

# MOHAMMED SATHAK A J COLLEGE OF ENGINEERING

Siruseri IT park, OMR, Chennai - 603103

| LESSON PLAN                                                                                                                                  |                                                                                                                                                                                     |        |                  |                                      |                                      |     |      |
|----------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|------------------|--------------------------------------|--------------------------------------|-----|------|
| Department of Science and Humanities                                                                                                         |                                                                                                                                                                                     |        |                  |                                      |                                      |     |      |
| Name of the Subject                                                                                                                          | Environmental Science and Engineering                                                                                                                                               |        |                  | Name of the handling Faculty         | Dr. A. Balakrishnan Dr. B. Devi Bala |     |      |
| Subject Code                                                                                                                                 | GE8291                                                                                                                                                                              |        |                  | Year / Sem                           | II / IV                              |     |      |
| Acad Year                                                                                                                                    | 2021-2022                                                                                                                                                                           |        |                  | Batch                                |                                      |     |      |
| Course Objective                                                                                                                             |                                                                                                                                                                                     |        |                  |                                      |                                      |     |      |
| To the study of nature and the facts about environment.                                                                                      |                                                                                                                                                                                     |        |                  |                                      |                                      |     |      |
| • To finding and implementing scientific, technological, economic and political solutions to environmental problems.                         |                                                                                                                                                                                     |        |                  |                                      |                                      |     |      |
| • To study the interrelationship between living organism and environment.                                                                    |                                                                                                                                                                                     |        |                  |                                      |                                      |     |      |
| • To appreciate the importance of environment by assessing its impact on the human world; envision the surrounding environment, its function |                                                                                                                                                                                     |        |                  |                                      |                                      |     |      |
| • To study the dynamic processes and understand the features of the earth’s interior and surface.                                            |                                                                                                                                                                                     |        |                  |                                      |                                      |     |      |
| To study the integrated themes and biodiversity, natural resources, pollution control and waste management                                   |                                                                                                                                                                                     |        |                  |                                      |                                      |     |      |
| Course Outcome                                                                                                                               |                                                                                                                                                                                     |        |                  |                                      |                                      |     |      |
| Environmental Pollution or problems can be solved by mere laws.                                                                              |                                                                                                                                                                                     |        |                  |                                      |                                      |     |      |
| Public participation is an important aspect which serves the environmental Protection.                                                       |                                                                                                                                                                                     |        |                  |                                      |                                      |     |      |
| Students will be free from Ignorance and have complete knowledge towards environment                                                         |                                                                                                                                                                                     |        |                  |                                      |                                      |     |      |
| Students can develop and improve their standard of living                                                                                    |                                                                                                                                                                                     |        |                  |                                      |                                      |     |      |
| Students can manage serious environmental disasters                                                                                          |                                                                                                                                                                                     |        |                  |                                      |                                      |     |      |
| Lesson Plan                                                                                                                                  |                                                                                                                                                                                     |        |                  |                                      |                                      |     |      |
| Sl. No.                                                                                                                                      | Topic(s)                                                                                                                                                                            | T / R* | Periods Required | Mode of Teaching (BB / PPT / NPTEL / | Blooms Level (L1-L6)                 | CO  | PO   |
|                                                                                                                                              |                                                                                                                                                                                     | Book   |                  |                                      |                                      |     |      |
| UNIT I : ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY                                                                                            |                                                                                                                                                                                     |        |                  |                                      |                                      |     |      |
| 1                                                                                                                                            | Definition, scope and importance of environment-need for public awareness                                                                                                           | T1     | 1                | Chalk and Talk, PPT                  | L1                                   | CO1 | PO1  |
| 2                                                                                                                                            | Concept of an ecosystem – structure and function of an ecosystem – producers, consumers and decomposers                                                                             | T1     | 2                | Chalk and Talk, PPT                  | L1                                   | CO1 | PO2  |
| 3                                                                                                                                            | Energy flow in the ecosystem                                                                                                                                                        | T1     | 3                | Chalk and Talk, PPT                  | L1                                   | CO1 | PO6  |
| 4                                                                                                                                            | Ecological succession processes                                                                                                                                                     | T1     | 4                | Chalk and Talk, PPT                  | L2                                   | CO1 | PO7  |
| 5                                                                                                                                            | Food chain and food webs-Ecological pyramids                                                                                                                                        | T1     | 5                | Chalk and Talk, PPT                  | L2                                   | CO1 | PO8  |
| 6                                                                                                                                            | Introduction, types, characteristic features, structure and function of the forest ecosystem                                                                                        | T1     | 6                | Chalk and Talk, PPT                  | L2                                   | CO1 | PO1  |
| 7                                                                                                                                            | Introduction, types, characteristic features, structure and function of the (a) grassland ecosystem (b)desert ecosystem                                                             | T1     | 7                | Chalk and Talk, PPT                  | L3                                   | CO1 | PO2  |
| 8                                                                                                                                            | Introduction, types, characteristic features, structure and function of the aquatic ecosystem (ponds,streams, lakes, rivers, oceans, estuaries)                                     | T1     | 8                | Chalk and Talk, PPT                  | L3                                   | CO1 | PO12 |
| 9                                                                                                                                            | Introduction to biodiversity definition: genetic, species and ecosystem diversity – biogeographical classification of India                                                         | T1     | 9                | Chalk and Talk, PPT                  | L1                                   | CO1 | PO12 |
| 10                                                                                                                                           | Values of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values. Biodiversity at global, national and local levels- India as a mega-diversity | T1     | 10               | Chalk and Talk, PPT                  | L1                                   | CO1 | PO1  |

|    |                                                                                                                               |    |    |                     |    |     |     |
|----|-------------------------------------------------------------------------------------------------------------------------------|----|----|---------------------|----|-----|-----|
| 11 | Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – endangered and endemic species of India | T1 | 11 | Chalk and Talk, PPT | L2 | CO1 | PO2 |
| 12 | Conservation of biodiversity: In-situ and ex-situ conservation of biodiversity                                                | T1 | 12 | Chalk and Talk, PPT | L2 | CO1 | PO6 |

**Suggested Activity: Assignment / Case Studies / Tuorials/ Quiz / Mini Projects / Model Developed/others Planned if any**

**Evaluation method**

## UNIT II : ENVIRONMENTAL POLLUTION

|    |                                                                                                        |    |    |                     |    |     |      |
|----|--------------------------------------------------------------------------------------------------------|----|----|---------------------|----|-----|------|
| 13 | Introduction, Definition – causes, effects and control measures of Air pollution                       | T1 | 13 | Chalk and Talk, PPT | L2 | CO2 | PO1  |
| 14 | Definition – causes, effects and control measures of water pollution                                   | T1 | 14 | Chalk and Talk, PPT | L2 | CO2 | PO2  |
| 15 | Definition – causes, effects and control measures of soil pollution and marine pollution               | T1 | 15 | Chalk and Talk, PPT | L2 | CO2 | PO6  |
| 16 | Definition-Causes, effects and control measures of noise and thermal pollution                         | T1 | 16 | Chalk and Talk, PPT | L2 | CO2 | PO7  |
| 17 | Nuclear hazards–solid waste management: causes, effects and control measures of municipal solid wastes | T1 | 17 | Chalk and Talk, PPT | L2 | CO2 | PO9  |
| 18 | Role of an individual in prevention of pollution-disaster management: floods, earthquake               | T1 | 18 | Chalk and Talk, PPT | L2 | CO2 | PO12 |
| 19 | Disaster management-cyclone and landslides                                                             | T1 | 19 | Chalk and Talk, PPT | L2 | CO2 | PO12 |

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**Evaluation method**

## UNIT III : NATURAL RESOURCES

|    |                                                                                                                                                                                 |    |    |                     |    |     |      |
|----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|----|---------------------|----|-----|------|
| 20 | Forest resources: Use and over-exploitation, deforestation, case studies.                                                                                                       | T1 | 20 | Chalk and Talk, PPT | L1 | CO3 | PO1  |
| 21 | Timber extraction, mining, dams and their effects on forests and tribal people                                                                                                  | T1 | 21 | Chalk and Talk, PPT | L1 | CO3 | PO2  |
| 22 | Water resources: Use and overutilization of surface and ground water, floods, drought, water conflicts, dams-benefits and problems                                              | T1 | 22 | Chalk and Talk, PPT | L2 | CO3 | PO6  |
| 23 | Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies                                                          | T1 | 23 | Chalk and Talk, PPT | L2 | CO3 | PO7  |
| 24 | Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case | T1 | 24 | Chalk and Talk, PPT | L2 | CO3 | PO9  |
| 25 | Energy resources: Growing energy needs, renewable and non-renewable energy sources                                                                                              | T1 | 25 | Chalk and Talk, PPT | L2 | CO3 | PO12 |
| 26 | Use of alternate energy sources, case studies                                                                                                                                   | T1 | 26 | Chalk and Talk, PPT | L3 | CO3 | PO12 |
| 27 | Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification                                                                  | T1 | 27 | Chalk and Talk, PPT | L2 | CO3 | PO1  |
| 28 | Role of an individual in conservation of natural resources-Equitable use of resources for sustainable lifestyles.                                                               | T1 | 28 | Chalk and Talk, PPT | L2 | CO3 | PO2  |

**Suggested Activity: Assignment / Case Studies / Tuorials/ Quiz / Mini Projects / Model Developed/others Planned if any**

**Evaluation method**

## UNIT IV : SOCIAL ISSUES AND THE ENVIRONMENT

|    |                                                                                                       |    |    |                     |    |     |     |
|----|-------------------------------------------------------------------------------------------------------|----|----|---------------------|----|-----|-----|
| 29 | From unsustainable to sustainable development – urban problems related to energy- water conservation, | T1 | 29 | Chalk and Talk, PPT | L1 | CO4 | PO1 |
|----|-------------------------------------------------------------------------------------------------------|----|----|---------------------|----|-----|-----|

|    |                                                                                                                          |    |    |                     |    |     |      |
|----|--------------------------------------------------------------------------------------------------------------------------|----|----|---------------------|----|-----|------|
| 30 | Resettlement and rehabilitation of people; its problems and concerns,                                                    | T1 | 30 | Chalk and Talk, PPT | L2 | CO4 | PO2  |
| 31 | Rain water harvesting, watershed management, Environmental ethics:                                                       | T1 | 31 | Chalk and Talk, PPT | L2 | CO4 | PO6  |
| 32 | Ozone layer depletion, nuclear accidents and holocaust, case studies. Wasteland reclamation                              | T1 | 32 | Chalk and Talk, PPT | L2 | CO4 | PO7  |
| 33 | Consumerism and waste products                                                                                           | T1 | 33 | Chalk and Talk, PPT | L2 | CO4 | PO9  |
| 34 | Air act (Prevention and control of pollution) – Wildlife protection act Forest conservation                              | T1 | 34 | Chalk and Talk, PPT | L3 | CO4 | PO12 |
| 35 | Water act, Environmental protection act                                                                                  | T1 | 35 | Chalk and Talk, PPT | L3 | CO4 | PO12 |
| 36 | Enforcement machinery involved in environmental legislation- central and state pollution control boards-public awareness | T1 | 36 | Chalk and Talk, PPT | L3 | CO4 | PO1  |
| 37 | Enforcement machinery involved in environmental legislation- central and state pollution control boards-public awareness | T1 | 37 | Chalk and Talk, PPT | L3 | CO4 | PO2  |
| 38 | case studies – role of non-governmental organization, Issues and possible solutions –                                    | T1 | 38 | Chalk and Talk, PPT | L3 | CO4 | PO12 |
| 39 | climate change, global warning, acid rain                                                                                | T1 | 39 | Chalk and Talk, PPT | L2 | CO4 | PO12 |

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**Evaluation method**

## **UNIT V : HUMAN POPULATION AND THE ENVIRONMENT**

|    |                                                                                |    |    |                     |    |     |      |
|----|--------------------------------------------------------------------------------|----|----|---------------------|----|-----|------|
| 40 | Population growth, variation among nations – population explosion              | T1 | 40 | Chalk and Talk, PPT | L1 | CO5 | PO1  |
| 41 | Family welfare programme – environment and human health                        | T1 | 41 | Chalk and Talk, PPT | L2 | CO5 | PO2  |
| 42 | Human rights – value education                                                 | T1 | 42 | Chalk and Talk, PPT | L2 | CO5 | PO6  |
| 43 | HIV / AIDS                                                                     | T1 | 43 | Chalk and Talk, PPT | L2 | CO5 | PO7  |
| 44 | Women and child welfare                                                        | T1 | 44 | Chalk and Talk, PPT | L2 | CO5 | PO8  |
| 45 | Role of information technology in environment and human health – Case studies. | T1 | 45 | Chalk and Talk, PPT | L3 | CO5 | PO12 |

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**Evaluation method**

### **Content Beyond the Syllabus Planned**

|   |  |
|---|--|
| 1 |  |
| 2 |  |

### **Text Books**

|   |                                                                                                                  |
|---|------------------------------------------------------------------------------------------------------------------|
| 1 | Dr.A.Ravikrishnan., Environmental Science and Engineering-20th edition, Hitech Publishing Pvt., Ltd, 2016        |
| 2 | Gilbert M.Masters, „Introduction to Environmental Engineering and Science“, 2nd edition, Pearson Education, 2004 |
| 3 | Benny Joseph, „Environmental Science and Engineering“, Tata McGraw Hill, New Delhi, 2006.                        |

### **Reference Books**

|   |                                                                                                                           |
|---|---------------------------------------------------------------------------------------------------------------------------|
| 1 | Trivedi R.K. „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 Publishing House, Mumbai, 2001.                |
| 3 | Dharmendra S. Sengar, „Environmental law“, Prentice hall of India PVT LTD, New Delhi, 2007.                               |

### **Website / URL References**

|   |                                                                                                                                                                                                                       |
|---|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | <a href="https://easyengineering.net/ge8291-environmental-science-and-engineering/">https://easyengineering.net/ge8291-environmental-science-and-engineering/</a>                                                     |
| 2 | <a href="https://studentsfocus.com/ge8291-ese-notes-environmental-science-and-engineering-notes-ece-4th-sem/">https://studentsfocus.com/ge8291-ese-notes-environmental-science-and-engineering-notes-ece-4th-sem/</a> |

|                                                                                         |                                                                                                                                                       |            |     |     |                      |            |                           |                |     |      |      |                       |                          |       |
|-----------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|------------|-----|-----|----------------------|------------|---------------------------|----------------|-----|------|------|-----------------------|--------------------------|-------|
| 3                                                                                       | <a href="https://padeepz.net/ge8291-notes-environmental-science-engineering/">https://padeepz.net/ge8291-notes-environmental-science-engineering/</a> |            |     |     |                      |            |                           |                |     |      |      |                       |                          |       |
| Blooms Level                                                                            |                                                                                                                                                       |            |     |     |                      |            |                           |                |     |      |      |                       |                          |       |
| Level 1 ( L1 ) : Remembering<br>Level 2 (L2) : Understanding<br>Level 3 (L3) : Applying |                                                                                                                                                       |            |     |     | Lower Order Thinking | Fixed Hour | Level 4 (L4) : Analysing  |                |     |      |      | Higher Order Thinking | Projects / Mini Projects |       |
|                                                                                         |                                                                                                                                                       |            |     |     |                      |            | Level 5 (L5) : Evaluating |                |     |      |      |                       |                          |       |
|                                                                                         |                                                                                                                                                       |            |     |     |                      |            | Level 6 (L6) : Creating   |                |     |      |      |                       |                          |       |
| Mapping syllabus with Bloom's Taxonomy LOT and HOT                                      |                                                                                                                                                       |            |     |     |                      |            |                           |                |     |      |      |                       |                          |       |
| Unit No                                                                                 | Unit Name                                                                                                                                             |            |     |     |                      | L1         | L2                        | L3             | L4  | L5   | L6   | LOT                   | HOT                      | Total |
| Unit 1                                                                                  | ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY                                                                                                              |            |     |     |                      | 5          | 3                         | 2              | 0   | 0    | 0    | 10                    | 0                        | 10    |
| Unit 2                                                                                  | Environmental pollution                                                                                                                               |            |     |     |                      | 0          | 7                         | 0              | 0   | 0    | 0    | 7                     | 0                        | 7     |
| Unit 3                                                                                  | Natural Resources                                                                                                                                     |            |     |     |                      | 2          | 6                         | 1              | 0   | 0    | 0    | 9                     | 0                        | 9     |
| Unit 4                                                                                  | Social Issues and Its Environment                                                                                                                     |            |     |     |                      | 1          | 6                         | 5              | 0   | 0    | 0    | 12                    | 0                        | 12    |
| Unit 5                                                                                  | Human Polupation and its Environme                                                                                                                    |            |     |     |                      | 1          | 4                         | 1              | 0   | 0    | 0    | 6                     | 0                        | 6     |
| Total                                                                                   |                                                                                                                                                       |            |     |     |                      | 9          | 26                        | 9              | 0   | 0    | 0    | 44                    | 0                        | 44    |
| Total Percentage                                                                        |                                                                                                                                                       |            |     |     |                      | 20.5       | 59.1                      | 20.455         | 0   | 0    | 0    | 100                   | 0                        | 100   |
| CO PO Mapping                                                                           |                                                                                                                                                       |            |     |     |                      |            |                           |                |     |      |      |                       |                          |       |
|                                                                                         | PO1                                                                                                                                                   | PO2        | PO3 | PO4 | PO5                  | PO6        | PO7                       | PO8            | PO9 | PO10 | PO11 | PO12                  | PSO1                     | PSO2  |
| CO1                                                                                     | 3                                                                                                                                                     | 2          | 0   | 0   | 0                    | 1          | 1                         | 1              | 0   | 0    | 0    | 2                     | 0                        | 0     |
| CO2                                                                                     | 2                                                                                                                                                     | 2          | 0   | 0   | 0                    | 1          | 1                         | 0              | 2   | 0    | 0    | 2                     | 0                        | 0     |
| CO3                                                                                     | 3                                                                                                                                                     | 3          | 0   | 0   | 0                    | 1          | 1                         | 0              | 1   | 0    | 0    | 2                     | 0                        | 0     |
| CO4                                                                                     | 2                                                                                                                                                     | 2          | 0   | 0   | 0                    | 1          | 1                         | 0              | 1   | 0    | 0    | 3                     | 0                        | 0     |
| CO5                                                                                     | 2                                                                                                                                                     | 2          | 0   | 0   | 0                    | 1          | 1                         | 1              | 0   | 0    | 0    | 2                     | 0                        | 0     |
| Avg                                                                                     | 2.4                                                                                                                                                   | 2.4        | 0   | 0   | 0                    | 1          | 1                         | 1              | 1.5 | 0    | 0    | 2.2                   | 0                        | 0     |
| Justification for CO-PO mapping                                                         |                                                                                                                                                       |            |     |     |                      |            |                           |                |     |      |      |                       |                          |       |
| CO1                                                                                     | • Ability to apply knowledge of environmental science for creativity and product designing in engineering and technology.                             |            |     |     |                      |            |                           |                |     |      |      |                       |                          |       |
| CO2                                                                                     | • Ability to recognize the need for to engage in lifelong learning and to understand the professional and ethical responsibilities.                   |            |     |     |                      |            |                           |                |     |      |      |                       |                          |       |
| CO3                                                                                     | • Ability to produce human capital who will be a responsible citizen, besides excelling in his/her own domain.                                        |            |     |     |                      |            |                           |                |     |      |      |                       |                          |       |
| CO4                                                                                     | • Ability to participate and succeed in competitive examinations like GATE, GRE etc. and also in other professional examinations at various levels.   |            |     |     |                      |            |                           |                |     |      |      |                       |                          |       |
| CO5                                                                                     | • Ability to produce a complete technocrat who is socially aware with adequate knowledge of his/her surroundings.                                     |            |     |     |                      |            |                           |                |     |      |      |                       |                          |       |
| 3                                                                                       |                                                                                                                                                       | High level |     |     | 2                    |            |                           | Moderate level |     |      | 1    |                       | Low level                |       |
| Name & Sign of Faculty Incharge : Dr. A. Balakrishnan, Dr. B. Devi Bala                 |                                                                                                                                                       |            |     |     |                      |            |                           |                |     |      |      |                       |                          |       |
| Name & Sign of Subject Expert : Dr. A. Balakrishnan                                     |                                                                                                                                                       |            |     |     |                      |            |                           |                |     |      |      |                       |                          |       |
| Head of the Department : Dr. A. Balakrishnan                                            |                                                                                                                                                       |            |     |     |                      |            |                           |                |     |      |      |                       |                          |       |