KDK COLLEGE OF ENGINEERING, NAGPUR

Session (2022-23)

Institution integrates crosscutting issues relevant to Professional Ethics, Gender, Human Values, Environment and Sustainability into the Curriculum

1.3.1

Institution integrates crosscutting issues relevant to Professional Ethics, Gender, Human Values, Environment and Sustainability into the Curriculum

INDEX

List of Courses related to Professional Ethics, Gender, Human Values, Environment and Sustainability into the Curriculum

Sr. No.	Course Code	Name of Course	Name of Program	Topic Related to
1	BEIT307T	Universal Human Values	Information Technology	Professional Ethics & Human Values
2	BEIT506T	Industrial Economics and Entrepreneurship Development	Information Technology	Professional Ethics & Human Values
3	BEIT308T	Environmental Engineering (Audit)	Information Technology	Environment & Sustainability
4	BEELE801T	Power Quality	Electrical Engineering	Professional Ethics
5	BEELE705T	Electrical Installation Design	Electrical Engineering	Professional Ethics
6	BEELE703	Energy Management & Audit	Electrical Engineering	Environment & Sustainability
7	BEELE406T	Environmental Studies	Electrical Engineering	Environment & Sustainability
8	BEEE305T	Renewable Energy Sources	Electrical Engineering	Environment & Sustainability
9	BEME4053	Professional Ethics	Mechanical Engineering	Professional Ethics & Human Values
10	BEME406P	Sports	Mechanical Engineering	Professional Ethics & Human Values
11	BEME406P	Yoga	Mechanical Engineering	Professional Ethics & Human Values
12	BEME406P	National Service Scheme (NSS)	Mechanical Engineering	Professional Ethics & Human Values

13	BEME803T3	Elective-III-Renewable Energy Systems	Mechanical Engineering	Environment & Sustainability
14	BEETC5040T	Industrial Economics and Entrepreneurship Development	Electronics and Telecommunication Engineering	Professional Ethics & Human Values
15	BEETC606T	Effective Technical Communication	Electronics and Telecommunication Engineering	Professional Ethics & Human Values
16	BEETC706A	Intellectual Property Rights	Electronics and Telecommunication Engineering	Professional Ethics & Human Values
17	BEETC803P	Project Phase-2	Electronics and Telecommunication Engineering	Professional Ethics & Human Values
18	BEETC409A	Universal Human Values	Electronics and Telecommunication Engineering	Professional Ethics & Human Values
19	BECVE605T	Environmental Engineering (open Elective-I)	Electronics and Telecommunication Engineering	Environment & Sustainability
20	BECSE305T	Ethics in IT	Computer Science Engineering	Professional Ethics & Human Values
21	BECSE306T	Universal Human Values	Computer Science Engineering	Professional Ethics & Human Values
22	BECVE803T	Elective – III- Water & Waste Water Treatment	Civil Engineering	Environment & Sustainability
23	BECVE703T	Elective – I – Air Pollution & Solid Waste Management	Civil Engineering	Environment & Sustainability
24	BECVE605T	Environmental Engineering-II	Civil Engineering	Environment & Sustainability
25	BECVE 303T	Environmental Engineering – I	Civil Engineering	Environment & Sustainability

Syllabus related to Professional Ethics, Gender, Human Values, Environment and Sustainability into the Curriculum

1. Universal Human Values

Rashtrasant Tukadoji Maharaj Nagpur University,

Nagpur Faculty of Engineering and Technology

B.E 3rd sem (IT)

Subject: Universal Human Values (Theory)

CREDITS: 02

Teaching Scheme: 2 Hours/Week: **Examination Scheme:**

University Assessment: 35 Marks **College Assessment: 15 Marks**

Aim: To inculcate sensitivity among students towards themselves and their surrounding including family, society and nature

Objective: The objective of the course is four fold:

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

Course outcomes: By the end of the course,

1. Students are expected to become more aware of themselves, and their surroundings (family, society, nature)
2. Students would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind.
3. They would have better critical ability.
4. They would also become sensitive to their commitment towards what they have understood (human values, human relationship and human society).

Unit 1

Value education, definition, need for value education. The content and the process of value education, basic guidelines for value education, self-exploration as a means of value education, happiness and prosperity as part of value education. (6 hours)

Unit 2

Harmony of self with body, coexistence of self and body, understanding the needs of self and the needs of body, understanding the activities in the self and the activities in the body. (6 hours)

Unit 3

Values in relationship, the five dimensions of human endeavour, the holistic perception of harmony in existence.(6 hours)

Unit 4

Basics for ethical human conduct, defects in ethical human conduct, human rights violations and social disparities, value based life. (6 **hours)**

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

Reference Books

1. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.
2. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
3. Indian Ethos and Modern Management: Amalgam of the best of the ideas from the East and the West, B.L. Bajpai, New Royal Book Bo., Lucknow, 2004
4. Human society in ethics and politics, Bertrand Russel, Routledge Publications, 2009

2. Industrial Economics and Entrepreneurship Development

BEIT506TINDUSTRIAL ECONOMICS AND ENTREPRENEURSHIP DEVELOPMENT

(Theory Credit: 03)

Teaching Scheme: **Examination Scheme:**

Lecture: 4 Hours/week **Theory: T (U): 80 Marks T (I): 20 Marks**

Tutorial: Nil **Duration of University Exam. : 03 Hours**

==========

Objective:
Study of this subject provides an understanding of the scope of an industrial economics and entrepreneurship development, key areas of business development, sources of finance, project preparation, methods of taxation and tax benefits, significance of entrepreneurship and economic growth, application of engineering skills in entrepreneurial activities etc.

UNIT I:
Industrial economics, Types of Business structures, top and bottom line of the organization, economic analysis of business, economics of operations, economic prudence in business.

UNIT II:
Market structures- Monopoly, Oligopoly, and Monopolistic competition. Pricing strategies, business integration- forward backward integration, economies of scale, diseconomies of scale, liberalization, privatization and globalization. Business cycles, optimum size of firm.

UNIT III:

The functions of central bank and commercial banks, Foreign Direct Investment, Free trade vs. Protectionism, Capital formation, Inflation, Recession and stagnation, Inclusive growth, Public-Private partnership for development, Multiplier effect, Accelerator effect.

UNIT IV:

Entrepreneurship meaning, Major Motives Influencing an Entrepreneur, Factors Affecting Entrepreneurial Growth. Project Formulation, Product development, Market Survey and Research, Demand forecasting techniques,Techno Economic Feasibility Assessment – Preparation of Preliminary Project Reports – Project Appraisal – Sources of Information – Classification of Needs and Agencies.

UNIT V:

Need – Sources of Finance, Term Loans, Capital Structure, venture capital. Angel funding, Financial Institution, management of working Capital, Costing, Break Even Analysis, Network Analysis Techniques of PERT/CPM – Taxation – Direct, Indirect Taxes.

UNIT VI:

Sickness in small Business, Major problems faced by SSIs, Foreign Direct Investments and threat to SSI, Technical consultancy organizations, safeguard measures against variation in currency value, Government Policy for Small Scale Enterprises, tax holidays, and incentives to SSIs.

TEXT BOOKS:

Industrial Economics. By, Ranjana Seth, Ane Book Pvt Ltd.

Modern Economic Theory By, K.K. Dewett. S.Chand.

Industrial Economics. By, JagdishSheth, Pearson Publication.

"Entrepreneurial Development" By, S.S.KhankaS.Chand& Co. Ltd. Ram Nagar New Delhi, 1999.
Hisrich R D and Peters M P, "Entrepreneurship" 5th Edition Tata McGraw-Hill, 2002.

Management of Entrepreneurship. By, N.V.R. Naidu, I.K. International Pvt Ltd.

REFERENCE BOOKS:

Business Economics. By, K.Rajgopalchar. Atalantic Publishers.

Microeconomics. By, Robert Pindyk

Business Economics. By, H.L. Ahuja,H. L. Ahuja,Louis Prof. De Broglie. S.Chand.

Rabindra N. Kanungo "Entrepreneurship and innovation", Sage Publications, New Delhi, 1998.

Financing Small Scale Industries in India, By, K.C.Reddy.Himalaya Publication.

3. Environmental Engineering (Audit)

Rashtrasant Tukadoji Maharaj Nagpur

University Syllabus for B.E. III Semester (IT)

Course Code					
Category	**Mandatory Courses**				
Course Title	**Environmental Science**				
Scheme & credits	**L**	**T**	**P**	**Credits**	**Semester**
	2	**0**	**0**	**0**	**III**

Course Outcomes

On successful completion of the course, the students:

1. Identify different types of air pollutions as well as explain their causes, detrimental effects on environment and effective control measures.
2. Recognize various sources of water pollutants and interpret their causes and design its effective control measure
3. Illustrate various types of pollutants and waste management.
4. Analyze various social issues related to environment and challenges in implementation of environmental laws.

Syllabus

Unit-I Air pollution and its control techniques: (6 lectures)

Contaminant behavior in the environment, Air pollution due to SOx, NOx, photochemical smog, Indoor air pollution Natural pathways for degradation: Carbon cycle, Sulphur cycle, Nitrogen cycle, Oxygen cycle. Factors responsible for altering the composition of atmosphere (deforestation, burning of fossil fuels, industrial and vehicular emissions, CFCs). Techniques to control Air pollution, ambient air quality and continuous air quality monitoring, Control measures at source, Kyoto Protocol, Carbon Credits.

Unit-II Water pollution and its control techniques: (6 lectures)

Major sources of water pollution: Eutrophication, acid mine drains, pesticides and fertilizers, dyeing and tanning, marine pollution, microplastics Techniques to control water pollution: Conventional waste water treatment-types of sewage, sewerage system, alternative systems, primary, secondary and tertiary processes including aerobic and anaerobic techniques, safe disposal and its utility. Treatment schemes for waste water from dairy, textile, power plants, pharmaceutical industries, and agro based industries such as rice mills

Unit-III Other Environmental Pollution& Waste Management: (6 lectures)

Soil pollution: Soil around us, Soil water characteristics, soil pollution. Causes, effects & control : noise pollution, nuclear & radiation hazards, marine pollution (Oil spills & Ocean Acidification) Solid waste

management: Composting, vermiculture, landfills, hazardous waste treatment, bioremediation technologies, conventional techniques (land farming, constructed wetlands), and phytoremediation. Degradation of xenobiotics in environment: Petroleum hydrocarbons, pesticides, heavy metals Introduction, types of e-wastes, environmental impact, e-waste recycling, e-waste management rules.

Unit-IV Social Issues and the Environmental Laws (6 lectures)

Concept of Sustainable development Water conservation, rain water harvesting, watershed management Resettlement and rehabilitation of people; its problems and concerns. Environmental Laws (brief idea only) Environment Protection Act, Air (Prevention and Control of Pollution) Act, Water (Prevention and control of Pollution) Act, Wildlife Protection Act, Forest Conservation Act Issues involved in enforcement of environmental legislation. Different government initiatives (brief idea only)- National ambient air quality standard 2009, Swachh Bharat Abhiyan, National afforestation program and Act- 2016, National River conservation plan and National Ganga River basin authority, Formation of National Green Tribunal

Activity

1. Field Trip & Report Writing
2. Case-study & Report Writing

Books suggested:

1) Benny Joseph, Environmental Studies, Mc Graw Hill Education (India) Private Limited
2) B. K. Sharma, Environmental Chemistry, Goel Publishing House, Meerut
3) P Aarne Vesilind, J. Jeffrey Peirce and Ruth F. Weiner, Environmental Pollution and Control, Butterworth-Heinemann
4) D. D. Mishra, S. S. Dara, A Textbook of Environmental Chemistry and Pollution Control, S. Chand & Company Ltd.
5) Shree Nath Singh, Microbial Degradation of Xenobiotics, Springer-Verlag Berlin Heidelberg
6) Indian Environmental Law: Key Concepts and Principles edited by Shibani Ghosh, Publisher, Orient BlackSwan, 2019. ISBN, 9352875796.
7) P. Thangavel & Sridevi, Environemental Sustainability: Role of Green technologies, Springer publications

4 Power Quality

Elective- II **BEELE 801T (3)** **POWER QUALITY**

Learning Objectives	Learning Outcomes
Students will know the various power quality issues such as voltage sag, swell, flickers etc. with a waveform distortion. They will also learn how to monitor, assess and mitigate these issues.	Students will be able to understand • Power quality standards for voltage sag, swell, distortions, flickers etc. • Approach for power quality monitoring, assessment and mitigation. • State variable model and harmonic estimation.

Unit I: Introduction: Importance of power quality, terms and definitions of power quality as per IEEE std. 1159. such as transients, short and long duration voltage variations, interruptions, short and long voltage fluctuations, imbalance, flickers and transients. Symptoms of poor power quality. Definitions and terminology of grounding. Purpose of groundings. Good grounding practices and problems due to poor grounding. **(8 Hrs)**

Unit II: Flickers & transient voltages: RMS voltage variations in power system and voltage regulation per unit system, complex power. Principles of voltage regulation. Basic power flow and voltage drop. Various devices used for voltage regulation and impact of reactive power management. Various causes of voltage flicker and their effects. Short term and long term flickers. Various means to reduce flickers. Transient over voltages, sources, impulsive transients, switching transients, Effect of surge impedance and line termination, control of transient voltages. **(10 Hrs)**

Unit III: Voltage sag, swells and interruptions: Definitions of voltage sag and interruptions. Voltage sags versus interruptions. Economic impact of voltage sag. Major causes and consequences of voltage sags. Voltage sag characteristics. Voltage sag assessment. Influence of fault location and fault level on voltage sag. Areas of vulnerability. Assessment of equipment sensitivity to voltage sags. Voltage sag *limits for computer equipment, CBEMA, ITIC, SEMI F 42 curves. Representation of the results of voltage sags analysis. Voltage sag indices. Mitigation measures for voltage sags, such as UPS, DVR, SMEs, CVT etc., utility solutions and end user solutions. **(8Hrs)**

Unit IV: Waveform Distortion: Definition of harmonics, inter-harmonics, sub-harmonics. Causes and effect of harmonics. Voltage versus current distortion. Overview of Fourier analysis. Harmonic indices. A.C. quantities under non-sinusoidal conditions. Triplen harmonics, characteristics and non characteristics harmonics. Harmonics series and parallel resonances. Consequences of harmonic resonance. Principles for controlling harmonics. Reducing harmonic currents in loads. K-rated transformer. Harmonic study procedure. Computer tools for harmonic analysis. Locating sources of harmonics. Harmonic filtering, passive and active filters. Modifying the system frequency response. IEEE Harmonic standard519-1992. **(10Hrs)**

Unit V: Power quality monitoring Need of power quality monitoring and approaches followed in power quality monitoring. Power quality monitoring objectives and requirements. Initial site survey. Power quality Instrumentation. Selection of power quality monitors, selection of monitoring location and period. System wide and discrete power quality monitoring. Setting thresholds on monitors, data collection and analysis. Selection of transducers. Harmonic monitoring, Transient monitoring, event recording and flicker monitoring. **(6Hrs)**

UNIT VI: Power Quality Assessment & Mitigation Power Quality assessment, Power quality indices and standards for assessment disturbances, waveform distortion, voltage and current unbalances. Power assessment under waveform distortion conditions. Power quality state estimation, State variable model, observability analysis, capabilities of harmonic state estimation. Test systems. Mitigation techniques at different environments. **(8 Hrs)**

Text Books		
Title of Book	**Name of Author/s**	**Edition & Publisher**
Understanding power quality problems, voltage sag and interruptions	M. H. J. Bollen	IEEE press, 2000, series on power engineering
Electrical power system quality	R.C. Dugan, M.F. McGranghan, S. Santoso, H. Wayne Beaty	2nd, McGraw Hill Pub.
Reference Books		
Power system quality assessment	J. Arrillaga, M.R. Watson, S. Chan	John Wiley and sons
Electric power quality	G. J. Heydt	
Power system harmonics: Computer modeling and analysis	Enriques Acha, Manuel Madrigal	John wiley and sons ltd
Power System Harmonics	J. Arrillaga & N. Watson	
IEEE std 519-1992/ IEEE std 1159 IEEE recommended practices and requirements for harmonics control in electrical power system		

1. Electrical Installation Design

BEELE 705 T - ELECTRICAL INSTALLATION DESIGN

Learning Objectives	Learning Outcomes
The course will prepare students 1. The course will prepare students to understand methodology of load forecasting and assessment of electrical loads, types of electric loads and selection of apparatus for controlling electrical power. 2. The course will prepare students to design the distribution system for residential, commercial, industrial applications and utility distribution networks and illumination design 3. The course will prepare students to understand methods of installation, testing and commissioning of electrical apparatus and conductors. 4. The course will prepare the students to understand statutory requirements related to electrical design, safety and protection.	Upon the completion of this course, a. The students will understand concept of load forecasting, solve problems based on regression analysis. b. The students will be able to draw single line diagrams with specifications for electrical distribution networks for residential and commercial installations. c. The students will be able to draw single line diagrams with specifications for distribution networks, motor and power control centers for industrial installations and design reactive power compensation. d. The students will be able to understand construction, types and selection of PVC/ XLPE cables and overhead conductors e. Students shall be able to design 11kV and 33 kV substations for utility and industrial installations and specify the ratings and specifications of apparatus used f. Students shall be able to understand procedure for receipt, storage, testing and commissioning of transformers along with its accessories viz OTI, WTI, Silica Gel Breather, MOG, Buchholz relay etc g. Students will be able to determine fault level at various locations in radial networks and be able to find rating and location of series reactors h. Students will understand the relevant provisions of IE rules for low medium and high voltage installations i. Students will be able to understand provisions for system and equipment earthings as per IS 3043

Unit 1:

Electrical load assessment: **(4H)**

Concept of electrical load, categories of load, types of loads, connected load, demand factor, Maximum demand, diversity factor, load factor, power factor, TOD Tariff, Industrial Electric Bills.

Cables, conductors & bus-bars: **(4H)**

Construction, selection, installation, testing of LT/ HT cables, overload & short circuit ratings, rating factors; Overhead line conductors, copper and aluminium busbars.

Unit 2:

Switching & protection devices: **(5H)**

Types, specifications; selections of isolators, switches, switch fuse units, MCB, ELCB, MCCB,ACB, VCB, SF6 breakers, dropout/ horn gap fuses, AB switches, contactors for voltages upto 33 kV. Various types of protective releases for above circuit breakers.

Symmetrical Short Circuit Calculations: **(4H)**

Determining symmetrical short circuit currents at various locations for selecting proper circuit breaker rating & determining value of series reactors for limiting short circuit current. Overcurrent protection with two phase fault & one ground fault relays.

Unit 3:

Electric supply to Induction Motors in industries: **(5H)**

Types of motors, SLD and working of DOL/ Star-Delta/ Autotransformer starters; types, specifications, selection of power contactors, Overload relays, short circuit protective devices.

Reactive power management in industries: **(4H)**

Reactive power compensation in industries using static capacitors, use of Power Triangle, Calculating payback period for capacitor investment due to reduced system currents.

Unit 4:

Transformers: **(4H)**
Specifications, ratings, selection, installation, testing & commissioning.

Substations: **(4H)**
11kV & 33 kV, indoor/ outdoor substations, plan/ elevations, Earthing Arrangement

Unit 5:

Design of Industrial Electrical Installations: **(8H)**
Preparing load list, assessing various factors associated with loads, selection of transformer, design of PCC & MCC, selection of all the associated electrical apparatus, busbars, cables, switchgear, protective devices, earthing system, testing, commissioning.

Unit 6:

Earthing (IS 3043): **(4H)**
Necessity of earthing, concept of system & equipment earthing, definitions of various terms, types of earthing, earth tester and measurement of earth resistance.

IE Rules: **(4H)**
Important IE Rules applicable to residential, commercial & industrial installations.

Text Books		
Title of Book	**Name of Author/s**	**Edition & Publisher**
Electric Power Distribution system	A.S.Pabla,	Tata McGraw-Hill
Course in Electrical Power	P. V. Gupta, M. L. Soni, U. S. Bhatnagar	Dhampat Rai and Sons., 1987
Electrical Substation Engineering & Practice	S. Rao	Kanna Tech. Publ., 1992
Reference Books		
Design of Electrical Installations	V. K. Jain, Er. V.K. Jain & Er. Amitabh Bajaj	Laxmi Publications Pvt Limited, 01-Jan-1993
Electrical Engineering Handbook	C. L. Wadhwa	
Indian Electricity Regulation 1956		

BEECE 705 P – ELECTRICAL INSTALLATION DESIGN (PRACTICAL)

A. Visit for Comprehensive study of existing electrical installation:
Student should visit a residential/ commercial or industrial facility, preferably with its own transformer substation and:

1. Understand the processes in which the electricity is used and characterize the processes viz lighting, heating, cooling, air-conditioning, ventilation, pumping and other industry specific applications like mixing, pulverizing, machining, welding etc.
2. Prepare a list of all the loads demanding electric supply and assess "connected load"
3. Get the copies of at least six previous electric bills and determine the "demand factor", "load factor""power factor" etc.
4. Study the tariff structure and note various costs, taxes and duties. Understand TOD tariff. Note the sanctioned load, contract demand etc.
5. Note how the establishment receives electric supply (overhead/ underground), its voltage level (HT/LT, single phase two wire/ three phase three wire, three-phase four wire etc. Note the specifications of incoming conductor/ cable.
6. Note the type of energy meter used by electricity board (analogue/ digital, single/ three phase, directly connected/ CT operated, HT metering cubical)
7. Draw the power flow diagram of the electrical installation including transformers, stand- by DG supply
8. Convert the power flow diagram into single line diagram (SLD). Identify different components of Power Control Center (PCC) and Motor Control Center (MCC). Specify the current rating and specifications of various HT/LT switchgear and control- gear.

9. Identify various protections against earth leakage, overloads and short circuits.
10. Note in details the Earthing System, types, material used and quantity of earth electrodes etc.
11. Note reactive power management system, types and rating of capacitors, manual/ automatic control of PF improvement capacitors, Location of capacitors in system.
12. Submit the report for assessment.

B) Understanding the operating principle, construction and internal parts of electrical apparatus/ equipments:

Power and Control contactors: power contacts, control contacts, fixed/ moving contacts, magnetic circuit, copper shading band in AC contactors, operating coil, arc chutes; dismantling & assembly of contactors.Capacitor Duty Contactors.Rating & Specifications.

Switchgear: Re-wirable/ HRC main switches (Switch fuse, fuse switch units), MCB/ MCCB (Thermal/ magnetic release), Overload relays. Identifying difference between switch and circuit breakers. Single vs double break arrangement of contacts.

Transformer accessories: Buchholz Relay, Oil temperature Indicator (OTI), Winding Temperature Indicator (WTI), magnetic Oil Level Gauge, Silica Gel Breather.

C) Performing Routine Tests:

1. OC/ SC test on 5 kVA, Three –phase, delta- star transformer.Megger Test.
2. Turns ratio, magnetic Balance Test; Megger Test on three phase transformer.
3. Megger and Continuity test for HT/ LT cables.

C) Assembling and testing of DOL and Automatic Star Delta Starters.

D) Simulation for 3-phase short circuit current in distribution system using software like e-tap.

E) Common HT equipments: construction, operation, specifications, ratings of 11 kV AB Switch, Drop Out/ Horn Gap fuse, Distribution/ station class lightening arrestors.

F) Earthing system: Study of various types of Earth electrodes (rod/pipe/plate), maintenance free earth electrodes, Measurement of Earth electrode resistance and measurement of soil resistivity.

G) Some practicals based on illumination.

H)Preparing a list of reputed national/ global manufacturers in Electrical systems, their product range.

2. Energy Management & Audit

Elective- I BEELE703T (4) ENERGY MANAGEMENT AND AUDIT

Learning Objectives	Learning Outcomes
To understand the need of energy audit and the mechanism through which it should be carry out and also to manage the electric and thermal energy.	A student will able to • Know Present energy scenario with need of energy audit and energy conservation. • Understand various aspects of energy audit such as planning, monitoring and implementation • Manage electric and thermal energy in the industry.

Unit 1: Basics of Energy Management and Conservation **(10 Hrs)**

Global and Indian energy scenario. Global environmental concerns, Climate Change, Concept of energy management, energy demand and supply, economic analysis; Carbon Trading & Carbon foot prints.

Energy Conservation: Basic concepts, Energy conservation in household, transportation, agricultural, service and industrial sectors; Lighting & HVAC systems in buildings.

Unit 2: Energy Audit **(8 Hrs)**

Definition, need, and types of energy audit; Energy management (audit) approach: Understanding energy costs, bench marking, energy performance, matching energy use to requirement, maximizing system efficiencies, optimizing the input energy requirements; Fuel & energy substitution; Energy audit instruments; Energy Conservation Act; Duties and responsibilities of energy managers and auditors.

Unit 3: Material & Energy balance and Waste Heat Recovery **(8 Hrs)**

Facility as an energy system; Methods for preparing process flow; material and energy balance diagrams. Cogeneration and waste heat recovery;

Unit 4: Energy Action Planning, Monitoring and Targeting: **(8 Hrs)**

Energy Action Planning : Key elements; Force field analysis; Energy policy purpose, perspective, contents, formulation, ratification; Organizing the management: location of energy management, top management support, managerial function, roles and responsibilities of energy manager, accountability; Motivation of employees: Information system-designing barriers, strategies; Marketing and communicating: Training and planning.

Monitoring and Targeting : Defining monitoring & targeting; Elements of monitoring & targeting; Data and information analysis; Techniques: energy consumption, production, cumulative sum of differences (CUSUM); Energy Service Companies; Energy management information systems; SCADA systems.

Unit 5: Electrical Energy Management: **(8 Hrs)**

Supply side: Methods to minimize supply-demand gap, renovation and modernization of power plants, reactive power management, Demand side management: conservation in motors, pumps and fan systems; energy efficient motors.

Unit 6: Thermal energy Management: **(8 Hrs)**

Energy conservation in boilers, steam turbines and Furnaces; Application of FBC, Heat exchangers and heat pumps.

Text Books		
Title of Book	**Name of Author/s**	**Edition & Publisher**
Handbook on Energy Audits and Management	Amit Kumar Tyagi	TERI
Energy Management Handbook	Wayne C. Turner	Wiley Inter Science Publication
Reference Books		
Principles of Energy Conservation	Archie, W Culp	McGraw Hill, 1991
Energy Management	P. O'Callaghan	McGraw - Hill Book Company, 1993
Handbook of Energy Engineering	Thuman A and Mehta D Paul	The Fairmount Press
Bureau of Energy Efficiency Study material for Energy Managers and Auditors Examination: Paper I to IV.		
Handbook of Energy Audit and Environment Management	Y.P. Abbi, Shashank Jain	TERI

3. Environmental Studies

BEELE406T	ENVIRONMENTAL STUDIES	L = 3	T = 0	P = 0	Credits = 0
Examination Scheme	College Assessment	University Examination		Total	Univ. Exam. Duration
	20	80		100	3 Hrs

Learning Objective	Learning Outcomes
• Student will be able to learn the natural sources available. • Students will also learn about ecosystem, biodiversity, pollution. • Student will also learn the effect on environment on social aspects and Human population.	The student on completion of course will understood the • Ecosystem • Environmental issues related with social and human population. • Biodiversity and its conversion

Unit 1 : Multidisciplinary nature of environmental studies

Definition, scope and importance (2 lectures)

Need for public awareness.

III

Unit 2 : Natural Resources :

Renewable and non-renewable resources :

Natural resources and associated problems.

a) Forest resources : Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forest and tribal people.

b) Water resources : Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.

c) Mineral resources : Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
d) Food resources : World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.
e) Energy resources : Growing energy needs, renewable and non renewable, energy sources, use of alternate energy sources. Case studies.
f) Land resources : Land as a resource, land degradation, man induced landslides, soil erosion and desertification. Role of an individual in conservation of natural resources. Equitable use of resoureces for sustainable lifestyles. (8 lectures)

Unit 3 : Ecosystems

- Concept of an ecosystem.
- Structure and function of an ecosystem.
- Producers, consumers and decomposers.
- Energy flow in the ecosystem.
- Ecological succession.
- Food chains, food webs and ecological pyramids.
- Introduction, types, characteristic features, structure and function of the following ecosystem :-

a. Forest ecosystem
b. Grassland ecosystem
c. Desert ecosystem
d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) (6 lectures)

Unit 4 : Biodiversity and its conservation

- Introduction – Definition : genetic, species and ecosystem diversity.
- Biogeographical classification of India
- Value of biodiversity : consumptive use, productive use, social, ethical, aesthetic and option values
- Biodiversity at global, National and local levels.
- Inida as a mega-diversity nation

V

- Hot-sports of biodiversity.
- Threats to biodiversity : habitat loss, poaching of wildlife, man-wildlife conflicts.
- Endangered and endemic species of India
- Conservation of biodiversity : In-situ and Ex-situ conservation of biodiversity. (8 lectures)

Unit 5 : Environmental Pollution

Definition

- Cause, effects and control measures of :-

a. Air pollution
b. Water pollution
c. Soil pollution
d. Marine pollution
e. Noise pollution
f. Thermal pollution
g. Nuclear hazards

- Solid waste Management : Causes, effects and control measures of urban and industrial wastes.
- Role of an individual in prevention of pollution.
- Pollution case studies.
- Diaster management : floods, earthquake, cyclone and landslides. (8 lectures)

VI

Unit 6 : Social Issues and the Environment

- From Unsustainable to Sustainable development
- Urban problems related to energy
- Water conservation, rain water harvesting, watershed management
- Resettlement and rahabilitation of people; its problems and concerns. Case Studies
- Environmental ethics : Issues and possible solutions.
- Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies.
- Wasteland reclamation.
- Consumerism and waste products.
- Environment Protection Act.
- Air (Prevention and Control of Pollution) Act.
- Water (Prevention and control of Pollution) Act
- Wildlife Protection Act
- Forest Conservation Act
- Issues involved in enforcement of environmental legislation.
- Public awareness. (7 lectures)

Unit 7 : Human Population and the Environment

- Population growth, variation among nations.
- Population explosion – Family Welfare Programme.

VII

- Environment and human health.
- Human Rights.
- Value Education.
- HIV/AIDS.
- Women and Child Welfare.
- Role of Information Technology in Environment and human health.
- Case Studies. (6 lectures)

Unit 8 : Field work

- Visit to a local area to document environmental assetsriver/ forest/grassland/hill/mountain
- Visit to a local polluted site-Urban/Rural/Industrial/Agricultural
- Study of common plants, insects, birds.
- Study of simple ecosystems-pond, river, hill slopes, etc. (Field work Equal to 5 lecture hours)

4. Renewable Energy Sources

III Semester B.E. (Electrical Engineering)
RENEWABLE ENERGY STUDIES
Total Credit- 04
Subject Code:-BEEE3O5T

Teaching Scheme	**Examination Scheme**
Theory-03 Hours/Week	Th (U)= 70 Th(I)=30
Tutorial/ Activity -01 Hours/Week	Duration of University Exam:- 3 Hours
Practical:-	

Course Objectives

Students will be able to –

- Demonstrate understanding of the different types of renewable energy technologies that are currently available, and how they are used to provide energy.
- Identify strengths and limitations associated with the different renewable energy technologies.
- Identify the current major uses of energy (i.e., in agriculture, manufacturing, residential, etc.).

Course Outcomes:

After studying the course, the students will be able to demonstrate the ability to

CO1. Memorize the fundamental of solar radiation geometry
CO2. Identify and analyse the process of power generation through solar photovoltaic
CO3. Highlighting the various applications of Solar Energy.
CO4. Outline the site requirement criteria for wind farm & compare different types of wind generators.
CO5. Identifying non-conventional Energy sources such as Geothermal, MHD, Biomass, Fuel cell, Tidal, Ocean for generating Electricity.

Unit I- Solar Radiation & its Measurement **(06 Hrs)**

Solar Radiation & its Measurement: Solar Constant, Solar radiation at earth's surface, solar radiation geometry, solar radiation measurement, estimation of average solar radiation, solar radiation on tilted surfaces.

Unit 2 – Solar Photovoltaic power generation **(10 Hrs)**

Solar Photovoltaic power generation: Physics of solar cells, Characteristic of solar cell, series and parallel connection, types of solar cell, module manufacturing, partial shading, bypass and blocking diode, load calculation, different panel calculations and selection (Monocrystalline, Polycrystalline etc), Calculation of Solar rooftop setup (rating): stand alone PV system with battery and grid connected PV system with Net Metering, Introduction to MPPT.

Unit-3 Application of Solar Energy **(07 Hrs)**

Application of Solar Energy: Solar water heating, space heating, space cooling, solar thermal heat conversion, Solar Cooking, Solar pumping, Solar Water pumping for agriculture purposes, Calculation of solar setup required in solar water pumping, Solar Green Houses, Hydrogen production from Solar Energy.

Unit – 4 Wind Energy **(10 Hrs)**

Basic principles of wind energy conversion, wind energy conversion system, wind data & energy estimation, site selection consideration, basic components of wind energy conversion system (WECS), classification of WEC system, generating system, energy storage, application of wind energy. Stand-Alone and Grid Connected Wind-Electrical Power System

Unit- 5 Other Nonconventional Energy Source **(07 Hrs)**

Brief Introduction to operating principles only: Small scale hydro electric power generation, Energy from Bio –Mass, Geothermal Energy, MHD power generation, Fuel cell, Energy from Ocean, Ocean thermal electric conversion (OTEC), Claude & Anderson cycles, Hybrid cycle, Energy from Tides ,Estimation of Energy & Power in simple single basin ,Tidal system

Text Books:

1. Non Conventional Energy Sources G.D. Rai, Khanna publishers
2. Non Conventional Energy Resources B. H. Khan 2nd , The McGraw Hill Companies
3. Solar Energy: Principles of thermal collection and storage, S. P. Sukhatme 2nd edition, Tata McGraw Hill Publishing Company Ltd.
4. Solar Photovoltaics: Fundamental, Technologies and Applications, Chetan Singh Solanki , 3rd Edition, PHI Learning Pvt. Ltd.
5. Non-Conventional Energy Sources and Utilization, R.K. Rajput, S. Chand Publications.
6. Non-Conventional Energy Resources, D S Chauhan, S K Srivastava, New Age International Publishers

Reference Books:

1. Fundamentals of Renewable Energy Processes, Aldo Vieira da Rosa, Juan Carlos Ordóñez, Fourth Edition, Elsevier Academic Press
2. Wind and Solar Power Systems: Design, Analysis, and Operation, Mukund R. Patel and Omid Beik, THIRD EDITION CRC PRESS(TAYLOR & FRANCIS)
3. Renewable & Efficient Electric Power Systems, Gilbert Masters John,, Wiley and son's publications.
4. Solar Energy , Robert Foster, Majid Ghassemi and Alma Cota, CRC Press
5. Renewable Energy Systems, David M. Buchla, Thomas E. Kissell, Thomas L Floyd, 1st edition, Pearson Publication
6. Ocean Energy: Tide and Tidal Power, R. H. Charlier, Charles W. Finkl, **SPRINGER**

Reference Links:

- http://www.nptel.iitm.ac.in/
- www.ocw.mit.edu

5. Professional Ethics

RTM Nagpur University
Mechanical Engineering

Professional Ethics Syllabus
(Theory) BEME405T

Semester	Course Title (Subject)	Hours / Week			Credits	Maximum Marks			Exam Duration (Hrs.)
		L	T	P		Continual Assessment	University Examination	Total	
IV	**Professional Ethics**	3	-	-	3	30	70	100	03

Sr. No.	Course Objective The objective of this course is–
1	The objective of this course is to inculcate the sense of social responsibility among learners and to make them realize the significance of ethics in professional environment so as to make them a global citizen

Course Outcomes	
After successful completion of this course the student will be able to:	
CO1	Understand basic purpose of profession, professional ethics and various moral and social issues
CO2	Analyze various moral issues and theories of moral development
CO3	Realize their roles of applying ethical principles at various professional levels
CO4	Identify their responsibilities for safety and risk benefit analysis.
CO5	Understand their roles in dealing various global issues

Professional Ethics SYLLABUS (Theory)	
Contents	No of hours
Unit I Human Values, Morals, values and Ethics, Integrity, Work ethics, Service learning, Civic virtue, Respect for others, Living peacefully, Caring, Sharing, Honesty, Courage ,	**08**
Unit II Engineering Ethics, Senses of 'Engineering Ethics', Variety of moral issues, Moral dilemmas, Moral Autonomy, Kohlberg's theory, Gilligan's theory ,	**07**
Unit III Engineering as Social Experimentation, Engineering as Experimentation, Engineers as responsible Experimenters, Codes of Ethics, A Balanced Outlook on Law ,	**07**
Unit IV Safety, Responsibilities and rights, Safety and Risk, Assessment of Safety and Risk, Risk Benefit Analysis and Reducing Risk, Collective Bargaining, Professional Rights, Employee Rights	**07**
Unit V Global issues, Multinational Corporations, Computer Ethics, Weapons Development, Engineers as Managers, Consulting Engineers, Engineers as Expert Witnesses and Advisors, Corporate Social Responsibility	**07**

References:

Text Books Recommended:

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

6. Sports

RTM Nagpur University
Mechanical Engineering –
IV Sem SPORTS

Course Code- BEME406P

Semester	Course Title (Subject)	Hours / Week			Credits	Maximum Marks			Exam Duration (Hrs.)
		L	T	P		Continual Assessment	University Examination	Total	
III & IV	SPORTS	0	0	3		00	00	00	00

Sr. No.	COURSE OBJECTIVE
1	Through sports, students should able to build a wide range of abilities and skills such as leadership, confidence, teamwork, patience, self-reliance, trust, and many more which facilitate the overall development of an individual
2	Students should learn to manage time between their lectures, sports, and personal life.

EXPECTATION FROM INSTITUTES
1. Provide sports facilities 2. Provide platforms for participation in events 3. Develop interest for sports amongst students 4. Conduct regular events (every month) in college for all indoor and outdoor sports

7. Yoga

RTM Nagpur University
Mechanical Engineering –
IV Sem YOGA

Course Code- BEME406P

Semester	Course Title (Subject)	Hours / Week			Credits	Maximum Marks			Exam Duration (Hrs.)
		L	T	P		Continual Assessment	University Examination	Total	
III &IV	YOGA	0	0	3		00	00	00	00

Sr. No.	COURSE OBJECTIVE
1	To introduce basic wellness principles and practices of Yoga to students
2	To bring awareness of the fundamentals of Yoga for wellness in their daily lives
3	To bring peace and harmony in the society at large by introducing the Yogic way of life.

EXPECTATION FROM TRAINERS

1. Brief to origin of Yoga,
2. History and Development of Yoga: Vedic Period, Classical Period, Post classical period, Modern Period.
3. Etymology and Definitions of Yoga in classical Yoga texts
4. Meaning, Aim and Objectives of Yoga,
5. Misconceptions about Yoga;
6. True Nature of Yoga;
7. Principles of Yoga;
8. Basis of Yoga.

8. National Service Scheme (NSS)

RTM Nagpur University
Mechanical Engineering –IV Sem
National Service Scheme

Semester	Course Title (Subject)	Hours / Week			Credits	Maximum Marks			Exam Duration (Hrs.)
		L	T	P		Continual Assessment	University Examination	Total	
III & IV	National Service Scheme (NSS)	0	0	3	00	00	00	00	00

Sr. No.	COURSE OBJECTIVE
1	1. Understand the community in which they work. 2. Understand themselves in relation to their community. 3. Identify the needs and problems of the community and involve them in problem-solving. 4. Develop among them a sense of social and civic responsibility. 5. Utilize their knowledge in finding practice solutions to individual and community problems. 6. Develop competence required for group-living and sharing of responsibilities. 7. Gain skills in mobilizing community participation. 8. Acquire leadership qualities and democratic attitudes 9. Develop capacity to meet emergencies and natural disasters. 10. Practice national integration and social harmony

EXPECTATION FROM TRAINERS

5. To assist and guide the NSS unit for implementation of NSS programs at college level
6. To advise in organizing camps, training and orientation programs for the NSS volunteers
7. To visit the NSS units for monitoring and evaluation.
8. To ensure implementation of NSS regular activities and special camping programs

RTM Nagpur University
Mechanical Engineering –
IV Sem

National Cadet Corps (NCC)

Course Code- BEME406P

Semester	Course Title (Subject)	Hours / Week			Credits	Maximum Marks			Exam Duration (Hrs.)
		L	T	P		Continual Assessment	University Examination	Total	
III &IV	National Cadet Corps (NCC)	0	0	3		00	00	00	00

ABOUT NCC
1. NCC is the Indian military cadet corps wing of the Indian armed forces. 2. NCC offers training to the students of schools and colleges. 3. This is not compulsory training for all students.

Sr. No.	OUTCOMES EXPECTED
1	During the training of NCC, candidates should get the basic military training. This training should be conducted to develop the interest of young students in all three forces; the army, the navy and the air force of India. Students should be able to check their abilities to join the Indian Defence Services.

Sr. No.	AIM
1	To create an organized, trained and motivated youth, create soldiers for the nation, develop the leadership skills in the youth.

9. Elective-III: Renewable Energy Systems

BEME803T3: ELECTIVE-III: RENEWABLE ENERGY SYSTEMS (Theory)

CREDITS: 04

Teaching Scheme	**Examination Scheme**
Lectures: 3 Hours/Week	Duration of Paper: 03 Hours
Tutorial: 1 Hour/Week	University Assessment: 80 Marks
	College Assessment: 20 Marks

Course Objectives and Expected Outcomes : This course is designed to make the students conversant with the non conventional energy sources and their utilization to harness power. The students will learn the solar energy utilization with its applications. The students will also understand the various methods by which energy can be generated from wind, ocean tides, Geothermal phenomenon, Biogas and MHD. At the end of this course, students will appreciate the importance of renewable energy systems & will be able to build them.

UNIT – I **[8 Hrs.]**

Solar Energy: Introduction, solar constant, spectral distribution of solar radiation, beam & diffuse radiation, measurement of solar radiation and measuring instruments. Solar radiation geometry, solar angles, estimation of average solar radiation, radiation on tilted surface, tilt factors, solar fuel cell.

UNIT – II **[8 Hrs.]**

Solar flat plate collectors: Types of collectors, liquid flat plate collectors, solar air heaters, transmissivity of glass cover system, collector efficiency, analysis of flat plate collector, fin efficiency, collector efficiency factor and heat removal factor, selective surfaces, evacuated collectors, novel designs of collector.

UNIT – III **[8 Hrs.]**

Concentric collectors: line focusing, point focusing and non focusing type, central receiver concept of power generations, compound parabolic collector, comparison of

flat & concentric collectors. Applications of solar energy to water heating, space heating, space cooling, drying refrigeration, distillation, pumping. Solar furnaces, solar cookers, solar thermal electric conversion, solar photo- voltaics. Solar energy storage, sensible, latent and thermo chemical storage, solar pond.

UNIT – IV **[8 Hrs.]**

Biogas: - Introduction, bio gas generation, fixed dome & floating drum biogas plants, their constructional details, raw material for biogas production, factors affecting generation of biogas and methods of maintaining biogas production, digester design considerations, fuel properties of biogas and utilization of biogas.

Bio Mass :- Introduction, methods of obtaining energy from biomass, Incineration, thermal gasification, classification of gasifiers & constructional details, chemistry of gasification, fuel properties, applications of gasifiers.

UNIT – V **[8 Hrs.]**

Wind and Ocean energy: - Power in wind, forces on blades. Wind energy: Basic principle of wind energy conversion, site selection consideration, wind data and energy estimation. Basic components of WECS classification of WEC systems, Savonius and Darrieus rotors applications of wind energy.

Ocean energy: Introduction, ocean thermal electric conversion, open and closed cycle of OTEC, hybrid cycle, energy from tides, basic principles of tidal power & components of tidal power plants. Single & double basin arrangement, estimation of tidal power and energy.

UNIT – VI **[8 Hrs.]**

Geothermal and MHD power generation:

Geothermal energy: Introduction, classification of geothermal systems, vapour dominated, liquid dominated system, total flow concept, petrothermal systems, magma resources, applications of geothermal operational & environmental problems.

Magneto Hydro Dynamic power generation: Introduction, principles of MHD power generation, MHD open and closed systems, power output from MHD generators.

LIST OF TUTORIALS: Tutorials based on above syllabus.

TEXT BOOKS:

1. Renewable Energy Recourses: Basic Principle and Applications: G.N.Tiwari and M.K. Ghosal, Narosa publication.
2. Non-Conventional Energy Resources: B.H. Khan, Tata McGraw Hill.
3. Solar Energy Utilization, G.D. Rai. Khanna pulishers.
4. Industrial Energy Conservation, D. A. Ray, Pergaman press.

REFERENCE BOOKS:

1. Non-Conventional Energy Sources , G.D. Rai, Khanna publishers.
2. Solar Energy, S.P. Shukhatme, Tata McGraw Hill Education.
3. Renewable Energy Sources and Emerging Tech., Kothari. PHI.

10. Industrial Economics and Entrepreneurship Development

Rashtrasant Tukadoji Maharaj Nagpur University, Nagpur

Electronics and Communication/ Electronics & Telecommunication Engineering/Electronics Engineering
B.Tech.5 th Semester

Subject: INDUSTRIAL ECONOMICS AND ENTREPRENEURSHIP DEVELOPMENT.

Examination Scheme:

Units: 05.

Marks: Internal - 30
External - 70

Objective

Study of this subject provides an understanding of the scope of an industrial economics and entrepreneurship development, key areas of business development, sources of finance, project preparation, methods of taxation and tax benefits, significance of entrepreneurship and economic growth, application of engineering skills in entrepreneurial activities etc.

Course Outcomes:After completing the course, students will be able to:

CO1. Understand different types of business structure.

CO2. Acquire the knowledge of different market structures and New economic policy

CO3. Grasp the functions of banks, taxations system and implications of Inflation.

CO4. Identify various sources of finance

CO5. Analyse the problems of Small Scall Industries and government's policies for them.

1. Industrial economics, Types of Business structures, top and bottom line of the organization, economic analysis of business, economics of operations, economic prudence in business.

2. Market structures- Monopoly, Oligopoly, and Monopolistic competition. Pricing strategies, business integration- forward backward integration, economies of scale, diseconomies of scale, liberalization, privatization and globalization, Business cycles, optimum size of firm.

3. The functions of central bank and commercial banks, Foreign Direct Investment, Free trade vs. Protectionism, Inflation, Recession, Inclusive growth, Public-Private partnership for development

4. Need – Sources of Finance, Term Loans, Capital Structure, venture capital. Angel funding, Financial Institution, management of working Capital, Break Even Analysis, Taxation – Direct, Indirect Taxes.

5. Sickness in small Business, Major problems faced by SSIs, Foreign Direct Investments and threat to SSI, Technical consultancy organizations, Government Policy for Small Scale Enterprises, tax holidays, and incentives to SSIs.

TEXT BOOKS

Industrial Economics. By, Ranjana Seth, Ane Book Pvt Ltd.

Modern Economic Theory By, K.K. Dewett. S.Chand.

Industrial Economics. By, Jagdish Sheth, Pearson Publication.

"Entrepreneurial Development" By, S.S.KhankaS.Chand& Co. Ltd. Ram Nagar New Delhi, 1999.

Hisrich R D and Peters M P, "Entrepreneurship" 5th Edition Tata McGraw-Hill, 2002.

Management of Entrepreneurship. By, N.V.R. Naidu, I.K. International Pvt Ltd.

Entrepreneurial Development. By, S.Anil Kumar. New Age International.

Small- Scale Industries and Entrepreneurship, By, Dr. Vasant Desai, Himalaya Publication.

REFERENCE BOOKS:

Business Economics. By, K.Rajgopalchar. Atalantic Publishers.

Microeconomics. By, Robert Pindyk

Business Economics.By, H.L. Ahuja,H. L. Ahuja,Louis Prof. De Broglie. S.Chand.

Rabindra N. Kanungo "Entrepreneurship and innovation", Sage Publications, New Delhi, 1998.

Financing Small Scale Industries in India, By, K.C.Reddy.Himalaya Publication.

11. Effective Technical Communication

Rashtrasant Tukadoji Maharaj Nagpur University, Nagpur

Electronics and Communication / Electronics & Telecommunication Engineering /Electronics Engineering

B.Tech. 6th Semester

Subject: Effective technical Communication (Theory)

Course Code :BEETC606T CREDITS: 02

Teaching Scheme Examination Scheme

Lectures: 2 Hours/Week Duration of Paper: 02 Hours

Tutorial: 1 hour/week University

Assessment: 35 Marks

College Assessment: 15 Marks

Objective: At the end of the semester, students will have enough confidence to face competitive examinations(IELTES/ TOEFL/CAT/ MAT/ XAT/SNAP/GMAT/GATE etc.)to pursue masters degree. They will also acquire language skills required to write their Reviews/Projects/Reports. They will be able to organize their thoughts in English and hence face job interviews more confidently.

Course Outcomes: After completing the course, the students will be able to

1. acquire knowledge of structure of language.
2. Build vocabulary and face interview process and can become employable.
3. develop business writing skills.
4. Understand technical and scientific writing skills.

Course Structure

Unit1.FunctionalGrammar: (6 hours)

Common errors, Transformation of Sentences (Change the voice, Change the narration,

transformation of Simple , Compound, Complex sentences), Use of Phrases, Idioms& Proverbs.

UnitII. English for Competitive Exams & Interview Techniques:

(6hours)

Prefix, Suffix, Word building processes, **English** words /phrases derived from other languages, Technical Jargons, Synonyms/Antonyms, Verbal Analogies, Give one word for, Types &Techniques of Interview

Unit III.Formal Correspondence and Analytical Comprehension

(6hours)

Job applications and Resume Writing, Business Letters,(Enquiry, Quotation, Orders, Complaints), Writing Memorandum, Circulars, notices, e-mail etiquettes, Unseen Comprehension passages

UnitIV. Technical &Scientific Writing:

(6hours)

Features of Technical Writing, Technical Report writing, Writing Manuals, Writing Project and research Proposals, Writing Research papers.

- **Reference Books:**
- EffectivetechnicalCommunicationbyBarunK.Mitra,OxfordUniversityPress,
- *TechnicalCommunication-PrinciplesandPractice*byMeenakshiRaman&Sharma,OxfordUniversityPress,2011, ISBN-13-978-0-19-806529-
- *HowtoPrepareaResearchProposal*:GuidelinesforFundingandDissertationsintheSocialandBehavioralSciencesbyKrathwohl&RDavid
- *TechnicalWriting-ProcessandProduct*bySharonJ.Gerson&StevenM.Gerson,3rdedition,PearsonEducation Asia, 2000
- *Developing Communication* skills by Krishna Mohan & Meera Banerjee
- *Functional English by* Dr. P. Mahato and Dr. Dora Thompson, Himalaya Publications

12. Intellectual Property Rights

B. Tech. Seventh Semester (CBCS)
(Electronics & Communication/ Electronics & Telecommunication /Electronics Engineering)
Intellectual Property Rights

Subject Code: BEETC706A **[L:1 P:0 T:0 - 1]** **Audit Course**

Course Outcomes

1. Read about the concepts of Intellectual Property Rights
2. Distinguish and understand the world of Intellectual Property.
3. Explain why it needs to be protected? How is it protected?
4. Analyze discuss and debate about the latest legal problems confronting the world and the solutions being offered.
5. Consider new and upcoming areas of Intellectual Property (IP) like Biotechnology, Domain
6. Names, Creative Commons etc.

UNIT I
Introduction: What is Intellectual Property, What are the various forms of Intellectual Property, Difference between Tangible and In-tangible property, Need for Intellectual Property

UNIT II
Copyrights: What is copyright? Registration procedure and copyright authorities, Assignment and transfer of copyright, Software copyright

UNIT III
Patents: What are patents and conditions for patentability, Procedure for obtaining patents, Rights of a patentee, Patent infringements, Patents from an international perspective.

UNIT IV
Trademarks: What are Trade Marks (TM), Statutory authorities associated with and its registration procedure, Rights conferred by registration, Licensing, assignment and transfer of trademark rights

UNIT V
Designs and Geographical Indications: What are designs, Industrial Designs - Registration and piracy, Geographical Indication of Goods & Appellations of Origin

REFERENCES:
1. The Law of Trademarks, Copyrights, Patents, and Trade Secrets 3rd Edition (Paperback) by Deborah E. Bouchoux
2.Intellectual Property Rights in India 1st Edition (Hardcover) by VK Ahuja
3.Intellectual Property Law 3rd Edition, P Narayanan

13. Project Phase-2

B. Tech. Eighth Semester (CBCS)

(Electronics /Electronics & Communication/ Electronics & Telecommunication Engineering)

Project phase 2

Subject Code: BEETC-803P **[L:0 –P:12- T:0 – 12]** **Credit: 0-6-0-6**

Course Objectives:

The object of Project Work II is to enable the student to extend further the extend project taken up under Project Phase-I, either fully theoretical/practical or involving both theoretical and practical work, under the guidance of a Supervisor from the Department alone or jointly with a Supervisor drawn from R&D laboratory/Industry

Course Outcome: By the end of the course, the students shall be able to

1. Analyze or Design the Electronics /telecommunication /allied Engineering problems by using appreciate methodology in a team work.
2. Interpret the communication skills of team members and
3. Use of Modern tools in the field of Electronics Engineering

Guidelines:

- In continuation to semester VII project work, the group of the students shall collect all necessary information pertaining to the project and analyse it.
- The group of the students shall prepare and submit a detailed report on the project.
- Student group shall try to implement project in minimum cost and learn financial aspect of project.
- Preferably project definition shall be in discussion and association with any industry
- The report shall be type written on A4 size papers and hard bound as per prescribed norms.
- Broadly the report shall include: Introduction, Literature Review, Problem definition, Data collection and analysis, Results (Numerical / Experimental), Conclusions and discussions.
- Acquaintance with survey and research methods and their use in conducting systematic investigations, use of data analysis tools, computational methods and style of report, preparation and presentation shall form basis of evaluation.
- The group shall prepare and present a seminar based on this work before an external examiner

N.G. Bawane

14. Universal Human Values

RashtrasantTukadoji Maharaj Nagpur University, Nagpur

Faculty of Engineering and Technology

B.E IVthsem (ETC/ECE/EN)

Subject: Universal Human Values (Theory)

CREDITS: 03

Teaching Scheme: 3 Hours/Week:

Examination Scheme: University Assessment: 70 Marks
College Assessment: 30 Marks

Aim: To inculcate sensitivity among students towards themselves and their surrounding including family, society and nature

Objective: The objective of the course is four fold:
1. Development of a holistic perspective based on self-exploration, about themselves(humanbeing), family,society and nature/existence.
2. Understanding (or developing clarity) of the harmony in the human being,family,society and nature/existence
3. Strengthening of self-reflection.
4. Development of commitment and courage to act.

Course outcomes: By the end of the course,

1. Students are expected to become more aware of themselves, and their surroundings (family, society, nature)
2. Students would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind.
3. Students would understand values in relationship.
4. Students would understand the role of a human being in ensuring harmony in society and nature.
5. Students would distinguish between ethical and unethical practices at work place and would contribute for making a value based society

Unit 1

Value education, definition, need for value education. The content and the process of value education, basic guidelines for value education, self-exploration as a means of value education, happiness and prosperity as part of value education.
(6 hours)

Unit 2

Harmony of self with body, coexistence of self and body, understanding the needs of self and the needs of body, understanding the activities in the self and the activities in the body, Understanding Harmony of I with the body, Sanyam, Aspects of Sanyam, Types of Sanyam,

benefits and obstacles in the path of Sanyam, Swasthya, Aspects of Swasthya, Determinants of Swasthya, Ways to maintain Swasthya.
(8 hours)

Unit 3

Values in relationship (nine universal values in relationships), Understanding values in human-human relationship; Meaning of Justice, Elements of Justice, Understanding meaning of Trust; Elements, Types and Dimensions of Trust, Difference between intention and competence.
(6 hours)

Unit 4

The five dimensions of human endeavour, the holistic perception of harmony in existence, Understanding harmony in society: Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals. (8 hours)

Unit 5

Basics for ethical human conduct, definitiveness in ethical human conduct, human rights violations and social disparities, value based life, Competence in professional ethics
(8 hours)

Text Book: Human Values and Professional Ethics by R R Gaur, R Sangal, G P Bagaria,ExcelBooks, NewDelhi,2010

Reference Books

1. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak,1999.
2. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
3. Indian Ethos and Modern Management: Amalgam of the best of the ideas from the East and the West, B.L. Bajpai, New Royal Book Bo., Lucknow, 2004
4. Human society in ethics and politics, Bertrand Russel, Routledge Publications, 2009

15. Environmental Engineering (open Elective-I)

RASHTRASANT TUKADOJI MAHARAJ NAGPUR UNIVERSITY, NAGPUR

FACULTY OF SCIENCE & TECHNOLOGY

B. TECH CIVIL ENGINEERING (CHOICE BASED CREDIT SYSTEM)

Sem: VI	Total Hours Distribution per week		
Total Credit:03	Lecture (L): 03 Hrs	Tutorial/Activity (T/A): 0 Hrs.	Practical (P): Nil Hrs.
Subject Code	BECVE605T	Name of Subject: Environmental Engineering (Open Elective-I)	

Examination Scheme			
Internal Marks:	University Marks:	Minimum Passing Marks:	Examination Duration:
30 Marks (15 Marks for sessional examination) (15 Marks for Activity based)	70 Marks	45 Marks	3 Hours

Course Objective	
1	Understanding the concept and principles of environment.
2	To impart knowledge on the sources, effects and control techniques of water pollution.
3	To understand the behaviour of air pollutants and the strategies to control their presence in the ambient atmosphere.
4	To provide a comprehensive insights of the types, sources, generation, storage, collection, transport, processing and disposal of solid waste.

Course Outcome	
After completion of syllabus student able to	
1	Explore the components of biosphere and impact of human activity on environment.
2	Summarize the causes and sources of pollutants, and their impact on global environment.
3	Develop ethics and scientific awareness about waste generation and treatment.
4	Identify sources and types of wastes and its management.
5	Understand noise, noise pollution and control.

MAPPING OF CO WITH PO

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	3	1	1	1	1	2	3	1	3	1	1	1
CO 2	3	2	1	2	1	1	3	1	3	1	2	2
CO 3	2	2	1	1	1	2	2	1	2	1	1	1
CO 4	2	2	1	2	1	1	2	1	2	1	1	1
CO 5	2	1	1	2	1	1	2	1	2	1	1	1

1 Low 2 Medium 3 High

SYLLABUS

Unit No.1 Introduction to Environment			
Details of Topic	**Allotment of Hours**		**Mapped with CO Number**
	L	**T/A**	**CO**
Definition, scope and importance of environmental studies. Ecosystem, types, structure and function of ecosystem.	01		1
Energy flow in ecosystem. Biodiversity and its importance, threats to biodiversity and conservation of biodiversity. Natural resources and associated problems.	02		1
Renewable and non-renewable resources, forest resources- Description, benefits, Effects due to deforestation, Water resources –Use and conservation. Mineral resources–mining activity.	02		1
Role and responsibility of engineer in environmental protection, health and safety. Fire hazards, prevention and precautions. Industrial hazards prevention and protection.	01		1
Protection from air and noise pollution. Environment protection act Wild life protection act. Forest conservation act.	01		1
Population growth aspects and importance and effects on environment. Human health and Human rights. Concept of carbon credits.	01		1
	08		
Unit No.2 Water Pollution & Waste Water Treatment Method			
Details of Topic	**Allotment of Hours**		**Mapped with CO Number**
	L	**T/A**	**CO**
Water resources, Classification of water, Origin, composition and characteristics of domestic waste water as well as industrial waste water, Biochemical oxygen demand, Water pollution laws and standards.	02		2
Water conservation, watershed management, Rain water harvesting: Definition, methods and benefits.	02		2
Water (prevention and control of pollution) act, Waste water, Classification of waste water, Chemical oxygen demand. Basic processes of water treatment.	01		2

Meaning of primary, secondary and tertiary treatment.	01		2
Flow chart of a simple effluent treatment plant, Theory of industrial waste treatment, Volume reduction, neutralization and precipitation methods.	01		2
	07		
Unit No.3 Air Pollution			
Details of Topic	**Allotment of Hours**		**Mapped with CO Number**
	L	**T/A**	**CO**
Standard definition of air pollution, Composition of natural air, Names of air pollutants, Classification of air pollutants, primary and secondary pollutants.	02		3
Classification of source of air pollutants on different bases, Definition of different types of aerosols.	01		3
Effect of air pollution on: human health, material properties, vegetation. Major toxic metals and their effects. Air (prevention and control of pollution) act.	01		3
Major environmental phenomenon e.g., acid rain, global warming, greenhouse effect, ozone layer depletion.	01		3
Air quality standards, Brief description of air pollution laws. Meteorological parameters influencing air pollution Environmental lapse rate, temperature inversion.	01		3
Role of national green tribunal in India, Function of Regulatory boards like CPCB and State Pollution Control Boards	01		3
	07		
Unit No.4 Energy Environment Climate Change			
Details of Topic	**Allotment of Hours**		**Mapped with CO Number**
	L	**T/A**	**CO**
An overview of Bureau of Energy Efficiency (bee), The National Action Plan on Climate Change (NAPCC),	02		4
Schemes under The National Mission for Enhanced Energy Efficiency (NMEEE),	02		4
Energy Conservation Building Code (ECBC),	01		4
Bio diversity and its conservation, Sustainable development, Kyoto Protocol,	01		4
Conference of Parties (Cop), Clean Development Mechanism (CDM).	01		4
	07		
Unit No.5 Solid Waste Management & Noise Pollution			
Details of Topic	**Allotment of Hours**		**Mapped with CO Number**
	L	**T/A**	**CO**
Sources and classification of solid waste, Public health aspects, Disposal methods – open dumping, sanitary, land fill, Incineration, compositing.	02		5
Potential methods of disposal, Recovery and recycling of paper, glass, metal and plastic Sources of noise pollution.	02		5

Units of Noise pollution measurement, Allowable limits for different areas.	01		5
Problems of noise pollution and measures to control it, Noise pollution control devices brief discussion	02		5
	07		

References

Applicable for Unit No.	Name of Book	Name of Author	Name of Publisher	Edition	Category		
					Text Book	Research paper	Reference Book
1	Environmental Engineering	Peavy and Rowe	McGraw Hill India.	2013			
2	Noise Control: Principles and Practices	Bruel & Kjaer,	. B & K Pub., Denmark	2nd ed			
3	Wastewater Engineering: Treatment and Reuse		Metcalf and Eddy	4th ed			
4	Environmental pollution control Engineering	C.S. Rao					
5	Industrial waste and its treatment	Seth					

16. Ethics in IT

RASHTRASANT TUKADOJI MAHARAJ NAGPUR UNIVERSITY, NAGPUR

FOUR YEAR BACHELOR OF ENGINEERING (B.E.) DEGREE COURSE

SEMESTER: III (C.B.C.S.)

BRANCH: COMPUTER SCIENCE & ENGINEERING

Subject : ***Ethics in IT*** Subject Code : **BECSE305T**

Load	Credits	College Assessment Marks	University Evaluation	Total Marks
3 Hrs. (Theory)	3	30	70	100

Aim: To understand the ethical behavior of individuals, organizations towards IT Profession

Prerequisite(s): None

Course Objectives:

1	Ability to understand and meet ethical standards and legal responsibilities.
2	Create an awareness on professionals Ethics and Human Values.
3	Discuss the Privacy and Anonymity issues, Defamation and Hate Speech
4	Gain the knowledge of Copyrights, Patents and Trade Secret Laws.
5	Create and understand the awareness on Whistle-blowing

Course Outcomes:

At the end of this course Student are able:

CO1	Acquire knowledge about ethical values & principals.
CO2	Understand key issues of privacy protection policies.
CO3	Understand and apply Intellectual Property Rights and related law in reality.
CO4	Understand the core values that shape the ethical behavior of an engineer / IT Professional.
CO5	Identify the multiple ethical interests at stake in a real-world situation.
CO6	Develop cognitive skills in solving social problems.

Unit I: **[09 Hrs]**

An overview of Ethics: Ethics in IT, Ethics for IT professionals and IT users, IT professionals, Ethical behavior, IT professional malpractices, IT users. Educating Employees, contractors and part-time Workers **Computer and Internet Crime:**Types of Exploits, Reducing Vulnerabilities, Establishing a Security Policy, Prevention, Detection, Response.

Unit II: **[07 Hrs]**

Privacy: The right of Privacy, Recent History of Privacy Protection, Key Privacy and Anonymity issues, Governmental Electronic Surveillance, Data Encryption, Identity Theft, Consumer Profiling, Workplace Monitoring, Advanced surveillance Technology, Freedom of Expression: Key issues, Controlling Access to Information on the Internet, Defamation and Hate Speech.

Unit III: **[07 Hrs]**

Intellectual Property: Copyrights, Patents, Trade Secret Laws, Key Intellectual Property Issues, Plagiarism, Reverse Engineering, Open Source Code, Software Development, Strategies to Engineer Quality Software, Capability Maturity Model Integration for Software, Development of Safety-Critical Systems.

Unit IV: **[06 Hrs]**

Ethics of IT Organization: Need for Nontraditional Workers, Contingent Workers H-IB Workers, Whistle-blowing, Protection for Whistle-Blowers, Dealing with Whistle-Blowing Situation.

Unit V: **[07 Hrs]**

The Impact of Information Technology on the Quality of Life: The impact of IT on the standard of Living and productivity, The impact of IT on Health care costs, Electronic Health Records, Use of Mobile and Wireless Technology, Telemedicine.

Text books:

1. George Reynolds, "Ethics in information Technology" Cengage Learning

Reference books:

1. Deborah G.Johnson,"Computer Ethics",3/e Pearson Education.
2. Sara Baase, "A Gift of Fire: Social, Legal and Ethical Issues, for Computing and the Internet," PHI Publications.
3. Richard A.Spinello, "Case study in Information Technology Ethics", second Edition PHI Publications.
4. Duncan Lanford "Internet Ethics".
5. D. Micah Hester and Paul J. Ford "Computer and Ethics in the Cyber age".
6. Prof.A.R.Aryasri, Dharanikota Suyodhana "Professional Ethics and Morals" Maruthi Publications.
7. A.Alavudeen, R.KalilRahman and M.Jayakumaran "Professional Ethics and Human Values" - LaxmiPublications.

17. Universal Human Values

RASHTRASANT TUKADOJI MAHARAJ NAGPUR UNIVERSITY, NAGPUR

FOUR YEAR BACHELOR OF ENGINEERING (B.E.) DEGREE COURSE

SEMESTER: 3rd (C.B.C.S.)

BRANCH: COMPUTER SCIENCE & ENGINEERING

Subject : ***Universal Human Values*** Subject Code : **BECSE306T**

Load	Credits	College Assessment Marks	University Evaluation	Total Marks
02 Hrs (Theory)	02	15	35	50

Aim: To inculcate sensitivity among students towards themselves and their surrounding including family, society and nature.

Prerequisite(s): None

Course Objectives:

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

Course Outcomes:

At the end of this course Student are able to:

CO1	Become more aware of themselves, and their surroundings (family, society, nature)
CO2	Become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind.
CO3	They would have better critical ability.
CO4	Become sensitive to their commitment towards what they have understand (human values, human relationship and human society).

Unit 1 **[06 Hrs]**

Value education, definition, need for value education. The content and the process of value education, basic guidelines for value education, self-exploration as a means of value education, happiness and prosperity as part of value education.

Unit 2 **[06 Hrs]**

Harmony of self with body, coexistence of self and body, understanding the needs of self and the needs of body, understanding the activities in the self and the activities in the body.

Unit 3 **[06 Hrs]**

Values in relationship, the five dimensions of human endeavour, the holistic perception of harmony in existence.

Unit 4 **[06 Hrs]**

Basics for ethical human conduct, defects in ethical human conduct, human rights violations and social disparities, value based life.

Text Books:

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

Reference Books

1. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.
2. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
3. Indian Ethos and Modern Management: Amalgam of the best of the ideas from the East and the West, B.L. Bajpai, New Royal Book Bo., Lucknow, 2004
4. Human society in ethics and politics, Bertrand Russel, Routledge Publications, 2009

18. Elective – III- Water & Waste Water Treatment

Subject Code: BECVE803T Elective – III

Semester: VIII

WATER AND WASTE WATER TREATMENT (ELECTIVE III)

BECVE803T **Evaluation Scheme: (80/20)**

(L-4 Hrs/Week); Total Credits-4 **Exam Duration: 3 hrs**

COURSE OUTCOMES: The students will be able to

1. Understand composition of typical municipal solid wastes, their sources, collection, treatment and disposal methods.
2. attain an ability to use the techniques, skills, and modern engineering tools necessary for environmental engineering practices.
3. designing of different units of water &waste water treatment plant.
4. Give the knowledge about recent development in water &waste water treatment .

Unit – I - Introduction to WTP & Aeration:

1. Objective of water treatment, unit operation and unit processes, treatment flow sheet, site selection for water treatment plant.
2. Aeration: objective of aeration, types or aerators, design of cascade aerator, gas transfer, two film theory.

Unit – II - Coagulation, Flocculation & Sedimentation

3. Coagulation- Flocculation: Theory of coagulation objectives, types& Design of rapid and slow mixing devices(hydraulic and mechanical), factors affecting coagulation and flocculation, nature and types of chemical coagulants used in water treatment, coagulant and flocculent aids
4. Sedimentation: Theory of sedimentation, factors affecting, types of settling, analysis of discrete and flocculent settling, design of sedimentation tank and clariflocculators.

Unit – III - Filtration, Disinfection &Minor methods

5. Filtration: mechanism of filtration, types of filters, design of rapid sand filters, filter media specifications, preparation of filter sand from stock sand, problems in filtration.
6. Disinfection: Method of disinfection, kinetics of disinfection, types of disinfectants, chlorination, method of chlorination (breakpoint chlorination), factors affecting efficiency of chlorination.
7. Iron and manganese removal, deflourination.
8. Recent development in water treatment.

Unit – IV - Characteristics & Disposal of Waste water

9. physical and chemical characteristics of waste water, DO, BOD, COD, determination of BOD rate constant
10. Disposal of sewage by dilution and by land disposal, Streater-Phelps's equation. Numerical

Unit – V - Preliminary & Primary Treatment

11. Treatment Methods: Waste water treatment flow sheet, preliminary & primary and secondary methods of treatment, design of screen. Girt chamber and primary settling tank.

Unit – VI- Secondary Treatments

12. Biological unit processes: principle of biological treatment processes, design parameters of activated sludge process, aerated lagoons and stabilization ponds. Design of ASP
13. Sludge treatment, aerobic and anaerobic digestion, reactor types (such as UASB, AFFB, Hybrid reactor) & factors affecting anaerobic digestion and sludge drying beds (excluding design)
14. Recent development in waste water treatment.

REFERENCE BOOKS:

1 Sali J. Arcelvala, Tata Mcgraw "Waste Water Treatment for Pollution Control and Reuse".
2 Dr. P.N. ModiVol I – Environmental Engineering I – Standard Publication.
3 Dr. P.N. ModiVol I – Environmental Engineering II – Standard Publication.
4 Dr. A.G. Bhole – Design of Water Treatment Plant, IWWA, Nagpur centre.
5 Dr. B.C. PunmiaVol I &Vol II – Laxmi Publication.
6 CPHEEO Manual.
7 V.N.S. Raju" Water and Waste Water Treatment"- Tata McGraw Hill.
8 Matcalf and Eddy - Water and Waste Water Treatment, Disposal And reuse - Tata McGraw Hill.

Subject Code: BECVE803P Elective – III

Semester: VIII

WATER AND WASTE WATER TREATMENT (ELECTIVE III)

BECVE803P **Evaluation Scheme: (25-Internal/25-External)**
(P-2 Hrs/Week); Total Credits-2

PRACTICALS:

A) Minimum 6 experiments

1. Determination of Sulphates
2. Determination of Chlorides.
3. Residual, Available Chlorine and Chlorine demand.
4. Determination of BOD
5. Determination of COD.
6. Jar test.
7. Determination of filter sand from available stack sand.
8. Balferiology test on water.

B) Design of individual unit of water and waste water treatment.

19. Elective – I – Air Pollution & Solid Waste Management

Subject Code: BECVE703T

Semester: VII

AIR POLLUTION AND SOLID WASTE MANAGEMENT (ELECTIVE-I)

BECVE703T **Evaluation Scheme: (80/20)**

(L-3 Hrs/Week, T-1 Hrs/Week); Total Credits-4 **Exam Duration: 3 hrs**

COURSE OUTCOMES:-The students will be able to

1. Understand different aspects of air pollutants, its sources and effects on man and material etc.
2. Design controls methods and equipments for air pollution to reduce its impact on environment.
3. Understand problems arriving in handling large amount of solid waste generated ,its collection and transportation, processing and will bw able to design safe collection and disposal methods.

Unit - I

Introduction to air pollution : Definition, air pollution episodes, atmosphere & its zones.

Classification and sources of air pollutants, Standards for air pollution (as per Indian Standards and CPHEEO). Effects of air pollutants on man, and materials.

Unit - II

Meteorological parameters and Air sampling: Primary and secondary parameters, atmospheric stability, plume behavior. Wind rose diagram, wind data analysis & wind impact area diagram, Stack height determination.

Air sampling and measurement : ambient air sampling and stack sampling, collection of particulate and gaseous pollutants, site selection criteria methods of estimation.

Unit – III pollution control

Air pollution controls methods and equipments : Principles of control methods for particulates and gaseous pollutants, gravity settlers, electrostatic precipitators, bag filters, cyclones and wet scrubbers, (adsorption, absorption, incineration, condensation)

Automobile exhaust :Introduction to Pollution due to diesel & petrol engines,

Noise Pollution : Sources, ill effects, control measures.

Unit - IV

Introduction to solid waste management.(SWM) : Structure , necessity and responsibility,

Sources, Quantity and quality, Sources of solid waste, classification and components, physical and chemical characteristics, per capita contribution, sampling and analysis.

Unit – V : Collection and Transportation methods:

Collection and transportation of solid waste: Method of collection, equipment used for collection and transportation, transfer stations, optimization of transport route.

Solid waste processing : Methods of processing, choice of methods, merits and demerits of various methods, gas control measures.3R concept

Unit – VI : Disposal methods:

Composting of waste, methods of composting, factors affecting composting

Sanitary land filling : Site requirements, methods, leachate management., control of gases.

Incineration: Principles of incineration, types of incinerators, advantages and disadvantages.,3T Diagrams

REFERENCE BOOKS

1. M.N. Rao & H.V.N.Rao, " Air Pollution", Tata McGraw Hill Publishing Co. Ltd.
2. C.S.Rao, "Environmental Pollution Control Engineering", Wiley Estern Ltd. New Delhi.
3. Stern A.C., "Air Pollution" Vol I to X.
4. A. D. Bhide, & Sunderesan B.B., "Solid Waste Management in dev eloping countries, INSDOC, N. Delhi.
5. Tchobanoglous, "Integrated Solid Waste Management in Engineering principles and management issuses.
6. K.V.S.G. Murlikrishna" Air Pollution" JTNU, Kakinada.

20. BECVE605T Environmental Engineering-II

Semester: VI

ENVIRONMENTAL ENGINEERING-II

BECVE605T **Evaluation Scheme: (80/20)**

(L-3 Hrs/Week, T-1 Hrs/Week); Total Credits-4 **Exam Duration: 3 hrs.**

COURSE OUTCOMES: The students shall be able to

1. Use the concept related to water & its quality, sewage, sewer, storm water, etc in its hydraulic design
2. Apply the knowledge of different components of sewer in construction, testing & maintenance of sewers,
3. To test the sample of waste water in the laboratory for physical & chemical characteristics.
4. Take-up functional planning, layout and design of water treatment plant components.
5. Take-up functional planning, layout and design of sewage treatment plant components.
6. Plan for rural sanitation provisions, perform functional design of septic tank,
7. Analyze the industrial waste water for its treatment units.
8. Make use of knowledge & effect of air pollution, solid waste in planning for its prevention and control.

Unit-I

General Aspects of Environmental Engineering – Study of waste water, black water & grey water. System of collection and conveyance of sewage- separate and combined systems, patterns of sewage collection systems. Quantity of storm water and sanitary waste water, Sewer: Types, Shapes, Hydraulic Design (Capacity, Size, Grade, etc.)

Unit - II

Construction of sewer - Shoring, Trenching and laying to grade. Sewer materials, Sewer Appurtenances - manhole street inlets, storm water overflows, inverted syphons, flushing and ventilation: House plumbing systems, sanitary fitting and appliances, traps, anti-syphonage, inspection chambers and intercepting traps. Sewage pumping - location of pumping station and types of pumps. Sewer testing and maintenance.

Unit - III

Physical and chemical characteristics of wastewater, significance of BOD, COD, BOD rate constant, Sewage treatment flow sheet, site selection for sewage treatment plant. Preliminary and primary treatment - Screens, Grit chambers, oil & grease removal. Primary settling tank (including simple design)

Unit- IV

Secondary treatment - Principle of Biological Treatment Activated sludge process, trickling filter, (Indian Standard for disposal), Methods of disposal, Sewage farming, self purification of stream (Streeter Phelp's equation, Oxygen sag curve). Recycle & reuse of sewage (Zero discharge concept). Sludge digestion, sludge drying beds.

Unit - V

Rural sanitation; Pit privy, aqua privy, bio-gas recovery Septic tank including soak pit, including design problem (as per relevant I.S. Code) Sullage collection and disposal

Industrial Waste Water Treatment - Significance of Industrial Waste Water Treatment, important physical and chemical parameters, unit operations and processes (flow equalization, neutralization, adsorption, chemical and biological treatment (in brief)

Unit VI

Air pollution and solid waste: Sources, classification, Effects, prevention and control. Introduction to carbon credit system and climate change

REFERENCE BOOKS

1. B.C.Punmia," Waste Water Engineering" - Laxmi Publication
2. S.K.Garg, "Environmental Engineering" -Vol II Standard Publication
3. G.S.Birdie, "Water Supply & Sanitary Engineering"
4. M.J.Macghee, "Water Supply & Sewage" – McGraw Hill Publication
5. M.N.Rao & HV.N.Rao, "Air Pollution" McGraw Hill Publication
6. C.S.Rao,"Environmental Pollution Control Engineering".

21. BECVE 303T ENVIRONMENTAL ENGINEERING – I

Semester : III Semester

Objectives:

1. To prepare students to apply basic knowledge of environmental engineering in conventional civil engineering practice involving water supply engineering in particular.
2. The course will provide students knowledge regarding the sources, of water demands, population forecasting, and conveyance of water.
3. To prepare students to analyze, plan, and design of various phases of water supply systems.
4. To provide the students the knowledge regarding the various characteristics of water, estimation of the quantity of water.
5. The course will provide students with fundamentals of solid waste management

Outcomes:

a. The students would be able to understand the importance and necessity of water supply.
b. The students would be able to determine the capacity of water supply scheme.
c. The students would have the basic knowledge related to the conveyance systems and the appurtenances used.
d. The students would have knowledge of characteristics of water, drinking water standards and necessity of treatment.
e. The students would be able to design various units of conventional water treatment plant.
f. The students would be equipped with the basic knowledge related to design of water supply system.
g. The students should be able to understand of necessity of treatment, types of treatment processes and disposal methods for solid waste.

Syllabus :

Unit – I

Introduction: Importance and necessity of water supply scheme.

Water Demand: All types of water demand, empirical formulae, factors affecting per capita demand, variation in demand, design period, population forecasting methods and examples.

Sources of water: Rain water, Ground water-springs, infiltration galleries, Dug wells, tube wells, Surface water-stream, lake, river, impounding reservoirs, ponds & sea.

Intake structures: Location, types river, lake, canal, reservoir etc.

Unit – II

Conveyance of water: Types of pipes, joints, fittings, valves & appurtenances.

Hydraulic design aspects: Friction, Manning's, DarcyWeishbach& Hazen Williams equationsand problem.

Rising main and pumps: Concept of rising main, Classification, working, merits and demerits, selection of pumps.

Unit – III

Water quality: Physical, Chemical and bacteriological characteristics of water, Health effects of various water characteristics, Standards of drinking water, (WHO 2011, CPHEEO, IS-10500) Water born diseases

Water treatment: Objective of treatment, unit operations and processes, house hold & community based rural water treatment, decentralized water treatment, flow sheet of conventional water treatment plant.

Aeration: Purpose, types of aerators, design of cascade aerator.

Coagulation and Flocculation: Definition, Principles, types of coagulants and reactions, coagulant doses, types of mixing and flocculation devices.

Unit – IV

Sedimentation: Principles, types of setting basins, inlet and outlet arrangements, simple design of sedimentation tank.

Clariflocculators: Principles and operation.

Filtration: Mechanism of filtration, types of filters-RSF, SSF, Pressure filters, elements of filters sand specification, operational problems in filtration, Design of SSF and RSF, Membrane filtration technique of water treatment,

Unit – V

Disinfection: Purpose, Mechanism, criteria for good disinfectant, various disinfectants, their characteristics, disinfection by chlorination using different forms of chlorine. Types of chlorination.

Distribution systems: Requirements of a good distribution system, methods of distribution systems and layouts, Leakage and leak detector, Study of fire hydrants.

Storage reservoirs for treated water: Types, capacity of reservoir, mass curve.

Unit – VI

Municipal solid waste management : Generation sources, composition, Methods of Collection, transportation, disposal, Recycle, Reuse.

Examples on simple hydraulic design of pipes, estimation of population and water quality, plain sedimentation tanks, cascade aerators, filters, pumps, dose of chlorine). Visit to Water treatment plant (compulsory)

Subject Code: BECVE 303 P PRACTICAL ENVIRONMENTAL ENGINEERING – I

Semester : III

BECVE 303 PPRACTICAL ENVIRONMENTAL ENGINEERING – I

Any TEN (Total)

I. Any Seven

1. Determination of pH
2. Determination of Conductivity
3. Determination Chlorides
4. Determination of Solid's (Suspended & dissolved)
5. Determination of Turbidity
6. Determination of Acidity
7. Determination of Dissolved Oxygen
8. Determination of Membrane filtration technique
9. Determination of Available Chlorine
10. Determination of Residual Chlorine
11. Jar Test
12. Bacteriological Plate count and MPN tests.
13. Determination of Alkalinity.

II. Only demonstration of COD, BOD.

III. Design of WTP using software.

IV. Brief Report on WTP Visit.