



Nagarjuna College of Engineering & Technology

(An Autonomous College under VTU)

1.3.1 List of the courses which address the Gender, Environment and Sustainability, Human Values and Professional Ethics

Category	Course Name	Course Code
Gender	Constitution of India, Professional Ethics and Human Rights	18CPH38
Gender	Constitution of India, Professional Ethics and Human Rights	19CPH37
Environment and Sustainability	Ecology and Environmental Impact Assessment	15CVT361
Environment and Sustainability	Rural Water Supply and Sanitation	15CVT362
Environment and Sustainability	Solid Waste Management	15CVT363
Environment and Sustainability	Air Pollution and Control	15CVT451
Environment and Sustainability	Renewable Energy Resources	15CVT461
Environment and Sustainability	Green Buildings	15CVT561
Environment and Sustainability	Environmental Engineering	15CVI63
Environment and Sustainability	Pollution Control and Management	15CVT651
Environment and Sustainability	Fundamentals of Energy, Environment and Climate Change	15CVT742
Environment and Sustainability	Industrial Waste Water Treatment	15CVT743

Environment and Sustainability	Natural Disaster Mitigation and Management	15HOE753
Environment and Sustainability	Natural Disaster Mitigation and Management	16HOE753
Environment and Sustainability	Renewable Energy Resources	18EET451
Environment and Sustainability	Environmental Air Pollution	18EET454
Environment and Sustainability	Green Buildings	18EET563
Environment and Sustainability	Water Resources Engineering	18EET653
Environment and Sustainability	Basics of Earthquake Engineering	18CVT726
Environment and Sustainability	Integrated Rural Development – Part 1	17CSH39
Environment and Sustainability	Integrated Rural Development – Part 2	17CSH49
Environment and Sustainability	Integrated Rural Development – Part 1	17CVH39
Environment and Sustainability	Integrated Rural Development – Part 2	17CVH49
Professional Ethics	Constitution of India, Professional Ethics and Human Rights	18CPH38
Professional Ethics	Constitution of India, Professional Ethics and Human Rights	19CPH37
Professional Ethics	Business Ethics and Corporate Governance	17MBA13
Professional Ethics	Business Ethics and Corporate Governance	18MBA24
Professional Ethics	Work Place Ethics	15MBAHR313
Human Values	Soft Skills Development-1	15CSH39
Human Values	Soft Skills Development-2	15CSH49
Human Values	Soft Skills Development-1	15CVH39

Human Values	Soft Skills Development-2	15CVH49
Human Values	Managerial Skill Development	17MBA17
Human Values	HR Analytics	17MBAHR4 42
Human Values	Universal Human Values-2	19UHV47

Constitution of India, Professional Ethics and Human Rights

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
18CPH38	1:0:0:0	1	CIE:50 SEE:50	2 hours	HSS

Course Objectives:

This course will enable students to :

- The basic information about Indian constitution.
- The fundamental rights and duties of a citizen.
- Special privileges of socially and economically weaker sections of the society.
- Individual role and ethical responsibility towards society.

Syllabus

Module – I

Introduction to the Constitution of India, The Making of the Constitution and Salient features of the Constitution. Preamble to the Indian Constitution, **Fundamental Rights & its limitations.** **03**

Hours

Module – II

Directive Principles of State Policy & Relevance of Directive Principles of State Policy, Fundamental Duties. Union Executives – President, Prime Minister, Parliament, Supreme Court of India. **03**

Hours

Module – III

State Executives – Governor, Chief Minister, State Legislature High Court of State. Electoral Process in India, Amendment Procedures, 42nd , 44th , 74th , 76th , 86th & 91st Amendments. **02**

Hours

Module – IV

Special Provision for SC & ST, **Special Provision for Women**, Children & Backward Classes, Emergency Provisions. **Human Rights- Working of National Human Rights Commission in India**, Powers and functions of Municipalities, Panchayats and

Module – V

Scope & Aims of Engineering Ethics, Responsibility of Engineers, Impediments to Responsibility. Risks, Safety and liability of Engineers, Honesty, Integrity & Reliability in Engineering. **02 Hours**

Course Outcomes:

On completion of this course, students will be able to:

- Familiarize with fundamental rights and duties.
- Recognize the Electoral Process.
- Get exposed to legislature and judiciary.
- Realize special provisions given for women, children and weaker section of society.
- Exhibit Engineering ethics and responsibilities of Engineers.

Text Books:

1. Durga Das Basu, "Introduction to the Constitution of India", Lexis Nexis Publications; 22nd Edition, 2015, ISBN-13: 978-9351434467.
2. Charles E. Haries, Michael S Pritchard and Michael J. Robins, "Engineering Ethics", Thomson Wadsworth, 2nd Edition, 2003, ISBN-13: 978-9812436764.

Reference Books:

1. M.V. Pylee, "An Introduction to Constitution of India", Vikas Publishing, 2002, 1st Edition, ISBN-13: 978-8125918325.
2. M. Govindarajan, S. Natarajan, V.S. Senthilkumar, "Engineering Ethics", PHI Learning Private Limited, New Delhi, 2nd Edition, 2013, ISBN-13: 978-8120348165.
3. Brij Kishore Sharma, "Introduction to the Constitution of India", PHI Learning Private Limited, New Delhi, 7th Edition, 2015, ISBN-13: 978-8120350892.

E-Resources:

1. <http://www.cgsird.gov.in/constitution.pdf>
2. <http://indiacode.nic.in/coiweb/welcome.html>



Constitution of India, Professional Ethics and Human Rights

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
19CPH37	1:0:0:0	1	CIE:50 SEE:50	2 hours	HSS

Course Objectives:

This course will enable students to :

- The basic information about Indian constitution.
- The fundamental rights and duties of a citizen.
- Special privileges of socially and economically weaker sections of the society.
- Individual role and ethical responsibility towards society.

Syllabus

Module – I

Introduction to the Constitution of India, The Making of the Constitution and Salient features of the Constitution. Preamble to the Indian Constitution, **Fundamental Rights & its limitations.** **03 Hours**

Module – II

Directive Principles of State Policy & Relevance of Directive Principles of State Policy, Fundamental Duties. Union Executives – President, Prime Minister, Parliament, Supreme Court of India. **03 Hours**

Module – III

State Executives – Governor, Chief Minister, State Legislature High Court of State. Electoral Process in India, Amendment Procedures, 42nd , 44th , 74th , 76th , 86th & 91st Amendments. **02 Hours**

Module – IV

Special Provision for SC & ST, **Special Provision for Women**, Children & Backward Classes, Emergency Provisions. **Human Rights- Working of National Human Rights Commission in India**, Powers and functions of Municipalities, Panchayats and Co - Operative Societies. **03 Hours**

Module – V

Scope & Aims of Engineering Ethics, Responsibility of Engineers, Impediments to

Course Outcomes:

On completion of this course, students will be able to:

- Familiarize with fundamental rights and duties.
- Recognize the Electoral Process.
- Get exposed to legislature and judiciary.
- Realize special provisions given for women, children and weaker section of society.
- Exhibit Engineering ethics and responsibilities of Engineers.

Text Books:

1. Durga Das Basu, "Introduction to the Constitution of India", Lexis Nexis Publications; 22nd Edition, 2015, ISBN-13: 978-9351434467.
2. Charles E. Haries, Michael S Pritchard and Michael J. Robins, "Engineering Ethics", Thomson Wadsworth, 2nd Edition, 2003, ISBN-13: 978-9812436764.

Reference Books:

1. M.V. Pylee, "An Introduction to Constitution of India", Vikas Publishing, 2002, 1st Edition, ISBN-13: 978-8125918325.
2. M. Govindarajan, S. Natarajan, V.S. Senthilkumar, "Engineering Ethics", PHI Learning Private Limited, New Delhi, 2nd Edition, 2013, ISBN-13: 978-8120348165.
3. Brij Kishore Sharma, "Introduction to the Constitution of India", PHI Learning Private Limited, New Delhi, 7th Edition, 2015, ISBN-13: 978-8120350892.

E-Resources:

1. <http://www.cgsird.gov.in/constitution.pdf>
2. <http://indiacode.nic.in/coiweb/welcome.html>



Ecology and Environmental Impact Assessment

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
15CVT361	3:0:0:0	3	CIE:50 SEE:50	3 Hours	FE

Course Objectives:

The students will be able to :

- Different ecological factors influencing environment.
- Frame work of Impact Assessment and various development projects.
- Assessment and Impact prediction on various features like air, water.
- Public Interest in Environmental Decision making.
- Salient Features of various Project Activity.

Syllabus

Module - I

Ecology: Development and evolution of ecosystems – Principles and concepts, Classification of Ecosystems, Structure and Function of Ecosystems, Energy flow in Ecosystems, Ecological Niche and succession, Bio-geo-chemical cycles, Ecological Pyramids.

Aquatic and Terrestrial Ecosystems: Diversity and dominance Indices, Ecosystem Models.

Lake Ecosystem: Trophic levels, nutrient loading, nutrient enrichment, Leibig's Law, control of eutrophication. **08 Hours**

Module - II

Environmental Impact Assessment: Definition, Objectives, Development Activity and Ecological Factors EIA. Types – Rapid and Comprehensive EIA, EIS, FONSI. Step-by-step procedure for conducting EIA and Limitations of EIA, Prevention of Significant Deterioration (PSD) Programme. Carrying capacity concept. **08 Hours**

Module - III

Frame work of Impact assessment: Scope and contents of EIA, methodologies and techniques of EIA. Frame work of Impact Assessment. Development Projects-Environmental Setting, Objectives and Scope, Contents of EIA.

Prediction and Assessment: Assessment and Prediction of Impacts on Attributes Air, Water, Noise, Land Ecology, Soil, Cultural and Socio-economic Environment. EIA guidelines for Development Projects, Rapid and Comprehensive EIA. **08 Hours**

Module - IV

Guidelines for Development: EIA guidelines for Development Projects, Rapid and Comprehensive EIA. Public Participation in Environmental Decision making. Practical Considerations in preparing Environmental Impact Assessment and Statements. Salient Features of the Project Activity-Environmental Parameter Activity Relationships- Matrices. **08 Hours**

Module - V

EIA On Projects: EIA for Water resource developmental projects, Highway projects: Nuclear-Power plant projects, Mining project (Coal, Iron ore), Thermal Power Plant, Infrastructure Construction Activities. Case studies with present scenario. **08 Hours**

Course Outcomes:

On completion of this course, the students are able to :

- Identify various ecological components influencing environment.
- Distinguish different methodologies, outlook of Impact assessment and development of many projects.
- Predict the impact of many components on environment.
- Assess the Public Interest in Environmental Decisions.
- Examine important features of different project activities.

Text Books:

1. Jain R.K., L.V. Urban: "Environmental Impact Analysis", (Chapters 1-3), Nostrand Reinhold Co., ISBN: 9780071370080.
2. Anjaneyalu. Y, Valli Manickam: "Environment Impact Assessment," (Chapters 1-5,6-9,11), CRC Press, 2011, ISBN: 9780415665568.

Reference Books:

1. Guidelines for EIA of developmental Projects Ministry of Environment and Forests, GOI.
2. Larry W. Canter: "Environment Impact Assessment", McGrawHill Publication.
3. Kormondy: "Concepts of Ecology", Prentice Hall Publication, New Jersey.
4. Odum: "Fundamentals of Ecology", Adisson Co.

E-Resources:

1. https://en.wikipedia.org/wiki/Environmental_impact_assessment
2. <https://scholar.google.co.in/scholar>.
3. <https://www.epa.gov/international-cooperation/technical-review-guidelines-environmental-impact-assessments-tourism>.
4. <https://www.nptel.ac.in/courses/120108004>

Rural Water Supply and Sanitation

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
15CVT362	3:0:0:0	3	CIE:50 SEE:50	3 Hours	FE

Course Objectives:

The students will be able to :

- Water sources, water borne diseases and drinking water quality standards.
- Water treatment methods and to control contamination of water.
- The usage of pumps.
- Refuse collection system and disposal.
- Principles of rural sanitation and rain water harvesting.

Syllabus

Module - I

Rural Water Supply: Introduction: Need for a protected water supply, Investigation and selection of water sources, water borne diseases, Protection of well waters, drinking water quality standards. **08 Hours**

Module - II

Types of Pumps: Supply systems viz., BWS, MWS, PWS, water treatment methods-disinfection, deflouridation, hardness and iron removal, ground water contamination and removal. **08 Hours**

Module - III

Rural Sanitation: Conservancy, public latrine, concept of eco-sanitation, trenching and composing methods, two pit latrines, aqua privy, W.C, septic tank, soak pit.

Drainage Systems: Storm water and sullage disposal, rain water harvesting and uses. **08 Hours**

Module - IV

Communicable diseases: Terminology, Classifications, Methods of communication, general methods of Control Refuse Collection and disposal: Garbage, ash, rubbish, collection methods, transportation and disposal-salvaging, dumping, controlled tipping, incineration and composting, dung disposal-digester, biogas plant. **08 Hours**

Module - V

Milk Sanitation: Essentials, Test for milk quality, pasteurization, quality control, cattle borne diseases, planning for a cow shed.

Insect Control: House fly and mosquito-life cycle, diseases, transmission and control measures.

08 Hours

Course Outcomes:

On completion of this course, the students are able to :

- Identify and select water supply systems in rural areas.
- Distinguish between urban and rural water supply systems.
- Categorize the different types of water borne and communicable diseases and apply the principles of rain water harvesting.
- Explain overall management of rural water supply and other components like milk sanitation.
- Examine overall management of solid waste collection, disposal and other components like composting of waste to energy.

Text Books:

1. S. K Garg: "Water Supply Engineering," (Chapters 1-3), Khanna Publishers, Delhi, 26th Edition, 2012, ISBN: 978-8174091208.
2. E.William: "Steel, Water Supply and Sewerage", (Chapters 4,5), McGraw-Hill Publishers, Delhi, 28th Edition, 2011, ISBN: 978-0471523772.

References Books:

1. K.Park: "Preventive and Social medicine", (Chapters 4,5), Bhanot Publishers, Jabalpur (M.P ,India), 23rd Edition, 2015, ISBN: 978-9382219057.
2. Joseph. A. Solveto: "Environmental Engineering and Sanitation", (Chapters1-3), Wiley-Interscience Publishers, New Delhi, 4th Edition, 2012, ISBN: 978-0471523772.

E-Resources:

1. <http://nptel.ac.in/courses/105105048/>
2. <http://nptel.ac.in/courses/105104102/>



Solid Waste Management

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
15CVT363	3:0:0:0	3	CIE:50 SEE:50	3 Hours	FE

Course Objectives:

The students will be able to :

- Characterize the waste and apply the knowledge of laws for municipal solid waste management and disposal of biomedical wastes and plastic wastes.
- Apply the knowledge of mathematics, science, and engineering for effective solid wastes collection systems, waste collection route optimization and processing of solid waste.
- Understand composting systems, maintenance and operation of aerobic and anaerobic composting processes for effective organic waste recycling.
- Know construction and operations of landfill facilities, energy recovery systems and management of leachate systems.

Syllabus

Module - I

Definition of solid wastes, Land Pollution-scope and importance of solid waste management, functional elements of solid waste management.

Sources: Classification and characteristics of solid wastes, Municipal Solid Waste, Commercial and Industrial. Method of quantification. Biomedical Waste Handling Rules and Recycled Plastic usage Rules. **08 Hours**

Module - II

Collection of solid waste: Systems of collection of solid wastes, transfer stations-bailing and compacting, collection equipments, garbage chutes, route optimization techniques and numerical problems on route optimization.

Incineration: Incineration process-3 T's, factors affecting incineration process, incinerators-types, prevention of air pollution, pyrolysis, design criteria for incineration. **08 Hours**

Module - III

Composting: Composting, factors affecting composting process, aerobic and anaerobic composting, Indore and Bangalore method of composting, mechanical composting process, vermi-composting. **08 Hours**

Module - IV

Landfills: Sanitary land filling –Different types, trench method, area method, ramp method and pit method. Factors considered for a landfill site selection, Prevention of site pollution. Cell design, leachate collection systems, control of gas movement and gas recovery systems. Geo-synthetic fabrics in sanitary landfills. **08 Hours**

Module - V

Disposal Methods: Open dumping-selection of site, ocean disposal, feeding to hogs, incineration, pyrolysis, composting, sanitary land filling, merits and demerits, plastic waste, Biomedical waste and its impact on Human health. **08 Hours**

Course Outcomes:

On completion of this course, the students are able to :

- Explain Components of solid waste management and the laws governing it.
- Describe the solid waste collection systems, route optimization techniques and processing of solid wastes.
- Design, operation and maintenance of landfills and composting units.
- Discuss the importance and techniques of all major and minor methods of disposal considering plastic and biomedical waste.

Text Books:

1. Howard S.Peavy et.al: “Environmental Engineering”, (Chapters 10-13), Mc-Graw-Hill Book Company, New York, 2012, ISBN: 978-0071002318.
2. George Tchobanoglous et.al.: “Integrated Solid Waste Management”, (Chapters 1-5), Mc-Graw-Hill Inc., New York, 2013, ISBN: 9780070632370.

Reference Books:

1. K Sasikumar: “Solid Waste management”, (Chapters 1-4), PHI Learning Pvt. Limited, New Delhi, 13th Edition, ISBN: 9788120338692.
2. S.K Garg: “Environmental Engineering (Vol II)”, (Chapters 9-12), Khanna Publishers, New Delhi, 2009, ISBN: 9788174092304.



Air Pollution and Control

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
15CVT451	3:0:0:0	3	CIE:50 SEE:50	3 Hours	FE

Course Objectives:

The students will be able to :

- The fundamentals of air pollution with a background on historical perspective on air pollution and current air quality policies and standards.
- Major air pollutants, their sources and their effects (environmental, economic and health) and how emissions are estimated from road traffic and industrial sources.
- Dispersion of air pollutants in the atmosphere.
- To analyze and present outputs of air quality models to a wide range of audiences.
- Different air quality monitoring equipments.

Syllabus

Module - I

Introduction: Definition – Classification and Characterization of Air Pollutants, Emission Sources, Behaviour and Fate of air pollutants, Chemical Reactions in the Atmosphere, Photo-chemical Smog, Coal-induced Smog.

Effects of Air Pollution: On Human Health, Animals, Plants and Materials – Major Environmental Air Pollution Episodes – London Smog, Los Angeles Smog and Bhopal Gas Tragedy. **08 Hours**

Module - II

Meteorology: Introduction – Meteorological Variables, Primary and Secondary Lapse Rate, Inversions, Stability Conditions, Windrose, General Characteristics of Stack Plumes, Meteorological Models.

Factors to be considered in Industrial Plant Location and Planning, Noise pollution – sources, measurement units, effects and control. **08 Hours**

Module - III

Sampling, Analysis and Control: Sampling and Measurement of Gaseous and Particulate matter, Stack Sampling, Analysis of Air Pollutants, Smoke and Smoke Measurement.

Air Pollution Control Methods: Particulate, Emission Control, Gravitational Settling Chambers, Cyclone Separators, Fabric Filters, Electrostatic Precipitators, Wet Scrubbers, Selection of a Particulate Collecting Equipment. **08 Hours**

Module - IV

Control of Gaseous Emissions, Adsorption by Liquids, Adsorption by Solids, Combustion Odours and their control.

Air Pollution due to Automobiles: Air Pollution due to Gasoline Driven and Diesel Driven Engines, Effects, Direct and Indirect Methods of control. **08 Hours**

Module - V

Burning Environmental Issues: Acid Rain, Global Warming, Ozone Depletion in Stratosphere, Indoor Air Pollution.

Environmental Legislation: Environmental Policy, Environmental Acts, Water, Air and Noise Pollution Standards. **08 Hours**

Course Outcomes:

On completion of this course, the students are able to :

- Examine emission standards for industrial and other sources.
- Identify air pollution concentrations as a function of emission, meteorology, topography and the built environment.
- Discuss impact of air pollution on health of humans, animals, plants and materials.
- Identify different equipments for air quality monitoring and control.
- Distinguish between global and local effects of air pollution.
- Recognize legal aspects of air pollution.

Text Books:

1. Rao M.N. and Rao H.V.N : "Air Pollution", (Chapters 1-6), Tata-McGraw-Hill Publishing Company Ltd., New Delhi, India, 2011, ISBN 13: 978-0074518717.
2. Anjaneyulu Y: "Air Pollution and control Technologies", (Chapters 2-5), Allied Publishers, Delhi, 2012, ISBN-13: 9788177641844.
3. Rao C.S: "Environmental Pollution Control Engineering", (Chapters 2-6), New-age International Publishers, New Delhi, 2nd Edition, 2013, ISBN-13: 978-8122418354.

References Books:

1. Gilbert M Masters: "Introduction To Environmental Engineering and Science", (Chapters 1-4), Pearson Education, 3rd Edition, 2007, ISBN-13: 978-0131481930.
2. Mahajan.S.P: "Pollution Control in Process Industries", (Chapters 1-5), Tata McGraw Hill Publishing Co., New Delhi, 2010, ISBN-13: 978-0074517727.

E-Resources:

1. <http://nptel.ac.in/courses/105102089/>
2. <http://nptel.ac.in/courses/105104099/>
3. nptel.ac.in/courses/103107084/module1/lecture1/lecture1.pdf

Renewable Energy Resources

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
15CVT461	3:0:0:0	3	CIE:50 SEE:50	3 Hours	EE

Course Objectives:

The students will be able to :

- To provide detailed information of the present energy scenario and the available Renewable Energy Resources.
- To get a detailed insight knowledge in basics of solar radiation geometry and various measurement techniques.
- To understand the solar energy through solar thermal devices, PV conversion and their performance analysis.
- To gain the conceptual knowledge about the various energy conversion methods such as Wind, Tidal, OTEC and Geothermal.
- To give introduction to Energy from Biomass, Hydrogen energy and their impact on environment and sustainability.

Syllabus

Module - I

Introduction: Energy source, India's production and reserves of commercial energy sources, need for non-conventional energy sources.

Solar Radiation : Extra-Terrestrial radiation, spectral distribution of extraterrestrial radiation, solar constant, solar radiation at the earth's surface, beam, diffuse and global radiation, solar radiation data.

Measurement of Solar Radiation: Pyrometer, shading ring pyrheliometer, sunshine recorder, schematic diagrams and principle of working. **09 Hours**

Module - II

Solar Radiation Geometry: Flux on a plane surface, latitude, declination angle, surface azimuth angle, hour angle, zenith angle, solar altitude angle expression for the angle between the incident beam and the normal to a plane surface (No derivation), local apparent time. Apparent motion of sun, day length, numerical examples.

Radiation Flux on a Tilted Surface: Beam, diffuse and reflected radiation, expression for flux on a tilted surface (no derivations), numerical examples.

Solar Thermal Conversion : Collection and storage, thermal collection devices, liquid flat plate collectors, solar air heaters concentrating collectors (cylindrical, parabolic, paraboloid) (Quantitative analysis). **09 Hours**

Module - III

Performance Analysis of Liquid Flat Plate Collectors: General description, collector geometry, selective surface (qualitative discussion) basic energy-balance equation, stagnation temperature, transmissivity of the cover system, transmissivity – absorptivity product, numerical examples. The overall loss coefficient, correlation for the top loss coefficient, bottom and side loss coefficient, problems (all correlations to be provided). Temperature distribution between the collector tubes, collector heat removal factor, collector efficiency factor and collector flow factor, mean plate temperature, instantaneous efficiency (all expressions to be provided). Effect of various parameters on the collector performance; collector orientation, selective surface, fluid inlet temperature, number covers dust. **09 Hours**

Module - IV

Photovoltaic Conversion: Description, principle of working and characteristics, applications.

Wind Energy: Properties of wind, availability of wind energy in India, wind velocity and power from wind; major problems associated with wind power, wind machines; Types of wind, machines and their characteristics, horizontal and vertical axis wind mills.

Tidal Power: Tides and waves as energy suppliers and their mechanics; fundamental characteristics of tidal power, harnessing tidal energy, limitations.

Ocean Thermal Energy Conversion: Principle of working, Rankine cycle.

Geothermal Energy Conversion: Principle of working, types of geothermal station with schematic diagram. **08 Hours**

Module - V

Energy from Bio Mass: Photosynthesis, photosynthetic oxygen production, energy plantation, bio gas production from organic wastes by anaerobic fermentation, description of bio-gas plants, transportation of bio-gas, problems involved with bio-gas production, application of bio-gas, application of bio-gas in engines, advantages.

Hydrogen Energy: Properties of Hydrogen with respected to its utilization as a renewable form of energy, sources of hydrogen, production of hydrogen, electrolysis of water, thermal decomposition of water, thermo chemical production bio-chemical production. **07 Hours**

Course Outcomes:

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

- Explain the present energy scenario and the available Renewable Energy Resources.
- Describe the basics of solar radiation geometry and various measurement techniques.
- Analyze the knowledge gained in tapping the solar energy through solar thermal devices, pv conversion and their performance analysis.
- Demonstrate the various energy conversion methods such as Wind, Tidal, OTEC and Geothermal.
- Apply knowledge of Biomass and Hydrogen energy and their impact on environment and sustainability.

Text Books:

1. G D Rai: "Non-Conventional Energy Sources", (Chapters 1-3,6-9,11), Khanna Publishers, 5th Edition, 2011, ISBN-13: 9788174090737.
2. John Twidell and Tony Weir: "Renewable Energy Resources", (Chapters 2,5,6,7,9-14), Routledge Publisher, 3rd Edition, 2015, ISBN-13: 978041558437.
3. N K Bansal, "Non-Conventional Energy Resources", (Chapters 1-3,9,10,12,13), Vikas Publishing, 2014, 1st Edition, ISBN-13: 978935978577

Reference Books :

1. B H Khan: "Non-Conventional Energy Resources", (Chapters 4-10), Tata McGraw-Hill Pub., 2nd Edition, 2006, ISBN - 13: 9780070142763.
2. S P Sukhatme, J K Nayak: "Solar Energy", (Chapters 3,4), Tata McGraw-Hill Pub., 3rd Edition, 2008, ISBN-13: 9780070260641.



Green Buildings

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
15CVT561	3:0:0:0	3	CIE:50 SEE:50	3 Hours	EE

Course Objectives:

This course will enable students to :

- Understand the global and local environmental problems connected to the built environment.
- Understand how ecosystem can be enhanced and improved in building projects.
- Understand about life cycle assessment of building materials and products.
- Understand the importance and utilisation of solar energy in building construction.
- Explore the best use of non-renewable energy with minimal intrusion to the environments and of renewable energy to sustain the advancement of civilization.
- Become familiar with water consumption and water quality assessment.

Syllabus

Module – I

Introduction: Environmental implications of buildings energy, carbon emissions, High performance green buildings; Building materials: sources, methods of production and environmental implications. Embodied Energy in Building Materials: Transportation Energy for Building Materials; Maintenance Energy for Buildings. **08 Hours**

Module – II

Implications of Building Technologies Embodied Energy of Buildings: Framed Construction, Masonry Construction. Resources for Building Materials, Alternative concepts. Recycling of Industrial and Buildings Wastes. Biomass Resources for buildings. Methods and tools for building assessment: LEED, Green globe, living building challenge. **08 Hours**

Module – III

Building energy and strategies: Low energy buildings, renewable energy systems. Economic issues and analysis, Life cycle assessment.

Comforts in Building: Thermal Comfort in Buildings- Issues; Heat Transfer Characteristic of Building Materials and Building Techniques. Incidence of Solar Heat on Buildings-Implications of Geographical Locations. **08 Hours**

Module – IV

Solar buildings: Utility of Solar energy in buildings concepts of Solar Passive Cooling and Heating of Buildings. Low Energy Cooling. Case studies of Solar Passive Cooled and Heated Buildings. **08 Hours**

Module – V

Green Composites for buildings: Concepts of Green Composites. Water Utilisation in Buildings, Low Energy Approaches to Water Management. Management of Solid Wastes. Management of Sullage Water and Sewage. Urban Environment and Green Buildings. Green Cover and Built Environment. **08 Hours**

Course Outcomes:

On completion of this course, students will be able to :

- Know the applications of building materials and energy involved.
- Apply the different technologies and methods involved in green buildings.
- Study different Strategies involved in green building.
- Summarize importance of solar energy in green buildings.
- Assess the causes and effects of waste and to know the effects on green buildings.

Text Books:

1. K.S.Jagadish, B. U. Venkataramareddy, K. S. Nanjundarao: “Alternative Building Materials and Technologies”, (Chapters 1-4,6), 2nd Edition, New Age International, 2007, ISBN: 978-93-859-2387-6 ,
2. Peavy, Tchobanoglous: “Environmental Engineering”, Volume-2, (Chapters 6,10-12), ISBN: 0-07-049134-8.

Reference books:

1. Osman Attmann: “Green Architecture Advanced Technologies and Materials”, (Chapters 2,4,6-9) McGraw Hill, 2010, ISBN: 9780071625012.
2. Jerry Yudelson: “Green building Through Integrated Design”, (Chapters 5-7) McGraw Hill, 2009, ISBN: 9780071546010.
3. Walker, B, W. Steffen: “Global change and terrestrial ecosystems”, International geosphere-biosphere programme book series, Cambridge University Press, 1996, ISBN-13: 9780521578103.

Environmental Engineering (IC)

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
15CVI63	3:0:2:0	4	CIE:50 SEE:50	3 Hours	FC

Course Objectives:

This course will enable students to :

- Understand the basic concepts and principles of Collection and conveyance of water.
- Identify the ill effects of environmental pollution.
- Understand the basic principles, concepts and Design of unit operations and Processes involved in water treatment and waste water.
- Develop a student's skill in evaluating the performance of water and waste water treatment plants.
- Understand the concepts estimating different parameters of the water and waste water quality

Syllabus

Module - I

Introduction: Requirement of water for various beneficial uses.

Demand of Water: Types of water demands-domestic demand, institutional and commercial, public uses, fire demand. Per capita consumption-factors affecting per capita demand, population forecasting, different methods with merits and demerits-variations in demand of water. Fire demand by kuichling's formula, Freeman formula and national board of fire underwriters formula, peak factors, design period and factors governing the design periods. **08 Hours**

Module – II

Quality of Water: Objectives of water quality management. Wholesomeness and palatability, Water quality parameters-physical, chemical, microbiological. Drinking water standards BIS and WHO guidelines.

Water Treatment: Objectives- Treatment flow-chart. Sedimentation: Theory, settling tanks, types, design. Coagulant aided sedimentation, jar test. **08 Hours**

Module – III

Aeration: Principles, types of Aerators.

Filtration: Mechanism-theory of Filtration, types of filters, slow sand, rapid sand and pressure filters including construction, operation, cleaning and their design-excluding under drainage system-back washing of filters. Operational problems in filters.

Disinfection: Theory of disinfection, types of disinfection, Chlorination, chlorine demand, residual chlorine, use of bleaching powder. UV rays. Treatment of swimming pool water.

Softening: definition methods of removal of hardness by lime soda process and zeolite process RO and membrane technique. **08 Hours**

Module – IV

Introduction to waste water: Necessity for sanitation, methods of domestic waste water disposal.

Waste Water Characterization: Sampling, significance, techniques and frequency. Physical, chemical and biological characteristics, aerobic and anaerobic activities, CNS cycles. BOD and COD. Their significance and problems. **08 Hours**

Module – V

Treatment of waste water: Flow diagram of municipal waste water treatment plant.

Primary and Secondary waste water treatment: Screening, Primary sedimentation tank. Trickling filter, Activated sludge process and Anaerobic sludge digestion tanks including theory and operation.. **08 Hours**

Environmental Engineering Laboratory

Sl. No.	Name of the experiment
1	Determination of pH and Electrical conductivity.
2	Determination of Acidity, Alkalinity.
3	Determination of Calcium, magnesium and Total hardness.
4	Determination of Solids in sewage: Total solids, suspended solids, Dissolved solids and settle able solids.
5	Determination of Chlorides.
6	Determination of Dissolved oxygen and BOD.
7	Determination of COD.
8	Determination of Optimum Dosage of Alum using Jar Test Apparatus, Turbidity determination by Nephelometer.
9	Determination of percentage of available chlorine in bleaching powder.

Course Outcomes:

On completion of this course, students will be able to :

- Recognize the importance of water to protect the water resources which is facing a continuous degradation in water quality.
- Recognize that water supply and sanitation is an important professional and ethical responsibility of civil engineer.
- Demonstrate an ability to recognize the type of unit operations and processes involved in water and waste water treatment plants.
- Demonstrate an ability to design individual unit operation in treatment of water and waste water.
- Demonstrate ability in monitoring and analysis of water and waste water quality parameters.

Text Books:

- 1 Garg S.K.: “Environmental Engineering”, Vols. I and II, (Chapters 1,2,8,9 and Chapters 2-8), 12th Edition, Khanna Publishers, New Delhi, 2001, ISBN: 81-7409-120-3.
2. B.C.Punmia: “Water Supply Engineering”, (Chapters 1,5,6,8,9), Arihant Publications, ISBN: 81-7008-092-4.
3. Metcalf and Eddy Inc.: “Waste water Treatment, Disposal and Reuse”, (Chapters 1-9), Tata McGraw Hill Publications, ISBN: 9780070495395.

Reference Book:

1. Rangwala: “Water supply and sanitary engineering”, (Chapters 1,2,5-10,17-20,27-30), ISBN: 81-85594-59-7.

E-Resources:

1. <https://ecommons.cornell.edu>
2. <https://doi.org/10.1016/j.enbsoft>



Pollution Control and Management

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
15CVT651	3:0:0:0	3	CIE:50 SEE:50	3 Hours	EE

Course Objectives:

This course will enable students to :

- Understand the factors that must be satisfied for potable water, land and air for the removal and treatment of pollutants.
- Provide a strong link between the Pollution Damage, Public Authority Control Systems and Technical Control Systems.
- Know the relationship between social, legislative and biological constraints in a modern developed society

Syllabus

Module - I

Water Pollution and Control: Natural process-pollution due to industrial, agricultural and municipal wastes-limitations of disposal by dilution-BOD consideration in streams – Oxygen Sag Curve-Water pollution control legislation.

08 Hours

Module – II

Air Pollution and Control: Pollution and their sources-effects of pollution on human health, vegetation and climate prevention and control of particulate-industry and air-pollution surveys and sampling-Air quality monitoring- air pollution control legislation.

08 Hours

Module – III

Noise Pollution and Control: Sound and Noise: Sources of noise pollution – environmental and industrial noise; effects of noise pollution; fundamentals of sound generation, propagation etc; sound measurement; sound level meters – types, components, Measures for prevention and control of noise; environmental and industrial noise; noise control legislation

08 Hours

Module – IV

Solid Waste Management: Source characteristics – quantities – collection methods and disposal techniques – sanitary landfill – incineration – and pyrolysis, composting, aerobic and anaerobic- economics of composting; recycling and reuse.

08 Hours

Module – V

Environmental Sanitation: Relation of food to disease-principles of food sanitation-sanitation of kitchens, restaurants and other catering establishments-quality changes in milk-milk as carrier of infection-pasteurisation of milk-HTST and LTLT processes – cattle shed sanitation. Orientation of buildings with respect to the direction of prevailing winds and solar movement. Air movement inside the buildings for a healthy residential environment **08 Hours**

Course Outcomes:

On completion of this course, students will be able to :

- Describe the principles of the biological and chemical treatment processes that are required to ensure adequate quality and quantities of potable water.
- Implement the principal techniques currently in use for wastewater treatment and to review operational procedures for the plant involved.
- Use advanced methods for monitoring and modeling spatial and temporal patterns of pollution.
- Analyze the different methods for solid waste management in the cities.
- Apply the concept of environmental sanitation process.

Text Books :

1. Peavy, H.S., Rowe, D.R, George Tcnobanoglous, “Environmental Engineering”, Mc-Graw Hill company, New Delhi, 2001, ISBN: 978-9351340263.
2. Rao C.S.: “Environmental Pollution Control Engineering”, Wiley Eastern Ltd., New Delhi, 1996, ISBN: 978-8122418354.

Reference Books :

1. Vesilind: “Introducing to Environmental Engineering”, PWS Publishing Company, 1997, ISBN: 1118785991.
2. Gerard Kiley: “Environmental Engineering”, 1st Edition, Irwin McGraw-Hill, 1997, ISBN: 9780077091279.

E-Resources:

1. <https://qualifications.pearson.com/Unit-17-Pollution-Control-and-Management.pdf>
2. www.ilocis.org/documents/chpt55e.html
3. www.indiaenvironmentportal.org.in/indian-journal-of-air-pollution-control/
4. www.scimagojr.com/journalsearch.php?q=23413&tip=sid



Fundamentals of Energy, Environment and Climate Change

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
15CVT742	3:0:0:0	3	CIE:50 SEE:50	3 Hours	EE

Course Objectives:

This course will enable students to :

- Understand the Earth's Energy Budget, Environment and the processes leading to climate change.
- Understand the inter-relatedness of the Terrestrial Energy-Environment-Climate System.
- Understand the perturbing effects of anthropogenic activities on this system.
- Understand the meaningful climate change quantification, and thence the means of ameliorating adverse climate change impacts.

Syllabus

Module – I

Overview: on the Earth's energy requirement vis-à-vis Climate Change. Origins of the terrestrial atmosphere. Earth's early atmosphere. Introduction to Climate. Layers of the atmosphere. Composition of the present day atmosphere. Post Industrial Revolution Scenario. **08 Hours**

Module – II

Energy Balance: Earth –Atmosphere System. Solar and Terrestrial Radiation. Absorption of Radiation by gases. Energy balance. Solar variability and the Earth's Energy Balance –Basic concepts only. **08 Hours**

Module – III

Atmospheric Chemistry and Climate: The Global Temperature Record. Green House Gas theory. Possible effects of Global Warming – Indian Context. The Ozone depletion problem. Atmospheric Aerosol and Cloud Effects on Climate. **08 Hours**

Module – IV

Environmental Variability: Natural and Anthropogenic. Effects of urbanization, Landscape changes, Influence of Irrigation, Desertification and Deforestation. **08 Hours**

Module – V

Equipment for Production of Alternative Materials: Machines for manufacture of concrete, Equipments for production of stabilized blocks, Moulds and methods of production of precast elements. **08 Hours**

Course Outcomes:

On completion of this course, students will be able to :

- Acquire a basic understanding of the terrestrial eco-system comprising of 3 principal components: Energy, Environment and Climate change.
- Comprehend a global picture of the inter-relatedness of the Energy-Environment-Climate system.
- Assess as qualified professionals, the perturbing effects of human activities on the earth's climate.
- Acquire the necessary skills to predict emerging climate change trends globally as well as within the Indian Subcontinent.
- Acquire the requisite professional skills to undertake policy decisions on the use and efficient management of the Earth's resources.

Text Books:

1. Jill Jaeger: "Climate and Energy Systems. A review of their interactions", John Wiley, 1983.
2. "Policy interventions to promote energy efficient and environmentally sound technologies in SMI", Asian Institute of Technology, 2002, ISBN: 974-8209-01-6.

E-Resources:

1. www.springer.com/br/book/9789027727688
2. onlinelibrary.wiley.com/doi/10.1002/j.1477-8696.1989.tb04972.x/pdf
3. onlinelibrary.wiley.com/doi/10.1029/2003GL018206/full



Industrial Waste Water Treatment

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
15CVT743	3:0:0:0	3	CIE:50 SEE:50	3 Hours	EE

Course Objectives:

This course will enable students to :

- Identify, formulate, and solve various types of industrial pollution.
- Function on multi-disciplinary teams in the areas of different types of industries to reduce, recycle and reuse the waste from industries.
- Apply knowledge of mathematics, science, and engineering in industrial waste water treatment, like planning, analysis and designing of treatment units including details of statutory rules and regulations.
- Design a system, components, or processes to meet desired needs in industrial waste water treatment.
- Identify, various types of industrial wastes and suitable treatment techniques.

Syllabus

Module - I

Industrial scenario in India - Industrial activity and Environment - Uses of Water by industry - Difference between domestic and industrial wastewater- Parameters of pollution and their effects receiving streams- Classification of streams based on the mixing of effluents-Self-purification of streams - Oxygen sag curve- Derivation of streeter – Phelps equation – Numerical problems

08 Hours

Module – II

Environmental standards for industrial effluents - Effluent sampling – grab and composite sampling, Treatment methods of industrial effluent – pretreatment of waste - Equalization – Neutralization-Flotation-Volume reduction and strength reduction.

07 Hours

Module – III

Introduction to Secondary treatment of industrial effluents – Design of an aeration unit – design of a trickling filter – design of an oxidation pond - Introduction and feasibility of combined treatment municipal waste and industrial waste -volume ratio -Rental charges and economics.

07 Hours

Module – IV

Manufacturing process flow sheet with source of wastewater, Characteristics of waste, effects of untreated waste on streams or on land and the treatment of the following industrial effluents Cotton textile Industry, Dairy industry and Sugar Mill.

07 Hours

Module – V

Manufacturing process flow sheet with source of wastewater, Characteristics of waste, effects of untreated waste on streams or on land and the treatment of the following industrial effluents Paper and pulp Industry, Distillery industry, Food Processing industry. Processing industry.

07 Hours

Course Outcomes:

On completion of this course, students will be able to :

- Characterize the different types of industrial effluents.
- Advise the regulating authority about the possible danger specific industries.
- Develop planning skill in designing water pollution control systems in industries.
- Differentiate red category industries from green category industries.
- Characterize the different effluents from specific industries.

Text Books:

1. Nelson L Nemerow: “Liquid Waste of industry, Theories, Practices and Treatment”, Addison-Wesley, 1st Edition, 1971, ISBN-13: 978-0201052640.
2. Rao M N, Dutta A.K: “Waste water treatment”, 3rd Edition, Oxford and IBH Publications Pvt. Ltd., New Delhi, 2008, ISBN: 9788120417120, 8120417127.

Reference Books:

1. Mahajan S P.: “Pollution control in Process Industries”, Tata McGraw Hill Company, New Delhi, 1985, ISBN: 9780074517727, 0074517724.
2. Eckenfelder: “Industrial Water pollution Control”, McGraw Hill Company, New Delhi American Chemical Society, Washington D.C., USA, 2000, ISBN: 9789339220433.

E-Resources:

1. www.neerienviis.nic.in/pdf/
2. www.fao.org/
3. www.gewater.com/applications
4. www.waterleau.com/en



Natural Disaster Mitigation and Management

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
15HOE753	2:0:0:4	3	CIE:50 SEE:50	3 Hours	OE

Course Objectives:

This course will enable students to :

- Understand the types of natural and environmental disasters.
- Develop skills in various stages of disaster preparedness, mitigation and management.
- Understand the methodologies for disaster risk assessment.

Syllabus

Module – I

Natural Disasters – Overview: Introduction- Natural Disasters around the world- Natural Disaster Risk Assessment- Earth and its characteristics Human Dimensions of Global environment Change – Disaster mitigation, preparedness, response and recovery comprehensive emergency management Early warning systems and Disaster Preparedness– Rehabilitation, Vulnerable Populations - Logistics and Services, Food, Nutrition and Shelter -Role of UN Red cross and NGOs. **08 Hours**

Module – II

Natural Hazards: Introduction and Review - Natural Disasters -Principles, Elements, and Systems - Geological-Geomorphological aspects, - Earthquake-Geology, Seismology, Characteristics and dimensions– Landslides- Human impact on the mountainous terrain and its relationship with Rainfall, liquefaction etc- Tsunami - Nature and characteristics. **08 Hours**

Module – III

Climate system aspects and Processes: Oceanic, Atmospheric and Hydrologic cycles - Severe Weather & Tornadoes , Cyclones, Floods and Droughts - Global Patterns - Mitigation & Preparation – Drought – Famine- nature and dimensions – Drought Assessment and Monitoring. **08 Hours**

Module – IV

Natural Disaster Communication: Mapping - Modeling, risk analysis and loss estimation – Natural disaster risk analysis - prevention and mitigation - Applications of Space Technology (Satellite Communications, GPS, GIS and Remote Sensing and Information / Communication Technologies (ICT) in Early warning Systems - Disaster Monitoring and Support Centre– Information Dissemination, mobile communication – etc. **08 Hours**

Module – V

Administrative mechanisms: Community and Social organizations – Education and Training – Establishment of capacity building among various stake holders – Government - Educational institutions – Use of Multi-media knowledge products for self education. **08 Hours**

Course Outcomes:

On completion of the course, the student will be able to :

- Learn about the types of natural and environmental disasters and its causes.
- Learn about organizational and Administrative strategies for managing disasters.
- Learn about the early warning systems, monitoring of disasters effect and necessity of rehabilitation.
- Learn about the engineering and non-engineering controls of mitigating various natural disasters.
- Understand the key roles of capacity building to face disaster among government bodies, institutions, NGO's, etc.
- Learn methodologies for disaster risk assessment with the help of latest tools like GPS, GIS, Remote sensing, information technologies, etc.

Text Books:

1. Kovach, Robert L :“Earth’s Fury: An Introduction to Natural Hazards and Disasters”, Englewood Cliffs, N.J., Prentice Hall, 1995.
2. Siddhartha Gautam, K Leelakrishna Rao: “Natural disaster Management”, 3rd Edition, 2012, ISBN: 9381604320.

Reference Books:

1. Arul Jothi, D L Balaji: “Safety And Disaster Management Education in Schools”, 1st Edition, Anmol Publications, 2009, ISBN: 9380252609.

E-Resources:

1. <https://www.publicsafety.gc.ca/cnt/mrgnc-mngmnt/dsstr/bt-dsstr-mtgtn-en.aspx>
2. www.nrdms.gov.in/natural_disaster.asp
3. <https://www.ncbi.nlm.nih.gov> › NCBI › Literature › Bookshelf



Natural Disaster Mitigation and Management

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
16HOE753	2:0:0:4	3	CIE:50 SEE:50	3 Hours	OE

Course Objectives:

This course will enable students to :

- Understand the types of natural and environmental disasters.
- Develop skills in various stages of disaster preparedness, mitigation and management.
- Understand the methodologies for disaster risk assessment.

Syllabus

Module – I

Natural Disasters – Overview: Introduction- Natural Disasters around the world- Natural Disaster Risk Assessment- Earth and its characteristics Human Dimensions of Global environment Change – Disaster mitigation, preparedness, response and recovery comprehensive emergency management Early warning systems and Disaster Preparedness– Rehabilitation, Vulnerable Populations - Logistics and Services, Food, Nutrition and Shelter -Role of UN Red cross and NGOs. **08 Hours**

Module – II

Natural Hazards: Introduction and Review - Natural Disasters -Principles, Elements, and Systems - Geological-Geomorphological aspects, - Earthquake-Geology, Seismology, Characteristics and dimensions– Landslides- Human impact on the mountainous terrain and its relationship with Rainfall, liquefaction etc- Tsunami - Nature and characteristics. **08 Hours**

Module – III

Climate system aspects and Processes: Oceanic, Atmospheric and Hydrologic cycles - Severe Weather & Tornadoes , Cyclones, Floods and Droughts - Global Patterns - Mitigation & Preparation – Drought – Famine- nature and dimensions – Drought Assessment and Monitoring. **08 Hours**

Module – IV

Natural Disaster Communication: Mapping - Modeling, risk analysis and loss estimation – Natural disaster risk analysis - prevention and mitigation - Applications of Space Technology (Satellite Communications, GPS, GIS and Remote Sensing and Information / Communication Technologies (ICT) in Early warning Systems - Disaster Monitoring and Support Centre– Information Dissemination, mobile communication – etc. **08 Hours**

Module – V

Administrative mechanisms: Community and Social organizations – Education and Training – Establishment of capacity building among various stake holders – Government - Educational institutions – Use of Multi-media knowledge products for self education. **08 Hours**

Course Outcomes:

On completion of the course, the student will be able to :

- Learn about the types of natural and environmental disasters and its causes.
- Learn about organizational and Administrative strategies for managing disasters.
- Learn about the early warning systems, monitoring of disasters effect and necessity of rehabilitation.
- Learn about the engineering and non-engineering controls of mitigating various natural disasters.
- Understand the key roles of capacity building to face disaster among government bodies, institutions, NGO's, etc.
- Learn methodologies for disaster risk assessment with the help of latest tools like GPS, GIS, Remote sensing, information technologies, etc.

Text Books:

1. Kovach, Robert L :“Earth’s Fury: An Introduction to Natural Hazards and Disasters”, Englewood Cliffs, N.J., Prentice Hall, 1995.
2. Siddhartha Gautam, K Leelakrishna Rao: “Natural disaster Management”, 3rd Edition, 2012, ISBN: 9381604320.

Reference Books:

1. Arul Jothi, D L Balaji: “Safety And Disaster Management Education in Schools”, 1st Edition, Anmol Publications, 2009, ISBN: 9380252609.

E-Resources:

1. <https://www.publicsafety.gc.ca/cnt/mrgnc-mngmnt/dsstr/bt-dsstr-mtgtn-en.aspx>
2. www.nrdms.gov.in/natural_disaster.asp
3. <https://www.ncbi.nlm.nih.gov> › NCBI › Literature › Bookshelf



Renewable Energy Resources

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
18EET451	4:0:0:0	4	CIE:50 SEE:50	3 Hours	EE

Course Objectives:

This course will enable students to :

- Provide detailed information of the present energy scenario and the available Renewable Energy Resources.
- Get detailed insight knowledge in basics of solar radiation geometry and various measurement techniques.
- Understand the solar energy through solar thermal devices, PV conversion and their performance analysis.
- Gain the conceptual knowledge about the various energy conversion methods such as Wind, Tidal, OTEC and Geothermal.
- Give introduction to energy from Biomass, Hydrogen energy and their impact on environment and sustain ability.

Syllabus

Module – I

Introduction: Energy source, India's production and reserves of commercial energy sources, need for non-conventional energy sources.

Solar Radiation: Extra-Terrestrial radiation, spectral distribution of extraterrestrial radiation, solar constant, solar radiation at the earth's surface, beam, diffuse and global radiation, solar radiation data.

Measurement of Solar Radiation: Pyrometer, shading ring pyr heliometer, sunshine recorder, schematic diagrams and principle of working. **10 Hours**

Module – II

Solar Radiation Geometry : Flux on a plane surface, latitude, declination angle, surface azimuth angle, hour angle, zenith angle, solar altitude angle expression for the angle between the incident beam and the normal to a plane surface (No derivation), and local apparent time. Apparent motion of sun, day length, numerical examples.

Radiation Flux on a Tilted Surface: Beam, diffuse and reflected radiation, expression For flux on a tilted surface (no derivations), numerical examples.

Solar Thermal Conversion: Collection and storage, thermal collection devices, liquid flat plate collectors, solar air heaters concentrating collectors (cylindrical, parabolic, paraboloid) (Quantitative analysis). **10 Hours**

Module – III

Performance Analysis of Liquid Flat Plate Collectors : General description, collector geometry, selective surface (qualitative discussion) basic energy-balance equation, stagnation temperature, transmissivity of the cover system, transmissivity-absorptivity product, numerical examples. The overall loss coefficient, correlation for the top loss coefficient, bottom and side loss coefficient, problems (all correlations to be provided). Temperature distribution between the collector tubes, collector heat removal factor, collector efficiency factor and collector flow factor, mean plate temperature, instantaneous efficiency (all expressions to be provided). Effect of various parameters on the collector performance; collector orientation, selective surface, fluid inlet temperature, number covers, dust. **12 Hours**

Module – IV

Photovoltaic Conversion : Description, principle of working and characteristics, applications.

Wind Energy: Properties of wind, availability of wind energy in India, wind velocity and power from wind; major problems associated with wind power, Wind machines: Types of wind machines and their characteristics, horizontal and vertical axis wind mills.

Tidal Power: Tides and waves as energy suppliers and their mechanics, fundamental characteristics of tidal power, harnessing tidal energy, limitations.

Ocean Thermal Energy Conversion: Principle of working, Rankin cycle.

Geothermal Energy Conversion: Principle of working, Types of geothermal station With schematic diagram. **10 Hours**

Module – V

Energy from Bio Mass: Photosynthesis, photosynthetic oxygen production, energy plantation, bio gas production from organic wastes by anaerobic fermentation, description of bio-gas plants, transportation of bio-gas, problems involved with bio-gas production, application of bio-gas, application of bio-gas in engines, advantages.

Hydrogen Energy : Properties of Hydrogen with respect to its utilization as a renewable form of energy, sources of hydrogen, production of hydrogen, electrolysis

of water, thermal decomposition of water, thermo chemical production bio-chemical production.

10 Hours

Course Outcomes:

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

- Explain the present energy scenario and the available Renewable Energy Resources.
- Describe the basics of solar radiation geometry and various measurement techniques.
- Analyze the knowledge gained in tapping the solar energy through solar thermal devices, pv conversion and their performance analysis.
- Demonstrate the various energy conversion methods such as Wind, Tidal, OTEC and Geothermal.
- Apply knowledge of Biomass and Hydrogen energy and their impact on environment and sustainability.

Text Books:

1. G D Rai: "Non-Conventional Energy Sources", (Chapters 1-3,6-9,11), 5th Edition, Khanna Publishers, 2011, ISBN-13: 9788174090737.
2. John Twidell and Tony Weir: "Renewable Energy Resources", (Chapters 2,5-7,9-14), 3rd Edition, Routledge Publisher, 2015, ISBN-13: 978041558437.
3. N K Bansal: "Non-Conventional Energy Resources", (Chapters 1-3,9,10,12,13), 1st Edition, Vikas Publishing, 2014, ISBN-13: 978935978577.

Reference Books:

1. B H Khan: "Non-Conventional Energy Resources", (Chapters 4-10), 2nd Edition, Tata McGraw-Hill Pub., 2006, ISBN-13: 9780070142763.
2. S P Sukhatme, J K Nayak, "Solar Energy", (Chapters 3,4), 3rd Edition, Tata McGraw-Hill Pub., 2008, ISBN-13: 9780070260641.



Environmental Air Pollution

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
18EET454	4:0:0:0	4	CIE:50 SEE:50	3 Hours	EE

Course Objectives:

- The fundamentals of air pollution with a background on historical perspective on air pollution and current air quality policies and standards.
- Major air pollutants, their sources and their effects (environmental, economic and health) and how emissions are estimated from road traffic and industrial sources.
- Dispersion of air pollutants in the atmosphere.
- Analyze and present outputs of air quality models to a wide range of audiences.
- Different air quality monitoring equipments.

Syllabus

Module - I

Introduction: Definition – Classification and Characterization of Air Pollutants, Emission Sources, Behaviour and Fate of air pollutants, Chemical Reactions in the Atmosphere, Photo-chemical Smog, Coal-induced Smog.

Effects of Air Pollution: On Human Health, Animals, Plants and Materials – Major Environmental Air Pollution Episodes–London Smog, Los Angeles Smog and Bhopal Gas Tragedy. **08 Hours**

Module - II

Meteorology: Introduction – Meteorological Variables, Primary and Secondary Lapse Rate, Inversions, Stability Conditions, Windrose, General Characteristics of Stack Plumes, Meteorological Models. Factors to be considered in Industrial Plant Location and Planning, Noise pollution sources, measurement units, effects and control. **10 Hours**

Module - III

Sampling, Analysis and Control: Sampling and Measurement of Gaseous and Particulate matter, Stack Sampling, Analysis of Air Pollutants, Smoke and Smoke Measurement.

Air Pollution Control Methods: Particulate, Emission Control, Gravitational Settling Chambers, Cyclone Separators, Fabric Filters, Electrostatic Precipitators, Wet Scrubbers, Selection of a Particulate Collecting Equipment. **10 Hours**

Module - IV

Control of Gaseous Emissions, Adsorption by Liquids, Adsorption by Solids, Combustion Odors and their control.

Air Pollution due to Automobiles: Air Pollution due to Gasoline Driven and Diesel Driven Engines, Effects, Direct and Indirect Methods of control. **10 Hours**

Module - V

Burning Environmental Issues: Acid Rain, Global Warming, Ozone Depletion in Stratosphere, Indoor Air Pollution.

Environmental Legislation: Environmental Policy, Environmental Acts, Water, Air and Noise Pollution Standards. **10 Hours**

Course Outcomes:

On completion of this course, the students are able to :

- Examine emission standards for industrial and other sources.
- Identify air pollution concentrations as a function of emission, meteorology, topography and the built environment.
- Discuss impact of air pollution on health of humans, animals, plants and materials.
- Identify different equipments for air quality monitoring and control.
- Distinguish between global and local effects of air pollution as well to recognize the legal aspects associated with air pollution.

Text Books:

1. Rao M.N. and Rao H.V.N: "Air Pollution", (Chapters 1-6), Tata- McGraw- Hill Publishing Company Ltd., New Delhi, India, 2011, ISBN 13: 978-0074518717.
2. Anjaneyulu Y: "Air Pollution and control Technologies", (Chapters 2-5), Allied Publishers, Delhi, 2012, ISBN- 13: 9788177641844.
3. Rao C.S: "Environmental Pollution Control Engineering", (Chapters 2-6), New age International Publishers, New Delhi, 2nd Edition, 2013, ISBN- 13: 978-8122418354.

References Books:

1. Gilbert M Masters: "Introduction To Environmental Engineering and Science", (Chapters 1-4), Pearson Education, 3rd Edition, 2007, ISBN-13: 978-0131481930.
2. Mahajan. S.P: "Pollution Control in Process Industries", (Chapters 1-5), Tata McGraw Hill Publishing Co., New Delhi, 2010, ISBN-13: 978-0074517727.

E-Resources:

1. <http://nptel.ac.in/courses/105102089/>
2. <http://nptel.ac.in/courses/105104099/>
3. nptel.ac.in/courses/103107084/module1/lecture1/lecture1.pdf

Green Buildings					
Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
18EET563	3:1:0:0	3	CIE:50 SEE:50	3 Hours	EE

Syllabus

Module – I

Introduction: Environmental implications of buildings energy, carbon emissions, High performance green buildings; Building materials: sources, methods of production and environmental implications. Embodied Energy in Building Materials: Transportation Energy for Building Materials; Maintenance Energy for Buildings. **08Hours**

Module – II

Implications of Building Technologies Embodied Energy of Buildings: Framed Construction, Masonry Construction. Resources for Building Materials, Alternative concepts. Recycling of Industrial and Buildings Wastes. Biomass Resources for buildings. Methods and tools for building assessment: LEED, Green globe, living building challenge. **08Hours**

Module – III

Building energy and strategies: Low energy buildings, renewable energy systems. Economic issues and analysis, Life cycle assessment.
 Comforts in Building: Thermal Comfort in Buildings- Issues; Heat Transfer Characteristic of Building Materials and Building Techniques. Incidence of Solar Heat on Buildings- Implications of Geographical Locations. **08Hours**

Module – IV

Solar buildings: Utility of Solar energy in buildings concepts of Solar Passive Cooling and Heating of Buildings. Low Energy Cooling. Case studies of Solar Passive Cooled and Heated Buildings. **08Hours**

Module – V

Green Composites for buildings: Concepts of Green Composites. Water Utilization in Buildings, Low Energy Approaches to Water Management. Management of Solid Wastes. Management of Sullage Water and Sewage. Urban Environment and Green Buildings. Green Cover and Built Environment. **08Hours**

Course Outcomes:

On completion of this course, students will be able to:

- Know the applications of building materials and energy involved.
- Apply the different technologies and methods involved in green buildings.
- Study different Strategies involved in green building.
- Summarize importance of solar energy in green buildings.
- Assess the causes and effects of waste and to know the effects on green buildings.

Textbooks:

1. K.S. Jagadish, B. U. Venkataramareddy, K. S. Nanjundarao: -Alternative Building Materials and Technologies, (Chapters 1-4,6), 2nd Edition, New Age International, 2007, ISBN: 978-93-859-2387-6 ,
2. Peavy, Tchobanoglous: —Environmental Engineering, Volume-2, (Chapters 6,10- 12), ISBN: 0-07-049134-8.

Reference books:

1. Osman Attmann: —Green Architecture Advanced Technologies and Materials, (Chapters 2,4,6-9) McGraw Hill, 2010, ISBN:9780071625012.
2. Jerry Yudelson: —Green building Through Integrated Design, (Chapters 5-7) McGraw Hill, 2009, ISBN:9780071546010.
3. Walker, B, W. Steffen: -Global change and terrestrial ecosystems, International geosphere-biosphere program, Cambridge University Press, 1996, ISBN-13:9780521578103.

Water Resources Engineering

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
18EET653	3:1:0:0	3	CIE:50 SEE:50	3 Hours	EE

Course Objectives:

This course will enable students to:

- Prepare the students for a successful career as hydrologist and water resources engineers.
- Develop the ability among students to synthesize data and technical concepts for application in hydrology and water resources engineering.
- Provide students with a sound foundation in the mathematical, scientific and engineering fundamentals necessary to formulate, analyze, solve engineering problems and to prepare them for their career.
- Provide students with advanced tools of data collection and the analysis of the same with respect to water resources.
- Promote student awareness for the lifelong learning and to introduce them professional ethics and codes of professional practice in water resources management.

Syllabus

Module - I

Basics of Hydrometeorology: Hydrologic cycle Global water budget Practical applications– Hydrometeorology Air front cyclones Formation of precipitation Types and forms of precipitation Climate and Weather Meteorological Observations.

Precipitation: Measurement of rainfall Rain gauges Radar Measurement of rainfall Rainfall Hyetograph Intensity Duration and Frequency analysis Consistency Missing data Rain gauge network Average depth of rainfall analysis (Theory and Problems).

08 Hours

Module – II

Surface Runoff: Concept of catchment, Linear, Areal and Relief Aspects, Detailed study of Runoff process, Factors affecting Runoff, Runoff estimation, SCS methods, yield estimation.

08 Hours

Module – III

Ground Water: Groundwater in Hydrologic Cycle Origin of groundwater, Rock properties affecting groundwater, Types of aquifer, Darcy's law, coefficient of permeability, groundwater flow rates, permeability formulae, laboratory and field measurement of permeability, Groundwater movement.

08 Hours

15

Module – IV

Water Harvesting and Conservation: Water Harvesting Techniques Micro Catchments Design of Small Water Harvesting Structures – Farm Ponds Percolation Tanks Yield from a Catchment, Site selection for artificial recharge Rain water and Runoff Harvesting in Rural and Urban Areas Reservoir Sedimentation.

08 Hours

Module – V

Watershed Management: Project Proposal Formulation Watershed Development Plan Entry Point Activities Estimation Watershed Economics Agroforestry Grassland Management Wasteland Management Watershed Approach in Government Programmes Developing Collaborative know how People's Participation Evaluation of Watershed Management.

08 Hours

Course Outcomes:

On completion of this course, students will be able to:

- Explain hydrologic cycle and hydro meteorological measurements with a know how about various

- methods of field measurements and estimation of precipitation.
- Recognize the process of abstraction and runoff which they apply to carry out the assessment of water balance and runoff potential.
 - Gain knowledge about basic aquifer parameters and groundwater resources for different hydro-geological boundary conditions.
 - Recognize the need of water harvesting and conservation.
 - Develop the water shed management concepts in accordance with importance to society.

Textbooks:

1. Subramanya K: -Hydrology, Tata McGraw-Hill, New Delhi, ISBN:9781259029974.
2. Jeya Rami Reddy P: -Hydrology, Laxmi Publications, New Delhi, ISBN:9788170080992.
3. Vir Singh: —Watershed Planning and Management, Raj Yash Publishing House, Bikaner, ISBN:9788186882405.

Reference Books:

1. Ven Te Chow: —Handbook of applied hydrology, McGraw Hill Book company. ISBN: 9780070107748.
2. S.K. Garg: -Irrigation Engineering and Hydraulic structures, Khanna Publication, New Delhi, ISBN:978-8174090478.
3. P.N. Modi: -Irrigation, water Resources and water power Engineering, Standard book house, New Delhi, ISBN:978-8189401290.

Basics of Earthquake Engineering					
Course Code	L-T-P-S (Hrs/week)	Credits	Exam marks	Exam Duration	Course Type
18CVT726	3-2-0-0	3	50:50	3 hours	PEC
Course Objectives:					
The students will be able to learn:					
<ul style="list-style-type: none"> • Fundamentals of engineering seismology • Fundamental of structural dynamics • Irregularities in building which are detrimental to its earthquake performance • Different methods of computation seismic lateral forces for framed and masonry structures • Earthquake resistant design requirements for RCC and Masonry structures • Relevant clauses of IS codes of practice pertinent to earthquake resistant design of structures. 					
Syllabus					
Module – I					
Engineering Seismology: Terminologies (Focus, Focal depth, Epicentre, etc.); Causes of Earthquakes; Theory of plate tectonics; Types and characteristics faults; Classification of Earthquakes; Major past earthquakes and their consequences; Types and characteristics of seismic waves; Magnitude and intensity of earthquakes; local site effects; Earthquake ground motion characteristics: Amplitude, frequency and duration; Seismic zoning map of India; (Problems on computation of wave velocities. Location of epicentre, Magnitude of earthquake).					
10 Hrs					
Module – II					
Response Spectrum: Basics of structural dynamics; Free and forced vibration of SDOF system; Effect of frequency of input motion and Resonance; Numerical evaluation of response of SDOF system (Linear acceleration method), Earthquake Response spectrum: Definition, construction, Characteristics and application; Elastic design spectrum.					
10 Hrs					
Module – III					
Seismic Performance of Buildings and Over View of IS-1893: Types of damages to building observed during past earthquakes; Plan irregularities; mass irregularity; stiffness irregularity; Concept of soft and weak storey; Torsional irregularity and its consequences; configuration problems; continuous load path; Architectural aspects of earthquake resistant buildings; Lateral load resistant systems. Seismic design philosophy; Structural modelling; Code based seismic design methods.					
10 Hrs					
Module – IV					
Determination of Design Lateral Forces: Equivalent lateral force procedure and dynamic analysis procedure. Step by step procedures for seismic analysis of RC buildings using Equivalent static lateral force method and response spectrum methods (maximum of 4 storeys and without infill walls).					
10 Hrs					
Module – V					
Earthquake Resistant Analysis and Design of RC Buildings: Typical failures of RC frame structures, Ductility in Reinforced Concrete, Design of Ductile Reinforced Concrete Beams, Seismic Design of Ductile Reinforced Concrete column, Concept of weak beam-strong column, Detailing of Beam-Column Joints to enhance ductility, Detailing as per IS-13920. Retrofitting of RC buildings.					
Earthquake Resistant Design of Masonry Buildings: Performance of Unreinforced, Reinforced, Infill Masonry Walls, Box Action, Lintel and sill Bands, elastic properties of structural masonry, lateral load analysis, Recommendations for Improving performance of Masonry Buildings during earthquakes; Retrofitting of Masonry buildings.					
10 Hrs					

Course Outcomes:

Students will be able to:

- Acquire basic knowledge of engineering seismology.
- Develop response spectra for a given earthquake time history and its implementation to estimate response of a given structure.
- Understanding of causes and types of damages to civil engineering structures during different earthquake scenarios.
- Analyse multi-storied structures modelled as shear frames and determine lateral force distribution due to earthquake input motion using IS-1893 procedures.
- Comprehend planning and design requirements of earthquake resistant features of RCC structures through exposure to different IS-codes of practices.

Text Books:

- Pankaj Agarwal and Manish Shrikande, “Earthquake resistant design of structures”, PHI India.
- S.K. Duggal, “Earthquake Resistant Design of Structures”, Oxford University Press
- Anil K. Chopra, “Dynamics of Structures: Theory and Applications to Earthquake Engineering”, Pearson Education, Inc.
- T. K. Datta, “Seismic Analysis of Structures”, John Wiley & Sons (Asia) Ltd.

Reference Books:

- David Dowrick, “Earthquake resistant design and risk reduction”, John Wiley and Sons Ltd.
- C. V. R. Murty, Rupen Goswami, A. R. Vijayanarayanan & Vipul V. Mehta, “Some Concepts in Earthquake Behaviour of Buildings”, Published by Gujarat State Disaster Management Authority, Government of Gujarat.
- IS-13920 – 2016, Ductile Detailing of Reinforced Concrete Structures Subjected to Seismic Forces, BIS, New Delhi.
- IS-1893 – 2016, Indian Standard Criteria for Earthquake Resistant Design of Structures, Part-1, BIS, New Delhi.
- IS- 4326 – 2013, Earthquake Resistant Design and Construction of Buildings, BIS, New Delhi.
- IS-13828 – 1993, Indian Standard Guidelines for Improving Earthquake Resistance of Low Strength Masonry Buildings, BIS, New Delhi.
- IS-3935 – 1993, Repair and Seismic Strengthening of Buildings-Guidelines, BIS, New Delhi.

Integrated Rural Development – Part 1

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
17CSH39	0:2:0:0	1	CIE:50 SEE:50	2 Hours	HSS

Course Objectives:

This course will enable students to:

- Gain an awareness of the existing challenges in rural areas of India
- Develop the ability to communicate and interact with rural sections of our society
- Use and apply their academic knowledge to facilitate rural development and uplift via targeted initiatives and activities.

Syllabus

Module - I

Introduction: Introduction to the course and its objectives; overview of typical challenges faced in villages; importance of integrating villages in mainstream society; relevance of course to nation building; division of students into groups; allotment of villages to student groups; assignment of mentors to student groups. **03 Hours**

Module - II

Project Definition: Visit of student groups to respective villages with assigned mentors; interacting with villagers and ice-breaking activities; identifying possible project topics with the help of mentor and supervisor; student group discussion to finalize the project definition; review of project definition with mentor and supervisor. **06 Hours**

Module - III

Project Conceptualization and Planning: Creation of plan to realize the project; review of plan with mentor and supervisor; assigning action items to students within the group; planning for needed logistics and infrastructure. **06 Hours**

Module - IV

Project Realization: Execution of the project plan (for example by conducting workshops); aggregation of project deliverables like survey reports, collected data, interviews, and questionnaires; recording of impact of the project on the village; periodical review of the project execution status as well as the project deliverables (like aggregated data and survey reports) with mentor and supervisor. **10 Hours**

Module - V

Project Reporting: Creation of project report by the student groups detailing the motivation for the project, the approach, the work packages along with student assignments, the execution of the project, impact of the project, and lessons learned by the students during the project; creation of a slide-set to present the project report during the final exam; review by mentor and supervisor. **03 Hours**

Course Outcomes:

On completion of this course, students will be able to:

- Develop the ability to interact and communicate with different sections of society, thus improving their communication skills.
- Understand the existing problems and needs of a village, thus developing an awareness of the challenges facing rural India.
- Conceptualize, plan, and realize measures to address these problems, thus improving their practical problem-solving and leadership skills.
- Make an impact to rural section of society, thus building their self-confidence.

Text Books:

1. Bhagawan Sri Sathya Sai Baba: "Service to Village is Service to God", Sri Sathya Sai Publications.

Reference Books:

1. Bhagawan Sri Sathya Sai Baba: "Man Management: A Value-Based Management Perspective", Sri Sathya Sai Publications.
2. Lt. Gen. M.L.Chibber: "Sai Baba's Mahavakya on Leadership : Book for Youth, Parents and Teachers."

E-Resources:

1. <http://rural.nic.in/netrural/rural/index.aspx>
2. www.annapoorna.org.in



Integrated Rural Development – Part 2

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
17CSH49	0:2:0:0	1	CIE:50 SEE:50	2 Hours	HSS

Course Objectives:

This course is an extension of the Integrated Rural Development course which was introduced in Semester 3. This course will extend the previous semester's work and will enable the students to:

- Continue working on the problems and challenges identified in the village.
- Apply their academic knowledge, talents, and abilities to come up with innovative and practical solutions to the challenges in the village.
- Foster a sense of entrepreneurship towards addressing the problems in the village.

Syllabus

Module - I

Overview: Overview of the course; summary of the experiences from previous semester with assigned mentors and supervisors; discussion of the challenges faced in the village identified previously. **03 Hours**

Module - II

Project Backlog Revision: Revisiting the challenges already identified in the previous semester and identifying possible project topics with the help of mentor and supervisor (this can be either continuation of the previous semester's project with a larger scope or a new project); student group discussion to finalize the new project definition; review of project definition with mentor and supervisor. **06 Hours**

Module - III

Project Plan Finalization: Modification of the previous semester's project plan to accommodate the new objectives; review of new proposal and plan with mentor and supervisor to finalize plan of work; distribution of work and needed resources and logistics within the group. **06 Hours**

Module - IV

Project Execution: Execution of the project as per the plan; conducting surveys to evaluate the impact of the project execution; collection of project deliverables; periodical review of the project execution status and collected artifacts (like aggregated data and survey reports) with mentor and supervisor. **10 Hours**

Module - V

Project Presentation: Creation of a final project report and a high-quality project presentation; both the project report and presentation should clearly articulate the motivation, how the project was conceptualized and executed, impact of the project, future directions in the project, and lessons learned by the students during the project; final review and evaluation by mentor and supervisor. **03 Hours**

Course Outcomes:

On completion of this course, students will be able to:

- Further develop their social and communication skills by interacting with residents of the village and within their team.
- Conceptualize long term solution to challenges in villages, thus developing a sense of entrepreneurship.
- Make an impact to rural sections of society, thus building their self-confidence.

Text Books:

1. Bhagawan Sri Sathya Sai Baba: "Service to Village is Service to God", Sri Sathya Sai Publications.

Reference Books:

1. Bhagawan Sri Sathya Sai Baba: "Man Management: A Value-Based Management Perspective", Sri Sathya Sai Publications.
2. Lt. Gen. M.L.Chibber: "Sai Baba's Mahavakya on Leadership : Book for Youth, Parents and Teachers."

E-Resources:

1. <http://rural.nic.in/netrural/rural/index.aspx>
2. www.annapoorna.org.in



Integrated Rural Development – Part 1

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
17CVH39	0:2:0:0	1	CIE:50 SEE:50	2 Hours	HSS

Course Objectives:

This course will enable students to:

- Gain an awareness of the existing challenges in rural areas of India
- Develop the ability to communicate and interact with rural sections of our society
- Use and apply their academic knowledge to facilitate rural development and uplift via targeted initiatives and activities.

Syllabus

Module - I

Introduction: Introduction to the course and its objectives; overview of typical challenges faced in villages; importance of integrating villages in mainstream society; relevance of course to nation building; division of students into groups; allotment of villages to student groups; assignment of mentors to student groups. **03 Hours**

Module - II

Project Definition: Visit of student groups to respective villages with assigned mentors; interacting with villagers and ice-breaking activities; identifying possible project topics with the help of mentor and supervisor; student group discussion to finalize the project definition; review of project definition with mentor and supervisor. **06 Hours**

Module - III

Project Conceptualization and Planning: Creation of plan to realize the project; review of plan with mentor and supervisor; assigning action items to students within the group; planning for needed logistics and infrastructure. **06 Hours**

Module - IV

Project Realization: Execution of the project plan (for example by conducting workshops); aggregation of project deliverables like survey reports, collected data, interviews, and questionnaires; recording of impact of the project on the village; periodical review of the project execution status as well as the project deliverables (like aggregated data and survey reports) with mentor and supervisor. **10 Hours**

Module - V

Project Reporting: Creation of project report by the student groups detailing the motivation for the project, the approach, the work packages along with student assignments, the execution of the project, impact of the project, and lessons learned by the students during the project; creation of a slide-set to present the project report during the final exam; review by mentor and supervisor. **03 Hours**

Course Outcomes:

On completion of this course, students will be able to:

- Develop the ability to interact and communicate with different sections of society, thus improving their communication skills.
- Understand the existing problems and needs of a village, thus developing an awareness of the challenges facing rural India.
- Conceptualize, plan, and realize measures to address these problems, thus improving their practical problem-solving and leadership skills.
- Make an impact to rural section of society, thus building their self-confidence.

Text Books:

1. Bhagawan Sri Sathya Sai Baba: "Service to Village is Service to God", Sri Sathya Sai Publications.

Reference Books:

1. Bhagawan Sri Sathya Sai Baba: "Man Management: A Value-Based Management Perspective", Sri Sathya Sai Publications.
2. Lt. Gen. M.L.Chibber: "Sai Baba's Mahavakya on Leadership : Book for Youth, Parents and Teachers."

E-Resources:

1. <http://rural.nic.in/netrural/rural/index.aspx>
2. www.annapoorna.org.in



Integrated Rural Development – Part 2

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
17CVH49	0:2:0:0	1	CIE:50 SEE:50	2 Hours	HSS

Course Objectives:

This course is an extension of the Integrated Rural Development course which was introduced in Semester 3. This course will extend the previous semester's work and will enable the students to:

- Continue working on the problems and challenges identified in the village.
- Apply their academic knowledge, talents, and abilities to come up with innovative and practical solutions to the challenges in the village.
- Foster a sense of entrepreneurship towards addressing the problems in the village.

Syllabus

Module - I

Overview: Overview of the course; summary of the experiences from previous semester with assigned mentors and supervisors; discussion of the challenges faced in the village identified previously. **03 Hours**

Module - II

Project Backlog Revision: Revisiting the challenges already identified in the previous semester and identifying possible project topics with the help of mentor and supervisor (this can be either continuation of the previous semester's project with a larger scope or a new project); student group discussion to finalize the new project definition; review of project definition with mentor and supervisor. **06 Hours**

Module - III

Project Plan Finalization: Modification of the previous semester's project plan to accommodate the new objectives; review of new proposal and plan with mentor and supervisor to finalize plan of work; distribution of work and needed resources and logistics within the group. **06 Hours**

Module - IV

Project Execution: Execution of the project as per the plan; conducting surveys to evaluate the impact of the project execution; collection of project deliverables; periodical review of the project execution status and collected artifacts (like aggregated data and survey reports) with mentor and supervisor. **10 Hours**

Module - V

Project Presentation: Creation of a final project report and a high-quality project presentation; both the project report and presentation should clearly articulate the motivation, how the project was conceptualized and executed, impact of the project, future directions in the project, and lessons learned by the students during the project; final review and evaluation by mentor and supervisor. **03 Hours**

Course Outcomes:

On completion of this course, students will be able to:

- Further develop their social and communication skills by interacting with residents of the village and within their team.
- Conceptualize long term solution to challenges in villages, thus developing a sense of entrepreneurship.
- Make an impact to rural sections of society, thus building their self-confidence.

Text Books:

1. Bhagawan Sri Sathya Sai Baba: “Service to Village is Service to God”, Sri Sathya Sai Publications.

Reference Books:

1. Bhagawan Sri Sathya Sai Baba: “Man Management: A Value-Based Management Perspective”, Sri Sathya Sai Publications.
2. Lt. Gen. M.L.Chibber: “Sai Baba's Mahavakya on Leadership : Book for Youth, Parents and Teachers.”

E-Resources:

2. <http://rural.nic.in/netrural/rural/index.aspx>
3. www.annapoorna.org.in



BUSINESS ETHICS AND CORPORATE GOVERNANCE

Course Code : 17MBA13 L: T: P: S 3:0:0:4 Credit : 4

Exam marks : CIE: 50 SEE: 50 Exam Duration: 3 hours

Course Objectives:

- To familiarize students with the concept of business ethics.
- To make students aware of the foundations and guiding principles of today's business.
- To help students develop an understanding of the need for good corporate governance.
- To make students aware of the existing codes of business.
- To have a better understanding on the working model of corporate governance and corporate social responsibility.

Module 1 (04 Hours)

Introduction to Business Ethics: Meaning, Need, Objectives, Importance, Nature and Scope. Type of ethics, Characteristics and Factors influencing business ethics

Module 2 (10 Hours)

Traditional theories of business ethics, Indian Value system, Values and ethics. Ethics in Management

Module 3 (08 Hours)

Introduction to Corporate Governance: Need, Importance, Objectives, Principles, Difference between Corporate Governance and Public Governance. OECD Principle, 4P's of Corporate Governance, Ownership and Corporate Governance.

Module 4 (10 Hours)

Evolution and Codes: Corporate Governance in Different countries. Corporate Obligations – to society, investors. Corporate Disclosures, Investor and Customer protection.

Corporate Governance Codes and Guidelines: SEBI Guidelines, Board and Corporate Management, Accounting standards and Practices, Whistle blower Policy.

Module 5(10 Hours)

Corporate Governance Mechanism and Control: Internal Monitoring, Remuneration, Audit Committee, External Auditors, Government Regulations.

Corporate Social Responsibility: Concept, Social Orientation, Stake Holder Expectation, Implementation and Advantages, Examples of CSR.

Practical Components:

- Students can select any domestic institutions of their choice and study the CSR initiatives carried out by them and present the same in the class.
- Case studies/Role plays depicting ethical issues in business with respect to Indian context.
- A group assignment on the interrelationship between the stakeholders of business in Indian context along with their business model to be presented in the class.

Course Outcomes:

Students will be able to:

- Understand the need for ethics in global business and develop skills required to work through ethical dilemmas.
- Appreciate and apply Indian value system, with knowledge of other countrysystems.
- Be aware of the need for good corporate Governance.
- Adopt effective corporate governance
- Know the benefits of CSR.

REFERENCE BOOKS:

1. Corporate Governance – N.V.Badi, Vrinda Publications.
2. Corporate Governance, Ethics and Social Responsibility- Balachandran V.&Chandrasekaran V, PHI.

BUSINESS ETHICS AND CORPORATE GOVERNANCE

Course Code : 18MBA24 L: T: P: S 3:0:0:4

Credit : 4

Exam marks : CIE: 50 SEE: 50

Exam Duration: 3 Hours

Course Objectives:

- To familiarize students with the concept of business ethics.
- To make students aware of the foundations and guiding principles of today's business.
- To help students develop an understanding of the need for good corporate governance.
- To make students aware of the existing codes of business.
- To have a better understanding on the working model of corporate governance and corporate social responsibility.

Module 1 (4 Hours)

Introduction to Business Ethics: Meaning, Need, Objectives, Importance, Nature and Scope. Type of ethics, Characteristics and Factors influencing business ethics

Module 2 (10 Hours)

Traditional theories of business ethics, Indian Value system, Values and ethics. Ethics in Management

Module 3

(8 Hours)

Introduction to Corporate Governance: Need, Importance, Objectives, Principles, Difference between Corporate Governance and Public Governance. OECD Principle, 4P's of Corporate Governance, Ownership and Corporate Governance.

Module 4 (10 Hours)

Evolution and Codes: Corporate Governance in Different countries. Corporate Obligations – to society, investors. Corporate Disclosures, Investor and Customer protection

Corporate Governance Codes and Guidelines: SEBI Guidelines, Board and Corporate Management, Accounting standards and Practices, Whistle blower Policy.

Module 5(10 Hours)

Corporate Governance Mechanism and Control: Internal Monitoring, Remuneration, Audit Committee, External Auditors, Government Regulations.

Corporate Social Responsibility: Concept, Social Orientation, Stake Holder Expectation, Implementation and Advantages, Examples of CSR.

Practical Components:

- Students can select any domestic institutions of their choice and study the CSR initiatives carried out by them and present the same in the class.
- Case studies/Role plays depicting ethical issues in business with respect to Indian context.
- A group assignment on the interrelationship between the stakeholders of business in Indian context along with their business model to be presented in the class.

COURSE OUTCOMES:

Students will be able to:

- Understand the need for ethics in global business and develop skills required to work through ethical dilemmas.
- Appreciate and apply Indian value system, with knowledge of other countrysystems.
- Be aware of the need for good corporate Governance.
- Adopt effective corporate governance
- Know the benefits of CSR.

REFERENCE BOOKS:

3. Corporate Governance – N.V.Badi, Vrinda Publications.
4. Corporate Governance, Ethics and Social Responsibility- Balachandran V & Chandrashekharan V.,PHI.

WORK PLACE ETHICS

Course Code : 15MBAHR313 **L: T: P: S** 2: 0: 2: 0
Credits: 3 **Exam marks:** CIE: 50 SEE: 50 **Exam Duration:** 3 hours

Course Objectives:

- To make the students understand the meaning and significance of ethics
- To understand the issues and problems encountered by organizations in the work place.
- To create awareness regarding privacy rights.
- To provide the guidelines regarding prevention of harassment

Course Outcome:

- Applying ethics in profession
- Adopting ethical principles for hiring & firing
- Protecting privacy of employees in work place
- Adopting measures for prevention of harassment at work place
- Building teams in work place.

Module-1

(6 Hours)

Work place ethics: Meaning, needs, principles, benefits of work place ethics, Professionalism at work place, reasons for unethical behavior, Measures to control unethical behavior.

Module-2

(6 Hours)

Ethical issues in various aspects, Ethics in HR- Hiring, firing, whistle blowing, Employee safety, remuneration, Ethics in Marketing- Quality of services and goods, Ethical market promotion, pricing

Module-3

(6 Hours)

Work place privacy and ethics Plagiarism, Computer crimes, watching the movements of employees, death of privacy of employees, defence by the organization, rewarding ethical behavior, Ethical issues in global business, IT & ITES.

Module-4

(6 Hours)

Harassment at work place. Reasons of harassment, types of harassment, measures for preventing harassment, guidelines by National human rights commission, **Compulsory guidelines to be followed by organizations for maintaining ethics.**

Module

5:

(4 Hours)

Teamwork in the Workplace & Ethics: 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.**

RECOMMENDED BOOKS:

- Ethical Theory and Business, 8th Edition, Tom L. Beauchamp, Norman E. Bowie and Denis Arnold
- Business Ethics, 9th Edition, O.C. Ferrell, John Fraedrich, and Linda Ferrell, Cengage Learning.
- How technology is compromising Workplace Privacy, Fredrick S Lane 111, AMACOM Div American Mgmt Assn, 2003
- Ethics in the Workplace, Dean Bredeson, Keith Goree, Cengage Learning, 2011.

Reference books

- Ethical Theory and Business, Tom L Beauchamp, Norman E. Bowie and Denis Arnold, 8th Edition
- Business Ethics, O.C. Ferrel, John Fraedrich, and Linda Ferrell, 9th Edition, Cengage Learning
- How Technology is compromising Workplace Privacy, Fredrick S Lane 111, AMACOM Div American Management Assn., 2003
- Ethics in the Workplace, Dean Bredeson, Keith Goree, Cengage Learning 2011

Constitution of India, Professional Ethics and Human Rights

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
18CPH38	1:0:0:0	1	CIE:50 SEE:50	2 hours	HSS

Course Objectives:

This course will enable students to :

- The basic information about Indian constitution.
- The fundamental rights and duties of a citizen.
- Special privileges of socially and economically weaker sections of the society.
- Individual role and ethical responsibility towards society.

Syllabus

Module – I

Introduction to the Constitution of India, The Making of the Constitution and Salient features of the Constitution. Preamble to the Indian Constitution, Fundamental Rights & its limitations. **03 Hours**

Module – II

Directive Principles of State Policy & Relevance of Directive Principles of State Policy, Fundamental Duties. Union Executives – President, Prime Minister, Parliament, Supreme Court of India. **03 Hours**

Module – III

State Executives – Governor, Chief Minister, State Legislature High Court of State. Electoral Process in India, Amendment Procedures, 42nd , 44th , 74th , 76th , 86th & 91st Amendments. **02 Hours**

Module – IV

Special Provision for SC & ST, Special Provision for Women, Children & Backward Classes, Emergency Provisions. Human Rights- Working of National Human Rights Commission in India, Powers and functions of Municipalities, Panchayats and Co - Operative Societies. **03 Hours**

Module – V

Scope & Aims of Engineering Ethics, Responsibility of Engineers, Impediments to

Course Outcomes:

On completion of this course, students will be able to:

- Familiarize with fundamental rights and duties.
- Recognize the Electoral Process.
- Get exposed to legislature and judiciary.
- Realize special provisions given for women, children and weaker section of society.
- Exhibit Engineering ethics and responsibilities of Engineers.

Text Books:

3. Durga Das Basu, "Introduction to the Constitution of India", Lexis Nexis Publications; 22nd Edition, 2015, ISBN-13: 978-9351434467.
4. Charles E. Haries, Michael S Pritchard and Michael J. Robins, "Engineering Ethics", Thomson Wadsworth, 2nd Edition, 2003, ISBN-13: 978-9812436764.

Reference Books:

4. M.V. Pylee, "An Introduction to Constitution of India", Vikas Publishing, 2002, 1st Edition, ISBN-13: 978-8125918325.
5. M. Govindarajan, S. Natarajan, V.S. Senthilkumar, "Engineering Ethics", PHI Learning Private Limited, New Delhi, 2nd Edition, 2013, ISBN-13: 978-8120348165.
6. Brij Kishore Sharma, "Introduction to the Constitution of India", PHI Learning Private Limited, New Delhi, 7th Edition, 2015, ISBN-13: 978-8120350892.

E-Resources:

3. <http://www.cgsird.gov.in/constitution.pdf>
4. <http://indiacode.nic.in/coiweb/welcome.html>



CONSTITUTION OF INDIA, PROFESSIONAL ETHICS & HUMAN RIGHTS

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
19CPH37	1:0::0:0	1	CIE:50 SEE:50	2 Hours	-

COURSE OBJECTIVE:

This course will enable students to:

- Learn about the preamble of the Indian constitution.
- Fundamental rights & duties of acitizen.
- Special privileges of society and economically weaker section of the society.
- Individual role & ethical responsibility towards society.

Syllabus:

Module-1

introduction to constitution: Introduction, making of constitution, Salient features of the constitution, preamble of the Indian constitution. Fundamental rights & limitations. **03 Hours**

Module-2

DPSP, Union Executives: Directive principles of state policy, Fundamental duties, union executives- President, Prime minister, Parliament, supreme court of India. **03Hours**

Module-3

State executives, Electoral process, Amendments: State executives- Governor, CM, state legislature, High courts, Electoral process. Amendment Procedures, Amendments -42nd, 44th, 74th, 76th, 86th and 91st. **02 Hours**

Module-4

Special provisions, Municipalities, co-operative society: Provisions for SC & ST, Women, Children & backward classes. Emergency provisions, Human rights. Municipalities, Panchayats and Co-operative societies. **03 Hours**

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Module-5

Scope & aim of Engineering ethics: Ethics, Responsibility of engineers, impediments to responsibility, Risks, Safety and Liability of engineers, Honesty, Integrity and reliability in engineering. **02 Hours**

Course Outcomes:

On completion of this course, students will be able to:

- Familiarize with fundamental rights and duties.
- Recognize the electoralprocess.
- Get exposed to legislature andjudiciary.
- Realize special provisions given for women, children and weaker section of the society.
- Exhibit engineering ethics and responsibilities of engineers.

Text Book:

1. D. Srinivasan, "Constitution of India, professional ethics", Himalaya Publishing House,

Soft Skills Development-1

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
15CSH39	0:2:0:0	1	CIE:50 SEE:50	2 Hours	HSS

Course Objectives:

This course will enable students to :

- Improve the communication skills.
- Develop the art of presentation and writing effectively.
- Enhance the technical knowledge.

To improve the communication and presentation skills, every student has to give a seminar on technical topics assigned by the supervisors. Each course coordinator/ faculty members will be assigned with few students to guide and monitor the presentation. The presentation shall be for 15 minutes. A brief report on the seminar has to be submitted by the student to the concerned department after completion of the seminar. The report shall be signed by the supervisor and the Head of the concerned department.

The objective of the seminar is to introduce students to the major constituent of technology that is concerned with critically reading, understanding, summarizing, explaining and presenting existing technical topics. Students have to refer one or more topics that are assigned to them by their supervisors. The idea behind the seminar system is to familiarize student more extensively with the methodology of their chosen subject, allow them to develop presentation skills and also interact with example of practical problems.

Course Outcomes:

On completion of this course, the students are able to :

1. Get rid of stage fear and answer questions from audience.
2. Communicate confidently and fluently.
3. Comprehend and prepare reports effectively.



Soft Skills Development-2

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
15CSH49	0:2:0:0	1	CIE:50 SEE:50	2 Hours	HSS

Course Objectives:

This course will enable students to :

- Improve the communication skills.
- Develop the art of presentation and writing effectively.
- Enhance the technical knowledge.

To improve the communication and presentation skills, every student has to give a seminar on technical topics assigned by the supervisors. Each course coordinator/faculty members will be assigned with few students to guide and monitor the presentation. The presentation shall be for 15 minutes. A brief report on the seminar has to be submitted by the student to the concerned department after completion of the seminar. The report shall be signed by the supervisor and the Head of the concerned department.

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Course Outcomes:

On completion of this course, the students are able to :

- Get rid of stage fear and answer questions from audience.
- Communicate confidently and fluently.
- Comprehend and prepare reports effectively.



Soft Skills Development-1

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
15CVH39	0:2:0:0	1	CIE:50 SEE:50	2 Hours	HSS

Course Objectives:

The students will be able to :

- Improve the communication skills.
- Develop the art of presentation and writing effectively.
- Enhance the technical knowledge.

Syllabus

To improve the communication and presentation skills, every student has to give a seminar on technical topics assigned by the supervisors. Each course coordinator/faculty members will be assigned with few students to guide and monitor the presentation. The presentation shall be for 15 minutes. A brief report on the seminar has to be submitted by the student to the concerned department after completion of the seminar. The report shall be signed by the supervisor and the Head of the concerned department.

The objective of the seminar is to introduce students to the major constituent of technology that is concerned with critically reading, understanding, summarizing, explaining and presenting existing technical topics. Students have to refer one or more topics that are assigned to them by their supervisors. The idea behind the seminar system is to familiarize student more extensively with the methodology of their chosen subject, allow them to develop presentation skills, and also interact with example of practical problems.

Course Outcomes:

On completion of this course, the students are able to :

- Overcome stage fear and answer questions from audience.
- Communicate confidently and fluently.
- Comprehend and prepare reports effectively.



Soft Skills Development

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
15CVH49	0:2:0:0	1	CIE:50 SEE:50	2 Hours	HSS

Course Objectives:

The students will be able to :

- Improve the communication skills.
- Develop the art of presentation and writing effectively.
- Enhance the technical knowledge.

Syllabus

To improve the communication and presentation skills, every student has to give a seminar on technical topics assigned by the supervisors. Each course coordinator/ faculty members will be assigned with few students to guide and monitor the presentation. The presentation shall be for 15 minutes. A brief report on the seminar has to be submitted by the student to the concerned department after completion of the seminar. The report shall be signed by the supervisor and the Head of the concerned department.

The objective of the seminar is to introduce students to the major constituent of technology that is concerned with critically reading, understanding, summarizing, explaining and presenting existing technical topics. Students have to refer one or more topics that are assigned to them by their supervisors. The idea behind the seminar system is to familiarize student more extensively with the methodology of their chosen subject, allow them to develop presentation skills, and also interact with example of practical problems.

Course Outcomes:

On completion of this course, the students are able to :

1. Overcome stage fear and answer questions from audience.
2. Communicate confidently and fluently.
3. Comprehend and prepare reports effectively.

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MANAGERIAL SKILL DEVELOPMENT

Course Objectives:

- To provide a practical input and to enhance the managerial competency among students.
- To provide a balance of the practical input in order to enhance the managerial skills set of the students.
- To highlight importance of managerial development through the blend of learning by doing.

Course Outcome:

- Enhancing managerial skills
- Developing practical managerial knowledge of the students by undertaking practical studies.
- Identifying and analyzing problem situations and providing practical solutions
- Overall personality development of the students

The following Broad areas will be covered;

- Rural community development initiative
- Visit to rural areas and identifying a persisting problem.
- Collecting data about the persisting problem, analyzing and presenting the report.
- Personality development of the students by focusing on aspects such as.
- Developing the art of public speaking before the audience.
- Impromptu speech.

NAGARJUNA
College of Engineering & Technology

HR ANALYTICS

Course Objectives:

1. To introduce the student to the theory, concepts, and business application of human resources research, data, metrics, systems, analyses, and reporting.
2. To develop an understanding of the role and importance of HR analytics, and the ability to track, store, retrieve, analyse and interpret HR data to support decision making.
3. To aware the challenges human resources analytics for the competitive advantage of the organization.
4. To enable students to use applicable benchmarks/metrics to conduct research and statistical analyses related to Human Resource

Module 1

(06 Hours)

HR Analytics in Perspective: Role of Analytics, Defining HR Analytics, HR Analytics: The Third Wave for HR value creation, HR Measurement journey in tune with HR maturity journey Understanding the organizational system (Lean), locating the HR challenge in the system, Valuing HR Analytics in the organizational system

Module 2:

(06 Hours)

HRA Frameworks: Current approaches to measuring HR and reporting value from HR contributions, Strategic HR Metrics versus Benchmarking, HR Scorecards & Workforce Scorecards and how they are different from HR Analytics, HR Maturity Framework: From level 1 to level 5, HR Analytics Frameworks: (a) LAMP framework; (b) HCM:21 Framework and (c) Talentship Framework, 5 overarching components of an effective Analytics

Module 3:

(05 Hours)

Basics of HR Analytics: What is Analytics, Evolution, Analytical capabilities, Analytic value chain, Analytical Model, Typical application of HR analytics.

Predictive Analytics: Steps involved in predictive analytics: Determine key performance indicator, analyse and report data, interpreting the results and predicting the future. Metrics and Regression analysis and Causation

Module 4:

(7 Hours)

Data driven HRA: Typical data sources, Typical questions faced (survey), Typical data issues, Connecting HR Analytics to business, benefit (case studies), Techniques for establishing questions, Building support and interest, Obtaining data, Cleaning data (exercise), Supplementing data. **HR Metrics** – Defining metrics, Demographics, data sources and requirements, Types of data, tying data sets together, Difficulties in obtaining data, ethics of measurement and evaluation. Human capital

Module 5:

(4 Hours)

HR Scorecard: Assessing HR Program, engagement and Turnover, Finding money in Analytics, Linking HR Data to operational performance, HR Data and stock performance. Creating HR Scorecard, develop an HR measurement system, guidelines for implementing a HR Scorecard.

Practical Components:

1. Identify the important HR metrics used in manufacturing companies.
2. Collect the payroll detail from IT Company and use module 5 contents.

Course Outcomes:

Students will be able to:

1. Have an understanding of How HR function adds value and demonstrates the value in business terms
2. Measure the value of Intangibles that HR helps builds for the organization given a particular business context to facilitate decision making.
3. Convert soft factors in a people management context into measurable variables across various domains.
4. Devise, conduct and analyse a study on employees or any other related to the HR context in an organization.

RECOMMENDED BOOKS

- Moore, McCabe, Duckworth, and Alwan. The Practice of Business Statistics: Using Data for Decisions, Second Edition, New York:W.H.Freeman, 2008.
- Predictive analytics for Human Resources, Jac Fitz-enz, John R.Mattox, II, Wiley, 2014.
- Human Capital Analytics: Gene Pease Boyce Byerly, Jac Fitz-enz,Wiley,2013.

REFERENCE BOOKS

- The HR Scorecard: Linking People, Strategy, and Performance, by
- Brian E. Becker, Mark A. Huselid, Mark A Huselid, David Ulrich,2001.
- HR Analytics: The What, Why and How, by Tracey Smith
- The New HR Analytics: Predicting the Economic Value of Your Company's Human By Jac FITZ-ENZ, 2010.

UNIVERSAL HUMAN VALUES 2: UNDERSTANDING HARMONY

Course Code	L:T:P:S	Credits	Exam Marks	Exam Duration	Course Type
19UHV47	2-1-0-3				

Universal Human Values 2: Understanding Harmony

Human Values Courses

This course also discusses their role in their family. It, very briefly, touches issues related to their role in the society and the nature, which needs to be discussed at length in one more semester for which the foundation course named as “H-102 Universal Human Values 2: Understanding Harmony” is designed which may be covered in their III or IV semester.

During the Induction Program, students would get an initial exposure to human values through Universal Human Values – I. This exposure is to be augmented by this compulsory full semester foundation course.

Universal Human Values 2: Understanding Harmony

Pre-requisites: None. Universal Human Values 1 (desirable)

1. **Objective:** The objective of the course is four fold:

- Development of a holistic perspective based on self-exploration about themselves (human being), family, society and nature/existence.
- Understanding (or developing clarity) of the harmony in the human being, family, society and nature/existence
- Strengthening of self-reflection.
- Development of commitment and courage to act.

2. **Course Topics:** The course has 28 lectures and 14 practice sessions in 5 modules:

Module 1

Course Introduction - Need, Basic Guidelines, Content and Process for Value Education

Purpose and motivation for the course, recapitulation from Universal Human Values-I

Self-Exploration–what is it? - Its content and process; ‘Natural Acceptance’ and

Experiential Validation- as the process for self-exploration

Continuous Happiness and Prosperity- A look at basic Human Aspirations

Right understanding, Relationship and Physical Facility- the basic requirements for fulfilment of aspirations of every human being with their correct priority

Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario

Method to fulfil the above human aspirations: understanding and living in harmony at various levels.

Include practice sessions to discuss natural acceptance in human being as the innate acceptance for living with responsibility (living in relationship, harmony and co-existence) rather than as arbitrariness in choice based on liking-disliking

Module 2

Understanding Harmony in the Human Being - Harmony in Myself!

Understanding human being as a co-existence of the sentient 'I' and the material 'Body'

Understanding the needs of Self ('I') and 'Body' - happiness and physical facility

Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer)

Understanding the characteristics and activities of 'I' and harmony in 'I'

Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail

Programs to ensure Sanyam and Health. Include practice sessions to discuss the role others have played in making material goods available to me. Identifying from one's own life. Differentiate between prosperity and accumulation. Discuss program for ensuring health vs dealing with disease

Module 3:

Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship

Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness; Trust and Respect as the foundational values of relationship.

Understanding the meaning of Trust; Difference between intention and competence

Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship.

Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals.

Visualizing a universal harmonious order in society- Undivided Society, Universal Order- from family to world family.

Include practice sessions to reflect on relationships in family, hostel and institute as extended family, real life examples, teacher-student relationship, goal of education etc. Gratitude as a universal value in relationships. Discuss with scenarios. Elicit examples from students' lives

Module 4:

Understanding Harmony in the Nature and Existence - Whole existence as Coexistence

Understanding the harmony in the Nature.

Interconnectedness and mutual fulfilment among the four orders of nature- recyclability and selfregulation in nature.

Understanding Existence as Co-existence of mutually interacting units in all-pervasive space
Holistic perception of harmony at all levels of existence. Include practice sessions to discuss human being as cause of imbalance in nature (film “Home” can be used), pollution, depletion of resources and role of technology etc.

Module 5:

Implications of the above Holistic Understanding of Harmony on Professional Ethics

Natural acceptance of human values

Definitiveness of Ethical Human Conduct

Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order

Competence in professional ethics: a. Ability to utilize the professional competence for augmenting universal human order b. Ability to identify the scope and characteristics of peoplefriendly and eco-friendly production systems, c. Ability to identify and develop appropriate technologies and management patterns for above production systems.

Case studies of typical holistic technologies, management models and production systems

Strategy for transition from the present state to Universal Human Order: a. At the level of individual: as socially and ecologically responsible engineers, technologists and managers b. At the level of society: as mutually enriching institutions and organizations

Sum up. Include practice Exercises and Case Studies will be taken up in Practice (tutorial) Sessions eg. to discuss the conduct as an engineer or scientist etc.

3. Readings: 3.1

Text Book 1. Human Values and Professional Ethics by R R Gaur, R Sangal, G P Bagaria, Excel Books, New Delhi, 2010

Reference Books-3.2

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1. Jeevan Vidya: Ek Panchaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.
 2. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
 3. The Story of Stuff (Book).The Story of My Experiments with Truth - by Mohandas Karamchand.
 4. Gandhi Small is Beautiful - E. F Schumacher.
 5. Slow is Beautiful - Cecile Andrews
 6. Economy of Permanence - J C Kumarappa
 7. Bharat Mein Angreji Raj - PanditSunderlal
 8. Rediscovering India - by Dharampal
 9. Hind Swaraj or Indian Home Rule - by Mohandas K. Gandhi
 10. India Wins Freedom - Maulana Abdul Kalam Azad
 11. Vivekananda - Romain Rolland (English)
 12. Gandhi - Romain Rolland (English)

4. **Mode Of Conduct** (L-T-P-C 2-1-0-3 or 2L:1T:0P 3 credits)

Lectures hours are to be used for interactive discussion, placing the proposals about the topics at hand and motivating students to reflect, explore and verify them. Tutorial hours are to be used for practice sessions. While analysing and discussing the topic, the faculty mentor's role is in pointing to essential elements to help in sorting them out from the surface elements. In other words, help the students explore the important or critical elements. In the discussions, particularly during practice sessions (tutorials), the mentor encourages the student to connect with one's own self and do self- observation, self-reflection and self-exploration. Scenarios may be used to initiate discussion. The student is encouraged to take up "ordinary" situations rather than "extra-ordinary" situations. Such observations and their analyses are shared and discussed with other students and faculty mentor, in a group sitting. Tutorials (experiments or practical) are important for the course. The difference is that the laboratory is everyday life, and practical are how you behave and work in real life. Depending on the nature of topics, worksheets, home assignment and/or activity are included. The practice sessions (tutorials) would also provide support to a student in performing actions commensurate to his/her beliefs. It is intended that this would lead to development of commitment, namely behaving and working based on basic human values. It is recommended that this content be placed before the student as it is, in the form of a basic foundation course, without including anything else or excluding any part of this content. Additional content may be offered in separate, higher courses. This course is to be taught by faculty from every teaching department, including HSS faculty. Teacher preparation with a minimum exposure to at least one 8-day FDP on Universal Human Values is deemed essential.

Assessment: This is a compulsory credit course. The assessment is to provide a fair state of development of the student, so participation in classroom discussions, self-assessment, peer assessment etc. will be used in evaluation.

Example: Assessment by faculty mentor: 10 marks Self-assessment: 10 marks Assessment by peers: 10 marks Socially relevant project/Group Activities/Assignments: 20 marks.

Semester End Examination: 50 marks The overall pass percentage is 40%. In case the student fails, he/she must repeat the course.

6. Outcome of the Course:

By the end of the course, students are expected to become more aware of themselves, and their surroundings (family, society, nature); they would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind. They would have better critical ability. They would also become sensitive to their commitment towards what they have understood (human values, human relationship and human society). It is hoped that they would be able to apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this direction. This is only an introductory foundational input. It would be desirable to follow it up by a) faculty-student or mentor-mentee programs throughout their time with the institution b) Higher level courses on human values in every aspect of living. E.g. as a professional.