

Sanjay Ghodawat University

Kolhapur



School of Engineering & Technology
Department of Civil Engineering

Minor offered Civil Engineering

Programme Structure and Course Contents

Academic Year 2024 -25



Sanjay Ghodawat University, Kolhapur

Established as a State Private University under Govt. of Maharashtra Act no. XL dated 3rd May 2017

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Programme structure for B. Tech. Civil Engineering Multi Disciplinary Minor

| Minor in Infrastructure Engineering | | | | |
|-------------------------------------|-------|----------|---|---------|
| Minor | Sr.No | Code | Title of the Course | Credits |
| I | 1. | U13MM011 | Project Appraisal | 2 |
| II | 2. | U13MM012 | Remote sensing and GIS Technics | 2 |
| III | 3. | U13MM013 | Structural Audits | 2 |
| IV | 4. | U13MM014 | Repair and Rehabilitation of Structures | 2 |
| V | 5. | U13MM015 | Legal Aspects in Civil Engineering | 2 |
| VI | 6. | U13MM016 | Advanced Construction Materials | 2 |

| Multidisciplinary Minor in Environmental Engineering | | | | |
|--|-------|----------|-----------------------------------|---------|
| Minor | Sr.No | Code | Title of the Course | Credits |
| I | 1. | U13MM021 | Air Pollution& Control | 2 |
| II | 2. | U13MM022 | Solid Waste Management | 2 |
| III | 3. | U13MM023 | Noise Pollution& Control | 2 |
| IV | 4. | U13MM024 | Water Conservation and Management | 2 |
| V | 5. | U13MM025 | Environmental Impact Assessment | 2 |
| VI | 6. | U13MM026 | Sustainable Development | 2 |

| Multidisciplinary Minor in Environmental Engineering | | | | |
|--|-------|----------|--------------------------------------|---------|
| Minor | Sr.No | Code | Title of the Course | Credits |
| I | 1. | U13MM061 | Air Pollution& Control | 2 |
| II | 1. | U13MM062 | Solid Waste Management | 3 |
| | 2. | U13MM066 | Solid Waste ManagementLab | 1 |
| III | 1. | U13MM063 | Noise Pollution& Control | 3 |
| | 2. | U13MM067 | Noise Pollution& ControlLab | 1 |
| IV | 1. | U13MM064 | Water Conservation and Management | 3 |
| | 2. | U13MM068 | Water Conservation and ManagementLab | 1 |
| V | 1. | U13MM065 | Environmental Impact Assessment | 3 |
| | 2. | U13MM069 | Environmental Impact Assessment Lab | 1 |



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| Minor in Infrastructure Engineering | | | | |
|--|--------------|-------------|---|----------------|
| Minor | Sr.No | Code | Title of the Course | Credits |
| I | 1. | U13MM011 | Project Appraisal | 2 |
| II | 2. | U13MM012 | Remote sensing and GIS Technics | 2 |
| III | 3. | U13MM013 | Structural Audits | 2 |
| IV | 4. | U13MM014 | Repair and Rehabilitation of Structures | 2 |
| V | 5. | U13MM015 | Legal Aspects in Civil Engineering | 2 |
| VI | 6. | U13MM016 | Advanced Construction Materials | 2 |



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| se Code | Course Name | Teaching Scheme (Hr/week) | | | Credits Assigned | | |
|----------|-------------------|---------------------------|-----------|----------|------------------|-----------|----------|
| | | Theory | Practical | Tutorial | Theory | Practical | Tutorial |
| U13MM011 | Project Appraisal | 02 | 00 | - | 02 | -- | - |

Evaluation Scheme

| Course Code | Course Name | Evaluation Scheme (In Semester) | | | | | End Semester Exam (ESE) | | |
|-------------|-------------------|---------------------------------|----|-----|-------|----------|-------------------------|----------|---------------|
| | | T1 | T2 | FET | Total | Min pass | Marks | Min pass | Total (Marks) |
| U13MM011 | Project Appraisal | 10 | - | 5 | 15 | 40% | 35 | 40% | 50 |

Course Description

To explain identification of a project, feasibility analysis including market, technical and financial appraisal of a project. Understand the relevance of alternative project appraisal techniques, financial structuring and financing alternatives. This course intends to involve students to apply appraisal techniques for evaluating live projects.

Pre-requisites: -

Course Objectives:

- Understand the method of cash flow in the projects.
- Explain the project appraisal & achieve the ultimate aim of profit
- Understand requirement and source of finance to carry out the project
- Decide feasibility of infrastructure project

Course Outcomes: After the successful completion of the course students will able to:

- **CO1** Explain the method of cash flow in the projects
- **CO2** Discuss the project appraisal & achieve the ultimate aim of profit
- **CO3** Demonstrate about the requirement and source of finance to carry out the project and financial institutions
- **CO4** Decide feasibility of infrastructure project



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Course Contents

| Module | Unit | Description | Hours |
|------------|------|---|----------|
| 1.0 | | Introduction | 6 |
| 1 | 1.1 | Identification of needs, present availability, Project cycle, alternatives and their comparative study, Project identification and formulation | |
| | 1.2 | Private and Public sector Projects; Identification of investment opportunities – industry analysis review of project profiles, feasibility study | |
| 2.0 | | Market Analysis | 6 |
| 2 | 2.1 | Market analysis of a project, need for market analysis, Demand and supply analysis, primary /secondary data, forecasting techniques | |
| | 2.2 | Technical appraisal of a project, project location resource requirement and their fulfillment technology, know how requirements technical study of alternatives and their suitability | |
| 3.0 | | Financial analysis | 6 |
| 3 | 3 | Investment criteria -compounding and discounting, Investment and capital outlay cash flow of the project and its significance profit, Probability and break-even analysis, internal rate of return, shadow pricing benefit cost ratio, influence of inflation on profitability. | |
| 4.0 | | Social cost benefit analysis and Risk Analysis | 8 |
| 4 | 4.1 | Objectives, direct – indirect costs and benefits – tangibles, intangibles and their conversion, levy subsidy concepts. | |
| | 4.2 | Risk analysis, Project Assessment under risk and uncertainty, sensitivity analysis, application of decision tree analysis and game theory Application Monte Carlo Simulation techniques. | |
| 5.0 | | Project administration | 6 |
| 5 | 5.1 | Organization and control during execution, period maintenance and care taker operational set up, project management after completion. Preparation of project report contents and importance of project report | |

Text Books

1. Machiraju, H.R.: Introduction to Project Finance, Vikas Publishing House
2. Prasanna Chandra: Project Preparation Appraisal Budgeting and Implementation, Tata McGraw.

References

1. Kohli, K. N (1993). Economic analysis of investment projects: a practical approach. Oxford University Press.
2. Hanley, N and Spash, C (1993). Cost Benefit Analysis and the Environment. Edward Elgar. Cambridge University Press.



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3. Curry, S and Weiss, J. (2002) Project Analysis in Developing Countries. The Macmillan Press Ltd.
4. Joy. P.K, "Total Project Management - The Indian Context", New Delhi, Macmillan India Ltd., 2007.

Internal Assessment (T1, T2 and FET)

1. T2 should be based on First to Fourth modules, for 10 marks.
2. FET shall be assessed for 5 marks separately.

End Semester Examination

1. Question paper will be of 35 marks comprise of 5 questions, each carrying 7 marks
2. The duration of end semester examination shall be Two hours.
3. The students need to solve all questions.
4. Question No.1 will be compulsory and based on entire syllabus.
5. Remaining question (Q.2 to Q.5) will be selected from all the modules.



| se Code | Course Name | Teaching Scheme (Hr/week) | | | Credits Assigned | | |
|----------|---------------------------------|---------------------------|-----------|----------|------------------|-----------|----------|
| | | Theory | Practical | Tutorial | Theory | Practical | Tutorial |
| U13MM012 | Remote sensing and GIS Technics | 02 | 00 | - | 02 | -- | - |

Evaluation Scheme

| Course Code | Course Name | Evaluation Scheme (In Semester) | | | | | End Semester Exam (ESE) | | |
|-------------|---------------------------------|---------------------------------|----|-----|-------|----------|-------------------------|----------|---------------|
| | | T1 | T2 | FET | Total | Min pass | Marks | Min pass | Total (Marks) |
| U13MM012 | Remote sensing and GIS Technics | 10 | - | 5 | 15 | 40% | 35 | 40% | 50 |

Course Description: This course will introduce the students to the state-of-the-art concepts and practices of remote sensing and GIS. It starts with the fundamentals of remote sensing and GIS and subsequently advanced methods will be covered. This course is designed to give comprehensive understanding on the application of remote sensing and GIS in solving the research problems. Upon completion, the participants should be able to use remote sensing (Satellite images and Field data) and GIS in their future research work.

Pre-requisites: Basic Civil and Mechanical Engineering, Engineering Mechanics

Course Objectives:

- Understand the principles of physics of Electromagnetic radiation as applied to remote sensing.
- Learn the interrelationship of civil, environmental and geological studies.
- Understand remote sensing and GIS concepts to engineering problems.

Course Outcomes: After the successful completion of the course students will able to:

- **CO1** Adopt the principles of physics of Electromagnetic radiation as applied to remote sensing
- **CO2** Apply the interrelationship of civil, environmental and geological studies.
- **CO3** Formulate and apply remote sensing and GIS concepts to engineering problems.

Course Contents

| Module | Unit | Description | Hours |
|------------|------|---|----------|
| 1.0 | | Introduction | 6 |
| 1 | 1.1 | Introduction Definition, History, Types of satellites based upon uses, Programs of different countries, India's position, etc. Scope - Various fields of applications, Users in India, Data requirements of users. Topo | |



| | | | |
|------------|-----|---|----------|
| | | sheets, Evolution of G.I.S. Technology | |
| 2.0 | | Space System | 6 |
| 2 | 2.1 | Technique of aerial photography, Photographic flight mission, Factors influencing flight mission, Numbering, scale and measurement of aerial photographs, mosaic of aerial photographs, introduction of mirror stereoscope Remote Sensing Technique of satellite imaging - Important units of satellite and functioning of satellite, height, and coverage. Stages in remote sensing, | 6 |
| | 2.2 | Electromagnetic radiation, and electromagnetic spectrum, Interaction of electromagnetic radiation with atmosphere and earth surface. Sensors, Types of Resolutions used in remote sensing. Introduction to the application of computer in analysis of satellite images, Digital Image processing. | |
| 3.0 | | Geomorphology | 6 |
| 3 | 3.1 | Geomorphology: Geomorphology and its scope in photo interpretation as well as in engineering, Drainage analysis, Drainage patterns, Drainage density and Drainage frequency. Geomorphologic aspects for water resources studies | 6 |
| | 3.2 | Fundamentals of GIS, Definition, Components, Types of data inputs in GIS, spatial data, thematic characteristics, rasters and vectors, Databases and database management | |
| 4.0 | | Application of RS and G.I.S in Civil Engineering | 8 |
| 4 | 4.1 | Study and selection of site or hydraulic structures, Application in urban planning. Use in Landslide, Application in Urban Planning and transportation engineering | |
| 5.0 | | Application of RS and G.I.S in water Resources and Environmental Studies | 6 |
| 5 | 5.1 | Surface water delineation, study of floods, surface keys for subsurface water, steps in water Land use/Land cover study, Terrain analysis and soil mapping with the help of remote sensing techniques, delineating forest areas | |



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- 1) American Society of Photogrammetry Washington D. C. Manual of Photographic Interpretation. (1960) and (1975)
- 2) Remote Sensing, Principles and Interpretation –F. F. Sabins, W. H. Freeman &co.
- 3) Principles of Geomorphology – W. D. Thornbury – John Wiley and Sons, INC. G.I.S- Anji Reddy , publishers- MGH
- 4) Remote sensing in Civil Engineering – T. J. M. Kennie and M. C. Mathews, Surry University press, London.
- 5) Remote Sensing and Image Interpretation- Thomas M. Liillesand and R.W. Kiefer, Wiley & Sons Insc.
- 6) Principles of Remote Sensing- P.N.Patel and Surendra Singh, Scientific Publishers, Jodhapur.
- 7) Text book on Remote Sensing –C.S.Agrawal and P.K.Garg,Wheeler Publishing, New-Delhi.
- 8) Introduction to geomatics –QGIS user guide – Mr.C.V. Nishinkanth, Mrs.AnnuNishinkanth, Dr S S Vasudevan, Dr P Ramkumar, Publishers

Internal Assessment (T1, T2 and FET)

1. T2 should be based on First to Fourth modules, for 10 marks.
2. FET shall be assessed for 5 marks separately.

End Semester Examination

1. Question paper will be of 35 marks comprise of 5 questions, each carrying 7 marks
2. The duration of end semester examination shall be Two hours.
3. The students need to solve all questions.
4. Question No.1 will be compulsory and based on entire syllabus.
5. Remaining question (Q.2 to Q.5) will be selected from all the modules.



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| Multidisciplinary Minor in Environmental Engineering | | | | |
|---|--------------|-------------|-----------------------------------|----------------|
| Minor | Sr.No | Code | Title of the Course | Credits |
| I | 1. | U13MM021 | Air Pollution& Control | 2 |
| II | 2. | U13MM022 | Solid Waste Management | 2 |
| III | 3. | U13MM023 | Noise Pollution& Control | 2 |
| IV | 4. | U13MM024 | Water Conservation and Management | 2 |
| V | 5. | U13MM025 | Environmental Impact Assessment | 2 |
| VI | 6. | U13MM026 | Sustainable Development | 2 |



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| Course code | Course name | Teaching Scheme (Hr/week) | | | Credits Assigned | | |
|-------------|-------------------------|------------------------------|-----------|----------|------------------|-----------|----------|
| | | Theory | Practical | Tutorial | Theory | Practical | Tutorial |
| U13MM021 | Air Pollution & Control | 02 | - | - | 02 | - | - |

Evaluation Scheme

| Course Code | Course Name | Evaluation Scheme (In Semester) | | | | | End Semester Exam (ESE) | | |
|-------------|-------------------------|---------------------------------|----|-----|-------|----------|-------------------------|----------|---------------|
| | | T1 | T2 | FET | Total | Min pass | Marks | Min pass | Total (Marks) |
| U13MM021 | Air Pollution & Control | - | 10 | 5 | 15 | 40% | 35 | 40% | 50 |

Pre-requisites: Elements of Civil Engineering.

Course Description:

It introduces the sources of air pollution, physical and chemical behavior of pollutants, the effects of air pollutants on human beings and environment and dispersion in the atmosphere. Also, it covers legislation and regulation; control technologies and future trends toward preventing air pollution.

Course Objectives:

1. Study the current situation with respect to air pollution at national and international levels
2. Learn dispersion of air pollutants and role of meteorological parameters
3. Study the mechanisms and design of control equipment's for air pollutants.
4. Learn the policies and measures for control of air pollution at national and international levels

Course Outcomes: after the end of this course students will able to

CO1 Study the current situation with respect to air pollution at national and international levels

CO2 Learn dispersion of air pollutants and role of meteorological parameters

CO3 Study the mechanisms and design of control equipment's for air pollutants

CO4 Learn the policies and measures for control of air pollution at national and international levels



| Module | Unit | Description | Hours |
|------------|------|---|-------|
| 1.0 | | Introduction to Air pollution | |
| 1 | 1.1 | Current scenario of air pollution at national and global scales, Sources and types air pollutants, criteria air pollutants and their effects, Ambient air quality standards | 6 |
| 2.0 | | Disaster Management Cycle and Framework | |
| 2 | 2.1 | Structure and composition of atmosphere, Wind circulation, Wind rose diagram, Lapse rates, Stability of atmosphere, Inversion and its types, Plume behavior, Maximum Mixing Depth, Cyclones and anticyclones, Precipitation and its relation to removal of air pollutants | 6 |
| 3.0 | | Dispersion of Air Pollutants | |
| 3 | 3.1 | Air quality dispersion models, Gaussian dispersion model for point sources and line sources, applications and limitations of Gaussian model, plume rise- causes and significance, Formulas for estimation of Plume Rise, Plume down wash, Stability classes, Box model , Street canyon model, Introduction to AERMOD and other soft wares | 6 |
| 4.0 | | Air Quality management and Control of Particulate Matter | |
| 4 | 4.1 | Control of air pollution from stationary and mobile sources, measures for effective control of air pollution in India, , Alternative fuels, Air quality index, National Air Quality Monitoring Program, Legislative measures, International treaties for control and mitigation of air pollution | 6 |
| | 4.2 | Sources of SPM, Terminal settling velocity, Particulate removal mechanisms, study of working principle and design of Particulate Control Equipments : - Gravity settling chamber, Cyclone separator, Fabric filters, Electrostatic precipitator, Wet collectors, removal efficiency- block flow and mixed flow | |
| 5.0 | | Air Quality management | |
| 5 | 5.1 | Control of air pollution from stationary and mobile sources, measures for effective control of air pollution in India, , Alternative fuels, Air quality index, | 6 |



| | | |
|--|---|--|
| | National Air Quality Monitoring Program, Legislative measures, International treaties for control and mitigation of air pollution | |
|--|---|--|

Text Books

1. K. Wark, C.F. Warner and W.T. Davis Air Pollution Control: its Origin and Control, Addison-Wesley, (1998).
2. Stern A.C., —Air Pollution Vol. I and III, Allied Publishers Limited, 1st Edition, 1994.
3. Nevers N., "Air Pollution control Engineering" McGraw-Hill, New York, 2nd edition, 1995

References

1. Martin Crawford, —Air Pollution and Control, Tata McGraw Hill Publication, 1st Edition, 1976
2. Air Pollution and Control Technologies by Anjaneyulu, D|, Allied Publishers, Mumbai, 2002
3. Environmental Pollution Control Engineering by Rao, C.S., Wiley Eastern Ltd., New Delhi, 1996
4. Environmental Engineering by Peavy S.W., Rowe D.R. and Tchobanoglous G, McGraw Hill, New Delhi, 1985

- Internal Assessment (T1, T2 and FET):

1. T2 should be based on First to Fourth modules, for 10 marks each.
2. FET shall be assessed for 5 marks separately.

- End Semester Examination:

1. Question paper will comprise of 5 questions, each carrying 07 marks.
2. The duration of end semester examination shall be two hours.
3. The students need to solve all 5 questions.
4. Question No.1 will be compulsory and based on entire syllabus.
5. Remaining question (Q.2 to Q.5) will be selected from all the modules.



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| Course code | Course name | Teaching Scheme (Hr/week) | | | Credits Assigned | | |
|-------------|------------------------|------------------------------|-----------|----------|------------------|-----------|----------|
| | | Theory | Practical | Tutorial | Theory | Practical | Tutorial |
| U13MM022 | Solid Waste Management | 02 | - | - | 02 | - | - |
| | | | | | | | |

Evaluation Scheme

| Course Code | Course Name | Evaluation Scheme (In Semester) | | | | | End Semester Exam (ESE) | | |
|-------------|------------------------|---------------------------------|----|-----|-------|----------|-------------------------|----------|---------------|
| | | T1 | T2 | FET | Total | Min pass | Marks | Min pass | Total (Marks) |
| U13MM022 | Solid Waste Management | - | 10 | 5 | 15 | 40% | 35 | 40% | 50 |
| | | | | | | | | | |

Pre-requisites: Elements of Civil Engineering.

Course Description:

Understanding importance of waste management is need of current scenario. After studying the course students will know problems related to waste management and will be able to grasp an overview of municipal solid waste, industrial waste and hazardous waste management. Students will be able to explain planning and engineering principles needed to address the growing and increasing problems of refuse. Students will understand different treatment technologies for waste to energy and disposal options. Students will be able to describe various legislations in waste management

Course Objectives:

1. Understand importance of waste management for sustainable development.
2. Know consequences of various types of pollutions, and effects of it on human health, socio economic problems, climate and marine environment.
3. Know utilization of waste effectively by applying waste to energy concept

Course Outcomes: after the end of this course students will able to

CO1 Discuss various sources, types, classification of solid waste, importance of waste management, waste suitable for energy production etc.

CO2 Explain waste generation, storage, collection, separation, transportation and processing of waste.



CO3 Describe characteristics of solid waste and different treatment methods to recover energy from waste, densification of solids.

CO4 Grasp various legislations in waste management and integrated waste management system.

Course Contents

| Module | Unit | Description | Hours |
|------------|------|---|-------|
| 1.0 | | Introduction | |
| 1 | 1.1 | Definition of waste and importance of waste management, classification and types of solid waste, Important quality parameters of wastes, Waste suitable for energy production. | 6 |
| 2.0 | | Elements of waste management system | |
| 2 | 2.1 | Waste generation, storage, collection, segregation and processing, transfer and transport, disposal methods of waste | 6 |
| 3.0 | | Characterization of wastes and Waste to Energy Technologies | |
| 3 | 3.1 | Characterization of solid wastes- Physical, Chemical, Proximate analysis, Leaching properties, Energy content, Heating value. | 6 |
| | 3.2 | Need of energy production from wastes, Routes of energy production from waste | |
| 4.0 | | Energy production from Organic Waste, Plastic | |
| 4 | 4.1 | Energy production from Organic Waste- Composting, Vermicomposting, Anaerobic digestion and biogas production from organic waste, anaerobic digester and types. | 6 |
| | 4.2 | Energy production from Plastic- Plastic waste generation and need for proper management of plastic, classification of plastic, various types of plastics and suitability for energy production, common steps for converting waste plastic to fuels. | |
| | 4.3 | Densification of solids- Fundamentals of densification, types of briquetting, Briquetting process and their comparison, Briquette characteristics, application of briquettes | |



| 5.0 | | Integrated Solid Waste Management (ISWM) and Legislations in Waste Management | |
|-----|-----|--|---|
| 5 | 5.1 | Integrated solid waste management, Principles of waste hierarchy, waste prevention and reduction, reuse, recycling. Swachh Bharat Abhiyan | 6 |
| | 5.2 | Legislations in Waste Management: Solid Waste Management Rules 2016, Hazardous and Other Wastes (Management and Transboundary movement) Rules, 2016, Plastic Waste Management Rules 2016, Extended Producer's Responsibility | |

Text Books

- 1 Tchobanoglous, G. and Kreith, F., HANDBOOK OF SOLID WASTE MANAGEMENT, McGraw Hill, 2002, 2nd Edition
- 2 Tchobanoglous, G., Theisen and Vigil, Integrated Solid Waste Management: Engineering Principles and Management Issues, McGraw Hill, 1993.
- 3 Ni –Bin Chang., Sustainable solid waste management: A Systems Engineering Approach Somerset: Wiley 1st ed, 2015

References

1. Municipal Solid Waste Management Manual, 2016 by CPHEEO
2. Christensen, H. T., Solid Waste Technology & Management, Wiley, 2010, Volume 1 & 2
3. Nicholasp P. Cheremisinoff., Handbook of Solid Waste Management and Waste Minimization Technologies, Butterworth Heinemann an imprint of Elsevier Science



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- Internal Assessment (T1, T2 and FET):
 3. T2 should be based on First to Fourth modules, for 10 marks each.
 4. FET shall be assessed for 5 marks separately.
- End Semester Examination:
 6. Question paper will comprise of 5 questions, each carrying 07 marks.
 7. The duration of end semester examination shall be two hours.
 8. The students need to solve all 5 questions.
 9. Question No.1 will be compulsory and based on entire syllabus.
 10. Remaining question (Q.2 to Q.5) will be selected from all the modules.



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| Course code | Course name | Teaching Scheme (Hr/week) | | | Credits Assigned | | |
|-------------|---------------------------|------------------------------|-----------|----------|------------------|-----------|----------|
| | | Theory | Practical | Tutorial | Theory | Practical | Tutorial |
| U13MM023 | Noise Pollution & Control | 02 | - | - | 02 | - | - |
| | | | | | | | |

Evaluation Scheme

| Course Code | Course Name | Evaluation Scheme (In Semester) | | | | | End Semester Exam (ESE) | | |
|-------------|---------------------------|---------------------------------|----|-----|-------|----------|-------------------------|----------|---------------|
| | | T1 | T2 | FET | Total | Min pass | Marks | Min pass | Total (Marks) |
| U13MM023 | Noise Pollution & Control | - | 10 | 5 | 15 | 40% | 35 | 40% | 50 |
| | | | | | | | | | |

Pre-requisites: Elements of Civil Engineering.

Course Description:

This course is intended to make students aware about the sources of noise, measurement. Various effects, health monitoring with respect to noise, legal provisions as well as various engineering measures for control of noise.

Course Objectives:

1. Study the sources and effects of noise
2. Learn measurement and propagation of noise
3. Study the various techniques for control of noise in community and industries
4. Understand the legal provisions for control of noise.

Course Outcomes:

CO1 Explain propagation and various effects of noise

CO2 Develop various indices for noise monitoring data

CO3 Select various control measures for noise in industry and community

CO4 Compare the measured levels to legal compliance



| Module | Unit | Description | Hours |
|------------|------|---|-------|
| 1.0 | | Sound Transmission and measurement | |
| 1 | 1.1 | Sound- characteristics, Sound transmission and Characteristics of sound wave, Measurement of sound with respect to sound pressure, Sound power and sound intensity, Units of measurement, Sound Level Meter, Factors influencing sound transmission in outdoor atmosphere | 6 |
| 2.0 | | Sources and effects of Noise | |
| 2 | 2.1 | Definition of noise, Sound Vs. Noise, Sources of noise and classification, Infrasonic and ultrasonic sound, Threshold of hearing, Threshold of pain, Anatomy of human ear and mechanism of hearing, Effects of noise - effects on human health, auditory effects, physiological and psychological effects, effects on animals, effects on wild life, effects on plants, effects on structures | 6 |
| 3.0 | | Community noise | |
| 3 | 3.1 | Sources and characteristics of community noise, nuisance of noise in India, Common noise levels, Measurement of community noise, Equivalent noise, Average Day and Night noise, Noise Pollution Levels, Noise Percentile | 6 |
| 4.0 | | Industrial noise | |
| 4 | 4.1 | Types, sources and characteristics of industrial noise, Noise levels generated in various industrial operations, Measurement of industrial noise, OSHA exposure standards, Exposure measurement, Use of Dose meter, Health Monitoring, Procedure of Audiometric testing, Interpretation of Noise Induced Hearing Loss from audiogram | 6 |



| 5.0 | | Control of noise and Legal Provision for Control of noise | |
|-----|-----|--|---|
| 5 | 5.1 | Engineering control of noise, noise reduction at source, acoustical absorbing devices, Enclosure, barrier, Various types of mufflers, Reduction at receiving end, Active Noise Reduction, Administrative control of noise, Personal Protective Equipments for noise, Strategy for control of noise, Control of community noise, Frequency analyzer and octave band analysis, Noise mapping and its applications. | 6 |
| | 5.2 | Legal provisions for control of noise under Noise Pollution (Regulation and Control) Rules, 2000 and its amendments, Local Bye-laws regarding noise pollution control, Case studies in India and abroad | |

Text Books

- 1 Noise Pollution and Control Strategy by S.P. Singhal, Narosa Publishing House, 2005
- 2 Noise Pollution – S.K.Agrawal- APH Publishing corporation, New Delhi. 2009

References

1. Handbook of Environmental management and technology by Gwendolyn Holmes, Ben Ramnasiaue Singh and Louis Theodore (A Wiley – Enter science publication)
2. Standard Hand book of Environmental Engineering by Robert A. Corbett (McGraw Hill Inc.)
3. Industrial Pollution by N. Irving Sax (Van Nostrand Reinhold Company)
4. Environmental issues and programme by I. Mohan (Ashish publishing house)
5. Environmental Engineering by G.N.Pandey and G.C. Carney (Tata McGraw Hill)
6. IS code for practice for noise reduction in industrial buildings IS: 3483, 1965



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- Internal Assessment (T1, T2 and FET):
 5. T2 should be based on First to Fourth modules, for 10 marks each.
 6. FET shall be assessed for 5 marks separately.
- End Semester Examination:
 11. Question paper will comprise of 5 questions, each carrying 07 marks.
 12. The duration of end semester examination shall be two hours.
 13. The students need to solve all 5 questions.
 14. Question No.1 will be compulsory and based on entire syllabus.
 15. Remaining question (Q.2 to Q.5) will be selected from all the modules.



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| Multidisciplinary Minor in Environmental Engineering | | | | |
|---|--------------|-------------|--------------------------------------|----------------|
| Minor | Sr.No | Code | Title of the Course | Credits |
| I | 1. | U13MM061 | Air Pollution& Control | 2 |
| II | 1. | U13MM062 | Solid Waste Management | 3 |
| | 2. | U13MM066 | Solid Waste ManagementLab | 1 |
| III | 1. | U13MM063 | Noise Pollution& Control | 3 |
| | 2. | U13MM067 | Noise Pollution& ControlLab | 1 |
| IV | 1. | U13MM064 | Water Conservation and Management | 3 |
| | 2. | U13MM068 | Water Conservation and ManagementLab | 1 |
| V | 1. | U13MM065 | Environmental Impact Assessment | 3 |
| | 2. | U13MM069 | Environmental Impact Assessment Lab | 1 |



| Course code | Course name | Teaching Scheme (Hr/week) | | | Credits Assigned | | |
|-------------|-------------------------|------------------------------|-----------|----------|------------------|-----------|----------|
| | | Theory | Practical | Tutorial | Theory | Practical | Tutorial |
| U13MM061 | Air Pollution & Control | 02 | - | - | 02 | - | - |

Evaluation Scheme

| Course Code | Course Name | Evaluation Scheme (In Semester) | | | | | End Semester Exam (ESE) | | |
|-------------|-------------------------|---------------------------------|----|-----|-------|----------|-------------------------|----------|---------------|
| | | T1 | T2 | FET | Total | Min pass | Marks | Min pass | Total (Marks) |
| U13MM061 | Air Pollution & Control | - | 10 | 5 | 15 | 40% | 35 | 40% | 50 |

Pre-requisites: Elements of Civil Engineering.

Course Description:

It introduces the sources of air pollution, physical and chemical behavior of pollutants, the effects of air pollutants on human beings and environment and dispersion in the atmosphere. Also, it covers legislation and regulation; control technologies and future trends toward preventing air pollution.

Course Objectives:

1. Study the current situation with respect to air pollution at national and international levels
2. Learn dispersion of air pollutants and role of meteorological parameters
3. Study the mechanisms and design of control equipment's for air pollutants.
4. Learn the policies and measures for control of air pollution at national and international levels

Course Outcomes: after the end of this course students will able to

CO1 Study the current situation with respect to air pollution at national and international levels

CO2 Learn dispersion of air pollutants and role of meteorological parameters

CO3 Study the mechanisms and design of control equipment's for air pollutants

CO4 Learn the policies and measures for control of air pollution at national and international levels

Course Contents



| Module | Unit | Description | Hours |
|------------|------|---|-------|
| 1.0 | | Introduction to Air pollution | |
| 1 | 1.1 | Current scenario of air pollution at national and global scales, Sources and types air pollutants, criteria air pollutants and their effects, Ambient air quality standards | 6 |
| 2.0 | | Disaster Management Cycle and Framework | |
| 2 | 2.1 | Structure and composition of atmosphere, Wind circulation, Wind rose diagram, Lapse rates, Stability of atmosphere, Inversion and its types, Plume behavior, Maximum Mixing Depth, Cyclones and anticyclones, Precipitation and its relation to removal of air pollutants | 6 |
| 3.0 | | Dispersion of Air Pollutants | |
| 3 | 3.1 | Air quality dispersion models, Gaussian dispersion model for point sources and line sources, applications and limitations of Gaussian model, plume rise- causes and significance, Formulas for estimation of Plume Rise, Plume down wash, Stability classes, Box model , Street canyon model, Introduction to AERMOD and other soft wares | 6 |
| 4.0 | | Air Quality management and Control of Particulate Matter | |
| 4 | 4.1 | Control of air pollution from stationary and mobile sources, measures for effective control of air pollution in India, , Alternative fuels, Air quality index, National Air Quality Monitoring Program, Legislative measures, International treaties for control and mitigation of air pollution | 6 |
| | 4.2 | Sources of SPM, Terminal settling velocity, Particulate removal mechanisms, study of working principle and design of Particulate Control Equipments : - Gravity settling chamber, Cyclone separator, Fabric filters, Electrostatic precipitator, Wet collectors, removal efficiency- block flow and mixed flow | |
| 5.0 | | Air Quality management | |
| 5 | 5.1 | Control of air pollution from stationary and mobile sources, measures for effective control of air pollution in India, , Alternative fuels, Air quality index, National Air Quality Monitoring Program, Legislative measures, International treaties for control and mitigation of air pollution | 6 |



Text Books

1. K. Wark, C.F. Warner and W.T. Davis Air Pollution Control: its Origin and Control, Addison-Wesley, (1998).
2. Stern A.C., —Air Pollution Vol. I and III, Allied Publishers Limited, 1st Edition, 1994.
3. Nevers N., "Air Pollution control Engineering" McGraw-Hill, New York, 2nd edition, 1995

References

1. Martin Crawford, —Air Pollution and Control, Tata McGraw Hill Publication, 1st Edition, 1976
2. Air Pollution and Control Technologies by Anjaneyulu, D, Allied Publishers, Mumbai, 2002
3. Environmental Pollution Control Engineering by Rao, C.S., Wiley Eastern Ltd., New Delhi, 1996
4. Environmental Engineering by Peavy S.W., Rowe D.R. and Tchobanoglous G, McGraw Hill, New Delhi, 1985

- Internal Assessment (T1, T2 and FET):

7. T2 should be based on First to Fourth modules, for 10 marks each.
8. FET shall be assessed for 5 marks separately.

- End Semester Examination:

16. Question paper will comprise of 5 questions, each carrying 07 marks.
17. The duration of end semester examination shall be two hours.
18. The students need to solve all 5 questions.
19. Question No.1 will be compulsory and based on entire syllabus.
20. Remaining question (Q.2 to Q.5) will be selected from all the modules.



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| Course code | Course name | Teaching Scheme (Hr/week) | | | Credits Assigned | | |
|-------------|------------------------|------------------------------|-----------|----------|------------------|-----------|----------|
| | | Theory | Practical | Tutorial | Theory | Practical | Tutorial |
| U13MM062 | Solid Waste Management | 02 | - | - | 02 | - | - |

Evaluation Scheme

| Course Code | Course Name | Evaluation Scheme (In Semester) | | | | | End Semester Exam (ESE) | | |
|-------------|------------------------|---------------------------------|----|-----|-------|----------|-------------------------|----------|---------------|
| | | T1 | T2 | FET | Total | Min pass | Marks | Min pass | Total (Marks) |
| U13MM062 | Solid Waste Management | - | 10 | 5 | 15 | 40% | 35 | 40% | 50 |

Pre-requisites: Elements of Civil Engineering.

Course Description:

Understanding importance of waste management is need of current scenario. After studying the course students will know problems related to waste management and will be able to grasp an overview of municipal solid waste, industrial waste and hazardous waste management. Students will be able to explain planning and engineering principles needed to address the growing and increasing problems of refuse. Students will understand different treatment technologies for waste to energy and disposal options. Students will be able to describe various legislations in waste management

Course Objectives:

1. Understand importance of waste management for sustainable development.
2. Know consequences of various types of pollutions, and effects of it on human health, socio economic problems, climate and marine environment.
3. Know utilization of waste effectively by applying waste to energy concept

Course Outcomes: after the end of this course students will able to

CO1 Discuss various sources, types, classification of solid waste, importance of waste management, waste suitable for energy production etc.

CO2 Explain waste generation, storage, collection, separation, transportation and processing of waste.



CO3 Describe characteristics of solid waste and different treatment methods to recover energy from waste, densification of solids.

CO4 Grasp various legislations in waste management and integrated waste management system.

Course Contents

| Module | Unit | Description | Hours |
|------------|------|---|-------|
| 1.0 | | Introduction | |
| 1 | 1.1 | Definition of waste and importance of waste management, classification and types of solid waste, Important quality parameters of wastes, Waste suitable for energy production. | 6 |
| 2.0 | | Elements of waste management system | |
| 2 | 2.1 | Waste generation, storage, collection, segregation and processing, transfer and transport, disposal methods of waste | 6 |
| 3.0 | | Characterization of wastes and Waste to Energy Technologies | |
| 3 | 3.1 | Characterization of solid wastes- Physical, Chemical, Proximate analysis, Leaching properties, Energy content, Heating value. | 6 |
| | 3.2 | Need of energy production from wastes, Routes of energy production from waste | |
| 4.0 | | Energy production from Organic Waste, Plastic | |
| 4 | 4.1 | Energy production from Organic Waste- Composting, Vermicomposting, Anaerobic digestion and biogas production from organic waste, anaerobic digester and types. | 6 |
| | 4.2 | Energy production from Plastic- Plastic waste generation and need for proper management of plastic, classification of plastic, various types of plastics and suitability for energy production, common steps for converting waste plastic to fuels. | |
| | 4.3 | Densification of solids- Fundamentals of densification, types of briquetting, Briquetting process and their comparison, Briquette characteristics, application of briquettes | |



| 5.0 | | Integrated Solid Waste Management (ISWM) and Legislations in Waste Management | |
|-----|-----|--|---|
| 5 | 5.1 | Integrated solid waste management, Principles of waste hierarchy, waste prevention and reduction, reuse, recycling. Swachh Bharat Abhiyan | 6 |
| | 5.2 | Legislations in Waste Management: Solid Waste Management Rules 2016, Hazardous and Other Wastes (Management and Transboundary movement) Rules, 2016, Plastic Waste Management Rules 2016, Extended Producer's Responsibility | |

Text Books

- 1 Tchobanoglous, G. and Kreith, F., HANDBOOK OF SOLID WASTE MANAGEMENT, McGraw Hill, 2002, 2nd Edition
- 2 Tchobanoglous, G., Theisen and Vigil, Integrated Solid Waste Management: Engineering Principles and Management Issues, McGraw Hill, 1993.
3. Ni –Bin Chang., Sustainable solid waste management: A Systems Engineering Approach Somerset: Wiley 1st ed, 2015

References

1. Municipal Solid Waste Management Manual, 2016 by CPHEEO
2. Christensen, H. T., Solid Waste Technology & Management, Wiley, 2010, Volume 1 & 2
3. Nicholasp P. Cheremisinoff., Handbook of Solid Waste Management and Waste Minimization Technologies, Butterworth Heinemann an imprint of Elsevier Science

- Internal Assessment (T1, T2 and FET):

9. T2 should be based on First to Fourth modules, for 10 marks each.
10. FET shall be assessed for 5 marks separately.

- End Semester Examination:

21. Question paper will comprise of 5 questions, each carrying 07 marks.
22. The duration of end semester examination shall be two hours.
23. The students need to solve all 5 questions.



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24. Question No.1 will be compulsory and based on entire syllabus.
25. Remaining question (Q.2 to Q.5) will be selected from all the modules.



U13MM063: Solid Waste Management Lab

| Course Code | Course Name | Teaching Scheme (Hr/week) | | | Credits Assigned | | |
|-------------|----------------------------|---------------------------|-----------|----------|------------------|-----------|----------|
| | | Theory | Practical | Tutorial | Theory | Practical | Tutorial |
| U13MM066 | Solid Waste Management Lab | - | 02 | - | - | 01 | - |

Evaluation Scheme

| Course Code | Course Name | In Semester Evaluation | | End Semester Exam (OE/POE) | | |
|-------------|----------------------------|------------------------|----------|----------------------------|----------|---------------|
| | | Term work | Min pass | Marks | Min pass | Total (Marks) |
| U13MM063 | Solid Waste Management Lab | 25 | 40% | - | - | 25 |

Course Outcomes: After the successful completion of the course students will able to:

- CO1** Perform experiments related to sources, types, classification of solid waste, importance of waste management, waste suitable for energy production etc.
- CO2** Analyse characteristics of solid waste and different treatment methods to recover energy from waste, densification of solids.

List of Experiments

1. Study of Composition of solid waste by Coning and Quartering method
2. Study of bulk density of solid waste
3. Determination of moisture content
4. Determination of particle size distribution
5. Determination of calorific value.
6. Determination of proximate analysis
7. Determination of Ultimate analysis

References

1. Integrated Solid Waste Management by Tchobanoglous/Theisen/Vigil; Publisher: McGraw Hill
2. CPHEEO Manual on solid Waste Management part I, II.

Evaluation Scheme

1. TERM WORK assessment shall be based on the overall performance of the student with every assignment graded from time to time.
2. The grades will be converted to marks as per 'credit and grading system' manual and should be added and averaged.
3. Based on above scheme grading and TERM WORK assessment should be done.



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U13MM023: Noise Pollution & Control

| Course code | Course name | Teaching Scheme (Hr/week) | | | Credits Assigned | | |
|-------------|---------------------------|------------------------------|-----------|----------|------------------|-----------|----------|
| | | Theory | Practical | Tutorial | Theory | Practical | Tutorial |
| U13MM063 | Noise Pollution & Control | 02 | - | - | 02 | - | - |

Evaluation Scheme

| Course Code | Course Name | Evaluation Scheme (In Semester) | | | | | End Semester Exam (ESE) | | |
|-------------|---------------------------|---------------------------------|----|-----|-------|----------|-------------------------|----------|---------------|
| | | T1 | T2 | FET | Total | Min pass | Marks | Min pass | Total (Marks) |
| U13MM023 | Noise Pollution & Control | - | 10 | 5 | 15 | 40% | 35 | 40% | 50 |

Pre-requisites: Elements of Civil Engineering.

Course Description:

This course is intended to make students aware about the sources of noise, measurement. Various effects, health monitoring with respect to noise, legal provisions as well as various engineering measures for control of noise.

Course Objectives:

1. Study the sources and effects of noise
2. Learn measurement and propagation of noise
3. Study the various techniques for control of noise in community and industries
4. Understand the legal provisions for control of noise.

Course Outcomes:

CO1 Explain propagation and various effects of noise

CO2 Develop various indices for noise monitoring data

CO3 Select various control measures for noise in industry and community

CO4 Compare the measured levels to legal compliance



| Module | Unit | Description | Hours |
|------------|------|---|-------|
| 1.0 | | Sound Transmission and measurement | |
| 1 | 1.1 | Sound- characteristics, Sound transmission and Characteristics of sound wave, Measurement of sound with respect to sound pressure, Sound power and sound intensity, Units of measurement, Sound Level Meter, Factors influencing sound transmission in outdoor atmosphere | 6 |
| 2.0 | | Sources and effects of Noise | |
| 2 | 2.1 | Definition of noise, Sound Vs. Noise, Sources of noise and classification, Infrasonic and ultrasonic sound, Threshold of hearing, Threshold of pain, Anatomy of human ear and mechanism of hearing, Effects of noise - effects on human health, auditory effects, physiological and psychological effects, effects on animals, effects on wild life, effects on plants, effects on structures | 6 |
| 3.0 | | Community noise | |
| 3 | 3.1 | Sources and characteristics of community noise, nuisance of noise in India, Common noise levels, Measurement of community noise, Equivalent noise, Average Day and Night noise, Noise Pollution Levels, Noise Percentile | 6 |
| 4.0 | | Industrial noise | |
| 4 | 4.1 | Types, sources and characteristics of industrial noise, Noise levels generated in various industrial operations, Measurement of industrial noise, OSHA exposure standards, Exposure measurement, Use of Dose meter, Health Monitoring, Procedure of Audiometric testing, Interpretation of Noise Induced Hearing Loss from audiogram | 6 |
| 5.0 | | Control of noise and Legal Provision for Control of noise | |



| | | | |
|---|-----|--|---|
| 5 | 5.1 | Engineering control of noise, noise reduction at source, acoustical absorbing devices, Enclosure, barrier, Various types of mufflers, Reduction at receiving end, Active Noise Reduction, Administrative control of noise, Personal Protective Equipments for noise, Strategy for control of noise, Control of community noise, Frequency analyzer and octave band analysis, Noise mapping and its applications. | 6 |
| | 5.2 | Legal provisions for control of noise under Noise Pollution (Regulation and Control) Rules, 2000 and its amendments, Local Bye-laws regarding noise pollution control, Case studies in India and abroad | |

Text Books

- 1 Noise Pollution and Control Strategy by S.P. Singhal, Narosa Publishing House, 2005
- 2 Noise Pollution – S.K.Agrawal- APH Publishing corporation, New Delhi. 2009

References

1. Handbook of Environmental management and technology by Gwendolyn Holmes, Ben Ramnasiaue Singh and Louis Theodore (A Wiley – Enter science publication)
2. Standard Hand book of Environmental Engineering by Robert A. Corbett (McGraw Hill Inc.)
3. Industrial Pollution by N. Irving Sax (Van Nostrand Reinhold Company)
4. Environmental issues and programme by I. Mohan (Ashish publishing house)
5. Environmental Engineering by G.N.Pandey and G.C. Carney (Tata McGraw Hill)
6. IS code for practice for noise reduction in industrial buildings IS: 3483, 1965

● Internal Assessment (T1, T2 and FET):

11. T2 should be based on First to Fourth modules, for 10 marks each.
12. FET shall be assessed for 5 marks separately.

● End Semester Examination:

26. Question paper will comprise of 5 questions, each carrying 07 marks.
27. The duration of end semester examination shall be two hours.
28. The students need to solve all 5 questions.
29. Question No.1 will be compulsory and based on entire syllabus.



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30. Remaining question (Q.2 to Q.5) will be selected from all the modules.



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U13MM067: Noise Pollution & Control Lab

| Course Code | Course Name | Teaching Scheme (Hr/week) | | | Credits Assigned | | |
|-------------|-------------------------------|---------------------------|-----------|----------|------------------|-----------|----------|
| | | Theory | Practical | Tutorial | Theory | Practical | Tutorial |
| U13MM067 | Noise Pollution & Control Lab | - | 02 | - | - | 01 | - |

Evaluation Scheme

| Course Code | Course Name | In Semester Evaluation | | End Semester Exam (OE/POE) | | |
|-------------|-------------------------------|------------------------|----------|----------------------------|----------|---------------|
| | | Term work | Min pass | Marks | Min pass | Total (Marks) |
| U13MM067 | Noise Pollution & Control Lab | 25 | 40% | - | - | 25 |

Course Outcomes: After the successful completion of the course students will able to:

- CO1** **CO1** Explain propagation and various effects of noise
- CO2** **CO2** Develop various indices for noise monitoring data

List of Experiments

1. Assignment based on each unit
2. Case study of noise pollution

References

1. Handbook of Environmental management and technology by Gwendolyn Holmes, Ben Ramnasiaue Singh and Louis Theodore (A Wiley – Enter science publication)
2. Standard Hand book of Environmental Engineering by Robert A. Corbett (McGraw Hill Inc.)

Evaluation Scheme

4. TERM WORK assessment shall be based on the overall performance of the student with every assignment graded from time to time.
5. The grades will be converted to marks as per ‘credit and grading system’ manual and should be added and averaged.
6. Based on above scheme grading and TERM WORK assessment should be done.



U13MM064: Water Conservation & Management

| Course code | Course name | Teaching Scheme (Hr/week) | | | Credits Assigned | | |
|-------------|---------------------------------|------------------------------|-----------|----------|------------------|-----------|----------|
| | | Theory | Practical | Tutorial | Theory | Practical | Tutorial |
| U13MM064 | Water Conservation & Management | 02 | - | - | 02 | - | - |
| | | | | | | | |

Evaluation Scheme

| Course Code | Course Name | Evaluation Scheme (In Semester) | | | | | End Semester Exam (ESE) | | |
|-------------|---------------------------------|---------------------------------|----|-----|-------|----------|-------------------------|----------|---------------|
| | | T1 | T2 | FET | Total | Min pass | Marks | Min pass | Total (Marks) |
| U13MM064 | Water Conservation & Management | - | 10 | 5 | 15 | 40% | 35 | 40% | 50 |
| | | | | | | | | | |

Pre-requisites: Elements of Civil Engineering.

Course Description:

The objective of the course is imparting fundamental knowledge of water crises due to exploitation and overuse natural resources of water. Student will get knowledge of sustainable development with the help of water conservation and management.

Course Objectives:

1. Apply knowledge about concept, necessity and scope of water conservation and Management.
2. Understand general, scientific and engineering approaches regarding proper planning and utilization of water using different technologies.
3. Develop communication skill so as to create awareness about conservation and utilization of natural resources team work, community for sustainable development participation among society.
4. Inculcate professional and multidisciplinary approach for excellence in various projects of civil and environmental engineering.

Course Outcomes:

CO1 Explain significance and necessity of water conservation, Management and sustainable management practices.



CO2Analyze standard watershed model based on standard modeling approaches and classifications

CO3Assess Socio Economic Aspects of conservation and utilization of natural resources through community participation, water legislation and implementations

CO4 Develop appropriate technology for water conservation and management with low cost for sustainable development

Course Contents

| Module | Unit | Description | Hours |
|------------|------|---|-------|
| 1.0 | | Sound Transmission and measurement | |
| 1 | 1.1 | Sound- characteristics, Sound transmission and Characteristics of sound wave, Measurement of sound with respect to sound pressure, Sound power and sound intensity, Units of measurement, Sound Level Meter, Factors influencing sound transmission in outdoor atmosphere | 6 |
| 2.0 | | Sources and effects of Noise | |
| 2 | 2.1 | Definition of noise, Sound Vs. Noise, Sources of noise and classification, Infrasonic and ultrasonic sound, Threshold of hearing, Threshold of pain, Anatomy of human ear and mechanism of hearing, Effects of noise - effects on human health, auditory effects, physiological and psychological effects, effects on animals, effects on wild life, effects on plants, effects on structures | 6 |
| 3.0 | | Community noise | |
| 3 | 3.1 | Sources and characteristics of community noise, nuisance of noise in India, Common noise levels, Measurement of community noise, Equivalent noise, Average Day and Night noise, Noise Pollution Levels, Noise Percentile | 6 |
| 4.0 | | Industrial noise | |
| 4 | 4.1 | Types, sources and characteristics of industrial noise, Noise levels generated in various industrial operations, Measurement of industrial | 6 |



| | | | |
|--|-----|--|---|
| | | noise, OSHA exposure standards, Exposure measurement, Use of Dose meter, Health Monitoring, Procedure of Audiometric testing, Interpretation of Noise Induced Hearing Loss from audiogram | |
| 5.0 | | | |
| Control of noise and Legal Provision for Control of noise | | | |
| 5 | 5.1 | Engineering control of noise, noise reduction at source, acoustical absorbing devices, Enclosure, barrier, Various types of mufflers, Reduction at receiving end, Active Noise Reduction, Administrative control of noise, Personal Protective Equipments for noise, Strategy for control of noise, Control of community noise, Frequency analyzer and octave band analysis, Noise mapping and its applications. | 6 |
| | 5.2 | Legal provisions for control of noise under Noise Pollution (Regulation and Control) Rules, 2000 and its amendments, Local Bye-laws regarding noise pollution control, Case studies in India and abroad | |

Text Books

- 1 Noise Pollution and Control Strategy by S.P. Singhal, Narosa Publishing House, 2005
- 2 Noise Pollution – S.K.Agrawal- APH Publishing corporation, New Delhi. 2009

References

1. Handbook of Environmental management and technology by Gwendolyn Holmes, Ben Ramnasiaue Singh and Louis Theodore (A Wiley – Enter science publication)
2. Standard Hand book of Environmental Engineering by Robert A. Corbett (McGraw Hill Inc.)
3. Industrial Pollution by N. Irving Sax (Van Nostrand Reinhold Company)
4. Environmental issues and programme by I. Mohan (Ashish publishing house)
5. Environmental Engineering by G.N.Pandey and G.C. Carney (Tata McGraw Hill)
6. IS code for practice for noise reduction in industrial buildings IS: 3483, 1965

- Internal Assessment (T1, T2 and FET):



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13. T2 should be based on First to Fourth modules, for 10 marks each.
 14. FET shall be assessed for 5 marks separately.
- End Semester Examination:
 31. Question paper will comprise of 5 questions, each carrying 07 marks.
 32. The duration of end semester examination shall be two hours.
 33. The students need to solve all 5 questions.
 34. Question No.1 will be compulsory and based on entire syllabus.
 35. Remaining question (Q.2 to Q.5) will be selected from all the modules.
