



**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA**  
**KAKINADA – 533 003, Andhra Pradesh, India**

**DEPARTMENT OF MECHANICAL ENGINEERING**

II Year - I Semester	L	T	P	C
ENVIRONMENTAL SCIENCE	3	0	0	0

**Learning Objectives:**

The objectives of the course are to impart:

- Overall understanding of the natural resources.
- Basic understanding of the ecosystem and its diversity.
- Acquaintance on various environmental challenges induced due to unplanned anthropogenic activities.
- An understanding of the environmental impact of developmental activities.
- Awareness on the social issues, environmental legislation and global treaties.

**UNIT-I:**

**Multidisciplinary nature of Environmental Studies:** Definition, Scope and Importance –Sustainability: Stockholm and Rio Summit-Global Environmental Challenges: Global warming and climate change, acid rains, ozone layer depletion, population growth and explosion, effects; Role of information technology in environment and human health.

**Ecosystems:** Concept of an ecosystem. - Structure and function of an ecosystem: Producers, consumers and decomposers. - Energy flow in the ecosystem - Ecological succession. - Food chains, food webs and ecological pyramids; Introduction, types, characteristic features, structure and function of Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems.

**UNIT-II:**

**Natural Resources:** Natural resources and associated problems.

**Forest resources:** Use and over – exploitation, deforestation – Timber extraction – Mining, dams and other effects on forest and tribal people.

**Water resources:** Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems.

**Mineral resources:** Use and exploitation, environmental effects of extracting and using mineral resources.

**Food resources:** World food problems, changes caused by non-agriculture activities-effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity.

**Energy resources:** Growing energy needs, renewable and non-renewable energy sources use of alternate energy sources.

**Land resources:** Land as a resource, land degradation, Wasteland reclamation, man induced landslides, soil erosion and desertification; Role of an individual in conservation of natural resources; Equitable use of resources for sustainable lifestyles.

**UNIT-III:**

**Biodiversity and its conservation:** Definition: genetic, species and ecosystem diversity-classification - Value of biodiversity: consumptive use, productive use, social-Biodiversity at national and local levels. India as a mega-diversity nation - Hot-spots of biodiversity - Threats to biodiversity: habitat loss, man-wildlife conflicts. - Endangered and endemic species of India – Conservation of biodiversity: conservation of biodiversity.



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**UNIT – IV Environmental Pollution:** Definition, Cause, effects and control measures of Air pollution, Water pollution, Soil pollution, Noise pollution, Nuclear hazards, Role of an individual in prevention of pollution. - Pollution case studies, Sustainable Life Studies, Impact of Fire Crackers on Men and his well being.

**Solid Waste Management:** Sources, Classification, effects and control measures of urban and industrial solid wastes, Consumerism and waste products, Biomedical, Hazardous and e – waste management.

**UNIT – V Social Issues and the Environment:** Urban problems related to energy -Water conservation, rain water harvesting-Resettlement and rehabilitation of people; its problems and concerns. Environmental ethics: Issues and possible solutions. Environmental Protection Act -Air (Prevention and Control of Pollution) Act. -Water (Prevention and control of Pollution) Act -Wildlife Protection Act - Forest Conservation Act-Issues involved in enforcement of environmental legislation. -Public awareness.

**Environmental Management:** Impact Assessment and its significance various stages of EIA, preparation of EMP and EIS, Environmental audit, Ecotourism, Green Campus – Green business and Green politics.

The student should Visit an Industry / Ecosystem and submit a report individually on any issues related to Environmental Studies course and make a power point presentation.

**Text Books:**

1. Environmental Studies, K. V. S. G. Murali Krishna, VGS Publishers, Vijayawada
2. Environmental Studies, R. Rajagopalan, 2<sup>nd</sup> Edition, 2011, Oxford University Press.
3. Environmental Studies, P. N. Palanisamy, P. Manikandan, A. Geetha, and K. Manjula Rani: Pearson Education, Chennai

**Reference:**

1. Text Book of Environmental Studies, Deeshita Dave & P. Udaya Bhaskar, Cengage Learning.
2. A Textbook of Environmental Studies, Shaashi Chawla, TMH, New Delhi
3. Environmental Studies, Benny Joseph, Tata McGraw Hill Co, New Delhi
4. Perspectives in Environment Studies, Anubha Kaushik, C P Kaushik, New Age International Publishers, 2014



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II Year - I Semester		L	T	P	C
		0	0	0	0.5
SOCIALLY RELEVANT PROJECT					

Student can choose any one of the given below / any other socially relevant problem and work on it to produce a project document.

1. Water Conservation Related Works
2. Swatch Bharath (Internal External)
3. Helping police
4. Traffic monitoring
5. Teaching Rural Kids (Sarva siksha Abhiyan)
6. Street light monitoring
7. Electricity Conservation
8. Solar panel utilization
9. E- policing & cyber solution
10. Pollution
11. Any social related



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**DEPARTMENT OF MECHANICAL ENGINEERING**

III Year - I Semester		L	T	P	C
		0	0	0	0.5
SOCIALLY RELEVANT PROJECT					

Student can choose any one of the given below / any other socially relevant problem and work on it to produce a project document.

1. Water Conservation Related Works
2. Swatch Bharath (Internal External)
3. Helping police
4. Traffic monitoring
5. Teaching Rural Kids (Sarva siksha Abhiyan)
6. Street light monitoring
7. Electricity Conservation
8. Solar panel utilization
9. E- policing & cyber solution
10. Pollution
11. Any social related

**MC 20MCX01 Environmental Science**

0 0 3 0

At the end of the course, students will be able to

Code	Course Outcomes	Mapping with POs		DoK
		PO1	PO12	
20MCX01.1	Gain in-depth knowledge on importance of environment, natural resources utilization and exploitation	3	1	L1, L2
20MCX01.2	Understand the concept of an ecosystem and identify their interconnections	3	1	L1, L2
20MCX01.3	Develop an understanding on values, threats and conservation of biodiversity	3	1	L1, L2
20MCX01.4	Illustrate the impacts of ever increasing environmental pollution and understand the issues on global environment	3	1	L1, L2
20MCX01.5	Understand various acts formulated by Govt. of India and apply the knowledge gained in conserving energy and environmental protection	3	1	L1, L2

1. Weakly Contributing | 2. Moderately Contributing | 3. Strongly Contributing, for the attainment of respective Pos  
 L1: Remember | L2: Understand | L3: Apply | L4: Analyze | L5: Evaluate | L6: Create. DoK: Depth of Knowledge

**Unit I: Natural Resources****12 Hours**

Introduction: Definition, Scope and Importance-Need for Public Awareness

Natural Resources: Classification of resources—Forest resources: Use and Over-exploitation, Deforestation- Mining, Water resources—Use and over utilization of surface and ground water—Floods, Drought, Conflicts over water, Dams- Benefits and Problems – Mineral resources: Use and exploitation, Environmental effects of extracting and using mineral resources—Energy resources: Renewable and Non- Renewable sources of energy- Solar energy, Wind energy.

**Unit II: Ecosystems****12 Hours**

Concept of an Ecosystem—Structural features of ecosystem- Producers, Consumers and Decomposers—Biogeochemical cycles- Carbon cycle and Nitrogen cycle-Ecological succession-Food chains, Food webs and Ecological pyramids—Energy flow in the ecosystem-Types of ecosystems (a) Forest ecosystem (b) Aquatic ecosystems.

**Unit III: Biodiversity and its Conservation****12 Hours**

Introduction, Definition, Genetic, Species and Ecosystem diversity, India as a mega-diversity nation, Hot spots of biodiversity, Values of biodiversity, Threats to biodiversity, Endemic, Endangered and Extinct species of India, In-Situ and Ex-situ conservation of biodiversity.

**Unit IV: Environmental Pollution and Global Environmental Issues****12 Hours**

Environmental Pollution: Air pollution, Water pollution, Noise pollution, Effects-Global warming, Acid Rain and Ozone layer depletion and controlling measures.

Global Environmental Issues: Population Growth, Urbanization, Climate change and impacts on human environment.

Solid Waste Management: Causes, Effects and Control measures of Municipal solid wastes – E - Waste Management. Role of an individual in prevention of pollution.

**Unit V: Environmental Legislation, Laws, Policies for Sustainable Development****12 Hours**

Environmental Legislation, Environmental Protection act – Air Prevention and Control of Pollution act—Water Prevention and control of Pollution act— Wildlife protection act – Forest conservation act.

From Unsustainable to sustainable development, Role of IT in Environment-Remote Sensing and GIS methods for Sustainable development

**Text Books**

1. Erach Bharucha, "Text Book of Environmental Studies", 1<sup>st</sup> Edition, University Grants Commission, University Press (India) Pvt. Ltd., 2010
2. Kaushik A. and Kaushik C. P., "Environmental Sciences", 5<sup>th</sup> Edition, New Age International Publishers, 2015
3. Anji Reddy M., "Text Book of Environmental Science and Technology", 3<sup>rd</sup> Edition, B. S. Publications, 2010

**Reference Books**

1. Anil Kumar and Arnab Kumar De, "Environmental Studies", 3<sup>rd</sup> Edition, New Age International Publishers, 2015
2. Trivedi R. K., "Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards", 2<sup>nd</sup> Edition, Volume I and II, Enviro Media, 2012
3. Rajagopalan R., "Environmental Studies-From Crisis to Cure", 2<sup>nd</sup> Edition, Oxford University Press, 2005

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Chairman  
Board of Studies (Chemistry)

Head of the Department  
Dept. of Mechanical Engg.,  
N.S. Raju Institute of Technology  
Sontyam, Visakhapatnam - 531173

**20MCX04 Indian Traditional Knowledge****0 0 3 0****Course Outcomes**

At the end of the course, students will be able to

Code	Course Outcomes	Mapping with POs				DoK
		PO1	PO6	PO7	PO12	
20MCX03.1	Identify the concept of Traditional knowledge and its importance	1	3	3	2	L1, L2
20MCX03.2	Explain the need and importance of protecting traditional knowledge	1	2	3	2	L1, L2
20MCX03.3	Illustrate the various enactments related to the protection of traditional knowledge	1	3	3	2	L1, L2
20MCX03.4	Interpret the concepts of Intellectual property to protect the traditional knowledge	1	2	3	2	L1, L2
20MCX03.5	Explain the importance of Traditional knowledge in Agriculture and Medicine	1	3	3	2	L1, L2, L3

1. Weakly Contributing | 2. Moderately Contributing | 3. Strongly Contributing, for the attainment of respective POs  
L1: Remember | L2: Understand | L3: Apply | L4: Analyze | L5: Evaluate | L6: Create

**UNIT-1: Introduction to traditional knowledge****6hours**

Define traditional knowledge, nature and characteristics, scope and importance, kinds of traditional knowledge, Indigenous Knowledge (IK), characteristics, traditional knowledge vis-a-vis indigenous knowledge, traditional knowledge Vs western knowledge traditional knowledge

**UNIT-2: Protection of traditional knowledge****6hours**

The need for protecting traditional knowledge Significance of TK Protection, value of TK in global economy, Role of Government to harness TK.

**UNIT-3: Legal framework and TK:****6hours**

The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006, Plant Varieties Protection and Farmer's Rights Act, 2001 (PPVFR Act); The Biological Diversity Act 2002 and Rules 2004, the protection of traditional knowledge bill, 2016.

**UNIT-4: Traditional knowledge and intellectual property:****6hours**

Systems of traditional knowledge protection, Legal concepts for the protection of traditional knowledge, Patents and traditional knowledge, Strategies to increase protection of traditional knowledge

**UNIT-5: Traditional Knowledge in Different Sectors:****6hours**

Traditional knowledge and engineering, Traditional medicine system, TK in agriculture, Traditional societies depend on it for their food and healthcare needs, Importance of conservation and sustainable development of environment, Management of biodiversity, Food security of the country and protection of TK

**Text Books:**

1. Traditional Knowledge System in India, by Amit Jha, 2009.

**Reference Books:**

1. Traditional Knowledge System in India by Amit Jha Atlantic publishers, 2002.
2. "Knowledge Traditions and Practices of India" Kapil Kapoor<sup>1</sup>, Michel Danino<sup>2</sup>.

**Web Links:**

- 1.<https://www.youtube.com/watch?v=LZP1StpYEPM>
- 2.<http://nptel.ac.in/courses/121106003/>

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Chairman  
Board of Studies (S&H)

OE

20SHO01 Women and Society

0 0 3 0

Code	Course Outcomes	Mapping with POs	DoK
20CE001.1	This course aims to generate awareness on various factors that constructs and shapes gender identity and perpetuates gender discrimination.	-	L1, L2
20CE001.2	This course aims to generate awareness on various factors that constructs and shapes gender identity and perpetuates gender discrimination.		L1, L2
20CE001.3	The course will examine how feminist analysis & methodology redefines traditional categories and disciplinary concepts through its attention to gender as a social category		L1, L2
20CE001.4	The course further aims to sensitize students on emerging areas of gender discrimination and its possible resolution		L1, L2
1. Weakly Contributing   2. Moderately Contributing   3. Strongly Contributing, for the attainment of respective Pos L1: Remember   L2: Understand   L3: Apply   L4: Analyze   L5: Evaluate   L6: Create. DoK: Depth of Knowledge			

### Objectives:

Total Hour: 40

This course aims to generate awareness on various factors that constructs and shapes gender identity and perpetuates gender discrimination.

### UNIT -1 WOMEN AND SOCIETY

9 Hours

Understanding Sex- Gender, Gender shaping Institutions, Theories of Gender construction  
Understanding Sexism and Androcentrism, Understanding Patriarchy and Theories of Patriarchy,  
Private and Public dichotomy, Sexual Division of Work, Patriarchy practices in different institutions  
and Text Books.

### UNIT -2 FEMINIST THEORY

9 Hours

Rise of Feminism, Introduction to various stands of Feminism- Liberal Feminism, Radical  
Feminism, Marxist Feminism, Socialist Feminism, Cultural Feminism, Eco-Feminism, Post-Colonial  
Feminism, Post Modern Feminism. Waves of Feminism.

### UNIT -3 WOMEN'S MOVEMENT

9 Hours

The socio-economic conditions of women during the age of Industrial revolution the Call for  
Women's Rights 1848, Women's rights movement 1848-1920, Historical Developments of Social  
Reform Movements in India, Women's groups and organizations, Women's Movement Movements  
for Uniform Civil code and ShahBano case, Dalit women and the question of double marginality.

### UNIT -4 GENDER ROLES AND PSYCHOLOGY OF SEX

9 Hours

Difference Conceptualization of gender roles and gender role attitudes, Gender: Aggression,  
Achievement, Communication, Friendship and Romantic, Relationships Sex Differences in Mental  
Health Trauma relating to Rape, Taboo, Childhood Sexual Abuse, Domestic Violence, Sexual  
Harassment at Work Place, Educational Institutions, Eve Teasing etc.

### UNIT – 5 GENDER AND REPRESENTATION

9 Hours

Gender and Mass Media- Print Media, Gender and Mass Media-Electronic Media, Gender and

Films, Advertisements, Mega Serials, Stereotyping and breaking the norms of women's roles  
Women's Representation in  
Literary Texts.

**Suggested reading:**

1. Basab iChakrabarti, Women's Studies: Various Aspects. UrbiPrakashani 2014
2. Arvind Narrain. Queer: Despised Sexuality Law and Social Change. Book for Change. 2005
3. Chandra Talpade Mohanty, Feminism without Borders: Decolonizing Theory, Practicing Solidarity. Duke University Press.
4. Flavia Agnes. Law and Gender Inequality: The Politics of Women's Rights in India. Oxford University Press, 2001
5. Sonia Bathla, Women, Democracy and the Media: Cultural and Political Representations in the Indian Press, Sage, New Delhi, 1998.

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Chairman

Board of Studies (S&H)

**MAC 20MCX03 Intellectual Property Rights and Patents**

2 0 0 0

At the end of the course, students will be able to

Code	Course Outcomes	Mapping with POs		DoK
		PO11	PO12	
20MCX03.1	Acquire knowledge on intellectual property rights	-	-	L1, L2
20MCX03.2	Know about the acquisition of trademarks.	-	-	L1, L2
20MCX03.3	Identify the importance of copyrights, patents and transfer of Ownership.	-	-	L1, L2
20MCX03.4	Reciprocate on new developments of intellectual property rights	-	-	L1, L2
20MCX03.5	International overview of IPR	-	-	L1, L2

1. Weakly Contributing | 2. Moderately Contributing | 3. Strongly Contributing, for the attainment of respective Pos  
L1: Remember | L2: Understand | L3: Apply | L4: Analyze | L5: Evaluate | L6: Create. DoK: Depth of Knowledge

**Unit I: Introduction to Intellectual property:**

4 Hours

Concepts, types of intellectual property, international organizations, agencies and importance of intellectual property rights. Industrial Property, technological Research, Inventions and Innovations – Important examples of IPR, IPR in India and Abroad

**Unit II: Introduction to Trade Marks:**

4 Hours

Purpose and function of trademarks, acquisition of trade mark rights, selecting and evaluating trademark, trademark registration processes. Trade Secrets and Industrial Design registration in India and Abroad

**Unit III: Registration of Copy Rights**

4 Hours

Fundamentals of copy right law, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copyright registration, international copyright laws.  
Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer.

**Unit IV: Latest development of intellectual property Rights**

4 Hours

New developments in trademark law; copy right law, patent law, intellectual property audits. Infringement of IPRs, Enforcement Measures, Emerging issues –

**Unit V: Enforcement Of IPRs**

4 Hours

International overview on intellectual property, international – trade mark law, copy right law, International patent law. International development in trade secrets law.

**Text Books**

1. Intellectual property right, Deborah, E. Bouchoux, cengage learning.
2. Intellectual property right - Unleashing the knowledge economy, Prabuddha Ganguli, Tata McGraw Hill Publishing Company Ltd.

3. Cornish, William Rodolph & Llewelyn, David. Intellectual property: patents, copyright, trademarks and allied rights. Sweet & Maxwell, 8/e, 2013.

**Reference Books**

1. Cornish, William Rodolph. Cases and materials on intellectual property. Sweet & Maxwell, 5/e, 2006.
2. Lo, Jack and Pressman, David. How to make patent drawings: a patent yourself companion. Nolo, 5/e 2007.

**Web References**

1. <https://www.investopedia.com/terms/i/intellectualproperty.asp>
2. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3217699/>
3. [https://www.wto.org/english/tratop\\_e/trips\\_e/intel1\\_e.htm](https://www.wto.org/english/tratop_e/trips_e/intel1_e.htm)

**Internal Assessment Pattern**

Cognitive Level	Internal Assessment #1 (%)	Internal Assessment #2 (%)
L1	40	40
L2	60	60
Total (%)	100	100

**Sample Short and Long Answer Questions of Various Cognitive Levels**

**L1: Remember**

1. What is Industrial property?
2. What are the fundamentals of copy rights
3. Define patents and its approval process
4. Define copy right law.
5. Define transfer of trade marks.

**L2: Understand**

1. Explain the role trade secrets in company law.
2. Explain the concept ownership rights of patents with suitable examples
3. Explain the international patent law.
4. Distinguish between copy rights and patents.
5. Explain copy right registration.

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Chairman  
Board of Studies (MBA)