

**VIGNAN'S**

Foundation for Science, Technology & Research

(Deemed to be University)

Established by Act 1985

List of programmes offering courses on Professional Ethics, Gender Equity, Human Values, Environment and Sustainability in the Curriculum

Sl.No	Programme name	Human Values	Professional Ethics	Gender Equity	Environment and Sustainability
1	B.Tech-Biotechnology	✓	✓	✓	✓
2	B.Tech-Chemical Engineering	✓	✓	✓	✓
3	B.Tech-Civil Engineering	✓	✓	✓	✓
4	B.Tech-Computer Science and Engineering	✓	✓	✓	✓
5	B.Tech-Electronics and Communication Engineering	✓	✓	✓	✓
6	B.Tech-Electrical and Electronics Engineering	✓	✓	✓	✓
7	B.Tech-Information Technology	✓	✓	✓	✓
8	B.Tech-Mechanical Engineering	✓	✓	✓	✓
9	B.Tech-Automobile Engineering	✓	✓	✓	✓
10	B.Tech-Textile Technology	✓	✓	✓	✓
11	B.Tech-Agriculture Engineering	✓	✓	✓	✓
12	B.Tech-Bioinformatics	✓	✓	✓	✓
13	B.Tech-Food Technology	✓	✓	✓	✓
14	B.Tech-Biomedical Engineering	✓	✓	✓	✓
15	B.Tech-Petroleum Engineering	✓	✓	✓	✓
16	M.Tech-Biotechnology		✓		
17	M.Tech-Computer Science and Engineering		✓		
18	M.Tech-Embedded Systems		✓		
19	M.Tech-Machine Design		✓		
20	M.Tech-Power Electronics and Drives		✓		
21	M.Tech-Very Large Scale Integration (VLSI)		✓		
22	M.Tech-Food Processing Technology		✓		
23	M.Tech-Structural Engineering		✓		
24	M.Tech-Farm Machinery		✓		
25	Master of Business Administration		✓		
26	Master of Computer Applications		✓		
27	Ph.D -Biotechnology		✓		
28	Ph.D -Chemical Engineering		✓		
29	Ph.D -Civil Engineering		✓		
30	Ph.D -Computer Science and Engineering		✓		
31	Ph.D -Electronics and Communication Engineering		✓		
32	Ph.D -Electrical and Electronics Engineering		✓		
33	Ph.D -Mechanical Engineering		✓		
34	Ph.D -Management Studies		✓		
35	Ph.D -Agriculture Engineering		✓		
36	Ph.D -Physics		✓		
37	Ph.D -Chemistry		✓		
38	Ph.D -Mathematics		✓		
39	Ph.D -English		✓		
40	Ph.D -Computer Applications		✓		
41	Bachelor of Computer Applications		✓		
42	Bachelor of Business Administration		✓		✓
43	B.Sc. (Mathematics, Statistics and Computer Science)		✓		✓
44	Bachelor of Pharmacy		✓		✓

G. Vijayaraj

DEAN, ACADEMICS
JEAN, ACADEMICS
 VIGNAN'S FOUNDATION
 FOR SCIENCE, TECHNOLOGY AND RESEARCH
 Deemed to be Deemed University U/S 3 of UGC Act.
 VADLAMUDI-522 213
 A.P. INDIA

19HS301 HUMAN VALUES, PROFESSIONAL ETHICS & GENDER EQUITY

Hours Per Week :

L	T	P	C
2	-	-	2

COURSE DESCRIPTION AND OBJECTIVES:

The course will provide students with an understanding on Engineering Ethics and the nature of moral issues and dilemmas faced by engineers in their professional lives. It will give them an awareness on professional rights and responsibilities of an engineer and acquaint them on the Code of Conduct and Ethics prescribed by professional bodies like IEEE, ASME, etc for its members

COURSE OUTCOMES:

Upon completion of the course, the student will be able to achieve the following outcomes:

COs	Course Outcomes	POs
1	Ability to engage in an informed critical reflection on the nature of professionalism and ethical challenges inherent in engineering profession.	6, 7 8,9,12
2	Apply awareness of professional rights and responsibilities of an engineer to conduct themselves ethically within an organization.	6,7,8 9,12
3	Apply understanding of safety norms to highlight ethical issues in risky situation.	6,7,8 9,12
4	Understand the role of professional bodies, and the code of ethics and industrial standards prescribed for engineers.	6,7,8 9,12

SKILLS:

- ✓ *Safety & Environment consciousness.*
- ✓ *Ethical behaviour and decision-making at workplace.*
- ✓ *Ability to work in large teams.*
- ✓ *Emotional intelligence for workplace.*



SOURCE:

<https://www.google.com/search?q=professional+ethics&client>

UNIT – I **L-6**

INTRODUCTION TO PROFESSIONAL ETHICS: Morals, values and ethics; Civic virtue; Respect for others, Living peacefully; Caring; Sharing; Honesty; Valuing time; Co-operation; Commitment, Empathy; Self-confidence; Courage, Character; Spirituality; Service learning; Introduction to Engineering Ethics; Profession; Professionalism.

UNIT – II **L-6**

NATURE OF MORAL ISSUES: Moral dilemmas (Problem of Vagueness, Conflicting Reasons & Disagreement); Types of inquiry (Normative, Conceptual & Factual); Moral autonomy; Kohlberg's & Carol Gilligan's theory; Impediments to responsible action; Theories of right action (Bentham's Theory of Utilitarianism, Theory of Consequentialism etc.).

UNIT – III **L-6**

ENGINEERING AS SOCIAL EXPERIMENTATION: Engineers' responsibility for safety ; Assessment of safety and risk; Testing for safety; Risk benefit analysis; Reducing risk; Government regulator's approach to risk; A balanced outlook on law; Discussion of case studies: Challenger disaster / Chernobyl disaster; Code of ethics; Professional societies; Sample code of ethics like ASME, ASCE, IEEE etc.

UNIT – IV **L-6**

RIGHTS AND RESPONSIBILITIES AT WORKPLACE: Organizational complaint procedures; Whistle blowing; Environment and the workplace; Gender equity; Understanding gender; Organizational policies regarding gender; Gender roles; Looking beyond stereotypical generalizations; Service rules; Conflict of interest; Prevention of sexual harassment; Women rights under labour laws.

UNIT – V **L-6**

ETHICS IN A GLOBAL CONTEXT: Multinational Corporations; Intellectual Property Rights; Business ethics; Transparency & fair practices; Discussion of case study-Enron-Dhabol project; Environmental Ethics; Challenge of sustainable development; UN Conventions & protocols on environment; Discussion of case studies: Bhopal gas tragedy, Pacific gas & Electric company Vs. Environmental activist, Erin Brockovich; Computer ethics; Automation & artificial intelligence; Cyber security & Cyber laws; Case study; Wiki leaks; Role in technological development; Weapons development.

TEXT BOOKS:

1. Martin Mike and Schinzingler Roland, "Introduction to Engineering Ethics", 2nd Edition, McGraw-Hill Higher Education, 2010.
2. M. Govindarajan, S.Natarajan and V. S. Senthil Kumar, "Engineering Ethics", Prentice Hall of India, Reprint 2013.
3. Charles E. Harris, Michael S. Pritchard and Michael J. Rabins, "Engineering Ethics: Concepts and Cases", 4th edition Wadsworth Thompson Learning, 2009.

REFERENCE BOOKS:

1. Charles B. Fleddermann, "Engineering Ethics", 4th edition, Pearson Education/Prentice Hall, 2014.
2. Edmund G. Seebauer and Robert L. Barry, "Fundamentals of Ethics for Scientists and Engineers", Oxford University Press, 2008.
3. "A Comprehensive Guide to Women's Legal Rights"–Prepared by Majlis Legal Centre for IIT-Kanpur, 2018.

16HS301 PROFESSIONAL ETHICS

Hours Per Week :

L	T	P	C
2	-	-	2

Course Description and Objectives:

This course offers insight into workplace rights of people, their safety concerns and more importantly the ethics that are to be followed by professionals and corporates. The objective of the course is to bring in awareness among the students about human values, social responsibility and the ethics to be followed by engineering professionals.

Course Outcomes:

Course Outcomes:

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

- CO1: Engage in informed critical reflection on the nature of professionalism and ethical Challenges inherent in professionalism.
- CO2: Apply his/her awareness of professional rights and responsibilities of an engineer to conduct.
- CO3: Possess the ability to highlight ethical issues in risky situation.
- CO4: Aware of the role of professional bodies, and the code of ethics.
- CO5: Aware of code of ethics as per industrial standards prescribed for engineers.

SKILLS:

- ✓ *Analyze the issues faced by society and business world related to safe technologies/ practices, employee rights, resource sharing and allocation, team work, organizational dynamics, legislations related to business and technology, discrimination.*
- ✓ *Appreciate the need for workplace etiquette and proper code of conduct.*
- ✓ *Construct and evaluate arguments during decision making by considering viewpoints of all the stakeholders.*
- ✓ *Analyze one's own beliefs and values during interpersonal and intra-organizational conflicts.*
- ✓ *Detect inconsistencies and common errors in reasoning during discussions and practices.*

UNIT - 1**L-6**

HUMAN VALUES : Morals, values, ethics, integrity, work ethic, service learning, civic virtue, respect for others, living peacefully, caring, sharing, honesty, courage, valuing time, co-operation, commitment, empathy, self-confidence, character and spirituality.

UNIT - 2**L-6**

ENGINEERING ETHICS AND ENGINEERING AS SOCIAL EXPERIMENTATION : Engineering ethics; variety of moral issues; Types of inquiry- moral dilemmas, moral autonomy, the problems of many hands, Kohlburg's theory, Gilligan's theory impediments to responsible action.

Engineering as social experimentation; Codes of ethics; A balanced outlook on law; The challenger case study.

UNIT - 3**L-6**

ENGINEER'S RESPONSIBILITY FOR SAFETY : Safety and risk; Assessment of safety and risk; Risk benefit analysis; Reducing risk, the government regulator's approach to risk - Chernobyl case studies and Bhopal gas tragedy.

UNIT - 4**L-6**

WORKPLACE RIGHTS, RESPONSIBILITIES AND WORK ENVIRONMENT : Workplace rights and responsibilities; Engineers and managers; Organizational complaint procedures; Government agencies; Resolving employee concerns; Limits on acceptable behaviour in large corporation; Work environment-ethical and legal considerations, organizational responses to offensive behaviour and harassment; Ethics in a global context.

UNIT - 5**L-6**

GLOBAL ISSUES : Multinational corporations; Business ethics; Environmental ethics; Computer ethics; Role in technological development, weapons development; Engineers as managers; Consulting engineers; Engineers as expert witnesses and advisors; Honesty; Moral leadership; Sample code of conduct.

TEXT BOOK:

1. M. Martin and R. Schinzinger, "Ethics in Engineering", McGraw Hill, New York, 2005.

REFERENCE BOOKS:

1. Prof. (Col) P. S. Bajaj and Dr. R. Agrawal, "Business Ethics – An Indian Perspective", Biztantra, New Delhi, 2004.
2. C. E. Harris, M. S. Protchard and M. J. Rabins, "Engineering Ethics – Concepts and Cases", Wadsworth Thompson Learning, United States, 2000.
3. E. G. Seebauer and R. L. Barry, "Fundamentals of Ethics for Scientists and Engineers", Oxford University Press, Oxford, 2001.

ACTIVITIES:

- Discuss a typical case study on workers strike and analyze the conflict of interest among different stakeholders.
- Reading and analyzing a prisoner's narrative of police abuse in custody.
- Watching and discussing a video report on mishaps such as space shuttle mishap.
- Analyze and comment on disasters such as Chernobyl, Bhopal etc.
- Analyzing the HR policies documents of a typical company on issues such as working hours, employee security and health care.

16HS109 ENVIRONMENTAL SCIENCE AND TECHNOLOGY

Hours Per Week :

L	T	P	C
2	-	-	2

Course Description and Objectives:

Environmental science and technology offers technological aspects of environmental science and in maintaining environmental integrity in relation to human development. It helps every engineer to plan appropriate strategies for addressing environmental issues and also contribute to the development of innovative technologies for solving such issues. It produces professionals who will ensure sustainable development of the nation in general and environmental in particular.

Course Outcomes:

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

- CO1: Observation and integration of diverse information from variable sources outside of the classroom and helps students to think critically, creatively, resourcefully, and strategically, including identifying steps needed to reach goals, manage projects, evaluate progress, and adapt approaches, developing both self reliance, and civic mindedness
- CO2: Collaborating across diverse disciplines and practices to identify and create solutions that conserve and help manage biodiversity for the long term
- CO3: Analyze the sources of pollutants and their effects on atmosphere and Adapting eco-friendly technologies and maintain hygienic conditions
- CO4: Identify the evidence of Global warming, Ozone depletion and acid rain
- CO5: Recognize safe receiving storing and handling of raw and prepared food and maintain hygienic conditions.

SKILLS:

- ✓ *Understand structural relationships, abstract models, symbolic languages and deductive reasoning.*
- ✓ *Gain perspectives to address the challenges, improvise and devise solutions.*
- ✓ *Identify solutions to environment and development issues, using planning, analysis, modeling, and new approaches.*
- ✓ *Acquire fieldwork techniques to study, observe and prepare documents, charts, PPTs, Models etc.*
- ✓ *Understand how natural resources should be used judiciously, to protect biodiversity and maintain ecosystem.*

UNIT - 1

L-6

NATURAL RESOURCES : Environmental Studies- definition, scope and its importance; Need for public awareness, natural resources, forest resources and deforestation; Water resources - properties and conflicts; Mineral resources - extraction and impacts; Food resources - modern agriculture methods, fertilizer-pesticide problems, water logging and salinity; Energy resources - renewable and non-renewable energy resources, harness technology, solar energy technologies; Land resources - land degradation, soil erosion; Role of an individual in conservation of natural resources.

UNIT - 2

L-6

ECOSYSTEMS AND BIODIVERSITY : Ecosystem - concept, structure and functions of an ecosystem; Food chains, food webs, ecological pyramids, energy flow, energy regulation and succession; Biogeochemical cycles; Aquatic ecosystems; Biodiversity - introduction, bio-geographical classification, values of biodiversity, biodiversity at global, national and local levels, hot-spots of biodiversity, threats to biodiversity, endangered and endemic species of India and conservation of biodiversity.

UNIT - 3

L -6

WASTE MANAGEMENT AND GREEN TECHNOLOGY : Solid waste management - causes, effects and control measures of municipal and industrial wastes; Pollution - air, water, thermal, soil and noise pollutions; Role of an individual in prevention of pollution; Remote sensing / GIS - introduction, definitions, applications of the remote sensing; Innovative practices-objectives, innovative practices in agriculture, forest-community and bio-villages; Green technology for sustainable development, life cycle assessment and its concept.

UNIT - 4

L-6

SOCIAL ISSUES AND EIA : Sustainable development, water conservation, cloud seeding, rainwater harvesting methods, watershed management, global warming, acid rain, ozone layer depletion; Environmental legislation; wildlife protection act, water act, forest conservation act, air act, environmental protection act; Environmental impact assessment (EIA) - introduction, definition of EIA and EIS, scope and objectives, importance of EIA in proposed projects/industry/developmental activity.

UNIT - 5

L-6

ENVIRONMENTAL SANITATION : Food sanitation - food and drugs act, food preservations, milk sanitation, tests for milk, pasteurization of the milk; Water, air, soil and food borne diseases; Maintenance of sanitary and hygienic conditions; Role of youth in the development; Promoting activities -youth as initiators and activities; Field work/environmental visit - visit to a local area to document environmental assets river/ forest/grassland/hill/mountain; Study of local environment - common plants, insects, birds; Study of simple ecosystems - pond, river, hill slopes etc., Visit to industries/water treatment plants/effluent treatment plants.

TEXT BOOKS:

1. A. Kaushik and C.P. Kaushik, "Perspectives in Environmental Studies", 5th edition, 2016.
2. B. Joseph, "Environmental studies", 2nd edition, McGraw Hill Education, 2015.

REFERENCE BOOKS:

1. Dr. M. Chandrasekhar, "A Text book of Environmental Studies", HI-TECH publications, 2006.
2. Dr. M. Anji Reddy, "A Text book of environmental science and Technology", B S Publications, 2008.
3. Dr. K. Mukkanti, "A Text book of Environmental Studies", S.Chand and Company Ltd, 2009.
4. EHILRS and ST, "Text book of Municipal and Rural Sanitation", M.S Hill, 1998.
5. C. S. Rao, "Environmental Pollution Control Engineering", New Age International Ltd, 2001.
6. Dr. M. Anji Reddy, "Introduction to Remote Sensing", B S Publications, 2004.
7. K. Joseph and R.Nagendram, "Essentials of environmental studies", Pearson Education Pt Ltd, Delhi, 2007. Education Pt Ltd, Delhi, 2007.

ACTIVITIES:

- *Painting contests on environmental issues and themes.*
- *Models of energy resources, Pollution and Solid Waste Management- 3R strategy.*
- *Quiz competition.*
- *Essay writing competition.*
- *Skit, JAM and debate.*
- *Field work and documentation.*
- *Assignments.*

17BB112 GEOGRAPHY AND ENVIRONMENTAL STUDIES

Hours Per Week :

L	T	P	To	C
4	-	-	4	4

Course Objective:

To sensitize the students on the environmental aspects of development and give basic exposure to geography. Students will learn fundamentals of geography, Sources of energy and importance of Bio-Diversity. They also learn environmental issues and their implications.

Course Outcomes:

By the end of this course it is expected that the student will be able to:

- Understand fundamentals of geography.
- Learn milestones in India's scientific and technological progress.
- Sources of energy and their importance.
- Importance of Bio-Diversity.
- Environmental issues and their implications.

SKILLS:

(These activities are only indicative, the Faculty member can innovate)

- ✓ *To study how business cycles have impacted the global economy in the past companies.*
- ✓ *To compare the monetary policies of any two economies.*
- ✓ *Do a case study of National income accounting company and underdeveloped economy with a developed area.*
- ✓ *Find out the recent changes introduced in monetary and fiscal policies.*
- ✓ *Prepare a report of Demonetization effect on economy.*
- ✓ *Find statistical trends in unemployment.*
- ✓ *List the difference between states in context of poverty, poverty alleviation programmes, literacy, population etc.*

UNIT - I

10 Hrs

Geography: Fundamental concepts of Geography-Physical Geography of India – River systems, climate, soils, minerals, geological Strata, climatic regions, natural vegetation, Races and Physical Types of People.

UNIT - II

10 Hrs

Scientific and Technological Development: Milestones in India's scientific and technological progress in diverse fields – space, Nuclear, IT, Defense, Agriculture and Rural technologies- Prominent scientists of India and their contribution -Recent initiatives to spread scientific temper and S & T practices.

UNIT-III

10 Hrs

Energy Sources: Sources of Energy-availability and consumption pattern, Energy policy and pricing Issues relating to hydel power (Big Dams), Thermal Plants and Nuclear power Green Energy technologies and their importance.

UNIT-IV

10 Hrs

Biodiversity: Meaning and importance of Bio-diversity, Sustainable Development-Ecosystems and their management -Bio-Diversity of India, Bio- spheres and Biodiversity hot spots of India Initiatives to preserve bio-diversity.

UNIT - V

10 Hrs

Environmental issues: Magnitude, causes and consequences of environmental pollution in India - Factors that led to global warming and climate change -Recent international protocols to tackle climate change, Carbon trading and its implications -Concerns of Developing Countries.

Reference Books:

1. Bio & Environmental Geog. Biosphere A Geography of Life
By Dr. Thomas and K. Siddhartha.
2. Environmental Geology –By Valdiya.1987, TMH

17HS001 RESEARCH METHODS

Hours Per Week :

L	T	P	C
3	-	-	3

Total Hours :

L	T	P	WARA	SSH/SHS	CS	SA	S	BS
45	-	-	15	30	-	5	5	-

Course Objectives:

Objective of the course is to enable research scholars to have a general understanding of research methods and application of statistical tools in the analysis and interpretation of findings and guidelines for report writing.

UNIT - I

Introduction: Nature and Importance of research, the role of business research, aims of social research, research process, types of research. Data Base: discussion on primary data and secondary data, probability and non-probability sampling techniques.

UNIT-II

Research Design: Meaning of research design. Functions and goals of research design. Questionnaire and Schedule.

UNIT – III

Measurement and Scaling Concepts: Attitude measurement, levels of measurement and types of scales, criteria for good measurement. Measures of central tendency, measures of dispersion, measures of variation, Correlation and Regression. Statistical Inference. Tests of significance for small samples, t-test, Chi-Square test and ANOVA-one way and two way classifications. Discriminate analysis, cluster analysis, conjoint analysis

UNIT-IV

Technical Report Writing: Pre-writing considerations, Thesis writing, formats of report writing, Formats of publications in Research Journals. Technique of Interpretation, Precaution in Interpretation, Significance of Report writing, Different steps in writing Report, Layout of the Research Report, Types of Reports, Report Format, Typing Instructions, Oral Presentations.

UNIT-V

Research Ethics and Morals: Issues related to plagiarism, collaborative models and ethics, Acknowledgements. *Intellectual Property Rights:* copyrights.

TEXT BOOKS:

1. Bhattacharya, D. K., Research Methodology, Excel Books, New Delhi.
2. Gupta S.P., Statistical Methods, Sultan Chad, New Delhi, 2001.
3. Pannerselvam, Research Methodology, Prentice Hall of India, New Delhi, 2005.

REFERENCE BOOKS:

1. Andrews, F.M. and S.B. Withey Social Indicators of well being, Plenum Press, 1976.
2. Bennet, Roger, Management Research, ILO, 1983.
3. Murray.R. How to write a Thesis:, Tata Mc Graw-Hill.
4. Nanda Gopal, Research Methods Using Computers, Excel Books, New Delhi.
5. Salkind. Neil.J, Exploring Research, Prentice Hall of India, New Delhi, 1997.
6. Shajahan.S, Research Methods for Management, Jaico Publishing House, 2005.
7. C.R. Kothari: Research Methodology, Methods & Techniques, 2nd Edition, New Age International Publications

19MB111

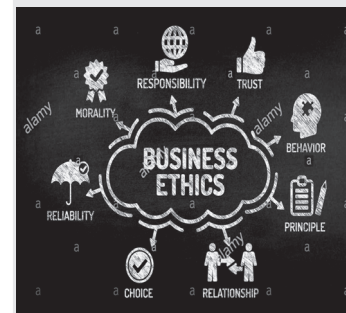
BUSINESS ENVIRONMENT & ETHICS

Hours Per Week :

L	T	P	C
4	-	-	4

Total Hours :

L	T	P
50	-	-



Source :
www.legalfuel.com

COURSE DESCRIPTION AND OBJECTIVE:

To analyze the overall business environment and evaluate its various components in business decision making, also provides an analysis and examination of significant contemporary ethical issues and challenges existing throughout the professional business arena. Emphasis will be placed upon the manager's social and environmental responsibilities to a wide variety of stakeholders, including employees, Customers and the public.

COURSE OUTCOMES:

Upon completion of the course, student will be able to achieve the following outcomes:

COs	Course Outcomes	POs
1	Define the nature of business environment and its components.	4,5,8
2	Analyze and develop conceptual framework of business environment and generate interest in international business.	1,4,7
3	Identifying the socio, political and economic situation faced by the business world.	1,4,5
4	Explain the definition of ethics and the importance and role of ethical behavior in the business world today.	2,3,5

SKILLS:

- ✓ List out the various cyber offences and the penalties for the same.
- ✓ List at least 3 MNCs of G-8 Countries operating in India along with products they manufacture.
- ✓ Collect the latest fiscal, monetary policies on business
- ✓ Students are expected to study any five CSR initiatives by Indian organizations and submit a report for the same.
- ✓ A group assignment on "The relationship between business houses and society in Indian context and relating the same with respect to the models studied.
- ✓ Mini Project: Collect details of unethical practices by businesses in today's context in the areas of production, Marketing, HRM and financial services and make a report.
- ✓ Case studies/Role plays related ethical issues in business with respect to Indian context.

UNIT - I **L-10**

THE CONCEPT OF BUSINESS ENVIRONMENT: Meaning of business environment – Nature and scope of business – Business objectives and its characteristics – Types of environment - Environmental analysis and forecasting – Importance of business environment.

UNIT - II **L-10**

ECONOMIC ENVIRONMENT: Concept of National Income – Role of Industry in economic development – Union budget as an instrument of growth and their impact on business – Inflation – Demonetization.

UNIT - III **L-10**

ECONOMIC SYSTEMS AND THEIR IMPACT ON BUSINESS: Capital market – Money market – Stock exchange and its regulation – Investor protection and role of SEBI - Liberalization – Privatization – Globalization.

UNIT - IV **L-10**

INDUSTRIAL POLICIES: A brief review of industrial policies since independence, Industrial policy of 1991 and recent developments – Policy on foreign direct investment in Indian Industry.

UNIT - V **L-10**

BUSINESS ETHICS: Meaning of ethics - Relationship between ethics and business – Ethics in functional areas of business – Ethics in HRM – Ethics in finance – Ethics in marketing - Ethics at workplace – Corporate social responsibility.

TEXT BOOKS:

1. Francis Cherunilam, "Business Environment", Text and Cases, 17th edition, Himalaya, 2007.
2. Manuel G. Velasquez, "Business Ethics", Concepts and Cases, PHI, New Delhi, 2009.

REFERENCE BOOKS :

1. Justin Paul, "Business Environment", 1st edition, Tata MH, 2007
2. Misra and Puri, "Indian Economy", Himalaya, 2007.
3. Dutt and Sundaram, "Indian Economy", S. Chand, New Delhi, 2007

17BB211 BUSINESS ETHICS AND CORPORATE GOVERNANCE

Hours Per Week :

L	T	P	To	C
4	-	-	4	4

Course Objective:

To discuss the theories of ethics and Corporate Governance and explain how they can be applied in various business situations, importance of ethics in conducting business. Corporate social responsibility and ethical dilemmas at work place and corporate governance – Codes and Laws.

Course outcomes:

By the end of this course it is expected that the student will be able to:

- Understand nature and objectives of ethics.
- Importance of ethics in conducting business.
- Ethical organization and its corporate code.
- Ethical issues in marketing.
- Corporate social responsibility and ethical dilemmas at work place.
- Corporate governance – Codes and Laws.

SKILLS:

(These activities are only indicative, the Faculty member can innovate)

- ✓ *Students are expected to study any five CSR initiatives by Indian organizations and submit a report for the same.*
- ✓ *A group assignment on "The relationship between Business houses and Society in Indian Context and relating the same with respect to the models studied.*
- ✓ *Mini Project: Collect details of unethical practices by businesses in today's context in the areas of Production, Marketing, HRM, and Financial services and make a report.*
- ✓ *Case studies/Role plays related ethical issues in business with respect to Indian context.*

UNIT - I

10 Hrs

Ethics- Nature of Ethics - Objectives of Ethics – Need - Business Ethics – Nature of Business Ethics – Relationship between ethics and business - The Utilitarian view – Separatist view – Integrated view of ethics – Stages of Ethical Consciousness.

Importance of Ethics in Business – Ethical theories – Meta ethics – Normative ethical theory – Theory of Justice – Theory of Rights – Ethics of Care – Law and Ethics - Trust and ethics – Suppliers, Customers, Employees Integrative Social Contact Theory – Hyper norms.

UNIT - II

10 Hrs

Ethical Organization and its corporate code – Characteristics of ethical organization - Corporate Moral Excellence – Stakeholders – Corporate Governance – Corporate Code – Implementation of Corporate Code.

Ethical issues in Marketing – Ethics in marketing strategy, Marketing Mix, Marketing Research - Ethical issues in Operations – Role of Operations Manager, Quality Control, Ethical Problems in operations - Ethical issues in Purchase – Role, Purchase Code of Ethics, Global Buyer-Supplier Relations - Ethical Issues in HRM – Principles of Ethical Hiring, Promotion, Equality of Opportunity, Ethics in remuneration and retrenchment – downsizing workforce - Ethical Issues in Finance – Ethics in Financial Markets – Investor protection measures – Ethical responsibility towards competitors and business partners.

UNIT - III

10 Hrs

Corporate Social Responsibility – Historical perspective of CSR from Industrial Revolution to Social Activism – Stake Holders – Share Holders – Employees – Management – External Stake Holders – Consumers – Suppliers – Competitors – Creditors – Community – Corporation as a moral person – Corporate expectations of Society - Current CSR Practices of firms in India.

UNIT - IV

10 Hrs

Ethical Dilemmas at work place – Ethical dilemmas in decision making – power – authority – secrecy – confidentiality – trust and loyalty - Ethical Leadership – Managerial integrity and decision making.

UNIT - V

10 Hrs

Corporate Governance – Codes and Laws – Committees of Corporate Governance – Role and functions of Chairman and Managing Director – Role and functions of Committees – Audit Committee – Remuneration Committee – Nomination Committee – Cadbury committee – OECD committee – KM Birla committee on Corporate Governance.

Text Books:

1. Sadri – Business Ethics Concepts and Cases, 7th edition., TMH, 1998,
2. Business Ethics and Corporate Governance – ICFAI Publications, 2007.
3. Business Ethics – An Indian Perspective by Francis, 1st Edition, TMH 2009.

Reference Books:

1. R.C.Shekar - Ethical Choices in Business, 2nd edition, 2002.
2. Ethics in Business & Corporate Governance by Mandat, 7th Edition, TMH, 2011.

19CE213

ENVIRONMENTAL ENGINEERING

Hours Per Week :

L	T	P	C
2	-	2	3

Total Hours :

L	T	P	WA/RA	SSH/HSH	CS	SA	S	BS
30	-	30	20	48	6	12	3	5



Source :https://ocw.mit.edu/courses/civil-and-environmental-engineering/dhp_1.jpg

COURSE DESCRIPTION AND OBJECTIVES:

The main objective of this course is to make the student aware of basic ideas of algorithms and programming. Basic Programming should be used to solve problems related to Structural Engineering, Water resource Engineering, Environmental Engineering, Geo-technical Engineering and Geology

COURSE OUTCOMES:

Upon completion of the course, the student will be able to achieve the following outcomes:

COs	Course Outcomes	POs
1	Describe water quality parameters and treatment techniques	1
2	Examine sewage quality parameters and treatment techniques.	1
3	Summarize the basic concepts of air and noise pollution	1
4	Discuss the solid waste management and disposal techniques	1
5	Discuss the various plumbing techniques	1

SKILLS:

- ✓ Evaluate the contamination level of water bodies.
- ✓ Design a filter medium.
- ✓ Design of Water softening models.
- ✓ Prepare, review, and update environmental investigation and recommendation reports.
- ✓ Design a water distribution system for a given city.

- UNIT-I** **L-9**
- WATER:-**Sources of Water and quality issues, water quality requirement for different beneficial uses, Water quality standards, water quality indices, water safety plans, Water Supply systems, Need for planned water supply schemes, Water demand industrial and agricultural water requirements, Components of water supply system; Transmission of water, Distribution system, Various valves used in W/S systems, service reservoirs and design.
- WATER TREATMENT:** aeration, sedimentation, coagulation flocculation, filtration, disinfection, advanced treatments like adsorption, ion exchange, membrane processes
- UNIT-II** **L-9**
- SEWAGE-**Domestic and Storm water, Quantity of Sewage, Sewage flow variations. Conveyance of sewage- Sewers, shapes design parameters, operation and maintenance of sewers, Sewage pumping; Sewerage, Sewer appurtenances, Design of sewerage systems - Small bore systems, Storm Water- Quantification and design of Storm water.
- WASTEWATER MANAGEMENT** - Sewage and Sullage, Pollution due to improper disposal of sewage, National River cleaning plans, Wastewater treatment, aerobic and anaerobic treatment systems, suspended and attached growth systems, recycling of sewage – quality requirements for various purposes.
- UNIT-III** **L-9**
- AIR** - Composition and properties of air, Quantification of air pollutants, Monitoring of air pollutants, Air pollution- Occupational hazards, Urban air pollution automobile pollution, Chemistry of combustion, Automobile engines, quality of fuel, operating conditions and interrelationship. Air quality standards, Control measures for Air pollution, construction and limitations.
- NOISE-** Basic concept, measurement and various control methods
- UNIT – IV** **L-9**
- SOLID WASTE MANAGEMENT-**Municipal solid waste, Composition and various chemical and physical parameters of MSW, MSW management: Collection, transport, treatment and disposal of MSW. Special MSW: waste from commercial establishments and other urban areas, solid waste from construction activities, biomedical wastes, Effects of solid waste on environment: effects on air, soil, water surface and ground health hazards.
- Disposal of solid waste - segregation, reduction at source, recovery and recycle. Disposal methods- Integrated solid waste management. Hazardous waste: Types and nature of hazardous waste as per the HW Schedules of regulating authorities
- UNIT-V** **L-9**
- BUILDING PLUMBING** - Introduction to various types of house plumbing systems for water supply and waste water disposal, high rise building plumbing, Pressure reducing valves, Break pressure tanks, and Storage tanks.
- Building drainage for high rise buildings, various kinds of fixtures and fittings used. Government authorities and their roles in water supply, sewerage disposal.

LABORATORY EXPERIMENTS

LAB EXPERIMENTS

TOTAL HOURS:30

1. Total suspended and dissolved solids in water / sewage sample.
2. Fixed and volatile solids in water / sewage sample.
3. Settle able Solids.
4. Turbidity of water / sewage sample.
5. pH value of water / sewage sample.
6. Nitrates of water / sewage sample.
7. Sulphates of water / sewage sample.
8. Temporary and permanent hardness of water sample.
9. Chloride concentration of water / sewage sample.
10. Acidity of water sample.
11. Alkalinity of water sample.
12. Fluorides in water sample.
13. Dissolved Oxygen of Water / Sewage Sample
14. Biochemical Oxygen Demand (BOD) of waste water.
15. Chemical Oxygen Demand (COD) of waste water.
16. Noise levels at various places.
17. Bacteriological quality measurement: MPN
18. Ambient Air quality monitoring (TSP, RSPM, SO_x, NO_x)
19. Ambient noise measurement

TEXT BOOKS:

1. Introduction to Environmental Engineering and Science by Gilbert Masters, Prentice Hall, New Jersey.
2. Introduction to Environmental Engineering by P. Aarne Vesilind, Susan M. Morgan, Thompson /Brooks/Cole; Second Edition 2008.

REFERENCES:

1. Manual on Water Supply and Treatment. Ministry of Urban Development, New Delhi.
2. Plumbing Engineering. Theory, Design and Practice, S.M. Patil, 1999
3. Integrated Solid Waste Management, Tchobanoglous, Theissen & Vigil. McGraw Hill Publication
4. Manual on Sewerage and Sewage Treatment Systems, Part A, B and C. Central Public Health and Environmental Engineering Organization, Ministry of Urban Development

19HS126

ENVIRONMENTAL SCIENCE AND DISASTER MANAGEMENT

Hours Per Week :

L	T	P	C
2	0	0	2

Total Hours :

L	T	P	WA/RA	SSH/HSH	CS	SA	S	BS
30	-	-	10	45	-	-	-	-



Disaster Management



Source :

<https://i0.wp.com/kashmirreader.com/wp-content/uploads/2019/03/disaster-managemen.jp>

COURSE DESCRIPTION AND OBJECTIVES:

To understand the natural environment and its relationships with human activities and to characterize and analyze human impacts on the environment. Design and evaluate strategies, technologies, and methods for sustainable management of environmental systems and for the remediation or restoration of degraded environments.

COURSE OUTCOMES:

Upon completion of the course, student will able to achieve the following outcomes:

COs	Course Outcomes	POs
1	Understand, discuss and describe effective usage of renewable and non-renewable sources.	---
2	Apply their knowledge of bio-diversity systematically to balance eco-system.	1
3	Analyse the reasons behind habitat loss, pollution, deforestation, man-wild life conflict and disasters.	4
4	Evaluate the trend and current scenario and come out with new technology which helps mankind in managing disasters.	4
5	Apply and develop eco-friendly technologies in order to maintain foul man-made conditions.	6,7
6	Creative across diverse disciplines to identify and create solutions that conserve and help maintain biodiversity in the long term.	7,11

SKILLS:

- ✓ Understand structural relationships, abstract models, symbolic languages and deductive reasoning.
- ✓ Gain perspectives to address the challenges, improvise and devise solutions.
- ✓ Identify solutions to environment and development issues, using planning, analysis, modeling, and new approaches.
- ✓ Acquire field work techniques to study, observe and prepare documents, charts, PPTs, Models.

UNIT - I**L-06**

Environmental Studies: Scope and importance. Natural Resources: Renewable and non-renewable resources Natural resources and associated problems. a) Forest resources b) Water resources c) Mineral resources d) Food resources e) Energy resources f) Land resources: Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.

UNIT - II**L-06**

Ecosystems: Concept, Structure, function, Producers, consumers, decomposers, Energy flow, ecological succession, food chains, food webs, ecological pyramids. Introduction, types, characteristic features, structure and function of the forest, grassland, desert and aquatic ecosystems (ponds, streams, lakes, rivers, oceans and estuaries).

UNIT - III**L-06**

Biodiversity and its conservation: Introduction, definition, genetic, species & ecosystem diversity and bio-geographical classification of India. Biodiversity at global, National and local levels; India as a mega-diversity nation, Hot-spots of bio-diversity. 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.

UNIT - IV**L-06**

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. Environment Protection Act, Air (Prevention and Control of Pollution) Act. Water (Prevention and control of Pollution) Act, Wildlife Protection Act. Forest Conservation Act.

UNIT - V**L-06**

Disaster Management: Natural Disasters and nature of natural disasters, their types and effects. man made Disasters-Nuclear disasters, chemical disasters, biological disasters, building fire, coal fire, forest fire, oil fire, air pollution, water pollution, deforestation, industrial waste water pollution, road accidents, rail accidents, air accidents, sea accidents. Concept of disaster management, national disaster management framework, financial arrangements, role of NGOs, community-based organizations and media.

TEXT BOOK :

1. Bharucha Erach. 2005, "Text Book of Environmental Studies for Undergraduate Courses". University Grants Commission, University Press, Hyderabad.

REFERENCE BOOKS :

1. Sharma J P. 2003, "Introduction to Environment Science". Lakshmi Publications.
2. Chary Manohar and Jaya Ram Reddy. 2004, "Principles of Environmental Studies". BS Publishers, Hyderabad.
3. Kaul S N and Ashuthosh Gautam. 2002, "Water and Waste Water Analysis". Days Publishing House, Delhi.
4. Gupta P K. 2004, "Methods in Environmental Analysis – Water". Soil and Air. Agro bios, Jodhpur.
5. Climate change.1995, "Adaptation and mitigation of climate change"-Scientific Technical Analysis Cambridge University Press, Cambridge.
6. Sharma, R.K. and Sharma, G. 2005, "Natural Disaster". APH Publishing Corporation, New Delhi.
7. Husain Majid. 2013, "Environment and Ecology": Biodiversity, Climate Change and Disaster Management. online book.

19HS204 ENVIRONMENTAL STUDIES

Hours Per Week :

L	T	P	C
1	-	-	1

SOURCE:

<https://stock.adobe.com/uk/images/sustainable-development-logo-with-green-watercolor-paint-background-vector-illustration/142787368>

COURSE DESCRIPTION AND OBJECTIVES:

This is a multidisciplinary course which deals with different aspects using a holistic approach. The major objective of the course is to plan appropriate strategies for addressing environmental issues. The course also brings awareness of nature and judicious use of natural resources for long term sustenance of life on this planet. The course also enables the students to understand their responsibility required to react effectively to natural, man-made and technological disasters.

COURSE OUTCOMES:

Upon completion of the course, the student will be able to achieve the following outcomes:

COs	Course Outcomes
1	Understand the importance of environment and natural resources.
2	Gain the concept on protection of biodiversity and maintain healthy environment.
3	Analyze the sources of pollutants and their effects on atmosphere.
4	Identify the evidence of global warming, ozone depletion and acid rain.
5	Develop a basic understanding of prevention, mitigation, preparedness, response and recovery.

SKILLS:

- ✓ *Acquire fieldwork techniques to study, observe and prepare documents, charts, PPTs, Models etc.*
- ✓ *Understand how natural resources should be used judiciously, to protect biodiversity and maintain ecosystem.*

UNIT - I **L-3****INTRODUCTION TO ENVIRONMENTAL STUDIES AND NATURAL RESOURCES**

Environmental Studies: Multidisciplinary nature of environmental studies - definition, scope and its importance; Concept of sustainability and sustainable development; Natural resources: Deforestation-causes and impacts; Water resources-use and over exploitation of surface and ground water, Conflicts over water; Heating of earth and circulation of air; Air mass formation and precipitation; Energy resources-renewable and non-renewable energy sources; Land resources-soil erosion and desertification.

UNIT - II **L-3****ECOSYSTEMS AND BIODIVERSITY**

Ecosystem: Structure and functions of an ecosystem; Energy flow - food chains, food webs and ecological succession; Forest, Grassland, Desert and Aquatic ecosystems (ponds, rivers, lakes, streams, ocean, estuary).

Biodiversity: Genetic, species and ecosystem diversity; Biogeography zones of India; Biodiversity patterns and global biodiversity; India as a mega diversity; Endangered and endemic species of India; Hotspots of biodiversity; Threats to biodiversity; Conservation of biodiversity.

UNIT - III **L-3****ENVIRONMENTAL POLLUTION**

Pollution: Air, Water, Soil, Chemical and Noise pollution; Nuclear hazards and human health risks; Solid waste Management, Control measures of urban and industrial wastes; Pollution case studies.

UNIT - IV **L-3**

ENVIRONMENTAL POLICIES AND PRACTICES: Climate change, Global warming, Acid rain, Ozone layer depletion and impacts on human communities and agriculture; Environmental laws - Wildlife protection act, Water (pollution prevention and control) act, Forest conservation act, Air (pollution prevention and control) act, Environmental protection act; Tribal populations and rights; EIA - introduction, definition of EIA; EIS - scope and objectives.

UNIT - V **L-3****HUMAN COMMUNITIES AND THE ENVIRONMENT:**

Human population growth: Impacts on environment, human health and welfare; Resettlement and Rehabilitation of project affected persons: Case Studies; Disaster management - floods, earthquake, landslides and cyclones; Environmental communication and public awareness, case studies (C.N.G Vehicles in Delhi).

Field work/Environmental Visit: Visit to a local area to document environmental assets—river/ forest / grassland / hill /mountain; Visit to a local polluted site; Study of local environment - common plants, insects, birds; Study of simple ecosystems – pond, river, hill slopes; Visit to industries/ water treatment plants/effluent treatment plants.

TEXTBOOKS:

1. A. Kaushik and C. P. Kaushik, "Perspectives in Environmental Studies", 5th edition, New Age International Publishers, 2016.
2. Y. Anjaneyulu, "Introduction to Environmental Science", B. S. Publications, 2015.
3. B. Joseph, "Environmental Studies", 2nd edition, Mc Graw Hill Education, 2015.
4. S. Subash Chandra, "Environmental Science", New Central Book Agency, 2011.

REFERENCE BOOKS:

1. Mahua Basu and S.Xavier, "Fundamentals of Environmental Studies", Cambridge University Press, 2016.
2. K. Mukkanti, "A Textbook of Environmental Studies", S. Chand & Company Ltd., 2009.
3. M. Anji Reddy, "A Textbook of Environmental Science and Technology", B. S. Publications, 2008.
4. K. Joseph and R. Nagendram, "Essentials of Environmental Studies", Pearson Education Pvt. Ltd., 2007.
5. M. Chandrasekhar, "A Textbook of Environmental Studies", Hi-tech Publications, 2006.
6. C. S. Rao, "Environmental Pollution Control Engineering", New Age International Publishers, 2001.

18BP060 PHARMACEUTICAL JURISPRUDENCE

Hours Per Week :

L	T	P	CP	CL
3	1	-	-	4

Total Hours :

L	T	P	WA/RA	SSH/SHS	CS	SA	S	BS
45	1	-						

SCOPE:

This course is designed to impart basic knowledge on important legislations related to the profession of pharmacy in India

COURSE OUTCOMES:

Upon completion of the course, the student will be able to achieve the following outcomes:

COs	Course Outcomes	POs	PSOs
1	The pharmaceutical legislations and their implications in the development and marketing of pharmaceuticals	1, 8, 9	1, 2
2	Various Indian pharmaceutical acts and laws	1, 8,7	1, 2
3	The regulatory authorities and agencies governing the manufacture and sale of pharmaceuticals	1, 8,7	1, 2
4	The code of ethics during pharmaceutical practice	1, 8	1, 2

UNIT - I**10HOURS**

DRUGS AND COSMETICS ACT, 1940 AND ITS RULES 1945: Objectives, Definitions, Legal definitions of schedules to the Act and Rules. Import of drugs – Classes of drugs and cosmetics prohibited from import, Import under license or permit. Offences and penalties. Manufacture of drugs – Prohibition of manufacture and sale of certain drugs, Conditions for grant of license and conditions of license for manufacture of drugs, Manufacture of drugs for test, examination and analysis, manufacture of new drug, loan license and repacking license.

UNIT - II**10HOURS**

Drugs and Cosmetics Act, 1940 and its rules 1945: Detailed study of Schedule G, H, M, N, P, T, U, V, X, Y, Part XII B, Schedule- F & DMR (OA) Sale of Drugs – Wholesale, Retail sale and restricted license. Offences and penalties Labeling & Packing of drugs- General labeling requirements and specimen labels for drugs and cosmetics, List of permitted colors. Offences and penalties. Administration of the Act and Rules – Drugs Technical Advisory Board, Central drugs Laboratory, Drugs Consultative Committee, Government drug analysts, Licencing authorities, controlling authorities, Drugs Inspectors.

UNIT - III**10HOURS**

PHARMACY ACT –1948: Objectives, Definitions, Pharmacy Council of India; its constitution and functions, Education Regulations, State and Joint state pharmacy councils; constitutionandfunctions, RegistrationofPharmacists, Offencesand Penalties

MEDICINAL AND TOILET PREPARATION ACT –1955: Objectives, Definitions, Licensing, Manufacture In bond and Outside bond, Export of alcoholic preparations, Manufacture of Ayurvedic, Homeopathic, Patent & Proprietary Preparations. Offences and Penalties.

NARCOTIC DRUGS AND PSYCHOTROPIC SUBSTANCES ACT-1985 AND RULES: Objectives, Definitions, Authorities and Officers, Constitution and Functions of narcotic & Psychotropic Consultative Committee, National Fund for Controlling the Drug Abuse, Prohibition, Control and Regulation, opium poppy cultivation and production of poppy straw, manufacture, sale and export of opium, Offences and Penalties.

UNIT - IV**08HOURS**

STUDY OF SALIENT FEATURES OF DRUGS AND MAGIC REMEDIES ACT AND ITS RULES: Objectives, Definitions, Prohibition of certain advertisements, Classes of Exempted advertisements, Offences and Penalties

PREVENTION OF CRUELTY TO ANIMALS ACT-1960: Objectives, Definitions, Institutional Animal Ethics Committee, CPCSEA guidelines for Breeding and Stocking of Animals, Performance of Experiments, Transfer and acquisition of animals for experiment, Records, Power to suspend or revoke registration, Offences and Penalties

NATIONAL PHARMACEUTICAL PRICING AUTHORITY: Drugs Price Control Order (DPCO)- 2013. Objectives, Definitions, Sale prices of bulk drugs, Retail price of formulations, Retail price and ceiling price of scheduled formulations, National List of Essential Medicines(NLEM)

UNIT - V**07HOURS**

PHARMACEUTICAL LEGISLATIONS: A brief review, Introduction, Study of drugs enquiry committee, Health survey and development committee, Hathi committee and Mudaliar committee

CODE OF PHARMACEUTICAL ETHICS: D efinition, Pharmacist in relation to his job, trade, medical profession and his profession, Pharmacist's oath Medical Termination of Pregnancy Act Right to Information Act Introduction to Intellectual Property Rights(IPR).

RECOMMENDED BOOKS: (LATEST EDITION)

1. Forensic Pharmacy by B.Suresh
2. Text book of Forensic Pharmacy by B.M.Mithal
3. Hand book of drug law-by M.L.Mehra
4. A text book of Forensic Pharmacy by N.K.Jain
5. Drugs and Cosmetics Act/Rules by Govt. of India publications.
6. Medicinal and Toilet preparations act 1955 by Govt. of India publications.
7. Narcotic drugs and psychotropic substances act by Govt. of India publications
8. Drugs and Magic Remedies act by Govt. of India publication
9. Bare Acts of the said laws published by Government. Reference books(Theory)

18BP021 ENVIRONMENTAL SCIENCES

Hours Per Week :

L	T	P	CP	CL
3	-	-	-	3

Total Hours :

L	T	P	WA/RA	SSH/SHS	CS	SA	S	BS
30	-	30	10	10	2	-	-	-

SCOPE:

Environmental Sciences is the scientific study of the environmental system and the status of its inherent or induced changes on organisms. It includes not only the study of physical and biological characters of the environment but also the social and cultural factors and the impact of man on environment.

COURSE OUTCOMES:

Upon completion of the course, the student will be able to achieve the following outcomes:

COs	Course Outcomes	POs
1	Understand the importance of Environmental education and conservation of natural resources.	7
2	Understand the importance of ecosystems and biodiversity.	7
3	Apply the environmental science knowledge on solid waste management, disaster management and EIA process.	7
4	Motivate learner to participate in environment protection and environment improvement	7
5	Strive to attain harmony with Nature	7

UNIT-I**10HOURS**

The Multidisciplinary nature of environmental studies Natural Resources

RENEWABLE AND NON-RENEWABLE RESOURCES: Natural resources and associated problems

a) Forest resources; b) Water resources; c) Mineral resources; d) Food resources; e) Energy resources; f) Land resources: Role of an individual in conservation of natural resources.

UNIT-II**10HOURS**

ECOSYSTEMS: Concept of an ecosystem; Structure and function of an ecosystem; Introduction, types, characteristic features, structure and function of the ecosystems: Forest ecosystem; Grassland ecosystem; Desert ecosystem; Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

UNIT-III**10HOURS**

ENVIRONMENTAL POLLUTION: Air pollution; Water pollution; Soil pollution Air pollution, Water pollution, Noise pollution, Thermal pollution, Soil pollution Control, Pollution case studies, Nuclear hazards and human health risks, Solid waste Management: control measures of urban and industrial wastes Remote sensing / GIS: Introduction, definitions, applications of the remote sensing, Green technology for Sustainable development.

UNIT - IV

ENVIRONMENTAL POLICIES AND PRACTICES: Climate change, Global warming, Acid rain, Ozone layer depletion and impacts on human communities and agriculture. Environmental laws: Wildlife Protection Act – Water (pollution prevention and control) Act - Forest Conservation Act - Air (pollution prevention and control) Act. –Environmental Protection Act, International agreements: Montreal and Kyoto protocols and Convention on Biological Diversity, Nature reserves, tribal populations and rights, and human wild life conflicts in Indian context, EIA: Introduction, definition of E.I.A and E.I.S – scope and objectives – Importance of E.I.A in proposed Projects / Industry / Developmental activity.

UNIT- V**HUMAN COMMUNITIES AND THE ENVIRONMENT:**

HUMAN POPULATION GROWTH: Impacts on environment, human health and welfare -Resettlement and Rehabilitation of project affected persons: Case Studies. -Disaster Management: floods, earthquake, landslides and cyclones -Environmental movements: Chick movement, Silent valley, Bishops of Rajasthan-Environmental ethics: Role of Indian and other religions and cultures in environmental conservation: Environmental communication and Public awareness, case studies (C.N.G Vehicles in Delhi)

FIELD WORK/ENVIRONMENTAL VISIT: Visit to a local area to document environmental assets – river/ forest/ grassland / hill /mountain: Visit to a local polluted site - Study of local environment - common plants, insects, birds - Study of simple ecosystems –pond, river, hill slopes etc - Visit to industries/ water treatment plants/effluent treatment plants.

RECOMMENDED BOOKS (LATEST EDITION):

1. Y.K. Sing, Environmental Science, New Age International Put, Publishers, Bangalore.
2. Agawam, K.C. 2001 Environmental Biology, Indi Publ. Ltd.Bikaner.
3. Barouche Erich, The Biodiversity of India, Main Publishing Pvt. Ltd., Ahmadabad – 380 013,India.
4. Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc.480p
5. Clark R.S., Marine Pollution, Clander son Press Oxford
6. Cunningham, W.P. Cooper, T.H. Gorham, E & Hepworth, M.T. 2001, Environmental Encyclopedia, Jiao Publ. House, Mumbai,1196p.
7. De A.K., Environmental Chemistry, Wiley Eastern Ltd.
8. Down of Earth, Centre for Science and Environment.

18BC208 ORGANIZATIONAL BEHAVIOR

Course Description and Objective:

This course deals with human behavior in organizations. Conceptual frameworks, case discussions, and skill-oriented activities applied to course topics which include: motivation, learning and development, group dynamics, leadership, communication, power and influence, change, diversity, organizational design, and culture. Class sessions and assignments are intended to help participants acquire skills and analytic concepts to improve organizational relationships and effectiveness.

Course Outcomes:

The student will be able to:

- Recognize and discuss the different perspectives of working culture in organizations.
- Interpret key concepts and theories with regard to individual differences and apply these appropriately to specific situations.
- Interpret the key concepts and theories with regard to group behaviour and apply these appropriately to specific situations.
- Understand how organizational performance can be improved through the effective management of human resources.

Syllabus

UNIT – 1

12 Hours

Defining Organizational Behaviour- Concept of OB - Contributing disciplines to the OB field—Challenges and Opportunities for OB – Diversity – Discrimination – Diversity Management

UNIT – 2

12 Hours

Attitude: Components- Major Job Attitudes – Job Satisfaction – Causes – Emotions and Moods – Emotional Intelligence

UNIT – 3

12 Hours

Personality – Myers-Briggs Type Indicator – Big Five Personality Model – Values: Importance – Person-Job Fit and Person-Organization Fit - Perception : Factors influencing perception, Shortcuts in judging others

UNIT – 4

12 Hours

Groups: Stages of Group development – Group Properties – Teams: Difference between groups and teams - Types of teams – creating effective teams- Turning individuals into team players – Communication: Process-Barriers- Making effective communication

UNIT – 5

12 Hours

Power: Bases of power - Conflict: The conflict process- Negotiation: Process – Bargaining strategies – Organization culture: culture’s functions – How employees learn culture – Work Stress: Sources- Managing stress

Text Books:

Robbins P. Stephen, Timothy A. Judge, Vohra. Niharika “Organization Behaviour”, 15th Edition, Pearson India, 2016.

Reference Books:

1. Fred Luthans, ORGANISATIONAL BEHAVIOUR, 11th Edition, Tata McGraw Hill, New Delhi,.
2. Hellriegel, Slocum & Woodman: ORGANISATIONAL BEHAVIOUR, Thomson South-Western, New Delhi.
3. Michael Drafke, Human Side of Organizations [International Edition 10], Pearson Education, New Delhi.

L	T	P	C
3	-	-	3

18MC110 PRINCIPLES AND PRACTICES OF MANAGEMENT

Course Description and Objectives:

The main objective of this course is to explain about concepts, principles and practices of management.

Course Outcomes:

The student will be able to:

- Understand what is management and evolution of management thought
- Importance of planning and decision making in organizations
- Process of organizing and delegation of authority
- Theories of motivation and leadership styles
- Coordination and control process in the organizations

Syllabus

UNIT – 1

12 Hours

MANAGEMENT: Definition, nature, purpose and scope of management - Functions and Roles of a manager - an overview of planning, organizing and controlling - Is managing a science or art? Ethics in managing and social responsibility of managers - Evolution of management thought. Contributions made by Taylor, Fayol, Weber, Elton Mayo, Maslow, Herzberg, and McGergor. Various approaches to Management - Decision Theory approach. Systems Approach: Key concepts in systems - Closed system versus open system. Subsystems, System Boundary. McKinsey's 7-S Approach needs - Leadership:

UNIT – 2

12 Hours

PLANNING & DECISION MAKING: Types of plans, steps in planning, and process of planning. Nature of objectives, setting objectives. Concept and process of Managing by Objectives. Nature and purpose of strategies and policies. Strategic planning process. SWOT analysis, Portfolio matrix, premising and forecasting. Decision Making: Meaning, Importance and steps in Decision Making - Traditional approaches to decision-making - Decision making under certainty, programmed decisions – Introduction to decision-making under uncertainty, non-programmed decisions, decision tree- group-aided decisions; Brain storming – Creativity, creative problem solving.

UNIT – 3

12 Hours

ORGANIZING: Concept of organization, process of organizing, bases of Departmentation, Authority & power - concept & distinction. Various types of

organization structures -Delegation - concept of delegation; elements of delegation - authority, responsibility, accountability. Reasons for failure of delegation & how to make delegation effective.Decentralization - concept, reasons for decentralization and types (or methods) of decentralization. Span ofManagement - concept, early ideas on span of management.

UNIT – 4

12 Hours

DIRECTING : Motivation and Motivators: Concept, Theories of Motivation: Hierarchy of Needs, Motivation-Hygiene Expectancy, Equity, Reinforcement, McClelland's needs - Leadership: Meaning, Definition, Ingredients of Leadership – Trait Approaches of Leadership – Leadership Behavior and Styles – Contingency Approaches to Leadership – Communication: Meaning, Process, and Importance in Functions of Organization – Barriers in Communication – Effective Communication.

UNIT – 5

12 Hours

CO-ORDINATION AND CONTROL: Concept and importance of coordination; factors which make coordination difficult; techniques or methods to ensure effective coordination. Control: Concept, planning-control relationship, process of control - setting objectives, establishing standards, measuring performance, correcting deviations. Human response to control. Dimensions or Types of Control: Feed forward control, Concurrent Control (Real Time Information & Control), Feedback Control - Techniques of Control: Brief review of Traditional and Modern Techniques of Control.

Text Books:

1. Stoner, Freeman and Gilbert, “Jr. Management”, 6th Edition, Pearson Education, New Delhi, 2006.
2. Heinz Weihrich, Harold Koontz, “Management A Global Perspective”,10th Edition, Tata McGraw Hill, 2007.

Reference Books:

1. Daft, “The New Era of Management”, 7th Edition, Thomson New Delhi, 2007.
2. “Schermerhorn: Management”, 8th , Wiley India, 2006.

17HS032 Human Values / Professional Ethics

Course Description and Objectives:

This foundation course aims at inculcating good values in the learner. This course is designed to introduce and instill professional ethics into the learner. It adds certain aspects of problem solving and real time issues to help students face society with positive attitude.

Course Outcomes:

Upon completion of the course, the student will be able to achieve the following outcomes:

COs	Course Outcomes
1	Learner will get meaning of key terms like morals, ethics and values.
2	Learner can know about co-existence of the Self and the Body, Human Interaction and Values in Relationships
3	Students will learn about professional ethics like Loyalty- collegiality- employee rights- employee responsibilities-respect for authority.
4	Learners can understand ethical and legal conditions real life problems and can relate with subject topics
5	Learner can differentiate situations self vs society and personal vs professional.

Unit-I : Introduction to Value Education

1. Value Education, Definition, Concept and Need for Value Education
2. The Content and Process of Value Education
3. Self-Exploration as a means of Value Education
4. Happiness and Prosperity as parts of Value Education

Unit-II : Harmony in the Human Being

1. Human Being is more than just the Body
2. Harmony of the Self ('I') with the Body
3. Understanding Myself as Co-existence of the Self and the Body
4. Understanding Needs of the Self and the Needs of the Body

Unit-III: Harmony in the Family and Society and Harmony in the Nature

1. Family as a basic unit of Human Interaction and Values in Relationships
2. The Basics for respect and today's Crisis : Affection, Care, Guidance, Reverence, Glory, Gratitude and Love
3. Comprehensive Human Goal : The Five dimensions of Human Endeavour

Unit-IV: Social Ethics

1. The Basics for Ethical Human conduct
2. Defects in Ethical Human Conduct
3. Holistic Alternative and Universal order
4. Universal Human Order and Ethical Conduct

Unit-V: Professional Ethics

1. Value Based Life and Profession
2. Professional Ethics and Right Understanding
3. Competence in Professional Ethics
4. Issues in Professional Ethics – The Current scenario

5. Vision for Holistic Technologies, Production System and Management Models

Reference Books :

1. A.N.Tripathy, Human Values, New Age International Publishers, 2003
2. Bajpai.B.L., Indian Ethos and Modern Management, New Royal Book Co., Lucknow, Reprinted, 2004
3. Bertrand Russell, Human Society in Ethics and Politics
4. Corliss Lamont, Philosophy of Humanism
5. Gaur.R.R., Sangal.R, Bagaria.G.P., A Foundation Course in Value Education, Excel Books, 2009

B.Tech.	IV Year	L	T	P	To	C
		4	-	-	4	4

CE422 ENVIRONMENTAL IMPACT ASSESSMENT**(Dept. Elective - VI)****Course Description and Objective:**

The course is designed to know the various environmental aspects like assessment of soil, surface water environment, impact of air pollution, which are essential to consider before establishment of any civil engineering projects at a particular location. It also deals with different legislative acts and environment audits regarding selection of location of the project.

Course Outcomes:

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

UNIT – I

Basic concepts of EIA : Initial Environmental Examination; Elements of EIA; Factors affecting EIA; Impact evaluation and analysis; Preparation of Environmental Base map; Classification of Environmental parameters. EIA Methodologies; Introduction; criteria for the selection of EIA Methodology; EIA Methods: Ad-hoc methods, Matrix methods, Network method, Environmental media quality index method; Overlay methods; Cost/benefit Analysis.

UNIT – II

Impact of Developmental Activities and Land Use : Introduction and Methodology for the assessment of soil and ground water; Delineation of study area; Identification of activities. Procurement of relevant soil quality; Impact prediction; Assessment of Impact significance; Identification and Incorporation of mitigation measures.

UNIT – III

EIA in surface water, Air and Biological Environment : Methodology for the assessment of Impacts on surface water environment; Air pollution sources; Generalized approach for assessment of Air pollution Impact. Assessment of Impact of Development activities on vegetation and wildlife; Environmental Impact of Deforestation; Causes and effects of deforestation.

UNIT - IV

Environmental Audit and Environmental legislation : Objectives of Environmental Audit; Types of Environmental Audit; audit protocol; stages of Environmental Audit; On-site activities; Evaluation of Audit data and preparation of Audit report.

UNIT - V

Post Audit activities; The Environmental Pollution Act, The Water Act; The Air (Prevention and Control of Pollution) Act; Wild life protection Act. Case Studies and preparation of Environmental Impact Assessment statement for various industries.

TEXT BOOK :

1. Y. Anjaneyulu; "Environmental Impact Assessment Methodologies", Vol-I, 2nd ed., B.S. Publication, Sultan Bazar, Hyderabad, 2007.

REFERENCE BOOKS :

1. J. Glynn and Gary W. Hein Ke, "Environmental Science and Engineering", Vol-I, 3rd ed., Prentice Hall Publishers, 1998.
2. K. Dhameja, S.K. Kataria, "Environmental Science and Engineering", Vol-II, 2nd ed., Suresh & Sons Publications, New Delhi, 2001.
3. Dr. H.S. Bhatia, "Environmental Pollution and Control", Vol-I, 4th ed., Galgotia Publications Pvt. Ltd., 1998.

B.Tech	IV Year	L	T	P	To	C
		4	-	-	4	4

CE437 AIR POLLUTION AND CONTROL**(Dept. Elective - IV)****Course Description and Objective:**

This course serve to provide the student with an introduction or refresher in the basics of air pollution control. After completing this course, the student should be familiar with the various interrelated aspects of air pollution control, understand the basic terminology, and have a rudimentary understanding of some of the technical aspects of regulating, measuring, and controlling air pollution. The student will find links to the Environmental Protection Agency (EPA) Web site for further research in the air pollution control field.

Course Outcomes:

- *Identify sampling and analysis techniques for air quality assessment*
- *Describe the plume behaviour for atmospheric stability conditions*
- *Apply plume dispersion modelling and assess the concentrations*
- *Design air pollution controlling devices*

UNIT – I

Introduction to air pollution : Air Pollution – Definitions, Scope, Significance and Episodes, Air Pollutants – Classifications – Natural and Artificial – Primary and Secondary, point and Non- Point, Line and Areal Sources of air pollution- stationary and mobile sources.

UNIT – II

Effects of air pollution: Effects of Air pollutants on man, material and vegetation: Global effects of air pollution – Green House effect, Heat Islands, Acid Rains, Ozone Holes etc.

UNIT - III

Air pollution Modeling : Thermodynamics and Kinetics of Air-pollution – Applications in the removal of gases like SO_x, NO_x, CO, HC etc., air-fuel ratio. Computation and Control of products of combustion.

UNIT – IV

Meteorology of air pollutants : Meteorology and plume Dispersion; properties of atmosphere; Heat, Pressure, Wind forces, Moisture and relative Humidity, Influence of Meteorological phenomena on Air Quality-wind rose diagrams. Lapse Rates, Pressure Systems, Winds and moisture plume behaviour and plume Rise Models; Gaussian Model for Plume Dispersion.

UNIT - V

Control of air pollution : Control of particulates – Control at Sources, Process Changes, Equipment modifications, Design and operation of control. Equipment's – Settling Chambers, Centrifugal separators, filters Dry and Wet scrubbers, Electrostatic precipitators. General Methods of Control of NO_x and Sox emissions – In-plant Control Measures, process changes, dry and wet methods of removal and recycling., Air Quality Management – Monitoring of SPM, SO₂; NO and CO Emission Standards.

TEXT BOOKS:

1. M.N.Rao and H.V.N.Rao , "Air pollution controlling" ; Vol.-I, 4th ed. , Tata Mc.Graw Hill Company,1998.
2. Wark and Warner, "Air Pollution", Vol.-II, 6th ed., Harper & Row, New York, 1996.

REFERENCE BOOK:

1. R.K. Trivedy and P.K. Goel , "An introduction to Air pollution", Vol.-I, 1st ed., B.S. Publications, 2005

17HS003 Environmental Studies

Course Description

An **environmental studies course** advances a student's knowledge in a variety of currently relevant topics such as energy, pollution, and **environmental** awareness. ... Students taking **courses** in this field can gain critical reasoning and thinking skills as they consider how to solve local and worldwide **environmental** problems.

OUTCOMES

After the completion of Environmental Science subject, students able to

CO1- Understand the importance of environment and natural resources.

CO2- Gain the concept on Protection of biodiversity and maintain healthy environment

CO3- Analyze the sources of pollutants and their effects on atmosphere.

CO4- Identify the evidence of Global warming, Ozone depletion and acid rain.

CO5- Develop a basic understanding of Prevention, Mitigation, Preparedness, Response and Recovery.

UNIT I – Introduction to Environmental Studies and Natural Resources

Environmental Studies: Definition Scope and its importance, Multidisciplinary nature of Environmental Studies, Concept of Sustainability and Sustainable development -Natural Resources: Deforestation: causes and impacts due to mining, dam building on environment, forests, biodiversity and tribal population. Water resources: use and over exploitation of surface and ground water, floods, drought, conflicts over water (international and inter-state) Energy resources: renewable and non-renewable energy sources, use of alternate energy sources, growing energy needs, case Studies- Land resources: land degradation, soil erosion and desertification

UNIT II - Ecosystems and Biodiversity

Ecosystem: Concept, Structure and functions of an ecosystem - Energy flow, Food chains, Food webs and ecological succession, Forest, Grassland and Aquatic ecosystems(Ponds, Rivers, Lakes, Streams, Ocean, Estuary). **Biodiversity:** Introduction, Bio-geographical classification Biodiversity at global, National and local levels – India as a Megadiversity-Hot-spots of biodiversity - Threats to biodiversity -Endangered and endemic species of India – Conservation of biodiversity, Ecosystem and biodiversity services: Ecological, economic, ethical, aesthetic and information value

UNIT III – Environmental Pollution

Pollution: Air pollution, Water pollution, Noise pollution, Thermal pollution, Soil pollution Control, Pollution case studies, Nuclear hazards and human health risks, Solid waste Management: control measures of urban and industrial wastes Remote sensing / GIS: Introduction, definitions, applications of the remote sensing, . Green technology for Sustainable development

UNIT IV – Environmental Policies and Practices

Climate change, Global warming, Acid rain, Ozone layer depletion and impacts on human communities and agriculture. Environmental laws: Wildlife Protection Act – Water (pollution

prevention and control) Act - Forest Conservation Act - Air (pollution prevention and control) Act. – Environmental Protection Act, International agreements: Montreal and Kyoto protocols and Convention on Biological Diversity, Nature reserves, tribal populations and rights, and human wild life conflicts in Indian context, EIA: Introduction, definition of E.I.A and E.I.S – scope and objectives – Importance of E.I.A in proposed Projects / Industry / Developmental activity.

UNIT V – Human Communities and the Environment

Human population growth: Impacts on environment, human health and welfare -Resettlement and Rehabilitation of project affected persons: Case Studies. -Disaster Management: floods, earthquake, landslides and cyclones -Environmental movements: Chipko movement, Silent valley, Bishnois of Rajasthan-Environmental ethics: Role of Indian and other religions and cultures in environmental conservation: Environmental communication and Public awareness, case studies (C.N.G Vehicles in Delhi)

Field work/Environmental Visit: Visit to a local area to document environmental assets – river/ forest/ grassland / hill /mountain: Visit to a local polluted site - Study of local environment - common plants, insects, birds - Study of simple ecosystems –pond, river, hill slopes etc - Visit to industries/water treatment plants/effluent treatment plants.

TEXT BOOKS :

1. Anubha Kaushik- CP Kaushik – ‘Perspectives in Environmental Studies’ – V th Edition
Current version – 2016
2. Benny Joseph – ‘Environmental studies’- IInd edition - 2015 – Mc Graw Hill Education
- 3 Text book for Environmental Studies-Erach Bharucha for University Grants Commission

REFERENCE BOOKS:

1. Sharma & Kour – ‘Environmental Pollution and Instrumentation’
2. Dr. M. Chandrasekhar, “A Text book of Environmental Studies”, HI-TECH publications, 2006
3. Dr. M. Anji Reddy, “A Text book of environmental science and Technology”, B S Publications, 2008
4. Dr. K. Mukkanti, “A Text book of Environmental Studies”, S.CHAND Company Ltd, 2009.
5. EHILRS and ST, “Text book of Municipal and Rural Sanitation”, M.S Hill, 1998.
6. C. S. Rao, Wiley Eastern Ltd, “Environmental Pollution Control Engineering”, New Age International Ltd, 2001
7. Dr. M. Anji Reddy, “Introduction to Remote Sensing”, B S Publications,2004.
8. Kurian Joseph and R.Nagendram, “Essentials of Environmental Studies”,Pearson Education Pt Ltd, Delhi, 2007.
9. H.C Perkins “Text book of Air Pollution”.

RESEARCH METHODOLOGY

(for Ph.D Scholars)

Course Code: PH014

Course Credits: 4

Objective of the Course: Objective of the course is to enable research scholars to have a general understanding of research methods and application of statistical tools in the analysis and interpretation of findings and guidelines for report writing.

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

- *Understand the conventions of research in contemporary science, technology, business and social science context.*
- *Acquire an understanding of the tools for analyzing quantitative and qualitative data collected by researching.*
- *Understand the ethical, international, social, and professional constraints of audience, style, and content for writing in different situations.*
- *Analyze various current resources for locating secondary information, and also the strategies of effective primary data gathering.*
- *Critically analyze data for research; incorporate it into assigned writing clearly, concisely, and logically; and attribute the source with proper citation.*

Unit - I

Introduction: Nature and Importance of research ~ the role of business research ~ aims of social research ~ research process ~ types of research ~ Data Base: discussion on primary data and secondary data ~ probability and non-probability sampling techniques.

Unit-II

Research design: Meaning of research design ~ Functions and goals of research design ~ Questionnaire and Schedule.

Unit – III

Measurement and scaling concepts: Attitude measurement ~ levels of measurement and types of scales ~ criteria for good measurement ~ Measures of central tendency ~ measures of dispersion, measures of variation ~ Correlation and Regression ~ Statistical Inference ~ Tests of significance for small samples ~ t-test, Chi-Square test and ANOVA-one way and two way classifications ~ Discriminate analysis, cluster analysis, conjoint analysis

Unit-IV

Technical Report Writing: Pre-writing considerations ~ Thesis writing ~ formats of report writing ~ Formats of publications in Research Journals ~ Technique of Interpretation ~ Precaution in Interpretation ~ Significance of Report writing ~ Different steps in writing Report ~ Layout of the Research Report ~ Types of Reports ~ Report Format ~ Typing Instructions ~ Oral Presentations.

Unit-V

Research Ethics and Morals: Issues related to plagiarism ~collaborative models and ethics ~ Acknowledgement ~ *Intellectual Property Rights*: copy rights.

Text Books:

- Bhattacharya, D. K., *Research Methodology*, Excel Books, New Delhi.
- Gupta S.P., *Statistical Methods*, Sultan Chad, New Delhi, 2001.
- Pannerselvam, *Research Methodology*, Prentice Hall of India, New Delhi, 2005.

Reference Books:

- Andrews, F.M. and S.B. Withey *Social Indicators of well being*, Plenum Press, 1976.
- Bennet, Roger, *Management Research*, ILO, 1983.
- Murray.R. *How to write a Thesis*, McGraw-Hill Education (UK), 2011
- Nanda Gopal, *Research Methods Using Computers*, Excel Books, New Delhi.
- Salkind. Neil.J, *Exploring Research*, Prentice Hall of India, New Delhi, 1997.
- Shajahan.S, *Research Methods for Management*, Jaico Publishing House, 2005.
- C.R. Kothari: *Research Methodology, Methods & Techniques*, New Age International, 2004

16EE252 ALTERNATE ENERGY RESOURCES

Hours Per Week :

L	T	P	C
3	1	-	4

Course Description and Objectives:

This course deals with the types, purpose and operation of alternate energy technologies. The objective of the course is to understand the implementation of geothermal energy, ocean energy and biomass energy resources, know the possibilities of energy storage and various technologies involved in it.

Course Outcomes:

The student will be able to:

- understand the components and operation of geothermal power plants.
- compare the operation of tidal and OTEC power plants.
- understand the components and operation of biomass plant.
- explore the feasibility of hydrogen usage in fuel cells.
- measure the battery performance.
- identify the possible energy storage technologies.

SKILLS:

- ✓ Identify different types of Renewable energy resources.
- ✓ Differentiate between various biomass energy conversion routes.
- ✓ Select appropriate batteries for specific applications.
- ✓ Identify appropriate energy storage options.



ACTIVITIES:

- *Review status aspects of geothermal energy in the World.*
- *Choose a Battery for a cell-phone/ laptop /tablet/ adapter/for various ratings...*
- *Design a prototype of biogas plant.*
- *Review status aspects of ocean energy in India and World.*
- *Review possible energy storage options for renewable energy systems.*

UNIT - 1**L-9, T-3**

GEOTHERMAL ENERGY : Availability of geothermal energy, Size and distribution, Recovery of geothermal energy, Types of systems using geothermal energy - Direct heat applications, Power generation; Sustainability of geothermal source, Status of geothermal technology, Economics of geothermal energy.

UNIT - 2**L-10, T-3**

OCEAN ENERGY : Ocean and tidal energy conversion, Energy sources in ocean - Ocean tidal, wave and thermal energy; Ocean saline gradient concept, Ocean currents, Ocean chemical energy, Ocean energy conversion routes - Electrical and non electrical routes, Advantages and merits of ocean energy technologies, Limitation; Tides - Spring tide, Neap tide, Daily and monthly variation, Tidal range, Tidal power; Types of tidal power plants - Single basin and double basin schemes; Main requirements in tidal power plants, Energy storage, Prospects of tidal power, Economic factors, Ocean Thermal energy conversion (OTEC), Open and closed cycle operation, Ecological and environmental impacts.

UNIT - 3**L-9, T-3**

BIOMASS ENERGY : Photosynthesis and origin of biomass energy, Biomass energy resources - Cultivated biomass resources, Waste to biomass resources; Terms and definitions, Incineration, Wood and wood waste, Harvesting super trees and energy forests, Pyrolysis, Thermo chemical biomass conversion to energy, Gasification, Anaerobic digestion, Fermentation, Gaseous fuel from biomass, Design of a bio gas plant.

UNIT - 4**L-8, T-3**

HYDROGEN AND FUEL CELLS: Hydrogen as a renewable energy source, Sources of hydrogen, Fuel for vehicles, Fuel cell technology – Types, Principle of working, construction, Power generation, Fuel cell polarization curve; Conversion of chemical energy into electricity in a fuel cell, Fuel cell power plant structure, Fuel processor and fuel cell stack, Applications, Cogeneration, Fuel cell electric vehicles.

UNIT - 5**L-10, T-3**

ALTERNATE ENERGY STORAGE TECHNOLOGIES: Necessity of energy storage, Types of energy storage - Flywheel, Super capacitors, Principles and methods, Applications; Fundamental concept of batteries - Measuring of battery performance, Charging and discharging of a battery, Storage density, Energy density and safety issues; Types of batteries – Lead Acid, Nickel, Cadmium, Zinc Manganese dioxide; Introduction to modern batteries - Zinc-Air, Nickel hydride and lithium batteries.

TEXT BOOKS:

1. G.D. Rai, "Non Conventional Energy Sources", 4th edition, Khanna Publishers, New Delhi, 2011.
2. Anne-Marie Borbely, Jan F.Kreider, "Distributed Generation", 1st edition, CRC Press, 2001.

REFERENCES BOOKS:

1. S.P. Sukhatme, J.K.Nayak., "Solar Energy", 3rd edition, Tata Mc-Graw Hill Education Private Limited, New Delhi, 2010.
2. Godfrey Boyle, "Renewable Energy, Power for a Sustainable Future", 1st edition, Oxford University Press, U.K., 2012.
3. Chauhan D.S., Srivastava S.K. "Non-Conventional Energy Resources", 1st edition, New Age, 2009.
4. Georgiadis M.C., "Energy Systems Engineering", 1st edition, Wiley-VCH, 2008.
5. Viswanathan B., "Fuel Cell Principles and Applications", 1st edition, Universities Press, India, 2006.
6. Rajput R.K., "Power Plant Engineering", 4th Edition, Laxmi Publications, 2008.

16EE251 RENEWABLE ENERGY TECHNOLOGIES

Hours Per Week :

L	T	P	C
3	1	-	4



Course Description and Objectives:

This course deals with the types, purpose and operation of renewable energy technologies. The objective of the course is to understand the implementation of geothermal energy, ocean energy and biomass energy resources, know the advantages and shortcomings of using hydrogen as an energy carrier in internal combustion engine and fuel cells.

Course Outcomes:

The student will be able to:

- understand the components and operation of geothermal power plant.
- understand the components and operation of geothermal power plants.
- compare the operation of tidal and OTEC power plants.
- understand the components and operation of biomass plant.
- explore the feasibility of hydrogen usage in fuel cells.
- describe the features of DG.
- analyse the impact of DG on power quality.

SKILLS:

- ✓ Identify different types of Renewable energy resources.
- ✓ Differentiate between various biomass energy conversion routes.
- ✓ Select appropriate batteries for specific applications.
- ✓ Understand the concept of distributed generation.

ACTIVITIES:

- *Review the technical aspects of geothermal energy in the World.*
- *Suggest a battery for cell-phone / laptop / tablet / adapter.*
- *Design prototype biogas plant.*
- *Review the technical aspects of ocean energy in the World.*
- *Review the status of Distributed generation in India.*

UNIT - 1**L-9, T-3**

GEOTHERMAL ENERGY : Availability of geothermal energy, Size and distribution, Recovery of geothermal energy, Types of systems using geothermal energy - Direct heat applications, Power generation; Sustainability of geothermal source, Status of geothermal technology, Economics of geothermal energy.

UNIT - 2**L-10, T-3**

OCEAN ENERGY : Ocean and Tidal energy conversion, Energy sources in ocean - Ocean tidal, wave and thermal energy; Ocean saline gradient concept, Ocean currents, Ocean chemical energy, Ocean energy conversion routes - electrical and non electrical routes, Advantages and merits of ocean energy technologies, Limitation; Tides - Spring tide, Neap tide, Daily and monthly variation, Tidal range, Tidal Power; Types of tidal power plants - Single basin and double basin schemes; Main requirements in tidal power plants, Energy storage, Prospects of tidal power, Economic factors, Ocean thermal energy conversion (OTEC) – Open and closed cycle operation, Ecological and environmental impacts.

UNIT - 3**L-8, T-3**

BIOMASS ENERGY : Photosynthesis and origin of biomass energy, Biomass energy resources - Cultivated biomass resources, Waste to biomass resources; Terms and definitions, Incineration, wood and wood waste, Harvesting super trees and energy forests, Pyrolysis, Thermo chemical biomass conversion to energy, Gasification, Anaerobic digestion, Fermentation, Gaseous fuel from biomass, Design of a bio gas plant.

UNIT - 4**L-9, T-3**

HYDROGEN AND FUEL CELLS: Hydrogen as a renewable energy source, Sources of hydrogen, Fuel for vehicles, Fuel cell technology – Types, Principle of working, construction, Power generation, Fuel cell polarization curve; Conversion of chemical energy into electricity in a fuel cell, Fuel cell power plant structure, Fuel processor and fuel cell stack, Applications, Cogeneration, Fuel cell electric vehicles.

UNIT – 5**L-9, T-3**

DISTRIBUTED GENERATION: Introduction to the concept of distributed generation - Advantages , needs; Basics on distributed generation Technologies, Effect on system operation - Impact of DG. Power quality implication; Acceptable ranges of voltage and frequency, Flicker, Reactive power compensation, Active filtering and Low voltage ride through requirements.

TEXT BOOKS:

1. G.D. Rai, "Non Conventional Energy Sources", 4th edition, Khanna Publishers, New Delhi, 2011.
2. Anne-Marie Borbely, Jan F.Kreider, "Distributed Generation", 1st edition, CRC Press, 2001.

REFERENCES BOOKS:

1. S.P. Sukhatme, J.K.Nayak., "Solar Energy", 3rd edition, Tata Mc-Graw Hill Education Private Limited, New Delhi, 2010.
2. Godfrey Boyle, "Renewable Energy, Power for a Sustainable Future", 1st edition, Oxford University Press, U.K., 2012.
3. Chauhan D.S., Srivastava S.K. "Non-Conventional Energy Resources", 1st edition, New Age, 2009.
4. Georgiadis M.C., "Energy Systems Engineering", 1st edition, Wiley-VCH, 2008.
5. Viswanathan B., "Fuel Cell Principles and Applications", 1st edition, Universities Press, India, 2006.
6. Rajput R.K., "Power Plant Engineering", 4th edition, Laxmi Publications, 2008.

16EE356 ENERGY AUDIT, CONSERVATION AND MANAGEMENT

Hours Per Week :

L	T	P	C
3	1	-	4



Course Description and Objectives:

This course deals with audit, conservation and management of electrical energy. The objective of the course is to introduce the concepts of energy efficient lighting, space heating and ventilation. This also deals with co-generation, tri-generation and waste heat recovery techniques.

Course Outcomes:

The student will be able to:

- Understand and determine the performance of various lighting systems.
- Analyse effective energy management policies, methods and planning.
- Carryout energy audit and economic analysis.
- Design energy utilization systems for heat recovery.
- Design a capacitor bank to address low power factor issues.

SKILLS:

- ✓ *Implement the energy conservation measures for various equipment.*
- ✓ *Analyze different lighting schemes.*
- ✓ *Design a capacitor bank for an energy utility.*
- ✓ *Perform energy audit for an energy utility.*

ACTIVITIES:

- *Survey the air-conditioning systems in VFSTRU to implement energy conservation measures.*
- *Survey the VFSTRU to modify the existing lighting schemes.*
- *Design the capacitor bank for improving the power factor of VFSTRU.*
- *Energy auditing of different blocks in VFSTRU.*

UNIT - 1**L-9, T-3**

BASIC PRINCIPLES OF ENERGY MANAGEMENT : Energy scenario, Energy Management, Strategies, Energy conservation, Energy audit, Types of audit, Sankey diagrams, Load profiles, Energy conservation schemes and energy saving potential, Energy Instruments, Watt-hour meter, Data loggers, Thermocouples, Pyrometers, Lux meters, Tong testers, Power analyzer.

UNIT - 2**L-9, T-3**

CO-GENERATION, TRI-GENERATION AND WASTE ENERGY RECOVERY: Co-generation and tri-generation, Need, Application, Advantages, Classification and saving potential, Waste heat recovery - Concept of conversion efficiency, Energy waste, Waste heat recovery classification, Advantages and applications, Commercially viable waste heat recovery devices.

UNIT - 3**L-10, T-3**

ENERGY EFFICIENT LIGHTING : Modification of existing systems, Replacement of existing systems, Priorities, Definition of terms and units, luminous efficiency, Polar curve, Calculation of illumination level, Illumination of inclined surface to beam, Luminance or brightness, Types of lamps, Types of lighting, Electric light fittings (luminaries), Flood lighting, White light LED and conducting polymers, Energy conservation measures.

UNIT - 4**L-9, T-3**

ENERGY EFFICIENCY IN ELECTRICAL APPLIANCES: Power factor, Causes of low p.f., Methods of Improving p.f. - Static Capacitors, Synchronous condensers phase advancer; Most economical p.f. for constant KW load and constant KVA type loads, Numerical problems, Location of improvement, Location of capacitors, p.f. with non-linear loads, Effect of harmonics on p.f., Motor controllers, Energy efficient motors (basic concepts), Load scheduling and shifting, Demand side management.

UNIT - 5**L-8, T-3**

ENERGY EFFICIENCY IN SPACE HEATING AND VENTILATION: Ventilation, Air-conditioning (HVAC) and Water heating, Heating of buildings, Transfer of heat, Space heating methods, Insulation, Cooling load, Electric water heating systems, Energy conservation methods.

TEXT BOOKS:

1. W. R. Murphy & F. McKay Butter wort, "Energy management", 1st edition, Elsevier publications. 2012.
2. John. C. Andreas, "Energy efficient electric motors", 2nd edition, Marcel Inc Ltd., 1995.

REFERENCE BOOKS:

1. S C Tripathy, "Electric Energy Utilization and Conservation", 1st edition, Tata Mc-Graw Hill Publishing company Ltd., New Delhi.
2. Paul o' Callaghan, "Energy management", 1st edition, Mc-Graw Hill Book Company, 1998
3. V.K Mehta and Rohit Mehta, "Principles of Power Systems", 1st edition, S.Chand & Company Ltd., New Delhi, 2009.
4. Reay, D.A., "Industrial energy conservation", 1st edition, Pergamon Press, 2003.
5. White, L. C., "Industrial Energy Management and Utilization", 1st edition, Hemisphere Publishers, 2002.
6. Beggs, Clive, "Energy – Management, Supply and Conservation", 2nd edition, Taylor and Francis, 2009.
7. Smith, C.B., Energy "Management Principles", 1st edition, Pergamon Press, 2006.

16EE457 ENERGY ECONOMICS

Hours Per Week :

L	T	P	C
3	1	-	4

Course Description and Objectives:

This course deals with the economic concepts and theories related to the supply and utilization of energy resources and technologies at various levels - economy, firm and individual. The objective of the course is to introduce economic tools, empirical data for economic analysis in the energy systems domain to support and influence decision making in the context of resource planning and energy efficiency to take economically sound decisions.

Course Outcomes:

The student will be able to:

- Develop an understanding of different economic principles.
- Apply various economic policies and application of theories.
- Analyse financial and economic concepts for a given problem.
- Evaluate different alternatives for better economic efficiency.
- Examine various methods of depreciation.

SKILLS:

- ✓ Compare economic and energy parameter of India with other countries.
- ✓ Perform make or buy decision.
- ✓ Compare various available alternatives.
- ✓ Perform replacement and maintenance analysis.
- ✓ Perform life cycle analysis of a product.



ACTIVITIES:

- Compare economic and energy parameters of India with other countries.
- Case study on make or buy decision (Eg: water coolers in VFSTRU)
- Case study on economical comparison of solar PV generation and diesel power generation.
- Case study on replacement and maintenance of ACs, UPS etc., from VFSTRU.
- Life cycle analysis of solar panel.

UNIT - 1**L-10, T-3**

ENERGY AND ECONOMICS: Role and significance of renewable energy sources for sustainable economic development and social transformation, Energy and GDP, GNP and its dynamics, Energy sources and overall energy demand and availability, Energy consumption in various sectors and its changing pattern, Exponential increase in energy consumption and projected future demands, Energy security, Energy consumption and its impact on environmental climatic change, Introduction to economics - Flow in an economy, Law of supply and demand, Concept of engineering economics, Engineering efficiency, Economic efficiency, Scope of energy economics; Element of costs - Marginal cost, Marginal revenue, Sunk cost, Opportunity cost; Break-even analysis and V-ratio.

UNIT - 2**L-9, T-3**

VALUE ENGINEERING: Make or buy decision, Value engineering – Function, Aims, Value engineering procedure; Interest formulae and their applications, Time value of money - Single payment compound amount factor, Single payment present worth factor, Equal payment series sinking fund factor, Equal payment series payment present worth factor, Equal payment series capital recovery factor, Uniform gradient series annual equivalent factor, Effective interest rate and examples.

UNIT - 3**L-9, T-3**

CASH FLOW : Methods of comparison of alternatives – Present worth method (Revenue dominated cash flow diagram), Future worth method (Revenue dominated cash flow diagram, Cost dominated cash flow diagram), Annual equivalent method (Revenue dominated cash flow diagram, Cost dominated cash flow diagram), Rate of return method and examples; Unit cost of power generation from different sources, Payback period, NPV, IRR and cost benefit analysis and life cycle costing.

UNIT - 4**L-8, T-3**

REPLACEMENT AND MAINTENANCE ANALYSIS : Types of maintenance, Types of replacement problem, Determination of economic life of an asset, Replacement of an asset with a new asset, Capital recovery with return and concept of challenger and defender, Simple probabilistic model for items which fail completely.

UNIT - 5**L-9, T-3**

DEPRECIATION : Introduction, Straight line method of depreciation, Declining balance method of depreciation, Sum of the years digits method of depreciation, Sinking fund method of depreciation / Annuity method of depreciation, Service output method of depreciation, Evaluation of public alternatives - Introduction, Inflation adjusted decisions, Procedure to adjust inflation, Examples on comparison of alternatives and determination of economic life of asset.

TEXT BOOKS:

1. Panneer Selvam. R, "Engineering Economics", 1st edition, Prentice Hall of India Ltd, New Delhi, 2001.
2. Subhes C.Bhattacharyya., "Energy Economics", 1st edition, Springer, 2011.

REFERENCE BOOKS:

1. Chan S.Park, "Contemporary Engineering Economics", 1st edition, Prentice Hall of India, 2002.
2. Aswathnarayana U, "Green energy: Technology, Economics and policy", 1st edition, CRC press, 2010.
3. Truett & Truett, " Managerial economics- Analysis, Problems & Cases " Wiley India, 8th edition 2004.
4. Suma Damodaran, "Managerial Economics", 1st edition, Oxford University press, 2006.