Social and Cultural awakening and social reform movements. Raja Rama Mohan Roy – Dayananda Saraswathi – Theosophical Society – Ramakrishna Paramahansa and Vivekananda – Iswara Chandra Vidyasagar and Veeresalingam-Enancipation of women and struggle against caste – Rise of Indian Nationalism – Mahatma Gandhi – Nonviolence and Satyagraha – Education of untouchability – Legacy of British Rule.

### **Unit III**

#### **Culture and its salient features**

Meaning, Definition and various inter relations of Culture.  
The Vedic – Upanishadic Culture and society. Human aspirations in those societies Values – Chaturvidha Purusharthas – Chaturvarna Theory – Cheturasrama Theory.  
The Culture in Artha Sastra, Kautilyan conception of the function of Philosophy, State, Religion and king.

### **Unit IV**

#### **Culture in Ramayana and Mahabharata**

The Ideal Man and Woman, Concepts Maitri, Karuna, Seela, Vinaya, Kshama, Santi, Anuraga – as exemplified in the stories and anecdotes of the Epics.  
The Culture of Jainism: Jaina conception of Soul, Karma and liberation, Buddhism as a Humanistic culture. The four Noble truths of Buddhism.  
Vedanta and Indian Culture. Religion and Ethical Practices: The Hindu View.

#### **Suggested Books:**

1. Indian Heritage and Culture by P R Rao, Sterling Publishers Pvt. Ltd.
2. Indian Heritage and Culture by D. Singh, APH Publishing Corporation.

**Course Outcomes**

1. Understand various terms related to sustainability.
2. Understand the estimation and valuation of different energy sources
3. Identify the key issues and lessons learned for sustainable development
4. Analyze the technical performance of sustainability.
5. Examine the interaction of energy systems with the environment.
6. Identify the environmental benefits and implications of sustainable energy.

**COs – POs Mapping**

COs	PO 1	PO 2	PO1 2	PSO2
1	2	1	1	2
2	3	2	2	2
3	2	1	2	2
4	2	1	1	2
5	3	2	2	2
6	1	2	2	2

3–Strongly linked | 2–Moderately linked| 1–Weakly linked

**Unit-I**

**Fundamentals of Sustainable Energy**

Sustainable Energy Systems: Issues for the 21<sup>st</sup> century, Critical challenges for a sustainable energy future, definitions, indicators, Key energy stakeholders, Energy: conservation, efficiency.

*investments and divestments.*

**(11+4 Hours)**

**Unit-II**

**Estimations and Evaluation of Energy resources**

Units of measurement: Energy and Power, comparison of different forms of energy, the energy life cycle, estimation and valuation of fossil mineral fuels, estimation and valuation of Nuclear Fuel Resources, Estimation and Valuation of Renewable Energy Resources.

*Lessons for Sustainable Development*

**(11+4 Hours)**

**Unit III**

**Technical Performance: Efficiency and Production Rates**

The Relation of Technical Performance to Sustainability, An Introduction to Methods of Thermodynamic Analysis, The Importance of Rate Processes in Energy Conversion, Chemical Rate Processes, The Physical Transport of Heat, Energy Requirements for Gas Separation Processes, Use and Abuse of Time Scales,

*Energy Resources and Energy Conversion: Fertile Common Ground.*

**(12+4 Hours)**

**Unit IV**

**Local, Regional, and Global Environmental Effects of Energy**

How Energy Systems Interact with the Environment, Adverse Environmental Effects over Local and Regional Length Scales, Global Climate Change: Environmental Consequences

over Planetary Length Scales, Attribution of Environmental Damage to Energy Utilization, Methods of Environmental Protection, Environmental Benefits of Energy,  
*Implications for Sustainable Energy.*

**(11+3 Hours)**

**(Total: 45+15 Hours)**

**Textbook (s)**

1. Jefferson W. Tester, Elisabeth M. Drake, Michael J. Driscoll, Michael W. Golay, and William A. Peters "Sustainable Energy: Choosing among options" Second edition, The MIT Press Cambridge, Massachusetts London, England, 2012.
2. Frank kreith, Susan krumdieck, "Principles of sustainable energy systems", second edition, CRC Press, Taylor and Francis group, 2008.

**Reference book (s)**

1. Ibrahim Dincer and Marc A. Rosen (Eds.), "Exergy. Energy, Environment and Sustainable Development" second edition, Elsevier sciences, 2013
2. Course readings and other reference are available on Canvas:  
<https://umich.instructure.com/>
3. US Department of Energy, Energy Information Administration:  
<http://www.eia.doe.gov/>
4. International Energy Agency: <http://iea.org/>
5. US DOE Office of Energy Efficiency and Renewable Energy (EERE)  
<http://energy.gov/eere/office-energy-efficiency-renewable-energy>
6. Renewable Energy World News and Network:  
<http://www.renewableenergyworld.com/>
7. OpenEnergyInfo Gateway to world energy information/ data  
[http://en.openei.org/wiki/Main\\_Page](http://en.openei.org/wiki/Main_Page)

**20EE002 Renewable Energy Sources**

**3 1 0 3**

**Course Outcomes**

1. Outline the operation of solar energy system
2. Summarize the operation of wind and biomass energy systems
3. Develop solar/wind energy systems for a given application
4. Interpret working principles of geothermal energy system
5. Summarize the operation of ocean, tidal, fuel cells, small hydro and magneto hydro energy system
6. Extend renewable energy sources to direct energy conversions & micro grids

**COs – POs Mapping**

COs	PO <sub>2</sub>	PO <sub>7</sub>
1	2	3
2	2	3
3	3	3
4	2	3
5	2	3
6	2	3

3–Strongly linked | 2–Moderately linked | 1–Weakly linked

**Unit I**

**Introduction & Solar Energy**

Introduction to renewable energy, advantages of generating power through renewable energy sources – technical & economical, Solar Energy: Physics of sun, the solar constant, extra-terrestrial and terrestrial solar radiation, instruments for measuring solar radiation and sun shine. Flat Plate and Concentrating Collectors, classification of concentrating collectors, thermal analysis of flat plate collectors, Photo voltaic energy conversion, PV cell model and characteristics, Maximum power point tracking for photovoltaic power systems. Types of Maximum power point tracking methods Perturb and Observe.

*Solar applications-solar heating /cooling technique*

**(12+4 Hours)**

**Unit II**

**Wind & Bio-Mass Energy**

Sources and potentials, horizontal and vertical axis windmills, performance characteristics, Betz criteria, Maximum power generation. Principles of Bio-Conversion, Anaerobic/aerobic digestion, Types of Bio-Gas Digesters, gas yield, Combustion characteristics of bio-gas.

*Utilization for cooking, IC Engine operation*

**(12+4 Hours)**

**Unit III**

**Geothermal & Ocean Energy**

Types of Resources (hydrothermal, geo-pressured, hot dry rock), types of wells, and methods of harnessing the energy (Vapour dominated, liquid dominated), Ocean thermal energy conversion, principles, Open loop & closed loop OTEC Cycles. Tidal energy- potential, conversion techniques-single basin, two basin system. Wave energy: conversion techniques.

*Captive power plant*

**(11+4 Hours)**



#### **Unit IV**

##### **Direct energy conversion & introduction to Micro-grid**

Fuel cells-Principle of working of various types of fuel cells and their working, Hydrogen generation, battery energy storage system. Magneto-hydrodynamics (MHD)

Define grid, microgrid, importance of DG & microgrid, typical structure and configuration of a microgrid, AC and DC microgrids, modes of operations (grid connected & islanded).

*Distributed generation (DG)*

**(10+3Hours)**

**(Total: 45+15=60 Hours)**

##### **Textbook (s)**

1. G.D. Rai, "*Non-Conventional Energy Sources*", Khanna Publishers, 2<sup>nd</sup> Edition, 2017.
2. B H Khan, "*Non-conventional energy resources*", Tata McGraw Hill Education Private Limited, 3<sup>rd</sup> Edition, 2015.
3. Alexis Kwasinski , Wayne Weaver, Robert S. Balog, "*Micro grids and other local area power and energy systems*", Cambridge University Press, 1<sup>st</sup> Edition, 2016

##### **Reference (s)**

1. Tiwari and Ghosal, "*Renewable energy resources*", Narosa Publishing house, 2<sup>nd</sup> Edition, 2001
2. Ranjan Rakesh, Kothari D. P. & Singal K. C., "*Renewable Energy Sources and Emerging Technologies*", PHI, 2<sup>nd</sup> Edition, 2013.
3. Nikos Hatziaargyriou, "*Micro grids: Architectures and Control*", Wiley, 1<sup>st</sup> Edition.
4. Electricity Act 2003, Renewable Energy Act 2015.
5. Indian Constitution-Articles 51A, 47, 48A.

**20EE017 Sustainable Energy**

**3 1 0 3**

**Course Outcomes**

1. Understand various terms related to sustainability.
2. Understand the estimation and valuation of different energy sources
3. identify the key issues and lessons learned for sustainable development
4. Analyze the technical performance of sustainability.
5. Examine the interaction of energy systems with the environment.
6. Identify the environmental benefits and implications of sustainable energy.

**COs - POs Mapping**

COs	PO 1	PO 2	PO1 2	PSO2
1	2	1	1	2
2	3	2	2	2
3	2	1	2	2
4	2	1	1	2
5	3	2	2	2
6	1	2	2	2

3-Strongly linked | 2-Moderately linked| 1-Weakly linked

**Unit-I**

**Fundamentals of Sustainable Energy**

Sustainable Energy Systems: Issues for the 21<sup>st</sup> century, Critical challenges for a sustainable energy future, definitions, indicators, Key energy stakeholders, Energy: conservation, efficiency.

*investments and divestments.*

**(11+4 Hours)**

**Unit-II**

**Estimations and Evaluation of Energy resources**

Units of measurement: Energy and Power, comparison of different forms of energy, the energy life cycle, estimation and valuation of fossil mineral fuels, estimation and valuation of Nuclear Fuel Resources, Estimation and Valuation of Renewable Energy Resources.

*Lessons for Sustainable Development*

**(11+4 Hours)**

**Unit III**

**Technical Performance: Efficiency and Production Rates**

The Relation of Technical Performance to Sustainability, An Introduction to Methods of Thermodynamic Analysis, The Importance of Rate Processes in Energy Conversion, Chemical Rate Processes, The Physical Transport of Heat, Energy Requirements for Gas Separation Processes, Use and Abuse of Time Scales,

*Energy Resources and Energy Conversion: Fertile Common Ground.*

**(12+4 Hours)**

**Unit IV**

**Local, Regional, and Global Environmental Effects of Energy**

How Energy Systems Interact with the Environment, Adverse Environmental Effects over Local and Regional Length Scales, Global Climate Change: Environmental Consequences

over Planetary Length Scales, Attribution of Environmental Damage to Energy Utilization, Methods of Environmental Protection, Environmental Benefits of Energy,  
*Implications for Sustainable Energy.*

**(11+3 Hours)**

**(Total: 45+15 Hours)**

**Textbook (s)**

1. Jefferson W. Tester, Elisabeth M. Drake, Michael J. Driscoll, Michael W. Golay, and William A. Peters "Sustainable Energy: Choosing among options" Second edition, The MIT Press Cambridge, Massachusetts London, England, 2012.
2. Frank kreith, Susan krumdieck, "Principles of sustainable energy systems", second edition, CRC Press, Taylor and Francis group, 2008.

**Reference book (s)**

1. Ibrahim Dincer and Marc A. Rosen (Eds.), "Exergy. Energy, Environment and Sustainable Development" second edition, Elsevier sciences, 2013
2. Course readings and other reference are available on Canvas:  
<https://umich.instructure.com/>
3. US Department of Energy, Energy Information Administration:  
<http://www.eia.doe.gov/>
4. International Energy Agency: <http://iea.org/>
5. US DOE Office of Energy Efficiency and Renewable Energy (EERE)  
<http://energy.gov/eere/office-energy-efficiency-renewable-energy>
6. Renewable Energy World News and Network:  
<http://www.renewableenergyworld.com/>
7. OpenEnergyInfo Gateway to world energy information/ data  
[http://en.openei.org/wiki/Main\\_Page](http://en.openei.org/wiki/Main_Page)

## **20AT005 Indian Heritage and Culture**

### **Unit I**

#### **Fundamental Unity of India**

Harappan and Vedic Culture- evolution of Caste system – Jainism and Buddhism Gandhara Art. Political unification of India under Mauryas and Guptas –Cultural achievements. Cultural condition under the Satavahanas – Contribution of Pallavas and Cholas to Art and Letters. Cholas Administrative System. Influence of Islam on the India Culture. The SufiBhakti and Vishnavite movements. Cultural achievements of Vijayanagara rulers Contribution of Shershah and Akbar to the evolution of Administrative system in India- Cultural Developments under Mughals.

### **Unit II**

#### **Westren Impact on India**

Introduction of Western Education Social and Cultural awakening and social reform movements. Raja Rama Mohan Roy – Dayananda Saraswathi – Theosophical Society – Ramakrishna Paramahansa and Vivekananda – Iswara Chandra Vidyasagar and Veeresalingam-Enancipation of women and struggle against caste – Rise of Indian Nationalism – Mahatma Gandhi – Nonviolence and Satyagraha – Education of untouchability – Legacy of British Rule.

### **Unit III**

#### **Culture and its salient features**

Meaning, Definition and various inter relations of Culture. The Vedic – Upanishadic Culture and society. Human aspirations in those societies Values – Chaturvidha Purusharthas – Chaturvarna Theory – Cheturasrama Theory. The Culture in Artha Sastra, Kautilyan conception of the function of Philosophy, State, Religion and king.

### **Unit IV**

#### **Culture in Ramayana and Mahabharata**

The Ideal Man and Woman, Concepts Maitri, Karuna, Seela, Vinaya, Kshama, Santi, Anuraga – as exemplified in the stories and anecdotes of the Epics. The Culture of Jainism: Jaina conception of Soul, Karma and liberation, Buddhism as a Humanistic culture. The four Noble truths of Bhuddhism. Vedanta and Indian Culture. Religion and Ethical Practices: The Hindu View.

#### **Suggested Books:**

1. Indian Heritage and Culture by P R Rao, Sterling Publishers Pvt. Ltd.
2. Indian Heritage and Culture by D. Singh, APH Publishing Corporation.

## **20AT006 Human Values and Professional Ethics**

### **Unit 1**

#### **Human Values**

Morals, Values and Ethics-Integrity-Work Ethics- Service Learning- Civic Virtues- Respect for Others- Living Peacefully-Caring-Sharing-Honesty-Courage-Valuing Time- Cooperation- Commitment- Empathy- Self Confidence- Spirituality

### **Unit 2**

#### **Professional Ethics**

The History of Ethics-Consensus and Controversy- Professional Roles of an Engineer- Professional and Professionalism- Self Interest, Customs and Religion- Engineering and Ethics-Types of Enquiry

### **Unit 3**

#### **Responsibilities and Rights**

Collegiality- Two Senses of Loyalty- Obligations of Loyalty- Professional Rights- Conflicts of Interest, Solving Conflict Problems- Self Interest, Customs and Religion- Ethical Egoism, Collective Bargaining- Confidentiality- Acceptance of Bribes/Gifts- Interests in other companies- Occupational Crimes- Industrial Espionage- Price Fixing- Endangering Lives- Whistle Blowing.

### **Unit 4**

#### **Global Issues**

Globalization- Environmental Ethics-Computer Ethics- Weapons Development- Intellectual Property Rights (IPR)s

### **Suggested Books:**

1. A Textbook On Professional Ethics and Human Values by R.S, Naagarazan, New Age International-2007
2. Professional Ethics and Human Values by M.P Raghavan, Scitech Publications-2013
3. A Foundation Course in Human Values and Professional Ethics by R.R. Gaur, R. Sangal, Excel Books -2010

## **16ME015 Energy and Environmental Engineering**

### **Unit- I**

#### **Introduction to Pollution-Effects and Analysis**

Pollution of air, water, and soil; Effect of pollution on living system. Sources and classification of air pollutants, Effect of air pollution, Pollution from industries, Chemical reactions in a contaminated atmosphere, urban air pollution, Greenhouse effect, Ozone layer depletion, Acid rain, Photo chemical smog, Meteorological aspects of air pollution. Collection of gaseous and particulate pollutants, Analysis of air pollutants – Sulphur dioxide, Nitrogen oxides, Carbon monoxide, Oxidants and Ozone Analysis of air pollutants-Hydrocarbons and Particulate matter

### **Unit- II**

#### **Air and Water Pollution Control**

Cleaning of gaseous effluents, Particulate emission control, Control of specific gaseous pollutants SO<sub>2</sub>, NO<sub>x</sub>, Hydrocarbons, CO, Carbon capture and carbon trading, Types of water pollutants and their effects, Thermal pollution and effects, Water pollution laws and standards, Waste water sampling and analysis Treatment of waste water (primary, secondary and tertiary treatment processes)

### **Unit- III**

#### **Energy conversion from waste**

Sources and classification of wastes, Energy generation from wastes - Biochemical vs. Thermo-chemical Conversion and their environment benefits, Introduction to Biochemical conversion (anaerobic digestion); Thermo-chemical conversion processes - direct combustion, incineration, pyrolysis, gasification and liquefaction; Economics of thermo-chemical conversion, Industrial applications of incinerators and gasifiers; Briquetting Utilization and advantages of briquetting

### **Unit- IV**

#### **Energy Conservation in industry**

Energy Conservation and its Importance; Energy Strategy for the Future; The Energy Conservation Act, 2001 and its Features, Energy conservation in Boilers, Steam Turbines and Cooling Towers; Waste Heat Recovery: Introduction; Classification and Application; Benefits of Waste Heat Recovery. Development of a Waste Heat Recovery System.

### **Textbook(s)**

1. C. S. Rao, Environmental pollution control engineering, New age International Pvt. Ltd, 2nd Edition, Reprint 2015.
2. M. N. Rao and M. V. N. Rao, Air pollution, Tata Mc Graw Hill, 2nd Edition, 2014.

### **Reference(s)**

1. Parker, Colin, & Roberts, Energy from Waste - An Evaluation of Conversion Technologies, Elsevier Applied Science, London, 1st Edition, 1985.
2. Reay, D.A, Industrial Energy Conservation, Pergamon Press, 1st Edition, 1977.  
George Tchobanoglo

## **16ME009 Professional Ethics in Engineering**

### **Unit- I**

#### **Human Values**

Morals, values and Ethics – Integrity – Work ethic – Service learning – Civic virtue – Respect for others – Living peacefully – Caring – Sharing – Honesty – Courage – Valuing time – Cooperation – Commitment – Empathy – Self-confidence – Character – Spirituality – Introduction to Yoga and meditation for professional excellence and stress management.

### **Unit- II**

#### **Engineering Ethics**

Senses of „Engineering Ethics“ – Variety of moral issues – Types of inquiry – Moral dilemmas – Moral Autonomy – Kohlberg’s theory – Gilligan’s theory – Consensus and Controversy – Models of professional roles - Theories about right action – Self-interest – Customs and Religion – Uses of Ethical Theories

### **Unit- III**

#### **Engineering as Social Experimentation**

Engineering as Experimentation – Engineers as responsible Experimenters – Codes of Ethics – A Balanced Outlook on Law. Professional Bodies IEEE, IETE, IE, ASME, ASCE, ABET, NSPE, ISTE, IChE, etc.,

### **Unit- IV**

#### **Engineering as Social Experimentation**

Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis and Reducing Risk - Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Professional Rights – Employee Rights – Intellectual Property Rights (IPR) – Discrimination Global Issues Multinational Corporations – Environmental Ethics – Computer Ethics – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Moral Leadership –Code of Conduct – Corporate Social Responsibility

### **Textbook(s)**

1. Mike W. Martin and Roland Schinzinger, Ethics in Engineering, Tata McGraw Hill, New Delhi, 2003.
2. Govindarajan M, Natarajan S, Senthil Kumar V. S, Engineering Ethics, Prentice Hall of India, New Delhi, 2004.

### **Reference(s)**

1. Charles B. Fleddermann, Engineering Ethics, Pearson Prentice Hall, New Jersey, 2004.
2. Charles E. Harris, Michael S. Pritchard and Michael J. Rabins, Engineering Ethics – Concepts and Cases, Cengage Learning, 2009.
3. John R Boatright, Ethics and the Conduct of Business, Pearson Education, New Delhi, 2003
4. Edmund G Seebauer and Robert L Barry, Fundamentals of Ethics for Scientists and Engineers, Oxford University Press, Oxford, 2001.



## **19ME004 ALTERNATE FUELS AND EMISSION CONTROL IN AUTOMOTIVES**

### **Unit- I**

#### **Need for Alternative Fuels and Liquid fuels:**

Need for Alternative Fuels, availability and comparative properties of alternate fuels, classification of alternative fuels. Liquid fuels Alcohol: Sources of Methanol and Ethanol, Properties of Methanol and Ethanol. Use of alcohols in S.I. and C.I. engines, performance of blending methanol with gasoline. Bio Diesels: raw materials used for production of Bio Diesel (Karanja oil, Neem oil, Sunflower oil, Soyabean oil, Mustard oil, Palm oil, Jatropha seeds). The process of preparation of Bio-diesel performance of Engine with biodiesel-diesel blends.

### **Unit- II**

#### **Gaseous fuels**

Gaseous Fuels - Availability, properties, and engine modifications required. Hydrogen as a substitute fuel. Study Properties, Sources and methods of Production of Hydrogen, Storage and Transportation of hydrogen. Application and advantages of liquid hydrogen used as fuel in IC engines. Biogas: Introduction to Biogas system, Process during gas formation, Factors affecting biogas formation. Biogas used as fuel in the SI & CI engines. LPG & CNG: Properties of LPG & CNG, fuel metering systems, performance and emission analysis. Fuel Cells: Concept of fuel cells and Layout of fuel cell vehicle.

### **Unit- III**

#### **Solar and Electric vehicles**

Solar cells for energy collection. Storage batteries for solar energy, Layout of solar powered automobiles, advantages and limitations of solar powered vehicles. Layout of an electric vehicles, advantages & limitations. Systems components, electronic controlled systems, high energy and power density batteries. Maintenance of hybrid vehicle

### **Unit- IV**

#### **Emission measurement and control**

Effects of constituents of Exhaust gas emission on environmental condition of earth (HC, CO<sub>2</sub>, CO, NO<sub>x</sub>, SO<sub>2</sub> and O<sub>2</sub>). Bharat Emission norms, Measurement & instrumentation for HC, CO<sub>2</sub>, CO, NO<sub>x</sub> & PM, smoke meters, calibration checks on emission equipment's, SI engine emission control: Engine design and fuel system parameters, Engine Department of Mechanical Engineering, GMRIT | Syllabus under Academic Regulation 2020 add-ons to enable reduction of engine-out emissions and Exhaust after treatment. CI engine emission control: Diesel Oxidation Catalyst, Impact of Sulphur on Oxidation Catalysts. Filters NO<sub>x</sub> Reduction: Exhaust Gas Recirculation, Lean NO<sub>x</sub> Catalysts NO<sub>x</sub> Absorber Catalysts Selective catalytic reduction.

#### **Textbook(s)**

1. V. Ganeshan, Internal Combustion Engines, McGraw Hill publishers, 4<sup>th</sup> Edition, 2017
2. A.K.Babu, Electric & Hybrid Vehicles, Khanna Books, 1<sup>st</sup> Edition, 2019
3. G. Amba Prasad Rao, T. Karthikeya Sharma, Engine Emission Control Technologies, Apple Academic Press, 1<sup>st</sup> Edition, 2020

#### **Reference(s)**

1. Tom Denton, Alternative Fuel Vehicles, Taylor & Francis, 7<sup>th</sup> Edition, 2019
2. John B Heywood, Internal Combustion Engines, McGraw Hill Education, 1<sup>st</sup> Edition, 2017
3. Simona, Hybrid Electric Vehicles, Springer India, 1<sup>st</sup> Edition, 2019.

## **19MEC33 Quality Assurance and Reliability Engineering for Sustainability**

### **Unit- I**

Quality Assurance Tools and Techniques- Concept of quality characteristics, Value of quality, Quality of design and conformance, Process capability, selective assembly, concept in total quality control and quality system, Quality assurance for sustainability.

### **Unit- II**

Statistical Quality Control- Quality cost aspects. Job plan. Case study in value analysis. Process control, Concept of S.Q.C. control chart for variable additives and attributes. Multi characteristics control chart. Acceptance sampling plan, single, Double and sequential sampling, ACL, LTPD concept. AOQL and rectification plan. Economic of inspection. Motivation for quality assurance. Total quality management principles, Zero defect program, Quality circle.

### **Unit- III**

Reliability Engineering principles and methods- Definition of reliability , reliability vs quality, the failure distribution, the reliability function, mean time to failure, Hazard rate function, bathtub curve, conditional reliability, constant failure rate model, time dependent failure models e.g., exponential, Weibull and normal distribution.

### **Unit- IV**

Sustainable Design for Reliability of Systems- Serial configuration, parallel configuration, combined series parallel systems, Reliability specification and system measurements, reliability allocation, design methods, FMEA failure analysis, system safety and fault tree analysis. Sustainability of Design for Reliability- Beyond reliability of systems, keeping the capability, keep the customers in mind and involved, make the most with vision and leadership, infrastructure, reinforcement and control organizational culture.

### **Textbook(s)**

1. Introduction to Reliability and Maintenance engineering by Charles E Ebeling, Tata McGrawhill, India.
2. Introduction to statistical quality control, 4<sup>th</sup> Edition by Douglas C Montgomery, John Wiley & Sons, Inc.
3. K. C. Jain and A. K. Chitale, Quality Assurance and Total Quality Management, Khanna Publication, 3<sup>rd</sup> Edition, 2003.

### **Reference(s)**

1. Fundamentals of quality control and improvement by Amitava Mitra, Pearson Education Asia.
2. Total Quality Management by Besterfield et al., Pearson Education, India, 2013.
3. David J Smith, "Reliability, Maintainability and Risk: Practical Methods for Engineers", Butterworth, 2015.
4. Narayana V. and Sreenivasan N.S., Quality Management Concepts and Tasks, New Age International, 2015.
5. Vincent K. Omachonu and Joel E. Ross, Principles of Total Quality, 7<sup>th</sup> Edition, Taylor & Francis, 2017.

## **20AT003 Design the Thinking**

### **Unit I**

#### **Process of Design**

Introduction – Product Life Cycle - Design Ethics - Design Process - Four Step – Five Step - Twelve Step - Creativity and Innovation in Design Process - Design limitation. History of Design Thinking, Multi-Whys, Design Thinking Empathize, Conflict of Interest, Multi-Whys, Elephant and Blind Men.

### **Unit II**

#### **Generating and Developing Ideas**

Introduction - Create Thinking - Generating Design Ideas - Lateral Thinking – Analogies – brainstorming - Mind mapping - National Group Technique – Synectics -Development of work - Analytical Thinking - Group Activities Recommended.

### **UNIT III**

#### **Reverse Engineering**

Introduction - Reverse Engineering Leads to New Understanding about Products - Reasons for Reverse Engineering - Reverse Engineering Process - Step by Step – Case Study.

### **UNIT IV**

#### **Basics of Drawing to Develop Design Ideas**

Introduction - Many Uses of Drawing - Communication through Drawing – Drawing Basis – Line - Shape/ Form – Value – Colour – Texture - Practice using Auto CAD recommended. Perspective Drawing - One Point Perspective - Two Point Perspective -Isometric Drawing - Orthographic Drawing - Sectional Views - Practice using Auto CAD recommended.

#### **Text Books:**

John.R.Karsnitz, Stephen O'Brien and John P. Hutchinson, "Engineering Design", Cengage learning (International edition) second Edition, 2013.

#### **References:**

Yousef Haik and Tamer M.Shahin, "Engineering Design Process", Cengage Learning, Second Edition, 2011.

## **20AT007 Intellectual Property Rights And Patents**

### **Unit I**

#### **Intellectual Property**

Introduction to Intellectual Property Law – The Evolutionary Past - The IPR Tool Kit- Para - Legal Tasks in Intellectual Property Law – Ethical obligations in Para Legal Tasks in Intellectual Property Law - Introduction to Cyber Law – Innovations and Inventions Trade related Intellectual Property Right

### **Unit II Trade mark**

Introduction to Trade mark – Trade mark Registration Process – Post registration procedures – Trade mark

maintenance - Transfer of Rights - Inter parties Proceeding – Infringement - Dilution Ownership of Trade mark –

Likelihood of confusion - Trademarks claims – Trademarks Litigations – International Trade mark Law

### **Unit III Copyrights**

Introduction to Copyrights – Principles of Copyright Principles -The subjects Matter of Copy right – The Rights Afforded by Copyright Law – Copy right Ownership, Transfer and duration – Right to prepare Derivative works – Rights of Distribution – Rights of Perform the work Publicity Copyright Formalities and Registrations - Limitations

- Copyright disputes and International Copyright Law – Semiconductor Chip Protection Act

### **Unit IV Trade Secret**

Introduction to Trade Secret – Maintaining Trade Secret – Physical Security – Employee Limitation - Employee confidentiality agreement - Trade Secret Law - Unfair Competition – Trade Secret Litigation – Breach of Contract – Applying State Law

### **Textbook (s)**

1. Deborah E.Bouchoux: “Intellectual Property”. Cengage learning , New Delhi
2. Prabhuddha Ganguli: ‘ Intellectual Property Rights” Tata Mc-Graw –Hill, New Delhi

### **Reference (s)**

1. Richard Stim: “Intellectual Property”, Cengage Learning, New Delhi.
2. R.Radha Krishnan, S.Balasubramanian: “Intellectual Property Rights”, Excel Books. New Delhi

## **21AT007 Introduction to Journalism**

### **Unit I**

**Ingredients of News:** meaning, definition, nature the news process: from the event to the reader Hard news vs Soft news, basic components of a news story attribution, embargo, verification, balance and fairness, brevity, dateline, credit line, byline.

### **Unit II**

**Journalism:** A historical context Basic terminology, concepts in journalism organizing a news story, 5W's and 1H, Inverted pyramid Criteria for news worthiness, principles of news selection use of archives, sources of news, use of internet. Yellow journalism penny press jazz journalism, gonzo journalism alternative journalism.

### **Unit III**

**Language and Principles of Writing:** Basic differences between the print, electronic and online journalism,

**Language of news Robert Gunning:** Principles of clear writing, Rudolf Flesch formula ([www.lsrcollegejournalism.org](http://www.lsrcollegejournalism.org))

### **Unit IV**

**Responsibility to Society:** Press and Democracy, Relationship between the reader/viewer and media, Contemporary debates and issues relating to trial by media

**Changing trends in Journalism:** An overview (with special reference to India)

### **Textbooks:**

1. Bruce D. Itule and Douglas A. Anderson, News Writing and reporting for today's media, McGraw Hill Publication, 2006.
2. M.L. Stein, Susan Paterno, R. Christopher Burnett, News writer's Handbook: An Introduction to Journalism, Blackwell Publishing, 2006.
3. George Rodmann, Mass Media In a Changing World, McGraw Hill Publication, 2011.

## 16IT802 Professional Ethics

### UNIT-I

#### **An Overview of Ethics and Ethics for IT Professional and IT Users**

**ETHICS:** Definition of Ethics ,The Importance of Integrity ,The Difference Between Morals, Ethics, and Laws , Ethics in the Business World ,Why Fostering Good Business Ethics Is Important , Improving Corporate Ethics ,Creating an Ethical Work Environment ,Including Ethical Considerations in Decision Making .

#### **Ethics for IT Workers and IT Users**

IT Professionals ,The Changing Professional Services Industry ,Professional Relationships That Must Be managed ,Professional Codes of Ethics , Professional Organizations ,Certification ,Government Licensing ,IT Professional Malpractice ,IT Users ,Common Ethical Issues for IT Users .

*Ethics in Information Technology, Supporting the Ethical Practices of IT Users*

**10+5 Hours**

### Unit-II

#### **Computer, Internet Crime and Privacy**

IT Security Incidents: A Major Concern ,Why Computer Incidents Are So Prevalent ,Types of Exploits ,Types of Perpetrators , Implementing Trustworthy Computing ,Risk Assessment ,Establishing a Security Policy ,Educating Employees, Contractors, and Part-Time Workers , prevention ,Detection , Response.

**Privacy:** Privacy Protection and the Law, Information Privacy, Privacy Laws, Applications, and Court Rulings,Key Privacy and Anonymity Issues, Identity Theft, Consumer Profiling, Treating Consumer Data Responsibly Workplace Monitoring.

*Federal Laws for Prosecuting Computer Attacks, Advanced Surveillance Technology.*

**10+3 Hours**

### Unit-III

**Intellectual Property:** Intellectual Property definition, Copyrights ,Copyright Term ,Eligible Works ,Fair Use Doctrine ,Software Copyright Protection ,The Prioritizing Resources and Organization for Intellectual Property (PRO-IP) Act of 2008 ,General Agreement on Tariffs and Trade (GATT) ,The WTO and the WTO TRIPS Agreement (1994) ,The World Intellectual Property Organization (WIPO) Copyright Treaty (1996) ,The Digital Millennium Copyright Act (1998) , Patents ,Software Patents ,Software Cross-Licensing Agreements ,Defensive Publishing and Patent Trolls , Submarine Patents and Patent Farming .

Key Intellectual Property Issues: Plagiarism, Reverse Engineering, Open Source Code, Competitive Intelligence.

**Software Development:** Strategies for Engineering Quality Software, the Importance of Software Quality, Software Product Liability, Key Issues in Software Development, Development of Safety-Critical Systems, Quality Management Standards.

*ACM code of ethics and professional conduct*

**12+4 Hours**

### Unit -IV

#### **Social Networking**

What Is a Social Networking Web Site? ,Business Applications of Online Social Networking ,Social Network Advertising ,The Use of Social Networks in the Hiring Process ,Social Shopping Web Sites ,Social Networking Ethical Issues ,Cyberbullying ,Cyberstalking ,Encounters with Sexual Predators ,Uploading of Inappropriate Material .

**The Impact of Information Technology on Productivity and Quality of Life**

The Impact of IT on the Standard of Living and Worker Productivity ,IT Investment and Productivity ,The Digital Divide ,The Impact of IT on Healthcare Costs ,Electronic Health Records, Use of Mobile and Wireless Technology in the Healthcare Industry, Telemedicine ,Medical Information Web Sites for Laypeople.

*Online Virtual Worlds, Crime in Virtual Worlds, Educational and Business Uses of Virtual Worlds*

**Text book (s)**

1. George W Reynolds, "Ethics in Information Technology," 5th Edition, Cengage Learning US, 2015,

**Reference Book (s)**

1. Deborah G. Johnson, "Computer Ethics," 3rd Edition, Prentice Hall, 2001,
2. Sara Base, A Gift of Fire: Social, Legal and Ethical Issues, for Computing and the Internet," 4th Edition, Pearson Edition 2012.



## **21AT008 Mass Media Communication**

### **Unit I**

#### **Introduction to Mass Communication:**

Concept of Journalism and mass communication, mass communication in India, History, growth and development of print and electronic media; Major landmarks in print and electronic media in Indian languages. Media's role in formulation of states of India, Media criticism and media literacy, Press Council and Press

Commissions of India, status of journalism and media education in India; Media policies of the Government of India since Independence.

#### **Models and Theories of Mass Communication**

Normative theories, administrative and critical traditions in communication, media and journalism studies, communication and theories of socio-cultural, educational and agricultural change, Technological determinism, critique of Marshall McLuhan's views on media and communication and Marxist approaches, Information and knowledge societies. Indian traditions and approaches to communication from the Vedic era to the 21st century, Western and Eastern

philosophical, ethical and aesthetic perceptions of communication – Aristotle and Plato, Hindu, Buddhist, and Islamic traditions.

### **Unit II**

#### **Media and Culture**

Framework for understanding culture in a globalized world, Globalization with respect to politico-economic & socio-cultural developments in India.

#### **Media Laws and Ethics**

Concept of law and ethics in India and rest of the world, The Constitution of India, historical evolution, relevance; Concept of freedom of speech and expression in Indian Constitution; Defamation, Libel, Slanders-Sedition; Various regulatory bodies for print, TV, Advertising, PR, and Internet; Rules, regulations and guidelines for the media as recommended by Press Council of India; Information and Broadcasting ministry and other professional organizations, adversarial role of the media, human rights and media.

### **Unit III**

#### **Media Management and Production**

Definition, concept of media management. Grammar of electronic media; Communication design theories and practice; Media production techniques – print and electronic; Digital media production techniques; Economics and commerce of mass media in India; Principles and management in media industry post liberalization.

### **Unit IV**

#### **ICT and Media**

ICT and media – definition, characteristics and role. Effect of computer mediated communication. Impact of ICT on mass media. Digitization; Social networking; Economics and commerce of web enabled media; Mobile adaption and new generation telephony by media, ethics and new media; ICT in education and development in India, online media and e-governance; Animation – concepts and techniques.

#### **Textbooks:**

1. D.S. Mehta, Mass Communication and Journalism in India, Allied Publishers, 2014.

2. Keval J. Kumar, Mass Communication in India, Fifth Edition, JAICO Publishing House, Mumbai, 2021.
3. B. K. Ahuja, Mass Media Communication, Lotus Press, 2010.
4. Jack Rosenberry, Lauren A. Vicker, Applied Mass Communication Theory: A Guide for Media Practitioners, 2nd Edition, Routledge, 2017.

**References:**

1. Peyton Paxson, Mass Communications and Media Studies: An Introduction, 2nd Edition, Bloomsbury Academic 2018.
2. Robert S. Fortner, P. Mark Fackler, The Handbook of Media and Mass Communication Theory, Wiley, 2014.
3. Vir Bala Aggarwal, V. S. Gupta, Handbook of Journalism and Mass Communication, Concept Publishing Company, New Delhi, 2002.

## **20AT012 The Art of Photography and Film Making**

### **Unit I**

#### **Introduction**

Development of Photography over the years: Brief History of Photography, early photography methods, switch from film to digital, difference between film and digital photography, formats of images in digital.

Cameras & Techniques: Types of cameras, film cameras V/S digital cameras, lenses and their importance, Story Design and Development, Laws of Composition, Gestalt Law and Visual Perception, Semiotic photography.

### **Unit II**

**Lighting** - Theory & practice: Sources of Lighting, 2 point lighting, 3 point lighting, creating contrast, outdoor natural lighting, related accessories for lighting.

**Post production of Photos, Digital Image Editing** – Photoshop: Processing of Raw images, Introduction to Adobe Photoshop and image ready software, how to enhance the photo digitally.

### **Unit III**

#### **Indian Cinema**

History of Indian cinema, history of regional cinema, legends of Indian cinema, Hindi film industry, the Hindi film industry, music and choreography in Indian cinema, contemporary cinema.

#### **Basics of Cinematography-1**

**Power of a Picture:** Power of a still picture shooting a good Still picture Composition-Framing Understanding & Use of colour, Capturing the Drama, Black and white Photography. **Light:** Role of light, Lighting techniques, Concept of lighting various planes, Understanding Various types: Tungsten lamps, Cool Lights, HMI, Cyclorama/background lights, Soft Box lights. Use of cutter stand, black cloth and Camera filters, barn doors, use of reflectors, Three point lighting, Ratio lighting: 1:2, 1:3, 1:4.

### **Unit IV**

**Lenses:** Type of Lenses, Power of Lenses, Understanding the shot requirement and usage of a lens, Idea of perspective: Depth Of Field, Depth of focus, Critical understanding of Fixed Lens Vs. Zoom Lens, Focus pulling, 18% grey card, Metering, Colour temperature meter.

**Camera Movements:** Basic grammar of shots, Camera Movement: Pan, Tilt, Zoom, Character Movement, Usage and need of Track and trolley, Crane, jimmy gip, Poll Cam, Managing Movements, Single camera Setup, Multi camera setup, Continuity Exercise, Do's and don'ts of camera movements, Aesthetics and Psychological.

#### **Textbooks:**

1. Camera Terms and Concepts by David Elkins
2. The Camera Assistant by Doug Hart
3. Motion Picture Camera and Lighting Equipment by David Samuelson
4. The Art of Photography; by Bruce Barnbaum.
5. Creative Nature & Outdoor Photography; Brenda Tharp.
6. Chasing the Light by Ibarionex Perello.

**Reference Books:**

1. Motion Picture Camera Techniques by David Samuelson
2. The 16mm Camera Book by Douglas Underdahl
3. The Hands On Manual for Cinematographers by David Samuelson
4. The Professional Lighting Handbook by Verne Carlson
5. The Filmmakers Pocket Reference by Blain Brown
6. The Camera by Larry Hills.
7. The Creative Black Book.
8. The Print by Ansel Adams, Robert Baker.
9. 500 poses for Photographing Women by Michelle Perkins.
10. Creative Landscapes: Digital Photography Tips & Techniques by Author: Davis, Harold.

## 20AT014 Women in Leadership

### **UNIT-I**

#### **Education, Employment and Empowerment**

Higher education for women, strategies to implement women's education in rural areas - Women's reservation in education sector, Formal and non-formal ways to education, National Literacy Mission, Traditions, maintaining family honour as strategies to curb financial independence

### **Unit-II**

#### **Roles of Women in Family and Society**

Archaeology of the evolution of women's role - Gender roles in the domestic sphere - Kitchen space feminism - Gender roles in the social sphere - Matriarchy and Matrilineal societies

### **Unit-III**

#### **Women in Sports**

Physical and Psychological effects of Sports on women - Socio-cultural and economic factors that deter Women's talent in Sports - Against all the odds- Narratives of Women athletes and Sport Stars – Serena Williams, Saina Nehwal, Sania Mirza, Deepika Palikal, Mary Kom - Gender testing, Drug tests and other issues related to sex determination process in sports

### **UNIT-IV**

#### **Women Entrepreneurship**

Significance of women entrepreneurship, Challenges faced by Women Entrepreneurs, - Relationship between Entrepreneurship and empowerment, Evolution of women entrepreneur development programme, Trends and Patterns of Women Entrepreneurship

#### **Text Books:**

1. Haque, T. 2015. Empowerment of Rural Women in Developing Countries: Challenges and Pathways. New Delhi: Concept Publishing Company. Sen, Amartya. Development and Freedom. New Delhi: Oxford University Press, 2000.
2. Agarwal, Suresh. 2015. Social Problems in India. New Delhi: Rajat Publications. Daly, Mary. Beyond God the Father.

#### **Reference Text Books:**

1. Drinkwater, Barabara, Ed. 2000. Women in Sport. Oxford: Blackwell Science.
2. Hisrich, Robert D., Michael Peters and Dean Shepherded-“ Entrepreneurship “ 9<sup>th</sup> Tata McGraw Hill 2012.
3. Peter F. Drucker “Innovation and Entrepreneurship”, Reprint Heinemann 2006.