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| Department of Applied Chemistry | LP: Sub Code **GE18251**  Rev. No: 00  Date: 20-12-2018 |
| B.E/B.Tech/M.E/M.Tech : Common For All BranchesRegulation:2018  PG Specialisation : \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Sub. Code / Sub. Name : **GE18251** / **ENVIRONMENTAL SCIENCE AND**  **ENGINEERING**  Unit : I : |

**Unit Syllabus: ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY**

Definition, scope and importance of environment - need for public awareness - concept of an ecosystem - structure and function of an ecosystem - energy flow in the ecosystem - ecological succession - food chains, food webs and ecological pyramids - Introduction, types, characteristic features, structure and function of the forest ecosystem, grassland ecosystem, desert ecosystem, aquatic ecosystems, Introduction to biodiversity definition: genetic, species and ecosystem diversity - Biogeographical classification of India - value of biodiversity - Biodiversity at global, national and local levels - India as a mega-diversity nation - hot-spots of biodiversity - threats to biodiversity - man-wildlife conflicts - endangered and endemic species of India - conservation of biodiversity: In-situ and ex-situ conservation of biodiversity.

**Objective:**

###### To create an awareness about the fundamentals and importance of ecosystems and biodiversity to the students.

* To study the interrelationship between living organism and environment.

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| Session  No \* | Topics to be covered | Ref | Teaching Aids |
|  | Definition, scope and importance of environment - need for public awareness | T1, Ch 4, 127-166 | PPT |
|  | Concept of an ecosystem - structure and function of an ecosystem | R4, Ch2, 20-24 | PPT |
|  | Energy flow in the ecosystem - ecological succession | R1, Ch.3, 113-118, | PPT |
|  | Food chains, food webs and ecological pyramids | T1, Ch4, p76-78 | PPT |
|  | Introduction, types, characteristic features, structure and function of the forest ecosystem | R4, Ch4, 36-43 | PPT |
|  | Grassland ecosystem, desert ecosystem | R4, Ch4, 36-43, 43-65 | PPT |
|  | Aquatic ecosystems, Introduction to biodiversity definition: genetic, species and ecosystem diversity | R3, Ch4, 43-65, | PPT |
|  | Biogeographical classification of India - value of biodiversity | T2, Ch5, 94-101 | PPT |
|  | Biodiversity at global, national and local levels - India as a mega-diversity nation - hot-spots of biodiversity | R4, Ch6, 71-82 | PPT |
|  | Threats to biodiversity - man-wildlife conflicts | R4, Ch6, 83-84 | PPT |
|  | Endangered and endemic species of India | R4, Ch6, 83-84 | PPT |
|  | Conservation of biodiversity: In-situ and ex-situ conservation of biodiversity. | R5, Ch6, 85-95 | PPT |
| **Content beyond syllabus covered (if any):** Definition, scope and importance of Risk and hazards | | | |

\* Session duration: 50 minutes - Online

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| **Sub. Code / Sub.Name:GE18251** / **ENVIRONMENTAL SCIENCE AND ENGINEERING**  Unit : II |

**Unit Syllabus :NATURAL RESOURCES:** Forest resources: Use and over-exploitation, deforestation, case studies- timber extraction, mining, dams and their effects on forests 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, case studies - Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture – fertilizer, pesticide problems, water logging, salinity, case studies - Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources. case studies - Land resources: Land as a resource - role of an individual in conservation of natural resources - Equitable use of resources for sustainable lifestyles.

###### Objective:

###### To impart knowledge about the dynamic process available in the nature and resources available on this earth crust.

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| Session  No \* | Topics to be covered | Ref | Teaching Aids |
|  | Forest resources: Use and over-exploitation, deforestation, case studies- timber extraction - | T2, Ch2, p17- 27 | PPT |
|  | Case studies - mining, dams and their effects on forests and tribal people | T2, Ch2, p17- 27 | PPT |
|  | Water resources: Use and over - utilization of surface and ground water, floods, drought | T2, Ch2, p28- 47 | PPT |
|  | Conflicts over water, Dams - benefits and problems | T2, Ch2, p17- 27 | PPT |
|  | Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources - case studies | R4, Ch10, p161-169 | PPT |
|  | Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture -fertilizer, pesticide problems | R4, Ch10, p156-161 | PPT |
|  | Water logging, salinity, case studies - Energy resources: Growing energy needs, renewable and non-renewable energy sources | R4, Ch10, p153-156 | PPT |
|  | Use of alternate energy sources. case studies | R4, Ch10, p153-156 | PPT |
|  | Land resources: Land as a resource - role of an individual in conservation of natural resources | R4, Ch10, p153-156 | PPT |
|  | Equitable use of resources for sustainable lifestyles | R4, Ch2, p82 | PPT |
| **Content beyond syllabus covered (if any): Genetically Modified Organisms (GMO’S) and its problems** | | | |

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| Sub Code / Sub Name: GE18251 / ENVIRONMENTAL SCIENCE AND ENGINEERING  Unit : III |

**Unit Syllabus :ENVIRONMENTAL POLLUTION AND DISASTER MANAGEMENT:** Definition - causes, effects and control measures Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear hazards - solid waste management: causes, effects and control measures of municipal solid wastes, e-Waste, risk related to e-Waste - role of an individual in prevention of pollution - pollution case studies - disaster management: floods, earthquake, cyclone and landslides, land degradation, man induced landslides, soil erosion and desertification.

**Objective:**

* To improve the knowledge about disaster management and the various types of environmental pollution and their effects on plants and animals.
* To implement scientific, technological, economic and political solutions to environmental problems.

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| Session  No \* | Topics to be covered | Ref | Teaching Aids |
|  | Definition - causes, effects and control measures of Air pollution | T2, Ch6, 118-130 | PPT |
|  | Definition - causes, effects and control measures of Water pollution | T2, Ch6, 137-145 | PPT |
|  | Definition - causes, effects and control measures of Soil pollution, , Nuclear hazards | T2, Ch6, 153-160 | PPT |
|  | Definition - causes, effects and control measures of Marine & Noise pollution | T2, Ch6, 160-168 | PPT |
|  | Definition - causes, effects and control measures of Thermal pollution & Nuclear hazards | T2, Ch6, 168-169 | PPT |
|  | Solid waste management: causes, effects and control measures of municipal solid wastes | T2, Ch6, 153-160 | PPT |
|  | e-Waste, risk related to e-Waste - role of an individual in prevention of pollution | T2, Ch5, 204-206 | PPT |
|  | Pollution case studies | T2, Ch6, 200-202 | PPT |
|  | Disaster management: floods, earthquake, cyclone and landslides, land degradation | T2, Ch6,200-202  R4, Ch10, p153-156 | PPT |
|  | Man induced landslides, soil erosion and desertification. | T2, Ch6,200-202 | PPT |
| **Content beyond syllabus covered (if any):** Biochemical degradation of pollutants | | | |

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| Sub Code / Sub Name: GE18251 / ENVIRONMENTAL SCIENCE AND ENGINEERING  Unit : IV |

**Unit Syllabus :SOCIAL ISSUES AND THE ENVIRONMENT -** From unsustainable to sustainable development - urban problems related to energy - water conservation, rain water harvesting, watershed management - resettlement and rehabilitation of people; its problems and concerns, case studies - role of non-governmental organization- environmental ethics: Issues and possible solutions - Principles of green chemistry, climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies - wasteland reclamation - consumerism and waste products - Environment protection act - Air (Prevention and Control of Pollution) act - Water (Prevention and control of Pollution) act - Wildlife protection act - Forest conservation act - central and state pollution control boards - Public awareness.

**Objective:**

* To elucidate the students about the sustainable development, water conservation, social issues, role of NGO’s and various laws available in the country to protect the environment

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| Session  No \* | Topics to be covered | Ref | Teaching Aids |
|  | From unsustainable to sustainable development - urban problems related to energy - water conservation, rain water harvesting, watershed management | T2, Ch7, 210-220 | PPT |
|  | Resettlement and rehabilitation of people; its problems and concerns, case studies | R5, Ch18,289-298 | PPT |
|  | Role of non-governmental organization- environmental ethics: Issues and possible solutions | R5, Ch18,289-298 | PPT |
|  | Principles of green chemistry, climate change, global warming, acid rain, ozone layer depletion | R5, Ch18,289-298, R4, Ch11, 174-176 | PPT |
|  | Nuclear accidents and holocaust, case studies - wasteland reclamation - consumerism and waste products | T2, Ch7,243-246 | PPT |
|  | Environment protection act - Air (Prevention and Control of Pollution) act - Water (Prevention and control of Pollution) act | T2, Ch7, 243-246 | PPT |
|  | Forest conservation act - central and state pollution control boards - Public awareness. | R3, Ch5,  79-94 | PPT |
| **Content beyond syllabus covered (if any): Biomedical Waste Management** | | | |

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| Sub Code / Sub Name: GE18251 / ENVIRONMENTAL SCIENCE AND ENGINEERING  Unit : V |

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| **Unit Syllabus : HUMAN POPULATION AND THE ENVIRONMENT -** Population growth, variation among nations - population explosion - family welfare programme – environment and |
| human health - human rights - value education - HIV / AIDS, Swine flu, Dengue fever - women and child welfare - role of information technology in environment and human health management - case studies. |

**Objective:**

* To impart knowledge about the Population, family welfare programmes and Environmental Management to the students.

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| Session  No \* | Topics to be covered | Ref | Teaching Aids |
|  | Population growth, variation among nations - population explosion | R4, Ch15, 200-202 | PPT |
|  | Family welfare programme | R4, Ch15, 200-202 | PPT |
|  | Environment and human health - human rights - value education | T2, Ch8, 274-277,  T2, Ch8, 277 R6, Ch17, 268-270 | PPT |
|  | HIV / AIDS, Swine flu, Dengue fever - women and child welfare - | T2, Ch8, 277 R6, Ch17, 268-270 | PPT |
|  | Role of information technology in environment GIS, remote sensing - case studies. | T2, Ch7, 246- 251 | PPT |
|  | Role of information technology in human health management - case studies. | T2, Ch8, 288- 289 | PPT |
| **Content beyond syllabus covered (if any): Environmental Impact Analysis** | | | |

**TEXT BOOKS:**

1. Benny Joseph, "Environmental Science and Engineering", Tata McGraw-Hill, New Delhi, 2012
2. Gilbert M.Masters, "Introduction to Environmental Engineering and Science", 2nd edition, Pearson Education, 2010.

**REFERENCES:**

1. **REFERENCES:**

1. R.K. Trivedi, ‘Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards’, Vol. I and II, Enviro Media.
2. Cunningham, W.P. Cooper, T.H. Gorhani, ‘Environmental Encyclopedia’, Jaico Publ., House, Mumbai, 2001.
3. Dharmendra S. Sengar, ‘Environmental law’, Prentice hall of India PVT LTD, New Delhi, 2007.
4. Rajagopalan, R, ‘Environmental Studies-From Crisis to Cure’, Oxford University Press (2005).
5. Wager. K. D. “Environmental Management”, W.B. Saunders Co., Philadelphia.
6. Townsend C, Harper J and Michel Begon, “Essentials of Ecology”, Blackwell Science.
7. Trivedi R. K, and P.K. Goel, “ Introduction to Air Pollution”, Techno-Science Publications.

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|  | Prepared by | Approved by |
| Signature |  |  |
| Name | Dr. Stanly | Dr. G. Devasagayam |
| Designation | Associate Professor | Professor |
| Date | 15-09-2018 | 15-09-2018 |
| Remarks \*: | | |
| Remarks \*: | | |

\* If the same lesson plan is followed in the subsequent semester/year it should be mentioned and signed by the Faculty and the HOD