

Shree Rahul Education Society's (Regd.)

SHREE L. R. TIWARI COLLEGE OF ENGINEERING

(Approved by AICTE & DTE, Maharashtra State & Affiliated to University of Mumbai)
NAAC Accredited, NBA Accredited Program, ISO 9001:2015 Certified | DTE Code No. : 3423
Minority Status (Hindi Linguistic)

Crosscutting issues relevant to Professional ethics, Gender and Human Values and Environmental Sustainability

| Sr. No. | Content |
|--|--|
| Professional Ethics Curriculum Mapping | |
| 1 | Business Communication Ethics Curriculum |
| 2 | Professional Ethics and CSR Curriculum |
| 3 | Disaster Management and Mitigation Issues Curriculum |
| 4 | Professional Communication and Ethics Curriculum |
| Environmental Sustainability Curriculum Mapping | |
| 5 | Environmental Management Curriculum |
| 6 | Renewable Energy Systems Curriculum |
| 7 | Energy Audit and Management Curriculum |
| 8 | Green Technologies and Practices Curriculum |
| 9 | Green Building and Infrastructure Engineering Curriculum |
| 10 | Fundamentals of Sustainable Engineering Curriculum |
| 11 | Sustainable Built Environment Engineering Curriculum |
| Human Values Curriculum Mapping | |
| 12 | Student Induction Program Curriculum |

PRINCIPAL

Shree L. R. Tiwari College of Engineering
Kanakiya Park, Mira Road (E).





Shree Rahul Education Society's (Regd.)


SHREE L. R. TIWARI COLLEGE OF ENGINEERING

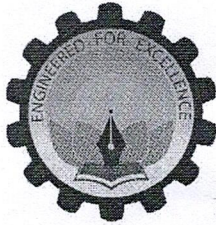
(Approved by AICTE & DTE, Maharashtra State & Affiliated to University of Mumbai)
NAAC Accredited, NBA Accredited Program, ISO 9001:2015 Certified | DTE Code No. : 3423
Minority Status (Hindi Linguistic)

Crosscutting issues relevant to Professional ethics, Gender and Human Values and Environmental Sustainability (2018-2023)

| Sr. No. | Semester | Course | Cross Cutting issues | Content relevant to Professional Ethics |
|---------|----------|--|----------------------|---|
| 1 | II | Professional Communication and Ethics-I | Professional Ethics | <ul style="list-style-type: none">• In module 1, students understand the importance and need of communication in life and profession. They can understand how to eliminate barriers in communication and improve their professional communication.• Module 2 allows the students to gain a wide-ranging vocabulary required for professional communication.• In Module 3, there is polishing of reading and writing skills for the students by improving their ability to construct sentences. Students get well acquainted their thought organizing process related to Professional Communication and Ethics.• Module 4 and 5 enables the students to acquire effective writing and drafting skills for academic, business and technical documents required for Professional Communication.• Module 6 helps and motivates the students to inculcate confident personality traits as a part of Professional Communication and Ethics. |
| 2 | V | Professional Communication and Ethics-II | Professional Ethics | <ul style="list-style-type: none">• Module 1 and 2 enhances the writing skills of the students in which they will be able to prepare various technical documents. Students will be able to communicate effectively in both verbal and written form and demonstrate knowledge of business communication and ethical responsibilities.• Module 3 helps in group discussions, meetings and result-oriented agreeable solutions in group communication situations.• Module 4 helps to prepare persuasive and |




PRINCIPAL
Shree L. R. Tiwari College of Engineering
Kanakiya Park, Mira Road, (E), Dist. Thane, Maharashtra - 401 302.



Shree Rahul Education Society's (Regd.)


SHREE L. R. TIWARI COLLEGE OF ENGINEERING

(Approved by AICTE & DTE, Maharashtra State & Affiliated to University of Mumbai)
NAAC Accredited, NBA Accredited Program, ISO 9001:2015 Certified | DTE Code No. : 3423
Minority Status (Hindi Linguistic)

Crosscutting issues relevant to Professional ethics, Gender and Human Values and Environmental Sustainability (2018-2023)

| | | | | |
|---|------|-----------------------------|---------------------|---|
| | | | | <p>professional presentations</p> <ul style="list-style-type: none">• Module 5 develops creative thinking and interpersonal skills required for effective professional communication.• Module 6 gives the knowledge to apply codes of ethical conduct, personal integrity and norms of organizational behavior better. |
| 3 | VIII | Professional Ethics and CSR | Professional Ethics | <ul style="list-style-type: none">• Module 1 prepares the students with the professional ethical standards.• In module 2 makes the students learn about various market structures which helps in shaping their Professional Ethics.• Module 3 introduces the students with various consumer's protection as a part of Professional Ethics and CSR.• Module 4 and 5 ensures about Corporate Social Responsibility (CSR) activities and how the organizations are adhering to this business thereby adapting CSR activities in small and medium enterprises. As a result, organizational are adhering to their Professional Ethical Standards.• In module 6, students understand about various CSR guidelines, 2009 and also the objective of understanding the Companies Act is reached upon. This gives a clear understanding of Professional Ethics and CSR. |




PRINCIPAL
Shree L. R. Tiwari College of Engineering
Kanakiya Park, Mira Road (E).

| Course Code | Course Name | Teaching Scheme (Contact Hours) | | | Credits Assigned | | | | |
|-------------|--|---------------------------------|--------|------|------------------|-------------------------|-----------|--------------|-------|
| | | Theory | Pract. | Tut. | Theory | Tut. | Pract. | Total | |
| FEC206 | Professional Communication and Ethics- I | 2 | -- | -- | 2 | -- | -- | 2 | |
| Course Code | Course Name | Examination Scheme | | | | | | | |
| | | Theory | | | | | Term Work | Pract. /oral | Total |
| | | Internal Assessment | | | End Sem. Exam. | Exam. Duration (in Hrs) | | | |
| | | Test1 | Test 2 | Avg. | | | | | |
| FEC206 | Professional Communication and Ethics- I | 10 | 10 | 10 | 40 | 2 | -- | -- | 50 |

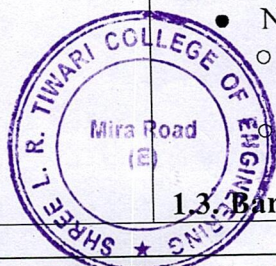
Objectives

1. To demonstrate the fundamental concepts of interpersonal and professional communication.
2. To encourage active listening with focus on content, purpose, ideas and tone.
3. To facilitate fluent speaking skills in social, academic and professional situations.
4. To train in reading strategies for comprehending academic and business correspondence.
5. To promote effective writing skills in business, technology and academic arenas.
6. To inculcate confident personality traits along with grooming and social etiquettes.

Outcomes: Learners will be able to understand how to...

1. Eliminate barriers and use verbal/non-verbal cues at social and workplace situations.
2. Employ listening strategies to comprehend wide-ranging vocabulary, grammatical structures, tone and pronunciation.
3. Prepare effectively for speaking at social, academic and business situations.
4. Use reading strategies for faster comprehension, summarization and evaluation of texts.
5. Acquire effective writing skills for drafting academic, business and technical documents.
6. Successfully interact in all kinds of settings, displaying refined grooming and social skills.

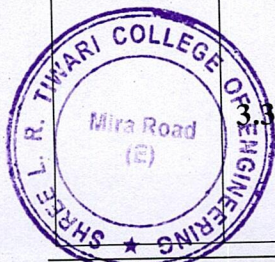
| Module | Detailed Contents | Hrs. |
|--------|--|------|
| 1 | FUNDAMENTALS OF COMMUNICATION | 12 |
| | 1.1. Introduction to Theory of Communication <ul style="list-style-type: none"> ● Definition ● Objectives ● Postulates/Hallmarks ● The Process of Communication ● Organizational Communication <ul style="list-style-type: none"> ○ Formal (Upward, Downward and Horizontal) ○ Informal (Grapevine) | |
| | 1.2. Methods of Communication <ul style="list-style-type: none"> ● Verbal (Written & Spoken) ● Non-verbal <ul style="list-style-type: none"> ○ Non-verbal cues perceived through the five senses: (Visual, Auditory, Tactile, Olfactory and Gustatory cues) ○ Non-verbal cues transmitted through the use of: (The Body, Voice, Space, Time and Silence) | |
| | 1.3. Barriers to Communication | |



Principal

Shree L. R. Tiwari College of Engineering
Kanakiya Park, Mira Road (E.)

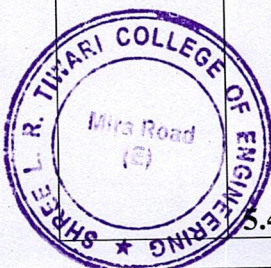
| | | |
|---|--|----|
| | <ul style="list-style-type: none"> ● Mechanical/External ● Physical/Internal ● Semantic & Linguistic ● Psychological ● Socio-Cultural <p>1.4. Communication at the Workplace</p> <ul style="list-style-type: none"> ● Corporate Communication - Case Studies ● Listening Tasks with Recordings and Activity Sheets ● Short Speeches as Monologues <ul style="list-style-type: none"> ○ Informative Speeches that Center on People, Events, Processes, Places, or Things ○ Persuasive Speeches to Persuade, Motivate or Take Action ○ Special Occasion Speeches for Ceremonial, Commemorative, or Epideictic purposes ● Pair-work Conversational Activities (Dialogues) ● Short Group Presentations on Business Plans | |
| 2 | <p>VERBAL APTITUDE FOR EMPLOYMENT</p> <p>2.1. Vocabulary Building</p> <ul style="list-style-type: none"> ● Root words (Etymology) ● Meaning of Words in Context ● Synonyms & Antonyms ● Collocations ● Word Form Charts ● Prefixes & Suffixes ● Standard Abbreviations <p>2.2. Grammar</p> <ul style="list-style-type: none"> ● Identifying Common Errors <ul style="list-style-type: none"> ○ Subject - Verb Agreement ○ Misplaced Modifiers ○ Articles ○ Prepositions ● Tautologies ● Pleonasms (Redundancies) ● Idioms ● Cliches | 02 |
| 3 | <p>DEVELOPING READING AND WRITING SKILLS</p> <p>3.1. Reading Comprehension</p> <ul style="list-style-type: none"> ● Long Passages ● Short Passages ● MCQs on Inferential Questions with 4 Options <p>3.2. Summarization of reading passages, reports, chapters, books</p> <ul style="list-style-type: none"> ● Graphic Organizers for Summaries <ul style="list-style-type: none"> ○ Radial Diagrams like Mind Maps ○ Flow Charts ○ Tree Diagrams ○ Cyclic Diagrams ○ Linear Diagrams like Timelines ○ Pyramids ○ Venn Diagrams ● Point-form Summaries ● One-sentence Summaries of Central Idea <p>3.3. Paraphrasing</p> <ul style="list-style-type: none"> ● Understanding Copyrights ● Running a Plagiarism Check on Paraphrased Passages ● Generating Plagiarism Reports | 02 |



(Signature)
Principal

Shree L. R. Tiwari College of Engineering
Kanakiya Park, Mira Road (E.)

| | | |
|---|---|---|
| | <ul style="list-style-type: none"> ● Basic APA and MLA Referencing Style and Format | |
| 4 | <p>BUSINESS CORRESPONDENCE</p> <p>4.1. Seven Cs of Business Correspondence</p> <ul style="list-style-type: none"> ● Completeness ● Conciseness ● Consideration ● Concreteness ● Clarity ● Courtesy ● Correctness <p>4.2. Parts of a Formal Letter and Formats</p> <ul style="list-style-type: none"> ● Parts/Elements of a Formal Letter <ul style="list-style-type: none"> ○ Letterheads and/or Sender's Address ○ Dateline ○ Inside Address ○ Reference Line (Optional) ○ Attention Line (Optional) ○ Salutation ○ Subject Line ○ Body ○ Complimentary Close ○ Signature Block ○ Enclosures/Attachments ● Complete/Full Block Format <p>4.3. Emails</p> <ul style="list-style-type: none"> ● Format of Emails ● Features of Effective Emails ● Language and style of Emails <p>4.4. Types of Letters in Both Formal Letter Format and Emails</p> <ul style="list-style-type: none"> ● Claim & Adjustment Letters ● Request/Permission Letters ● Sales Letters | 06 |
| | 5 | <p>BASIC TECHNICAL WRITING</p> <p>5.1. Introduction</p> <ul style="list-style-type: none"> ● What is Technical Writing? ● Importance and Principles of Technical Writing ● Difference between Technical Writing & Literary Writing ● Framing Definitions ● Difference between Technical Description & Instructions <p>5.2. Description of a Technical Object</p> <ul style="list-style-type: none"> ● Definition ● Diagram ● Discussion of Parts/Characteristics <p>Working</p> <p>5.3. Writing User Instructions</p> <ul style="list-style-type: none"> ● User Instructions ● Special Notices (Note, Warning, Caution and Danger) ● Styles of Presentation <ul style="list-style-type: none"> ○ Impersonal ○ Indirect ○ Direct ● Imperative <p>5.4. Description of a Technical / Scientific Process</p> |



Principal

Shree L. R. Tiwari College of Engineering
Kanakiya Park, Mira Road (E.)

| | | |
|---|--|----|
| | <ul style="list-style-type: none"> ● Definition ● Diagram ● Tools/ Apparatus/Software/ Hardware Used ● Working ● Result | |
| 6 | <p>PERSONALITY DEVELOPMENT AND SOCIAL ETIQUETTES</p> <p>6.1. Personality Development</p> <ul style="list-style-type: none"> ● Introducing Self and/or a Classmate ● Formal Dress Code <p>6.2. Social Etiquettes</p> <ul style="list-style-type: none"> ● Formal Dining Etiquettes ● Cubicle Etiquettes ● Responsibility in Using Social Media ● Showing Empathy and Respect ● Learning Accountability and Accepting Criticism ● Demonstrating Flexibility and Cooperation ● Selecting Effective Communication Channels | 02 |

Assessment:

Internal Assessment Test:

Assessment consists of two class tests of 10 marks each.

TEST I -Public speech on general topics (Maximum 5 mins. per student)

TEST II - Written test covering modules 1 - 6

The second test should be based on theory and application exercises as mentioned in the syllabus. (Note: Summarization should be a compulsory question in Test II and not in the End Semester Theory Examination.)

End Semester Theory Examination:

1. Question paper will comprise of total 06 questions, each carrying 15marks.
2. Total 04 questions need to be solved.
3. Question No: 01 will be compulsory and based on entire syllabus wherein sub-questions of 2 to 5 marks will be asked.
4. Remaining questions will be mixed in nature.(e.g. Suppose Q.2 has part (a) from module3 then part (b) will be from any module other than module 3)
5. In question paper weightage of each module will be proportional to number of respective lecture hours as mentioned in the syllabus
6. The first module (Fundamentals of Communication) will carry 40 % weightage.

Text Books.

1. Sanjay Kumar & Pushp Lata (2018). Communication Skills with CD. New Delhi: Oxford University Press.
2. Hemphill, P.D., McCormick, D. W., & Hemphill, R. D. (2001). Business Communication with writing improvement exercises. Upper Saddle River, NJ: Prentice Hall.
3. Locker, Kitty O. Kaczmarek, Stephen Kyo. (2019). Business Communication: Building Critical Skills. Place of publication not identified: Mcgraw-hill.
4. Murphy, H. (1999). Effective Business Communication. Place of publication not identified: Mcgraw-Hill.
5. Raman, M., & Sharma, S. (2016). Technical Communication: Principles and practice. New Delhi: Oxford University Press.
6. Katz, A. (2015). Effective Business Communication. Place of publication not identified: Prentice-Hall of India.



Shree L. R. Tiwari College of Engineering
Kanakya Park, Mira Road (E.)

| Subject Code | Subject Name | Teaching Scheme | | | Credits Assigned | | | |
|--------------|--|-----------------|--------------------------|----------|------------------|-----------|----------|-------|
| | | Theory | Practical | Tutorial | Theory | Practical | Tutorial | Total |
| ECL504 | Professional Communication and Ethics-II | -- | 2*+ 2 Hours (Batch-wise) | -- | -- | 02 | -- | 02 |

*Theory class to be conducted for full class.

| Subject Code | Subject Name | Examination Scheme | | | | | | | | |
|--------------|--|---------------------|--------|--------------------------|---------------|---------------------|-----------|-----------|------|-------|
| | | Theory Marks | | | | | Term Work | Practical | Oral | Total |
| | | Internal assessment | | | End Sem. Exam | Exam duration Hours | | | | |
| | | Test 1 | Test 2 | Avg of Test 1 and Test 2 | | | | | | |
| ECL504 | Professional Communication and Ethics - II | -- | -- | -- | -- | -- | 25 | -- | 25 | 50 |

Course Objectives:

Learners should be able to:

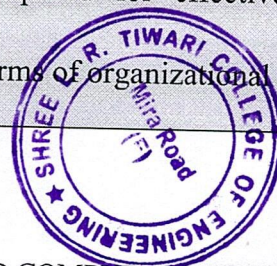
1. Discern and develop an effective style of writing important technical/business documents.
2. Investigate possible resources and plan a successful job campaign.
3. Understand the dynamics of professional communication in the form of group discussions, meetings, etc. required for career enhancement.
4. Develop creative and impactful presentation skills.
5. Analyse personal traits, interests, values, aptitude and skills.
6. Understand the importance of integrity and develop a personal code of ethics

Course Outcomes:

After successful completion of the course students will be able to:

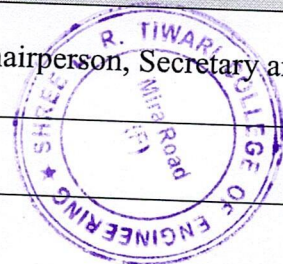
1. Plan and prepare effective business/ technical documents which will in turn provide solid foundation for their future managerial roles.
2. Strategize their personal and professional skills to build a professional image and meet the demands of the industry.
3. Emerge successful in group discussions, meetings and result-oriented agreeable solutions in group communication situations.
4. Deliver persuasive and professional presentations.
5. Develop creative thinking and interpersonal skills required for effective professional communication.
6. Apply codes of ethical conduct, personal integrity and norms of organizational behavior.

Shree L. R. Tiwari College of Engineering
Kanakiya Park, Mira Road (E).



| Module No. | Unit No. | Contents | Hrs. |
|------------|----------|--|------|
| 1 | | ADVANCED TECHNICAL WRITING: PROJECT/PROBLEM BASED LEARNING (PBL) | 06 |
| | 1.1 | Purpose and Classification of Reports Classification on the basis of: Subject Matter (Technology, Accounting, Finance, Marketing, etc.), Time Interval (Periodic, One-time, Special), Function (Informational, Analytical, etc.), Physical Factors (Memorandum, Letter, Short & Long) | |
| | 1.2 | Parts of a Long Formal Report Prefatory Parts (Front Matter), Report Proper (Main Body), Appended Parts (Back Matter) | |
| | 1.3 | Language and Style of Reports Tense, Person & Voice of Reports, Numbering Style of Chapters, Sections, Figures, Tables and Equations, Referencing Styles in APA & MLA Format, Proof-reading through Plagiarism Checkers | |
| | 1.4 | Definition, Purpose & Types of Proposals Solicited (in conformance with RFP) & Unsolicited Proposals, Types (Short and Long proposals) | |
| | 1.5 | Parts of a Proposal Elements, Scope and Limitations, Conclusion | |
| | 1.6 | Technical Paper Writing Parts of a Technical Paper (Abstract, Introduction, Research Methods, Findings and Analysis, Discussion, Limitations, Future Scope and References), Language and Formatting, Referencing in IEEE Format | |
| 2 | | EMPLOYMENT SKILLS | 06 |
| | 2.1 | Cover Letter & Resume Parts and Content of a Cover Letter, Difference between Bio-data, Resume & CV, Essential Parts of a Resume, Types of Resume (Chronological, Functional & Combination) | |
| | 2.2 | Statement of Purpose Importance of SOP, Tips for Writing an Effective SOP | |
| | 2.3 | Verbal Aptitude Test Modelled on CAT, GRE, GMAT exams | |
| | 2.4 | Group Discussions Purpose of a GD, Parameters of Evaluating a GD, Types of GDs (Normal, Case-based & Role Plays), GD Etiquette | |
| | 2.5 | Personal Interviews Planning and Preparation, Types of Questions, Types of Interviews (Structured, Stress, Behavioral, Problem Solving & Case-based), Modes of Interviews: Face-to-face (One-to one and Panel) Telephonic, Virtual | |
| 3 | | BUSINESS MEETINGS | 02 |
| | 3.1 | Conducting Business Meetings Types of Meetings, Roles and Responsibilities of Chairperson, Secretary and Members, Meeting Etiquette | |
| | 3.2 | Documentation Notice, Agenda, Minutes | |

PRINCIPAL
Shree L. R. Tiwari College of Engineering
Kanakiya Park, Mira Road (E).



| | | | |
|---|--|--|----|
| 4 | TECHNICAL/ BUSINESS PRESENTATIONS | | 02 |
| | 4.1 | Effective Presentation Strategies Defining Purpose, Analyzing Audience, Location and Event, Gathering, Selecting & Arranging Material, Structuring a Presentation, Making Effective Slides, Types of Presentations Aids, Closing a Presentation, Platform Skills | |
| | 4.2 | Group Presentations Sharing Responsibility in a Team, Building the contents and visuals together, Transition Phases | |
| 5 | INTERPERSONAL SKILLS | | 08 |
| | 5.1 | Interpersonal Skills Emotional Intelligence, Leadership & Motivation, Conflict Management & Negotiation, Time Management, Assertiveness, Decision Making | |
| | 5.2 | Start-up Skills Financial Literacy, Risk Assessment, Data Analysis (e.g. Consumer Behavior, Market Trends, etc.) | |
| 6 | CORPORATE ETHICS | | 02 |
| | 6.1 | Intellectual Property Rights Copyrights, Trademarks, Patents, Industrial Designs, Geographical Indications Integrated Circuits, Trade Secrets (Undisclosed Information) | |
| | 6.2 | Case Studies Cases related to Business/ Corporate Ethics | |
| | Total | | |

LIST OF ASSIGNMENTS FOR TERMWORK:

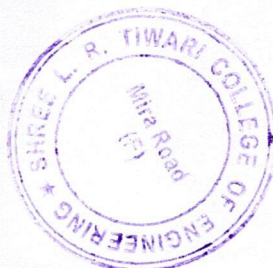
(In the form of Short Notes, Questionnaire/ MCQ Test, Role Play, Case Study, Quiz, etc.)

1. Cover Letter and Resume
2. Short Proposal
3. Meeting Documentation
4. Writing a Technical Paper/ Analyzing a Published Technical Paper
5. Writing a SOP
6. IPR
7. Interpersonal Skills
8. Aptitude test (Verbal Ability)

Note:

1. The Main Body of the project/book report should contain minimum 25 pages (excluding Front and Back matter).
2. The group size for the final report presentation should not be less than 5 students or exceed 7 students.
3. There will be an end-semester presentation based on the book report.

PRINCIPAL
Shree L. R. Tiwari College of Engineering
Kanakiya Park, Mira Road (E).



GUIDELINES FOR INTERNAL ASSESSMENT

Term Work:

Term work shall consist of minimum 8 experiments.

The distribution of marks for term work shall be as follows:

| | |
|-------------------------|------------|
| Assignment | : 10 Marks |
| Attendance | : 5 Marks |
| Presentation slides | : 5 Marks |
| Book Report (hard copy) | : 5 Marks |

The final certification and acceptance of term work ensures the satisfactory performance of laboratory work and minimum passing in the term work.

Internal oral:


Oral Examination will be based on a GD & the Project/Book Report presentation.

| | |
|----------------------|-----------|
| Group Discussion | :10 marks |
| Project Presentation | :10 Marks |
| Group Dynamics | :5 Marks |

Text books and Reference books:

1. Arms, V. M. (2005). *Humanities for the engineering curriculum: With selected chapters from Olsen/Huckin: Technical writing and professional communication, second edition*. Boston, MA: McGraw-Hill.
2. Bovée, C. L., & Thill, J. V. (2021). *Business communication today*. Upper Saddle River, NJ: Pearson.
3. Butterfield, J. (2017). *Verbal communication: Soft skills for a digital workplace*. Boston, MA: Cengage Learning.
4. Masters, L. A., Wallace, H. R., & Harwood, L. (2011), *Personal development for life and work*. Mason: South-Western Cengage Learning.
5. Robbins, S. P., Judge, T. A., & Campbell, T. T. (2017). *Organizational behaviour*. Harlow, England: Pearson.
6. Meenakshi Raman, Sangeeta Sharma (2004) *Technical Communication, Principles and Practice*. Oxford University Press
7. Archana Ram (2018) *Place Mentor, Tests of Aptitude For Placement Readiness*. Oxford University Press
8. Sanjay Kumar & Pushp Lata (2018). *Communication Skills a workbook*, New Delhi: Oxford University Press.




PRINCIPAL
Shree L. R. Tiwari College of Engineering
Kanakiya Park, Mira Road (E).

| Course Code | Course Name | Credits |
|-------------|---|---------|
| ILO8025 | Professional Ethics and Corporate Social Responsibility (CSR) | 03 |

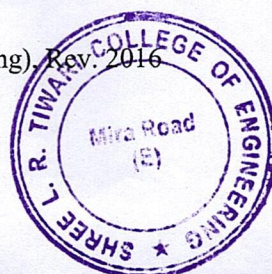
Objectives:

1. To understand professional ethics in business
2. To recognized corporate social responsibility

Outcomes: Learner will be able to...

1. Understand rights and duties of business
2. Distinguish different aspects of corporate social responsibility
3. Demonstrate professional ethics
4. Understand legal aspects of corporate social responsibility

| Module | Detailed Contents | Hrs |
|--------|---|-----|
| 01 | Professional Ethics and Business: The Nature of Business Ethics; Ethical Issues in Business; Moral Responsibility and Blame; Utilitarianism: Weighing Social Costs and Benefits; Rights and Duties of Business | 04 |
| 02 | Professional Ethics in the Marketplace: Perfect Competition; Monopoly Competition; Oligopolistic Competition; Oligopolies and Public Policy Professional Ethics and the Environment: Dimensions of Pollution and Resource Depletion; Ethics of Pollution Control; Ethics of Conserving Depletable Resources | 08 |
| 03 | Professional Ethics of Consumer Protection: Markets and Consumer Protection; Contract View of Business Firm's Duties to Consumers; Due Care Theory; Advertising Ethics; Consumer Privacy Professional Ethics of Job Discrimination: Nature of Job Discrimination; Extent of Discrimination; Reservation of Jobs. | 06 |
| 04 | Introduction to Corporate Social Responsibility: Potential Business Benefits—Triple bottom line, Human resources, Risk management, Supplier relations; Criticisms and concerns—Nature of business; Motives; Misdirection. Trajectory of Corporate Social Responsibility in India | 05 |
| 05 | Corporate Social Responsibility: Articulation of Gandhian Trusteeship Corporate Social Responsibility and Small and Medium Enterprises (SMEs) in India, Corporate Social Responsibility and Public-Private Partnership (PPP) in India | 08 |
| 06 | Corporate Social Responsibility in Globalizing India: Corporate Social Responsibility Voluntary Guidelines, 2009 issued by the Ministry of Corporate Affairs, Government of India, Legal Aspects of Corporate Social Responsibility—Companies Act, 2013. | 08 |



133
Principal

Assessment:

Internal Assessment for 20 marks:

Consisting **Two Compulsory Class Tests**

First test based on approximately 40% of contents and second test based on remaining contents (approximately 40% but excluding contents covered in Test I)

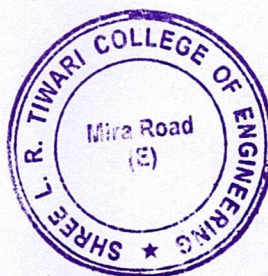
End Semester Examination:

Weightage of each module in end semester examination will be proportional to number of respective lecture hours mentioned in the curriculum.

1. Question paper will comprise of total **six questions, each carrying 20 marks**
2. **Question 1** will be **compulsory** and should **cover maximum contents of the curriculum**
3. **Remaining questions will be mixed in nature** (for example if Q.2 has part (a) from module 3 then part (b) will be from any module other than module 3)
4. Only **Four questions need to be solved.**

REFERENCES:

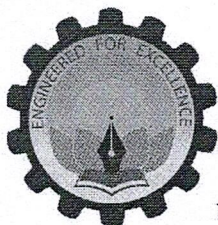
1. Business Ethics: Texts and Cases from the Indian Perspective (2013) by Ananda Das Gupta; Publisher: Springer.
2. Corporate Social Responsibility: Readings and Cases in a Global Context (2007) by Andrew Crane, Dirk Matten, Laura Spence; Publisher: Routledge.
3. Business Ethics: Concepts and Cases, 7th Edition (2011) by Manuel G. Velasquez; Publisher: Pearson, New Delhi.
4. Corporate Social Responsibility in India (2015) by Bidyut Chakrabarty, Routledge, New Delhi.



A handwritten signature in black ink, appearing to be "S. R. Tiwari".

Principal

Shree L. R. Tiwari College of Engineering
Kanakiya Park, Mira Road (E.)



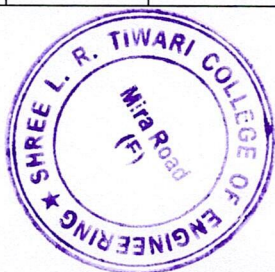
Shree Rahul Education Society's (Regd.)


SHREE L. R. TIWARI COLLEGE OF ENGINEERING

(Approved by AICTE & DTE, Maharashtra State & Affiliated to University of Mumbai)
NAAC Accredited, NBA Accredited Program, ISO 9001:2015 Certified | DTE Code No. : 3423
Minority Status (Hindi Linguistic)

Crosscutting issues relevant to Professional ethics, Gender and Human Values and Environmental Sustainability (2018-2023)

| Sr. No. | Semester | Course | Cross Cutting Issues | Content relevant to Environmental Sustainability |
|---------|----------|-----------------------------|------------------------------|--|
| 1 | VII | Energy Audit and Management | Environmental Sustainability | <ul style="list-style-type: none">• Modules 1, 2 helps students with various energy scenarios, conservation, importance where students can make use of various audit principles under Energy Audit Management.• Modules 3 and 4 enable students to become aware about energy efficiency measures and they can conserve energy in thermal systems which is required under energy audit.• In modules 5 and 6, students become well aware about performance analysis and application of various onsite performance evaluation techniques which comes under Energy Audit in order to keep the environment sustainable. |
| 2 | VIII | Environmental Management | Environmental Sustainability | <ul style="list-style-type: none">• Modules 1 and 2 introduce students with various definitions and significances of environment management. Students understand the global environmental issues and sustainable development.• In modules 3 and 4, students can identify scope of environment management and ecological importance. Also, they can make out the role and functions of Government as a planning and regulating agency.• In modules 5 and 6, students get clear cut knowledge about ISO Certification, its importance and also about various Environmental Acts. |
| 3 | VII | Renewable Energy Systems | Environmental Sustainability | <ul style="list-style-type: none">• Module 1 discusses about the energy scenarios where students understand about solar energy as a part of environmental sustainability.• Modules 2 and 3 instills amongst the students about using solar thermal energy and solar photovoltaic energy under renewable energy |




PRINCIPAL
Shree L. R. Tiwari College of Engineering
Kanakiya Park, Mira Road (E).



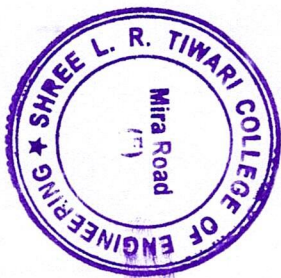
Shree Rahul Education Society's (Regd.)

SHREE L. R. TIWARI COLLEGE OF ENGINEERING

(Approved by AICTE & DTE, Maharashtra State & Affiliated to University of Mumbai)
NAAC Accredited, NBA Accredited Program, ISO 9001:2015 Certified | DTE Code No. : 3423
Minority Status (Hindi Linguistic)

Crosscutting issues relevant to Professional ethics, Gender and Human Values and Environmental Sustainability (2018-2023)

| | | | | |
|---|-----|--|------------------------------|--|
| | | | | <ul style="list-style-type: none">In modules 4 and 5, students understand the importance of wind energy and about the energy from biomass in order bring environmental sustainability.Module 6 introduces the students with various geothermal technologies and their conservation techniques to bring sustainable environmental development. |
| 4 | VII | Disaster Management and Mitigation Issues. | Environmental Sustainability | <ul style="list-style-type: none">Module 1 and 2 helps the students to understand about various disasters as a part of environmental sustainability.In module 3, students develop problem-solving approach towards disaster management in order to ensure environmental sustainability.Module 4 makes students confident about how to deal with any disaster in India. Students understand the institutional framework for disaster management under sustainability.Modules 5 and 6 deal with various relief measures as a part of environmental sustainability where our students can be responsible citizens. |




PRINCIPAL
Shree L. R. Tiwari College of Engineering
Kanakiya Park, Mira Road (E).

| Course Code | Course Name | Teaching Scheme (Contact Hours) | | | Credits Assigned | | | |
|-------------|-----------------------------|---------------------------------|-----------|----------|------------------|-----------|----------|-------|
| | | Theory | Practical | Tutorial | Theory | Practical | Tutorial | Total |
| ILO 7018 | Energy Audit and Management | 03 | -- | -- | 03 | -- | -- | 03 |

| Course Code | Course Name | Examination Scheme | | | | | | | |
|-------------|-----------------------------|---------------------|-------|------|----------------|----------------------|-----------|--------------------|-------|
| | | Theory Marks | | | | Exam Duration (Hrs.) | Term Work | Practical and Oral | Total |
| | | Internal Assessment | | | End Sem. Exam. | | | | |
| | | Test1 | Test2 | Avg. | | | | | |
| ILO 7018 | Energy Audit and Management | 20 | 20 | 20 | 80 | 03 | -- | -- | 100 |

Objectives:

1. To understand the importance energy security for sustainable development and the fundamentals of energy conservation.
2. To introduce performance evaluation criteria of various electrical and thermal installations to facilitate the energy management
3. To relate the data collected during performance evaluation of systems for identification of energy saving opportunities.

Outcomes: Learner will be able to...

1. To identify and describe present state of energy security and its importance.
2. To identify and describe the basic principles and methodologies adopted in energy audit of an utility.
3. To describe the energy performance evaluation of some common electrical installations and identify the energy saving opportunities.
4. To describe the energy performance evaluation of some common thermal installations and identify the energy saving opportunities
5. To analyze the data collected during performance evaluation and recommend energy saving measures

| Module | Detailed Contents | Hrs |
|--------|---|-----|
| 01 | Energy Scenario: Present Energy Scenario, Energy Pricing, Energy Sector Reforms, Energy Security, Energy Conservation and its Importance, Energy Conservation Act-2001 and its Features. Basics of Energy and its various forms, Material and Energy balance | 04 |
| 02 | Energy Audit Principles: Definition, Energy audit- need, Types of energy audit, Energy management (audit) approach-understanding energy costs, Bench marking, Energy performance, Matching energy use to requirement, Maximizing system efficiencies, Optimizing the input energy requirements, Fuel and energy substitution. Elements of monitoring& targeting; Energy audit Instruments; Data and information-analysis. Financial analysis techniques: Simple payback period, NPV, Return on investment (ROI), Internal rate of return (IRR) | 08 |



Principal

| | | |
|--------------|---|----|
| 03 | Energy Management and Energy Conservation in Electrical System: Electricity billing, Electrical load management and maximum demand Control; Power factor improvement, Energy efficient equipments and appliances, star ratings. Energy efficiency measures in lighting system, Lighting control: Occupancy sensors, daylight integration, and use of intelligent controllers. Energy conservation opportunities in: water pumps, industrial drives, induction motors, motor retrofitting, soft starters, variable speed drives. | 10 |
| 04 | Energy Management and Energy Conservation in Thermal Systems: Review of different thermal loads; Energy conservation opportunities in: Steam distribution system, Assessment of steam distribution losses, Steam leakages, Steam trapping, Condensate and flash steam recovery system. General fuel economy measures in Boilers and furnaces, Waste heat recovery, use of insulation- types and application. HVAC system: Coefficient of performance, Capacity, factors affecting Refrigeration and Air Conditioning system performance and savings opportunities. | 10 |
| 05 | Energy Performance Assessment: On site Performance evaluation techniques, Case studies based on: Motors and variable speed drive, pumps, HVAC system calculations; Lighting System: Installed Load Efficacy Ratio (ILER) method, Financial Analysis. | 04 |
| 06 | Energy conservation in Buildings: Energy Conservation Building Codes (ECBC): Green Building, LEED rating, Application of Non-Conventional and Renewable Energy Sources | 03 |
| Total | | 39 |

Assessment:

Internal:

Assessment consists of two tests out of which; one should be compulsory class test and the other is either a class test or assignment on live problems or course project.

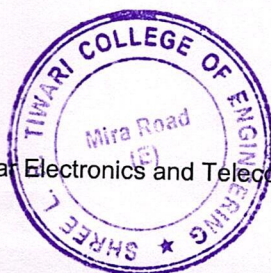
End Semester Theory Examination:

Some guidelines for setting up the question paper. Minimum 80% syllabus should be covered in question papers of end semester examination. **In question paper weightage of each module will be proportional to number of respective lecture hours as mention in the syllabus.**

1. Question paper will comprise of total six question
2. All question carry equal marks
3. Questions will be mixed in nature (for example supposed Q.2 has part (a) from module 3 then part (b) will be from any module other than module 3)
4. Only Four question need to be solved.

REFERENCES:

1. Handbook of Electrical Installation Practice, Geofry Stokes, Blackwell Science
2. Designing with light: Lighting Handbook, By Anil Valia, Lighting System
3. Energy Management Handbook, By W.C. Turner, John Wiley and Sons
4. Handbook on Energy Audits and Management, edited by A. K. Tyagi, Tata Energy Research Institute (TERI).
5. Energy Management Principles, C.B.Smith, Pergamon Press
6. Energy Conservation Guidebook, Dale R. Patrick, S. Fardo, Ray E. Richardson, Fairmont Press
7. Handbook of Energy Audits, Albert Thumann, W. J. Younger, T. Niehus, CRC Press
8. www.energymanagertraining.com
9. www.bee-india.nic.in



(Signature)
Principal

Shree L. R. Tiwari College of Engineering
Kanakiya Park, Mira Road (E.)

| Course Code | Course Name | Teaching Scheme (Contact Hours) | | | Credits Assigned | | | |
|-------------|--------------------------|---------------------------------|-----------|----------|------------------|-----------|----------|-------|
| | | Theory | Practical | Tutorial | Theory | Practical | Tutorial | Total |
| ILO 8019 | Environmental Management | 03 | -- | -- | 03 | -- | -- | 03 |

| Course Code | Course Name | Examination Scheme | | | | | | | |
|-------------|--------------------------|---------------------|----|----|----------------|----------------------|-----------|--------------------|-------|
| | | Theory Marks | | | | Exam Duration (Hrs.) | Term Work | Practical and Oral | Total |
| | | Internal Assessment | | | End Sem. Exam. | | | | |
| Test1 | Test2 | Avg. | | | | | | | |
| ILO 8019 | Environmental Management | 20 | 20 | 20 | 80 | 03 | -- | -- | 100 |

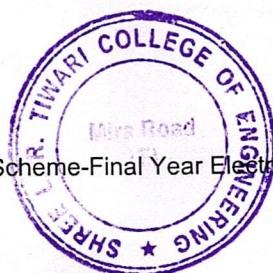
Objectives:

1. Understand and identify environmental issues relevant to India and global concerns
2. Learn concepts of ecology
3. Familiarise environment related legislations

Outcomes: Learner will be able to...

1. Understand the concept of environmental management
2. Understand ecosystem and interdependence, food chain etc.
3. Understand and interpret environment related legislations

| Module | Detailed Contents | Hrs |
|--------------|--|-----|
| 01 | Introduction and Definition of Environment: Significance of Environment Management for contemporary managers, Career opportunities. Environmental issues relevant to India, Sustainable Development, The Energy scenario. | 10 |
| 02 | Global Environmental concerns : Global Warming, Acid Rain, Ozone Depletion, Hazardous Wastes, Endangered life-species, Loss of Biodiversity, Industrial/Man-made disasters, Atomic/Biomedical hazards, etc. | 06 |
| 03 | Concepts of Ecology: Ecosystems and interdependence between living organisms, habitats, limiting factors, carrying capacity, food chain, etc. | 05 |
| 04 | Scope of Environment Management, Role & functions of Government as a planning and regulating agency. Environment Quality Management and Corporate Environmental Responsibility | 10 |
| 05 | Total Quality Environmental Management, ISO-14000, EMS certification. | 05 |
| 06 | General overview of major legislations like Environment Protection Act, Air (P & CP) Act, Water (P & CP) Act, Wildlife Protection Act, Forest Act, Factories Act, etc. | 03 |
| Total | | 39 |



Principal

Shree L. R. Tiwari College of Engineering
Kanakiya Park, Mira Road (E.)

Assessment:

Internal:

Assessment consists of two tests out of which; one should be compulsory class test and the other is either a class test or assignment on live problems or course project.

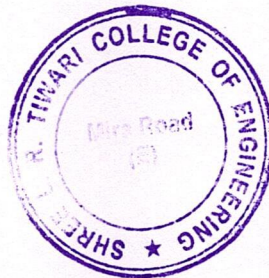
End Semester Theory Examination:

Some guidelines for setting up the question paper. Minimum 80% syllabus should be covered in question papers of end semester examination. **In question paper weightage of each module will be proportional to number of respective lecture hours as mention in the syllabus.**

1. Question paper will comprise of total six question
2. All question carry equal marks
3. Questions will be mixed in nature (for example supposed Q.2 has part (a) from module 3 then part (b) will be from any module other than module 3)
4. Only Four question need to be solved.

REFERENCES:

1. Environmental Management: Principles and Practice, C J Barrow, Routledge Publishers London, 1999
2. A Handbook of Environmental Management Edited by Jon C. Lovett and David G. Ockwell, Edward Elgar Publishing
3. Environmental Management, T V Ramachandra and Vijay Kulkarni, TERI Press
4. Indian Standard Environmental Management Systems — Requirements With Guidance For Use, Bureau Of Indian Standards, February 2005
5. Environmental Management: An Indian Perspective, S N Chary and Vinod Vyasulu, Macmillan India, 2000
6. Introduction to Environmental Management, Mary K Theodore and Louise Theodore, CRC Press
7. Environment and Ecology, Majid Hussain, 3rd Ed. Access Publishing.2015



Principal

Shree L. R. Tiwari College of Engineering
Kanakiya Park, Mira Road (E.)

| | | |
|-------------|--------------------------|---------|
| Course Code | Course Name | Credits |
| MEDLO7032 | Renewable Energy Sources | 03 |

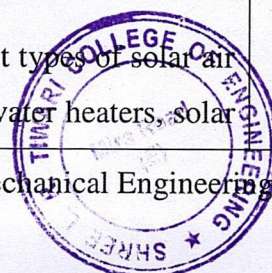
Objectives:

1. To study working principles of various renewable energy sources and their utilities.
2. To study design and installation criteria of various equipment's to convert the renewable energy into useful energy.
3. To study economics of harnessing energy from renewable energy sources.

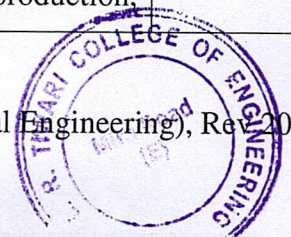
Outcomes: Learner will be able to...

1. Describe the need for renewable energy and its potential for the development of a sustainable environment.
2. Analyze different solar collectors using geometrical parameters and photovoltaics for generation of solar energy.
3. Identify and analyze various wind turbine energy harnessment techniques.
4. Design biogas plant for harnessing energy from organic waste.
5. Describe significance of hydrogen energy to fulfill present and future energy needs.
6. Describe the operating principle of geothermal energy and ocean energy and their role in sustainable development.

| Module | Contents | Hours |
|--------|--|-------|
| 1 | <p>1.1: Introduction to Renewable Energy Sources and Solar Radiation: Global and National current energy scenarios, Prospects of renewable energy sources and renewable energies role in developing sustainable model.</p> <p>1.2: Solar radiation terms, solar geometry, earth sun angles, attenuation and measurement of solar radiation on horizontal and inclined surfaces, methods of solar radiation estimation.</p> | 05 |
| 2 | <p>Solar Thermal Energy:</p> <p>2.1: Introduction and working principle of flat plate collectors, thermal performance analysis of flat plate collectors, concentrating collectors, Installation and maintenance criteria of solar thermal systems.</p> <p>2.2: Solar thermal devices- Solar air heater and different types of solar air heaters, solar water heater and different types of solar water heaters, solar</p> | 07 |



| | | |
|---|--|----|
| | <p>dryers, solar pond, solar distillation, solar still, solar cooker.</p> <p>2.3: Solar space heating & cooling, solar refrigerator, solar thermal energy storage systems.</p> <p>Case Study: Solar thermal power plant working operation.</p> | |
| 3 | <p>Solar Photovoltaic Energy:</p> <p>3.1: Introduction and working principle of a solar PV systems, types of solar PV cells, solar tracking systems, controls and measurement methods of solar PV systems.</p> <p>3.2: Methods to improve the efficiency of PV cells, parameters which affect the efficiency and life cycle of PV cells.</p> <p>Case Study: Installation of 1 kW of solar PV plant.</p> | 07 |
| 4 | <p>Wind Energy:</p> <p>4.1: Basic components and working principle of wind energy conversion systems, wind data and site selection considerations, various types of wind energy conversion systems, constructional features of horizontal and vertical axis wind machines, performance analysis of horizontal and vertical axis wind machines.</p> <p>4.2: Estimation of power output- betz limits, Environmental impacts of wind energy.</p> | 06 |
| 5 | <p>5.1: Energy from Biomass: Introduction of bioenergy, conversion technologies, types of biogas generation plants, design and construction details of biogas plant (KVIC), site selection, digester design consideration, filling a digester for starting, maintaining biogas production, utilization of biogas.</p> <p>5.2: Hydrogen Energy: Introduction and application, General introduction to infrastructure requirement for hydrogen production.</p> | 07 |



| | | |
|---|--|----|
| | <p>storage, dispensing & utilization.</p> <p>Principles of fuel cells, types of fuel cells, power generation by fuel cells, applications of fuel cells.</p> | |
| 6 | <p>6.1: Geothermal Energy: Introduction to geothermal technologies and methods of extracting geothermal energy, prospects of geothermal energy in India.</p> <p>6.2: Energy from the ocean: Wave energy characteristics and wave energy conversion devices, tide energy conversion devices, Ocean Thermal Energy Conversion (OTEC) systems.</p> <p>6.3: Energy management and economics: Energy conservation, energy security, energy economics, energy audit- definition, need, types of energy audit, Energy management (audit) approach-understanding energy costs,</p> <p>Energy conservation in Buildings: Energy Conservation Building Codes (ECBC): Green Building, LEED rating.</p> | 07 |

Visit to wind farm/solar plant/biogas plant.

Assessment:

Internal Assessment for 20 marks:

Consisting **Two Compulsory Class Tests**

First test based on approximately 40% of contents and second test based on remaining contents (approximately 40% but excluding contents covered in Test I)

End Semester Examination:

Weightage of each module in end semester examination will be proportional to number of respective lecture hours mentioned in the curriculum.

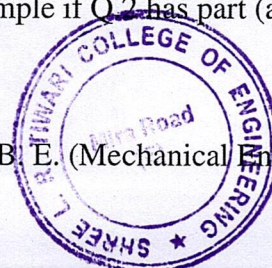
1. Question paper will comprise of total **six questions, each carrying 20 marks.**
2. **Question 1** will be **compulsory** and should **cover maximum contents of the curriculum.**
3. **Remaining questions will be mixed in nature** (for example if Q 2 has part (a) from module 3 then part (b) will be from any module other than module 3).
4. Only Four questions need to be solved

University of Mumbai

Principal

Shree L. R. Tiwari College of Engineering
Kanakiya Park, Mira Road (E.)

B. E. (Mechanical Engineering), Rev 2019

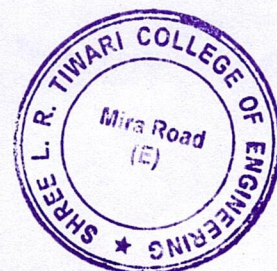


REFERENCES:

1. 'Disaster Management' by Harsh K.Gupta, Universities Press Publications.
2. 'Disaster Management: An Appraisal of Institutional Mechanisms in India' by O.S.Dagur, published by Centre for land warfare studies, New Delhi, 2011.
3. 'Introduction to International Disaster Management' by Damon Copolla, Butterworth Heinemann Elsevier Publications.
4. 'Disaster Management Handbook' by Jack Pinkowski, CRC Press Taylor and Francis group.
5. 'Disaster management & rehabilitation' by Rajdeep Dasgupta, Mittal Publications, New Delhi.
6. 'Natural Hazards and Disaster Management, Vulnerability and Mitigation – R B Singh, Rawat Publications
7. Concepts and Techniques of GIS –C.P.Lo Albert, K.W. Yongng – Prentice Hall (India) Publications.

(Learners are expected to refer reports published at national and International level and updated information available on authentic web sites)

Draft Syllabus



| Course Code | Course Name | Credits |
|-------------|---|---------|
| ILO7017 | Disaster Management and Mitigation Measures | 03 |

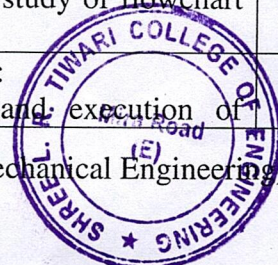
Objectives:

1. To understand physics and various types of disaster occurring around the world
2. To identify extent and damaging capacity of a disaster
3. To study and understand the means of losses and methods to overcome /minimize it.
4. To understand role of individual and various organization during and after disaster
5. To understand application of GIS in the field of disaster management
6. To understand the emergency government response structures before, during and after disaster

Outcomes: Learner will be able to...

1. Get to know natural as well as manmade disaster and their extent and possible effects on the economy.
2. Plan of national importance structures based upon the previous history.
3. Get acquainted with government policies, acts and various organizational structure associated with an emergency.
4. Get to know the simple do's and don'ts in such extreme events and act accordingly.

| Sr. No. | Detailed Contents | Hrs |
|---------|---|-----|
| 01 | Introduction 1.1 Definition of Disaster, hazard, global and Indian scenario, general perspective, importance of study in human life, Direct and indirect effects of disasters, long term effects of disasters. Introduction to global warming and climate change. | 03 |
| 02 | Natural Disaster and Manmade disasters: 2.1 Natural Disaster: Meaning and nature of natural disaster, Flood, Flash flood, drought, cloud burst, Earthquake, Landslides, Avalanches, Volcanic eruptions, Mudflow, Cyclone, Storm, Storm Surge, climate change, global warming, sea level rise, ozone depletion 2.2 Manmade Disasters: Chemical, Industrial, Nuclear and Fire Hazards. Role of growing population and subsequent industrialization, urbanization and changing lifestyle of human beings in frequent occurrences of manmade disasters. | 09 |
| 03 | Disaster Management, Policy and Administration 3.1 Disaster management: meaning, concept, importance, objective of disaster management policy, disaster risks in India, Paradigm shift in disaster management. 3.2 Policy and administration: Importance and principles of disaster management policies, command and co-ordination of in disaster management, rescue operations-how to start with and how to proceed in due course of time, study of flowchart showing the entire process. | 06 |
| 04 | Institutional Framework for Disaster Management in India: 4.1 Importance of public awareness, Preparation and execution of | 06 |



| | | |
|----|--|----|
| | <p>emergency management program. Scope and responsibilities of National Institute of Disaster Management (NIDM) and National disaster management authority (NDMA) in India. Methods and measures to avoid disasters, Management of casualties, set up of emergency facilities, importance of effective communication amongst different agencies in such situations.</p> <p>4.2 Use of Internet and softwares for effective disaster management. Applications of GIS, Remote sensing and GPS in this regard.</p> | |
| 05 | <p>Financing Relief Measures:</p> <p>5.1 Ways to raise finance for relief expenditure, role of government agencies and NGO's in this process, Legal aspects related to finance raising as well as overall management of disasters. Various NGO's and the works they have carried out in the past on the occurrence of various disasters, Ways to approach these teams.</p> <p>5.2 International relief aid agencies and their role in extreme events.</p> | 09 |
| 06 | <p>Preventive and Mitigation Measures:</p> <p>6.1 Pre-disaster, during disaster and post-disaster measures in some events in general</p> <p>6.2 Structural mapping: Risk mapping, assessment and analysis, sea walls and embankments, Bio shield, shelters, early warning and communication</p> <p>6.3 Non Structural Mitigation: Community based disaster preparedness, risk transfer and risk financing, capacity development and training, awareness and education, contingency plans.</p> <p>6.4 Do's and don'ts in case of disasters and effective implementation of relief aids.</p> | 06 |

Assessment:

Internal Assessment for 20 marks:

Consisting **Two Compulsory Class Tests**

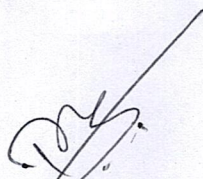
First test based on approximately 40% of contents and second test based on remaining contents (approximately 40% but excluding contents covered in Test I)

End Semester Examination:

Weightage of each module in end semester examination will be proportional to number of respective lecture hours mentioned in the curriculum.

1. Question paper will comprise of total **six questions, each carrying 20 marks**
2. **Question 1** will be **compulsory** and should **cover maximum contents of the curriculum**
3. **Remaining questions will be mixed in nature** (for example if Q.2 has part (a) from module 3 then part (b) will be from any module other than module 3)
4. Only **Four questions need to be solved.**

University of Mumbai


Principal

Shree L. R. Tiwari College of Engineering
Kanakiya Park, Mira Road (E.)



B. E. Mechanical Engineering), Rev 2019

Reference Books:

1. "Non-conventional Energy Sources", G.D. Rai, 6th Edition, Khanna Publishers, ISBN: 978-81-7409-073-7
2. "Renewable Energy: Power for a Sustainable Future", Edited by Godfrey Boyle, 3rd Edition 2012, Oxford University Press, ISBN: 978-0199681273
3. "Solar Energy: Principles of Thermal Collection and Storage", SP Sukhatme and J K Nayak, 4th Edition, Tata McGraw Hill Publishing Co. Ltd.
4. "Solar Energy: Fundamentals and Applications", H.P. Garg & Jai Prakash, First Revised Edition, Tata McGraw-Hill Education.
5. "Wind Power Technology", Joshua Earnest, 2nd Edition, PHI Learning, 2015.
6. "Solar Engineering of Thermal Processes", John A. Duffie and William A Bechman, 4th Edition, Wiley Publications.
7. "Renewable Energy Sources", J W Twidell & Anthony D. Weir, 3rd Edition 2015, ELBS Pub, ISBN: 978-1-315-76641-6
8. "Energy Conversion Systems", Rakosh Das Begamudre, New Age International (P) Ltd., Publishers, New Delhi, 2007, ISBN: 9788122412666
9. "Solar Photovoltaics: Fundamentals, Technologies and Applications", C S Solanki, 3rd Edition, PHI Learning.
10. "Biomass Regenerable Energy", D. D. Hall and R. P. Overend, John Wiley, New York, ISBN: 047190919X
11. "Wind and Solar Power Systems", Mukund R Patel, 2nd Revised Edition, CRC Press, ISBN: 9780429114960
12. "Wind Energy Explained: Theory, Design and Application", J F Manwell, J.C. McGowan, A.L. Rogers, 2nd Edition 2009, John Wiley and Sons.

Links for online NPTEL/SWAYAM courses:

1. <https://nptel.ac.in/courses/103103206>
2. <https://nptel.ac.in/courses/103107157>
3. <https://nptel.ac.in/courses/115105127>



Principal

Shree L. R. Tiwari College of Engineering
Kanakiya Park, Mira Road (E.)



Shree Rahul Education Society's (Regd.)

SHREE L. R. TIWARI COLLEGE OF ENGINEERING

(Approved by AICTE & DTE, Maharashtra State & Affiliated to University of Mumbai)
NAAC Accredited, NBA Accredited Program, ISO 9001:2015 Certified | DTE Code No. : 3423
Minority Status (Hindi Linguistic)

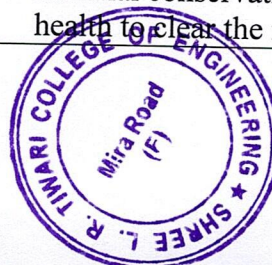
Crosscutting issues relevant Environmental sustainability

Honors/Minor Course for Civil Engineering (2022-2023)

| Sr. No | Semester | Course | Cross Cutting issues | Content relevant to Environmental sustainability |
|--------|----------|---|--|---|
| 1 | V | Green Technologies and Practices | Green Technology and Sustainable Engineering | <ul style="list-style-type: none">Module 1 helps to understand the concept of green technology and evaluation of green technology with role of government in all aspects.Module 2 helps the students to understand the principles of Green Chemistry with clearing the concepts of all issues related to green chemistry.Module 3, students understands the idea about ISO-14000, and get the idea about project implementation.Module 4 teaches students understands various Pollution Prevention and Cleaner Production Awareness Plan.Module 5 teaches students understand about various energy efficiencies with Non-conventional energy sources and solar energy conceptsModule 6 students can understand about green fuel by considering the parameter like Biomass energy, wind energy and Tidal and geothermal energy. |
| 2 | VI | Green Building and Infrastructure Engineering | Green Technology and Sustainable Engineering | <ul style="list-style-type: none">Module 1 helps to understand the concept of green building and principles of green building.Module 2 helps to understand the concept green building practices in India with opportunities of green building and green building council in India.Module 3 helps to design of green building considering the ecofriendly parameters for design of sustainable green building.Module 4 helps to give the idea about material conservation and occupational health to clear the idea about the methods of |

PRINCIPAL

Shree L. R. Tiwari College of Engineering
Kananiya Park, Mira Road (E).





Shree Rahul Education Society's (Regd.)

SHREE L. R. TIWARI COLLEGE OF ENGINEERING

(Approved by AICTE & DTE, Maharashtra State & Affiliated to University of Mumbai)
NAAC Accredited, NBA Accredited Program, ISO 9001:2015 Certified | DTE Code No. : 3423
Minority Status (Hindi Linguistic)

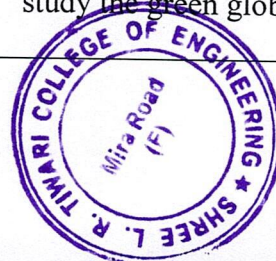
Crosscutting issues relevant Environmental sustainability

Honors/Minor Course for Civil Engineering

| | | | | |
|---|-----|---|--|---|
| | | | | <p>handling waste and reduction of waste, also study about how to improve the Air quality.</p> <ul style="list-style-type: none">• Module 5 students study about different green building rating systems in India and parameters to rate the building to be a green building• Module 6 students study about the life cycle assessment of materials, introduction to EIA, energy management and clean development mechanism and protocol. |
| 3 | VII | Fundamentals of Sustainable Engineering | Green Technology and Sustainable Engineering | <ul style="list-style-type: none">• Module 1 students can understand the concept of sustainability with social, environmental, economic and sustainability concepts. Students also study about CDM• Module 2 students can study about environmental pollution and acts related to environment, social and economic.• Module 3 helps to understand the concepts of international Environmental management standards, also can clear the idea about ISO-14000 & ISO-14001 life cycle analysis, Ozone layer Depletion and Global warming and climate changes effects on environment.• Module 4 students can study about basic concepts of sustainable habitat and energy sources. And can implement the idea how to conserve the energy sources in future.• Module 5 study about sustainable engineering with all the processes of material selection, pollution, prevention, industrial ecology and industrial symbiosis and concept of Bio mimicking.• Module 6 study about the sustainable assessment techniques of green building with the LEED India and GRIHA. Also study the green globes. |

PRINCIPAL

Shree L. R. Tiwari College of Engineering
Kanakiya Park, Mira Road (E).





Shree Rahul Education Society's (Regd.)

SHREE L. R. TIWARI COLLEGE OF ENGINEERING

(Approved by AICTE & DTE, Maharashtra State & Affiliated to University of Mumbai)
NAAC Accredited, NBA Accredited Program, ISO 9001:2015 Certified | DTE Code No. : 3423
Minority Status (Hindi Linguistic)

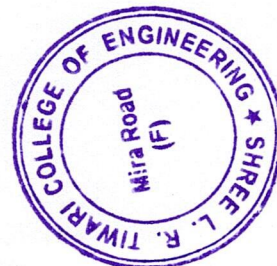
Crosscutting issues relevant Environmental sustainability

Honors/Minor Course for Civil Engineering

| | | | | |
|---|------|---|--|--|
| 4 | VIII | Sustainable Built Environment Engineering | Green Technology and Sustainable Engineering | <ul style="list-style-type: none">• Module 1 students can understand the concept of sustainable development, Environment and Development linkages- Globalization and environment, Millennium Development Goals- Status (global and Indian), and Impacts on approach to development policy and practice in India, future directions.• Module 2 understand the ecosystem biodiversity hotspots, Understanding Critical Perspectives on Environment and Development-Environmental Policy and Law, Landscape Ecology and human development.• Module 3 understand about environmental sustainability in land, water and food production. Also to develop in finance management and sustainable development in development of environmental protection mechanism.• Module 4 student can study about the concept of Socio-economic Sustainability. Also study about the science and technology in sustainable development.• Module 5 helps to understand the concepts of urban planning environment by considering all the parameter to make urban planning with all the rules and norms.• Module 6 study about the concept of the built in environment and considering all the forms to make it sustainable with the designed principles and Transport Integrated Urban land use Planning- Guidelines for Environmentally sound Transportation. |
|---|------|---|--|--|


PRINCIPAL

Shree L. R. Tiwari College of Engineering
Kanakiya Park, Mira Road (E).



University of Mumbai



Syllabus

Honours/Minor Degree Program

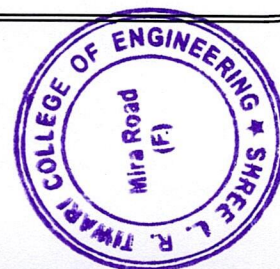
In

Green Technology and Sustainable Engineering

FACULTY OF SCIENCE & TECHNOLOGY

(As per AICTE guidelines with effect from the academic year 2022-2023)

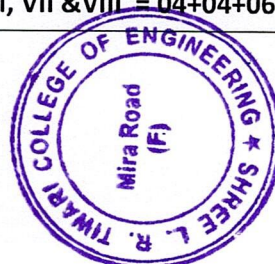

PRINCIPAL
Shree L. R. Tiwari College of Engineering
Kanakiya Park, Mira Road (E).



University of Mumbai
Green Technology and Sustainable Engineering
(With effect from 2022-23)

| Year & Sem | Course Code and Course Title | Teaching Scheme Hours / Week | | | Examination Scheme and Marks | | | | | Credit Scheme |
|---|--|------------------------------|------------------|-----------|------------------------------|--------------|-----------|------------|-----------|---------------|
| | | Theory | Seminar/Tutorial | Pract | Internal Assessment | End Sem Exam | Term Work | Oral | Total | Credits |
| TE Sem V | HGSC501: Green Technologies and Practices | 04 | -- | -- | 20 | 80 | -- | -- | 100 | 04 |
| | Total | 04 | - | -- | 100 | - | - | 100 | 04 | |
| Total Credits = 04 | | | | | | | | | | |
| TE Sem. VI | HGSC601: Green Building and Infrastructure Engineering | 04 | -- | -- | 20 | 80 | -- | -- | 100 | 04 |
| | Total | 04 | - | - | 100 | - | - | 100 | 04 | |
| Total Credits = 04 | | | | | | | | | | |
| BE Sem. VII | HGSC701: Fundamentals of Sustainable Engineering | 04 | -- | -- | 20 | 80 | -- | -- | 100 | 04 |
| | HGSSBL701: Lab-1 Green Building and Infrastructure Engineering | -- | -- | 04 | -- | -- | 50 | 50 | 100 | 02 |
| | Total | 04 | - | 04 | 100 | 50 | 50 | 200 | 06 | |
| Total Credits = 06 | | | | | | | | | | |
| BE Sem. VIII | HGSC801: Sustainable Built Environment Engineering | 04 | - | -- | 20 | 80 | -- | -- | 100 | 04 |
| | Total | 04 | - | - | 100 | - | - | 100 | 04 | |
| Total Credits = 04 | | | | | | | | | | |
| Total Credits for Semesters V,VI, VII &VIII = 04+04+06+04 = 18 | | | | | | | | | | |

PRINCIPAL
 Shree L. R. Tiwari College of Engineering
 Kanakiya Park, Mira Road (E).



| Green Technology and Sustainable Engineering: Semester V | | |
|--|----------------------------------|---------|
| Course Code | Course Name | Credits |
| HGSC501 | Green Technologies and Practices | 04 |

| Contact Hours | | | Credits Assigned | | | |
|---------------|-----------|----------|------------------|-----------|----------|-------|
| Theory | Practical | Tutorial | Theory | Practical | Tutorial | Total |
| 4 | - | - | 4 | - | - | 4 |

| Theory | | | | | Term Work/Practical/Oral | | | Total |
|---------------------|---------|---------|--------------|--------------------------|--------------------------|--------|------|-------|
| Internal Assessment | | | End Sem Exam | Duration of End Sem Exam | Term Work | Pract. | Oral | |
| Test-I | Test-II | Average | | | | | | |
| 20 | 20 | 20 | 80 | 03 Hours | - | - | - | 100 |

Rationale

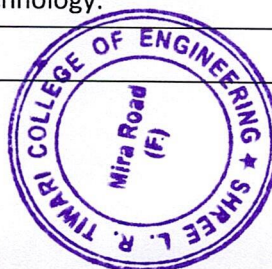
Technology is application of knowledge to practical requirements. Green technologies encompass various aspects of technology which help us reduce the human impact on the environment and create ways of sustainable development. Social equitability, economic feasibility and sustainability are the key parameters for green technology. Today, the environment is racing towards the tipping point at which we would have done permanent irreversible damages to the planet earth. Our current actions are pulling the world towards an ecological landslide which if happens would make destruction simply inevitable. Green technologies are an approach towards savings earth and are necessary. Green technologies are our way out of destruction.

Objectives

1. To acquire knowledge on the concept of green technologies
2. To understand the principles of Green Chemistry in the Energy efficient technologies.
3. To analyze the methods of reducing CO₂ levels in atmosphere for Cleaner Production Project Development and Implementation
4. To evaluate the methods of Pollution Prevention and Cleaner Production Awareness Plan.
5. To analyze the application of Energy Efficacy.
6. To apply the knowledge of Green Fuels during implementation.

| Detailed Syllabus | | | |
|-------------------|---|---|-------|
| Module | Course Module / Contents | | Hours |
| 1 | Introduction to Green Technology | | 07 |
| | 1.1 | Definition- Importance – Historical evolution – advantages and disadvantages of green technologies. | |
| | 1.2 | Factors affecting green technologies. | |
| | 1.3 | Role of Industry, Government and Institutions-Industrial Ecology. | |
| | 1.4 | Role of industrial ecology in green technology. | |
| 2 | Green Chemistry | | 08 |

PRINCIPAL
 Shree L. R. Tiwari College of Engineering
 Kanakiya Park, Mira Road (E).

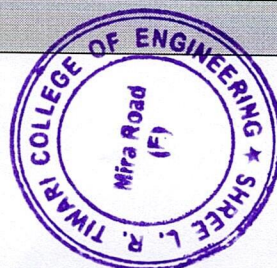


| | | | |
|---|---|---|----|
| | 2.1 | Principles of Green Chemistry, Green chemistry metrics-atom economy. | |
| | 2.2 | E factor, reaction mass efficiency. | |
| | 2.3 | Waste: Sources of waste, different types of waste. | |
| | 2.4 | Chemical, physical and biochemical methods of waste minimization. | |
| | 2.5 | Clean development mechanism: reuse, recovery & recycle. | |
| | 2.6 | Raw material substitution: Wealth from waste, case studies. | |
| | Cleaner Production Project Development and Implementation | | |
| 3 | 3.1 | Overview of CP Assessment Steps and Skills, Process Flow Diagram. | 09 |
| | 3.2 | Material Balance, CP Option Generation: Technical and Environmental Feasibility analysis. | |
| | 3.3 | Economic valuation of alternatives: Total Cost Analysis – CP Financing. | |
| | 3.4 | Preparing a Program Plan: Measuring Progress-ISO 14000. | |
| | Pollution Prevention and Cleaner Production Awareness Plan | | |
| 4 | 4.1 | Waste audit: Environmental Statement. | 10 |
| | 4.2 | Carbon credit, Carbon trading, Carbon footprint. | |
| | 4.3 | Carbon sequestration. | |
| | 4.4 | Life Cycle Assessment- Elements of LCA. | |
| | 4.5 | Life Cycle Costing. | |
| | 4.6 | Eco Labeling. | |
| | Energy Efficacy | | |
| 5 | 5.1 | Availability and need of conventional energy resources: major environmental problems related to the conventional energy resources. | 08 |
| | 5.2 | Future possibilities of energy need and availability. | |
| | 5.3 | Non-conventional energy sources: Solar Energy-solar energy conversion technologies and devices. | |
| | 5.4 | Solar Energy: principles, working and application. | |
| | Green Fuels | | |
| 6 | 6.1 | Definition-benefits and challenges: comparison of green fuels with conventional fossil fuels with reference to environmental, economical and social impacts- public policies and market driven initiatives. | 10 |
| | 6.2 | Biomass energy: Concept of biomass energy utilization, types of biomass energy, conversion processes. | |
| | 6.3 | Wind Energy, energy conversion technologies, their principles, equipment and suitability in Indian context. | |
| | 6.4 | Tidal and geothermal energy. | |

Contribution to Outcome

On completion of this course, the students will be able to:

PRINCIPAL
 Shree L. R. Tiwari College of Engineering
 Kanakiya Park, Mira Road (E).



1. Enlist different concepts of green technologies in a project.
2. Describe the principles of Green Chemistry in the Energy efficient technologies.
3. Select the best method for the carbon credits of various activities for Cleaner Production Project Development and Implementation.
4. Evaluate the importance of life cycle assessment for Pollution Prevention and Cleaner Production Awareness Plan.
5. To apply the problems related to Pollution Prevention and Cleaner Production Awareness Plan.
6. To choose the green fuels based on their benefits for sustainable development.

Internal Assessment

20 Marks

Consisting Two Compulsory Class Tests - First test based on approximately 40% of contents and second test based on remaining contents (approximately 40% but excluding contents covered in Test I)

End Semester Examination

80 Marks

Weightage of each module in end semester examination will be proportional to number of respective lecture hours mentioned in the curriculum.

1. Question paper will comprise of total six questions, each carrying 20 marks.
2. Question 1 will be compulsory and should cover maximum contents of the curriculum.
3. Remaining questions will be mixed in nature (for example if Q.2 has part (a) from module 3 then part (b) will be from any module other than module 3).
4. Only Four questions need to be solved.

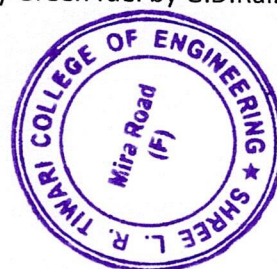
Recommended Books:

1. 'Pollution Prevention: Fundamentals and Practice' by Paul L Bishop (2000), McGraw Hill International.
2. 'Pollution Prevention and Abatement Handbook –Towards Cleaner Production' by World Bank Group (1998), World Bank and UNEP, Washington D.C.
3. 'Cleaner Production Audit' by Prasad Modak, C. Visvanathan and Mandar Parasnis (1995), Environmental System Reviews, No.38, Asian Institute of Technology, Bangkok
4. 'Handbook of Organic Waste Conversion' by Bewik M.W.M.
5. 'Solar Energy' by Sukhatme S.P.

Reference Books:

1. 'Energy, The Solar Hydrogen Alternative' by Bokris J.O.
2. 'Non-conventional Energy Sources' by Rai G.D.
3. 'Waste Energy Utilization Technology' by Kiang Y. H.
4. Wind, Tidal, Geothermal, Biomass and Non-conventional energy Green fuel by G.D.Rai.


PRINCIPAL
Shree L. R. Tiwari College of Engineering
Kanakiya Park, Mira Road (E).



| Green Technology and Sustainable Engineering : Semester VI | | |
|--|---|---------|
| Course Code | Course Name | Credits |
| HGSC601 | Green Building and Infrastructure Engineering | 04 |

| Contact Hours | | | Credits Assigned | | | |
|---------------|-----------|----------|------------------|-----------|----------|-------|
| Theory | Practical | Tutorial | Theory | Practical | Tutorial | Total |
| 4 | - | - | 4 | - | - | 4 |

| Theory | | | | | Term Work/Practical/Oral | | | Total |
|---------------------|---------|---------|--------------|--------------------------|--------------------------|--------|------|-------|
| Internal Assessment | | | End Sem Exam | Duration of End Sem Exam | Term Work | Pract. | Oral | |
| Test-I | Test-II | Average | | | | | | |
| 20 | 20 | 20 | 80 | 03 Hours | - | - | - | 100 |

Rationale

This course incorporating sustainable design/thinking as a new civil engineering course and experiences from the pilot offering. Important areas are outlined to aid all engineers in understanding sustainability in context with traditional engineering principles. Green-building rating systems are used to introduce the concepts of sustainability in buildings and infrastructure, highlighted by presentations from green-building professionals. By providing a better understanding of sustainability through education, civil engineers can provide proactive solutions to a growing global infrastructure.

Objectives

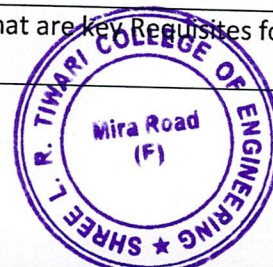
1. To acquire knowledge on various aspects of green building concepts.
2. To acquire knowledge on Indian Green Building Council.
3. To understand to green building design.
4. To apply knowledge on material conservation handling of non-process waste.
5. To analyze green building assessment systems national as well international.
6. To evaluate various terminologies Embodied Energy, Life Cycle Assessment, Environmental Impact Assessment, Energy Audit and Energy Management.

Detailed Syllabus

| Module | Course Module / Contents | | Hours |
|--------|--------------------------------|---|-------|
| 1 | Green Building Concepts | | 07 |
| | 1.1 | What is Green Building, Why to go for Green Building, Benefits of Green Buildings- | |
| | 1.2 | Green Building Materials and Equipment in India, What are key Requisites for Constructing a Green Building? | |

PRINCIPAL

R. Tiwari College of Engineering
Viveka Park, Mira Road (E).



| | | | |
|---|--|---|----|
| | 1.3 | Principles of green building – Selection of site and Orientation of the building – usage of low energy materials – effective cooling and heating systems- | |
| | 1.4 | Effective electrical systems – effective water conservation systems- | |
| | Green Building Practices in India | | |
| 2 | 2.1 | Practices Indian Green Building Council, Green Building Moment in India, Benefits Experienced in Green Buildings- | 09 |
| | 2.2 | Launch of Green Building Rating Systems, Residential Sector, Market Transformation- | |
| | 2.3 | Green Building Opportunities And Benefits: Opportunities of Green Building- | |
| | 2.4 | Green Building Features, Material and Resources, Water Efficiency | |
| | 2.5 | Optimum Energy Efficiency- | |
| | 2.6 | Typical Energy Saving Approach in Buildings- | |
| | Introduction to Green Building Design | | |
| 3 | 3.1 | Green Building Design Introduction, Reduction in Energy Demand- | 09 |
| | 3.2 | Onsite Sources and Sinks, Maximize System Efficiency- | |
| | 3.3 | Steps to Reduce Energy Demand and Use Onsite Sources and Sinks, Use of Renewable Energy Sources. | |
| | 3.4 | Eco-friendly captive power generation for factory, Building requirement- | |
| | Material Conservation and Occupational Health | | |
| 4 | 4.1 | Material Conservation Handling of non -process waste, waste reduction during construction- | 09 |
| | 4.2 | Materials with recycled content, local materials, material reuse, certified wood, Rapidly renewable building materials and furniture- | |
| | 4.3 | Indoor Environment Quality And Occupational Health: Air conditioning, Indoor air quality, Sick building syndrome, Tobacco smoke control- | |
| | 4.4 | Minimum fresh air requirements avoid use of asbestos in the building- | |
| | 4.5 | Improved fresh air ventilation, Measure of IAQ- | |
| | 4.6 | Reasons for poor IAQ, Measures to achieve Acceptable IAQ levels- | |
| | Green building Rating Systems | | |
| 5 | 5.1 | Green building assessments system studying e.g. LEED US (Leadership in Energy and Environmental Design)- | 09 |
| | 5.2 | Living Building Challenge, Green Globes (Green Building Initiative) (US), Green Globes (ECD-Canada; LEED-Canada, Built Green CANADA | |
| | 5.3 | BREEAM (Building Research Establishment Environmental Assessment Method) (UK)- | |
| | 5.4 | LEED India (Indian GBC); IGBC Green modules; TERI-GRIHA (Green Rating for Integrated Habitat Assessment) (India) Rating modules- | |
| | Embodied Energy, Life Cycle Assessment, Environmental Impact Assessment, Energy Audit and Energy Management | | |
| 6 | 6.1 | Introduction to the Concept: "Life Cycle assessment of materials" | 09 |

| | |
|-----|---|
| 6.2 | EIA: Introduction to EIA. Process of EIA and its application through a case study, EIA as a strategic tool for sustainable development-Social Impact Assessment of Infrastructure projects- |
| 6.3 | Embodied energy of various construction materials-Energy Management with respect to buildings- |
| 6.4 | Clean Development Mechanism, Kyoto Protocol, Energy Conservation Building Code- |

Contribution to Outcome

On completion of this course, the students will be able to:

1. Explain the concepts of green building.
2. Learn practices Indian Green Building Council and GRIHA.
3. Use the green building design in the projects.
4. Learn material conservation handling of non -process waste.
5. Learn green building assessment systems national as well international.
6. Study various terminologies Embodied Energy, Life Cycle Assessment, Environmental Impact Assessment, Energy Audit and Energy Management.

Internal Assessment

20 Marks

Consisting Two Compulsory Class Tests - First test based on approximately 40% of contents and second test based on remaining contents (approximately 40% but excluding contents covered in Test I)

End Semester Examination

80 Marks


Weightage of each module in end semester examination will be proportional to number of respective lecture hours mentioned in the curriculum.

1. Question paper will comprise of total six questions, each carrying 20 marks.
2. Question 1 will be compulsory and should cover maximum contents of the curriculum.
3. Remaining questions will be mixed in nature (for example if Q.2 has part (a) from module 3 then part (b) will be from any module other than module 3).
4. Only Four questions need to be solved.

Recommended Books:

1. Manual of Tropical housing and climate by Koenisberger
2. Climate responsive architecture by Arvind Krishnan
3. Manual of solar passive architecture - by Nayak J.K. R. Hazra J. Prajapati.
4. Energy Efficient Buildings in India by Milli Mujumdar
5. Solar Energy in Architecture and Urban Planning by Herzog Thomas
6. Sustainable Building Design Manual-Volume I and II –TERI Publication
7. Green building codes and standards
8. International Green Construction Code
9. Complete Guide to Green Buildings by Trish riley
10. Standard for the design for High Performance Green Buildings by Kent Peterson, 2009

Reference Books:


PRINCIPAL
 Shree L. R. Tiwari College of Engineering
 Kanakiya Park, Mira Road (E).



1. Green Building Hand Book by Tom woolley and Sam kimings, 2009.
2. Green Building Materials by Ross Spiegel and Dru Meadows
3. Publications from - CBRI, SERC, BMTPC
4. Shahane, V. S, "Planning and Designing Building", Poona, Allies Book Stall, 2004.
5. Michael Bauer, Peter Mösle and Michael Schwarz "Green Building – Guidebook for Sustainable Architecture" Springer, 2010.
6. Tom Woolley, Sam Kimmins, Paul Harrison and Rob Harrison "Green Building Handbook" Volume I, Spon Press, 2001.



PRINCIPAL
Shree L. R. Tiwari College of Engineering
Kanakiya Park, Mira Road (E).



| Green Technology and Sustainable Engineering : Semester VII | | |
|---|---|---------|
| Course Code | Course Name | Credits |
| HGSC701 | Fundamentals of Sustainable Engineering | 04 |

| Contact Hours | | | Credits Assigned | | | |
|---------------|-----------|----------|------------------|-----------|----------|-------|
| Theory | Practical | Tutorial | Theory | Practical | Tutorial | Total |
| 4 | - | - | 4 | - | - | 4 |

| Theory | | | | | Term Work/Practical/Oral | | | Total |
|---------------------|---------|---------|--------------|--------------------------|--------------------------|--------|------|-------|
| Internal Assessment | | | End Sem Exam | Duration of End Sem Exam | Term Work | Pract. | Oral | |
| Test-I | Test-II | Average | | | | | | |
| 20 | 20 | 20 | 80 | 03 Hours | - | - | - | 100 |

Rationale

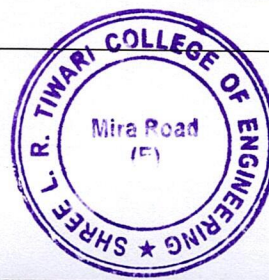
This course contains content that address sustainability issues and innovations of relevance to the discipline area. Sustainability content (principles and theory) is well integrated into the course. The course outline specifically addresses the sustainability content.

Objectives

1. To acquire knowledge and awareness among students on issues in areas of sustainability.
2. To understand the role of engineering Environmental Pollution and Environmental legislations in India.
3. To understand the International Environmental Management Standards.
4. To apply a clear understanding of the role and impact of various aspects of engineering and engineering decisions on environmental, societal, and economic problems.
5. To analyze the Sustainable Engineering.
6. To evaluate the Sustainable Assessment Systems.

| Detailed Syllabus | | | |
|-------------------|--|--|-------|
| Module | Course Module / Contents | | Hours |
| 1 | Introduction to Sustainability | | 08 |
| | 1.1 | Sustainability-Introduction, Historical Evolution-Goals of Sustainable Development-Principles of Sustainability-Sustainability-need and concept, challenges. | |
| | 1.2 | Social, Environmental and Economic sustainability concepts | |
| | 1.3 | Sustainable development, Nexus between Technology and Sustainable development, Challenges for Sustainable Development. | |
| | 1.4 | Multilateral environmental agreements and Protocols-Clean Development Mechanism (CDM) | |
| 2 | Environmental Pollution and Environmental legislations in India | | 09 |

PRINCIPAL
 Shree L. R. Tiwari College of Engineering
 Kanakiya Park, Mira Road (E).



| | | | |
|---|---|--|----|
| | 2.1 | Regional and Local Environmental Issues-Air Pollution, Sources- Effects-Preventative Measures of Air Pollution; Water pollution- Land Pollution | |
| | 2.2 | Sustainable wastewater treatment, Solid waste - sources, impacts of solid waste, Zero waste concepts, 3 R concept- | |
| | 2.3 | Environmental legislations in India-Water Act, Air (Pollution & Prevention) Act | |
| | 2.4 | Environmental Protection Act and Climate Change Act | |
| | 2.5 | Forest Act, Animal Protection Act, Factory Act, Labour Act | |
| | 2.6 | SEZ Notifications, CRZ Notifications etc | |
| | International Environmental Management Standards | | |
| 3 | 3.1 | International Environment Acts and Protocols, Global, Regional and Local environmental issues, Natural resources and their pollution, Carbon credits, Carbon Trading, Carbon Foot Print | 09 |
| | 3.2 | ISO 14000, ISO 14001, Life Cycle Analysis, Environmental Impact Assessment studies, Sustainable habitat | |
| | 3.3 | Global environmental issues-Resource degradation, Climate change, Global warming, Ozone layer depletion | |
| | 3.4 | Sustainable materials-Conventional and renewable material sources, sustainable development, Sustainable urbanization, Industrial Ecology | |
| | Basic concepts of sustainable habitat and Energy sources | | |
| 4 | 4.1 | Basic concepts of sustainable habitat, Sustainable materials for building construction | 09 |
| | 4.2 | Material selection for sustainable design | |
| | 4.3 | Conventional and non-conventional energy sources-Solar energy, Fuel cells, Wind energy, Small hydro plants, bio-fuels, Energy derived from oceans, Geothermal energy-Methods for increasing energy efficiency of buildings | |
| | 4.4 | Embodied energy of various construction materials-Energy Management with respect to buildings | |
| | 4.5 | Clean Development Mechanism | |
| | 4.6 | Kyoto Protocol, and Energy Conservation Building Code | |
| | Sustainable Engineering- | | |
| 5 | 5.1 | Sustainable Urbanization- Sustainable cities- | 08 |
| | 5.2 | Sustainable transport-Industrialization and poverty reduction-Social and technological change- | |
| | 5.3 | Industrial Processes: Material selection, Pollution Prevention, Industrial Ecology, Industrial symbiosis | |
| | 5.4 | Bio-mimicking | |
| | Sustainable Assessment Systems | | |
| 6 | 6.1 | Studying few Green/Sustainable building assessments systems e.g. Living Building Challenge, Green Globes (Green Building Initiative) (US) | 09 |
| | 6.2 | LEED India and GRIHA Sustainability Assessment Techniques- | |
| | 6.3 | Green Globes (ECD-Canada/International Initiative for a Sustainable Built Environment: iiSBTool | |

PRINCIPAL
 Shree L. R. Tiwari College of Engineering
 Kanakiya Park, Mira Road (E).



| | | |
|--------------------------------|------------|--|
| 6.4 | SBModel 15 | |
| Contribution to Outcome | | |

On completion of this course, the students will be able to:

1. To explain issues in areas of sustainability.
2. To summarize the role of engineering Environmental Pollution and Environmental legislations in India.
3. To interpret the International Environmental Management Standards.
4. To relate a clear understanding of the role and impact of various aspects of engineering and engineering decisions on environmental, societal, and economic problems.
5. To connect the Sustainable Engineering
6. To develop the Sustainable Assessment Systems.

Internal Assessment

20 Marks

Consisting Two Compulsory Class Tests - First test based on approximately 40% of contents and second test based on remaining contents (approximately 40% but excluding contents covered in Test I)

End Semester Examination

80 Marks

Weightage of each module in end semester examination will be proportional to number of respective lecture hours mentioned in the curriculum.

- 1 Question paper will comprise of total six questions, each carrying 20 marks.
- 2 Question 1 will be compulsory and should cover maximum contents of the curriculum.
- 3 Remaining questions will be mixed in nature (for example if Q.2 has part (a) from module 3 then part (b) will be from any module other than module 3).
- 4 Only Four questions need to be solved.

Recommended Books:

1. Allen, D. T. and Shonnard, D. R., Sustainability Engineering: Concepts, Design and Case Studies, Prentice Hall.
2. Bradley, A.S; Adebayo, A.O., Maria, P. Engineering applications in sustainable design and development, Cengage learning
3. Mackenthun, K.M., Basic Concepts in Environmental Management, Lewis Publication, London, 1998
4. Twidell, J. W. and Weir, A. D., Renewable Energy Resources, English Lang.
5. Prohit, S. S., Green Technology - An approach for sustainable environment, Agrobios publication uage Book Society (ELBS).

Reference Books:

1. Environment Impact Assessment Guidelines, Notification of Government of India, 2006
2. ECBC Code 2016, Bureau of Energy Efficiency, New Delhi Bureau of Energy Efficiency Publications-Rating System, TERI Publications - GRIHA Rating System
3. Ni bin Chang, Systems Analysis for Sustainable Engineering: Theory and Applications, McGraw-Hill Professional.

PRINCIPAL
 Shree L. R. Tiwari College of Engineering
 Kanakiya Park, Mira Road (E).



Green Technology and Sustainable Engineering : Semester-VII

| Course Code | Course Name | Credits |
|------------------|---|---------|
| Lab 1: HGSSBL601 | Green Building and Infrastructure Engineering | 02 |

| Contact Hours | | | Credits Assigned | | | |
|---------------|-------------|----------|------------------|-----------|----------|-------|
| Theory | Practical | Tutorial | Theory | Practical | Tutorial | Total |
| - | 04 Per Week | - | - | 02 | | 02 |

| Theory | | | | | Term Work/Practical/Oral | | | Total |
|---------------------|---------|---------|--------------|--------------------------|--------------------------|--------|------|-------|
| Internal Assessment | | | End Sem Exam | Duration of End Sem Exam | Term Work | Pract. | Oral | |
| Test-I | Test-II | Average | | | | | | |
| - | - | - | - | - | 50 | - | 50 | 100 |

Course Objective:

1. To acquire knowledge on various aspects of green building concepts.
2. To acquire knowledge on Indian Green Building Council.
3. To understand green building design.
4. To analyze green building assessment systems national as well international.
5. To apply knowledge on material conservation handling of non-process waste.
6. To evaluate various terminologies of Embodied Energy, Life Cycle Assessment, Environmental Impact Assessment, Energy Audit and Energy Management

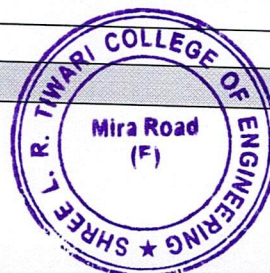
List of Experiments (Conduct six practicals out of nine mentioned below)

| Module | Detailed Content | Lab Session / Hr. |
|--------|---|-------------------|
| 1 | To study sustainable planning aspects for urban housing (Literature based). | 04 |
| 2 | To study the benefits given by Municipal Corporations to Green Buildings (Literature based). | 04 |
| 3 | To prepare detailed plan for a hypothetical site indicating utility of solar path, wind direction, rainfall intensity etc., to make it sustainable (Literature based) | 04 |
| 4 | To prepare a report on energy efficient buildings in India (Case Study based). | 04 |
| 5 | To compare the benefits under different green building rating systems (Literature based) | 04 |
| 6 | To study: Innovative Materials Developed by CBRI, SERC (Literature based). | 04 |
| 7 | To study, analyze present scenario of organic waste collection and management of any of the premise; preferably hotels (Case Study based) | 04 |
| 8 | To prepare a report on carbon credit, carbon Trading and Carbon footprint (Literature based). | 04 |
| 9 | To study: Environmental Audit of any existing building and prepare a report (Case Study based). | 04 |

Course Outcomes

PRINCIPAL

Shree L. R. Tiwari College of Engineering
Kanakiya Park, Mira Road (E).



At the end of the course, learner will be able to:

1. Understand the concepts of green building.
2. Learn practices of Indian Green Building Council and GRIHA
3. Design a sustainable green building
4. Assessed green building systems nationally as well internationally.
5. Learn material conservation handling of non-process waste.
6. Study various terminologies of Embodied Energy, Life Cycle Assessment, Environmental Impact Assessment, Energy Audit and Energy Management.

Assessment:

Term work:

Shall consist of Assignment, design report, case study and Site visit report related to this course. Distribution of marks for Term Work shall be as follows:

Assignment: 15 marks

Case study/Literature report: 15 marks

Site visit: 15 marks

Attendance: 05 marks

Further, while giving weightage of marks on the attendance, following guidelines shall be resorted to: 75%- 80%: 03 Marks; 81%- 90%: 04 Marks; 91% onwards: 05 Marks.

End Semester Oral Examination:

Oral examination shall be based upon the entire theory, site visit and laboratory syllabus.

Recommended Books:

1. 'Handbook of Organic Waste Conversion' by Bewik M.W.M.
2. Green Building Hand Book by Tom woolley and Sam kimings, 2009.
3. Energy Efficient Buildings in India by Milli Mujumdar
4. Allen, D. T. and Shonnard, D. R., 'Sustainability Engineering: Concepts, Design and Case Studies', Prentice Hall.
5. 'Solar Energy' by Sukhatme S.P.
6. 'Waste Energy Utilization Technology' by Kiang Y. H.

Reference Books:

1. Handbook on Green Practices published by Indian Society of Heating Refrigerating and Air-conditioning Engineers, 2009.
2. Manual of Tropical housing and climate by Koenisberger
3. Climate responsive architecture by Arvind Krishnan
4. Manual of solar passive architecture - by Nayak J.K. R. Hazra J. Prajapati.
5. Green Building Materials by Ross Spiegel and Dru Meadows Publications from - CBRI, SERC, BMTPC
6. Solar Energy in Architecture and Urban Planning by Herzog Thomas
7. Sustainable Building Design Manual-Volume I and II -TERI Publication
8. Green building codes and standards
9. International Green Construction Code
10. Complete Guide to Green Buildings by Trish riley
11. Standard for the design for High Performance Green Buildings by Kent Peterson, 2009
12. Shahane, V. S, "Planning and Designing Building", Poona, Allies Book Stall, 2004.
13. Michael Bauer, Peter Mösle and Michael Schwarz "Green Building – Guidebook for Sustainable Architecture" Springer, 2010.
14. Tom Woolley, Sam Kimmins, P. Harrison and R. Harrison "Green Building Handbook" Volume 1, Spon Press, 2001.

PRINCIPAL
Shree L. R. Tiwari College of Engineering
Kanakiya Park, Mira Road (E).



Green Technology and Sustainable Engineering : Semester VIII

| | | |
|--------------------|---|----------------|
| Course Code | Course Name | Credits |
| HGSC801 | Sustainable Built Environment Engineering | 04 |

| Contact Hours | | | Credits Assigned | | | |
|---------------|-----------|----------|------------------|-----------|----------|-------|
| Theory | Practical | Tutorial | Theory | Practical | Tutorial | Total |
| 4 | - | - | 4 | - | - | 4 |

| Theory | | | | | Term Work/Practical/Oral | | | Total |
|---------------------|---------|---------|--------------|--------------------------|--------------------------|--------|------|-------|
| Internal Assessment | | | End Sem Exam | Duration of End Sem Exam | Term Work | Pract. | Oral | |
| Test-I | Test-II | Average | | | | | | |
| 20 | 20 | 20 | 80 | 03 Hours | - | - | - | 100 |

Rationale

Education for sustainability is an important part of the journey to live and work in a sustainable manner. Curricula changes to incorporate sustainability education in the built environment disciplines is not a new phenomenon. Often, curricula changes are made from the perspective of the discipline and the individual learning the course.

Objectives

1. To Understand Sustainable Development
2. To apply knowledge for Understanding Ecosystems
3. To evaluate Environmental Sustainability.
4. To create Socio-economic Sustainability.
5. To create Urban Planning and Environment.
6. To analyze the Built in Environment.

Detailed Syllabus

| Module | Course Module / Contents | | Hours |
|--------|---------------------------------|---|-------|
| 1 | Sustainable Development | | 08 |
| | 1.1 | Definitions and principles of Sustainable Development - History and emergence of the concept of Sustainable Development. | |
| | 1.2 | Environment and Development linkages- Globalization and environment. | |
| | 1.3 | Millennium Development Goals- Status (global and Indian)- | |
| | 1.4 | Impacts on approach to development policy and practice in India, future directions. | |
| 2 | Understanding Ecosystems | | 09 |
| | 2.1 | Understanding Ecosystems-biodiversity hotspots, Understanding Critical Perspectives on Environment and Development-Environmental Policy and Law, Landscape Ecology and human development. | |
| | 2.2 | Introduction to Policy, Institutions and Governance-Urbanization-Conservation of natural resources and livelihood security. | |

PRINCIPAL
 Shree L. R. Tiwari College of Engineering
 Kanakiya Park, Mira Road (E).



| | | | |
|---|---------------------------------------|---|----|
| | 2.3 | Environment- Evaluation and Impact Assessment Frameworks-Knowledge of ecosystem dynamics, ecosystem-livelihood linkages, Environmental vulnerabilities and adaptations. | |
| | 2.4 | Resilience towards climate change and disasters-Environment-development-poverty linkages, issues of access and justice. | |
| | 2.5 | Understanding of field techniques and skills to assess ecological processes-Skills to engage with local communities, undertake impact assessments. | |
| | 2.6 | Experiential learning of conservation and development issues. | |
| 3 | Environmental Sustainability | | 09 |
| | 3.1 | Land, Water and Food production | |
| | 3.2 | Moving towards sustainability: Energy powering | |
| | 3.3 | Sustainable Development - Financing the environment | |
| | 3.4 | Sustainable Development- Development of Environmental Protection Mechanism | |
| 4 | Socio-economic Sustainability | | 09 |
| | 4.1 | Empowerment of Women, Children, Youth, Indigenous People | |
| | 4.2 | Non-Governmental Organizations, Local Authorities, Business and Industry | |
| | 4.3 | Sustainability Performance indicators and Assessment mechanism | |
| | 4.4 | Hurdles to sustainability- Constraints and barriers for sustainable development | |
| | 4.5 | Operational guidelines-Interconnected prerequisites for sustainable development | |
| | 4.6 | Science and Technology for sustainable development | |
| 5 | Urban Planning and Environment | | 08 |
| | 5.1 | Environment and Resources | |
| | 5.2 | Sustainability Assessment- Future Scenarios | |
| | 5.3 | Form of Urban Region- Managing the change | |
| | 5.4 | Integrated Planning-Sustainable Development | |
| 6 | The Built in Environment | | 09 |
| | 6.1 | Urban Form | |
| | 6.2 | Land Use-Compact Development | |
| | 6.3 | Principles of street design-complete streets | |
| | 6.4 | Transport Integrated Urban land use Planning- Guidelines for Environmentally sound Transportation | |

Contribution to Outcome

On completion of this course, the students will be able to:

1. Describe the concept and socio-economic policies of Sustainable Development.
2. Identify the strategies for implementing eco development programs.
3. Identify different approaches for resource conservation and management.

PRINCIPAL
 Shree L. R. Tiwari College of Engineering
 Kanakiya Park, Mira Road (E).



4. Suggest action plans for implementation of sustainable development.
5. Explain Urban Planning and Environment.
6. Explain the built in environment.

Internal Assessment

20 Marks

Consisting Two Compulsory Class Tests - First test based on approximately 40% of contents and second test based on remaining contents (approximately 40% but excluding contents covered in Test I)

End Semester Examination

80 Marks

Weightage of each module in end semester examination will be proportional to number of respective lecture hours mentioned in the curriculum.

1. Question paper will comprise of total six questions, each carrying 20 marks.
2. Question 1 will be compulsory and should cover maximum contents of the curriculum.
3. Remaining questions will be mixed in nature (for example if Q.2 has part (a) from module 3 then part (b) will be from any module other than module 3).
4. Only Four questions need to be solved.

Recommended Books:

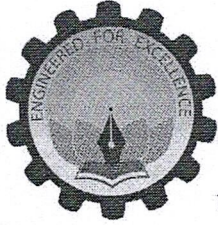
1. Allen, D. T. and Shonnard, D. R., Sustainability Engineering: Concepts, Design and Case Studies, Prentice Hall.
2. Mackenthun, K.M., Basic Concepts in Environmental Management, Lewis Publication, London, 1998
3. ECBC Code 2016, Bureau of Energy Efficiency, New Delhi Bureau of Energy Efficiency Publications-Rating System, TERI Publications - GRIHA Rating System
4. Ni bin Chang, Systems Analysis for Sustainable Engineering: Theory and Applications, McGraw-Hill Professional.
5. Prohit, S. S., Green Technology - An approach for sustainable environment, Agrobios publication uage Book Society (ELBS).
6. Ganesha Somayaji and Sakarama Somayaji, "Environmental Concerns and Sustainable development: Some perspectives from India", Editors: publisher TERI Press, ISBN 8179932249.
7. Kirkby, J, O'Keefe P. and Timberlake, "Sustainable development" Earth Scan Publication, London, 1996.

Reference Books:

1. Bradley. A.S; Adebayo, A.O., Maria, P. Engineering applications in sustainable design and development, Cengage learning
2. Environment Impact Assessment Guidelines, Notification of Government of India, 2006
3. Twidell, J. W. and Weir, A. D., Renewable Energy Resources, English Lang
4. Gilg A W and Yarwood R, "Rural Change and Sustainability - Agriculture, the Environment and Communities", CABI Edited by S J Essex, September2005.
5. James H. Weaver, Michael T. Rock, Kenneth Kustere, "Achieving Broad-Based Sustainable Development: Governance, Environment, and Growth with Equity", Kumarian Press, West Hartford, CT. Publication Year, 1997.
6. Kerry Turner. R, "Sustainable Environmental Management", Principles and Practice Publisher: Belhaven Press, ISBN: 1852930039.
7. Munier N, "Introduction to Sustainability", Springer2005.

PRINCIPAL
 Shree L. R. Tiwari College of Engineering
 Kanakiya Park, Mira Road (E).





Shree Rahul Education Society's (Regd.)

SHREE L. R. TIWARI COLLEGE OF ENGINEERING


(Approved by AICTE & DTE, Maharashtra State & Affiliated to University of Mumbai)
NAAC Accredited, NBA Accredited Program, ISO 9001:2015 Certified | DTE Code No. : 3423
Minority Status (Hindi Linguistic)

Crosscutting issues relevant to Professional ethics, Gender and Human Values and Environmental Sustainability

(2018-2023)

| Sr. No. | Semester | Course | Cross Cutting Issues | Content relevant to Human Values |
|---------|----------|------------------------------------|----------------------|---|
| 1 | I | Student Induction Program (5 days) | Human Values | <ul style="list-style-type: none">• New students can sensitize them towards exploring academic interests and activities thereby understanding the institutional culture, values, policies and practices. Learners and parents get a complete idea related to academics.• Learners understand the need and importance of mentoring. Also with the help of universal values, they are able to explore themselves, take decisions with courage thereby experiencing the feeling of prosperity.• Students become aware about Proficiency Modules, certain physical activities which will enable them to gain confidence.• Students can get rejuvenation and relief by attending various motivational lectures, workshops taken by eminent speakers.• Students are also encouraged to make presentations in the language they are comfortable with to boost up their confidence. |




PRINCIPAL
Shree L. R. Tiwari College of Engineering
Kanakiya Park, Mira Road (E).

UNIVERSITY OF MUMBAI



Bachelor of Engineering

First Year Engineering (Semester I & II), Revised course
(REV- 2019 'C' Scheme) from Academic Year 2019 – 20
(Common for All Branches of Engineering)

Under

FACULTY OF SCIENCE & TECHNOLOGY

(As per AICTE guidelines with effect from the academic year
2019–2020)




Principal
Shree L. R. Tiwari College of Engineering
Kanakiya Park, Mira Road (E.)

Preamble

To meet the challenge of ensuring excellence in engineering education, the issue of quality needs to be addressed, debated and taken forward in a systematic manner. Accreditation is the principal means of quality assurance in higher education. The major emphasis of accreditation process is to measure the outcomes of the program that is being accredited. In line with this Faculty of Science and Technology (in particular Engineering) of University of Mumbai has taken a lead in incorporating philosophy of outcome based education in the process of curriculum development.

Faculty resolved that course objectives and course outcomes are to be clearly defined for each course, so that all faculty members in affiliated institutes understand the depth and approach of course to be taught, which will enhance learner's learning process. Choice based Credit and grading system enables a much-required shift in focus from teacher-centric to learner-centric education since the workload estimated is based on the investment of time in learning and not in teaching. It also focuses on continuous evaluation which will enhance the quality of education. Credit assignment for courses is based on 15 weeks teaching learning process, however content of courses is to be taught in 12-13 weeks and remaining 2-3 weeks to be utilized for revision, guest lectures, coverage of content beyond syllabus etc.

There was a concern that in the present system, the first year syllabus is heavily loaded and it is of utmost importance that the students entering into the first year of an engineering course should feel at ease by lowering the burden of syllabus and credits. This is necessary for a student to get accustomed to the new environment of a college and to create a bonding between the teacher and a student. In this regard, AICTE has provided a model of Induction Program, which has been accommodated with certain modification and also overall credits proposed by AICTE in their model curriculum.

The present curriculum will be implemented for First Year of Engineering from the academic year 2019-20. Subsequently this system will be carried forward for Second Year Engineering in the academic year 2020-21, for Third Year and Final Year Engineering in the academic years 2021-22, 2022-23, respectively.

Dr. Suresh K. Ukarande

Dean (I/C)

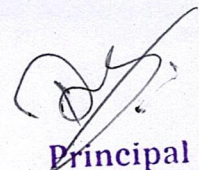
Faculty of Science and Technology

Member, Senate Academic Council

Board of Dean's, BOEE, RRC

University of Mumbai, Mumbai




Principal

Shree L. R. Tiwari College of Engineering
Kanakiya Park, Mira Road (E.)

Structure for Student Induction Program

New students enter an institution with diverse thoughts, backgrounds and preparations. It is important to help them adjust to the new environment and inculcate in them the ethos of the institution with a sense of larger purpose.

The Induction Program is designed to make the newly joined students feel comfortable, sensitize them towards exploring their academic interests and activities, reducing competition and making them work for excellence, promote bonding within them, build relations between teachers and students, give a broader view of life, and building of character.

Its purpose is to make the students feel comfortable in their new environment, open them up, set a healthy daily routine, create bonding in the batch as well as between faculty and students, develop awareness, sensitivity and understanding of the self, people around them, society at large, and nature.

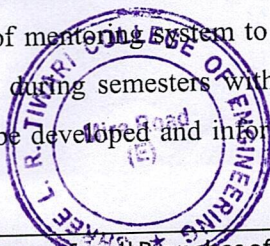
Transition from school to university/college life is one of the most challenging events in student's life. Therefore, it should be taken seriously, and as something more than the mere orientation program.

The time during the Induction Program is also used to rectify some critical lacunas, for example, English background, for those students who have deficiency in it.

New students be informed that the Induction is mandatory non-credit course for which a certificate will be issued by the institution.

At the start of the induction, the incumbents learn about the institutional policies, processes, practices, culture and values, and their mentor groups are formed. The different activities are:

1. **Orientation:** In the first session of Induction program learners and parents to be oriented about institute policies, processes, practices, culture and values. In addition to this, learners will be educated for 1st year academic program information in terms of academic calendar, Assessment plan, grading information, university ordinances, rules and regulations related to academics.
2. **Mentoring:** Mentoring and connecting the students with faculty members is the most important part of student induction. Mentoring process shall be carried out in small groups, group of 10 students to be formed and allocate one senior student from 3rd year of same program in which new students have taken admission, students mentor will continue for two years, till student mentors graduate from the institute. For two (2) such groups one faculty mentor to be allocated from the same department/program, who will remain the mentor till those students graduates from the institute. In the second session of Induction program, groups for mentoring to be formed and student mentors and faculty mentors to be introduced to newly inducted students. Introduction of mentoring system to be given to new students. Minimum one meeting to be conducted every month during semesters with students group by faculty mentors. For record keeping appropriate formats to be developed and information to be updated regularly by faculty mentors.



Shree L. R. Tiwari College of Engineering
Shree L. R. Tiwari College of Engineering
Kanakya Park, Mira Road (E)

3. **Universal Human Values:** Universal Human Values gets the student to explore oneself and experience the joy of learning, prepares one to stand up to peer pressure and take decisions with courage, be aware of relationships and be sensitive to others, understand the role of money in life and experience the feeling of prosperity. Need for character building has been underlined by many thinkers, universal human values provide the base. Methodology of teaching this content is extremely important. It must not be through do's and don't's, but by getting the students to explore and think by engaging them in a dialogue. It is best taught through group discussions and real life activities rather than lecturing. The role of group discussions, however, with clarity of thought of the teachers cannot be over emphasized. It is essential for giving exposure, guiding thoughts, and realizing values.

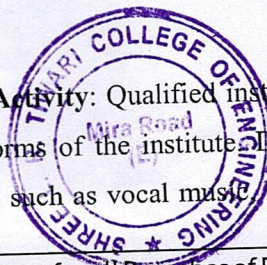
4. **Proficiency Modules:** The induction program period can be used to overcome some critical lacunas that students might have, for example, English, Mathematics, computer familiarity etc. These should run like crash courses, so that when normal courses start after the induction program, the student has overcome the lacunas substantially.

A diagnostic test should be conducted on Day 2 itself. Before the test, the students should be informed that the test would not affect their grades, branch change, or any aspect of their admission, placement, study, etc. Purpose of the test is to provide help to those students who need help in English, Mathematics, Computer proficiency etc. Students having more than 80% marks in their qualifying examination in respective subjects need not take the diagnostic test. For those below this cut-off, writing the test is mandatory. Students with weak performance in the test, must attend a non-credit course in Basic English, Basic Mathematics, and Basic Computer Operation etc. Their attending the course is mandatory. There would be no separate fee payable for the course. The classes of Basic courses must start from Day 4 at the latest. Students those who are excluded from basic courses, for them some activity in the domain of creative arts, cultural and literature to be organised.

5. **Physical Activity:** Fitness session, yoga classes, lecture(s) on facing world with sportsman spirit, making young students aware that there is nothing like being failure in the world. The world gives opportunities to all.

The incoming students must be divided into batches of 50 students maximum, and a qualified coach in physical education/ faculty member should be attached to each batch. The list of available games, sport, or physical activities should be announced in orientation program on Day 1. They should be asked to fill their choice with three preferences, and the game or sport be allotted to them as per their preference. The physical activity should start from Day 3 onwards, wherein the student learns and plays his assigned game during the induction program. It is also important that along with his assigned game the student also practises yoga.

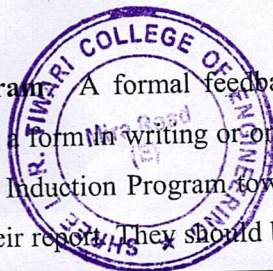
6. **Creative Arts, Cultural and Literary Activity:** Qualified instructors for arts may be hired on contract basis and be paid honorarium as per norms of the institute. Daily 90 to 120 minute sessions may be arranged. The list of available art forms, such as vocal music, instrumental music, folk music, painting,
Principal
Shree L. R. Tiwari College of Engineering



sketching, dance, group dance, clay modelling, pottery, dramatics, etc. should be announced. They should be asked to fill their choice with three preferences, and the art form be allotted to them as per their preference. There should be sufficient number of teachers for each art form. The ratio may be kept as 1 teacher for every 25 students.

A faculty member interested in literary activity should be assigned for organizing the activity. A list of books which are interesting and educational should be prepared beforehand. Books in Indian languages must be included and even given priority. Students are losing connection with languages in general and their own language, in particular. Students should be assigned a book or other smaller reading material. They should be asked to read and write a critical summary. They should present their summary in front of their group. A literary group may consist of around 30-40 students. Similarly, debating and public speaking activity could also be undertaken. If the college can arrange for a drama workshop where a group of students learn and enact a play it would be very good. Not all the incoming students would do this, but those who wish may be provided the opportunity. Help may be taken from senior students engaged in such extra-curricular activities in the college.

7. **Familiarisation with Institute and Department:** The students admitted in a branch would visit their allotted department or branch. The Head of the department and other associated faculty should address the new student's right on Day 2 or so. Arrangements should be made about the meeting/gathering. The parents of the students should also be welcomed if they accompany their ward. It would be helpful if an alumnus of the Dept. relates his professional experience related to the field of the study to the incoming students.
8. **Lectures /Workshops by Eminent People:** Eminent people from all walks of life may be invited to deliver lectures, namely, from industry, academia, social science (authors, historians), social work, civil society, alumni etc. be identified and invited to come and address the new students. Motivational lectures about life, meditation, etc. by Ramakrishna Mission, Art of Living, S-VYASA university, VivekanandKendras, etc. may be organized. Workshops which rejuvenate or bring relief to students would also be welcome, such as, Art of Living workshops.
9. **Extra-Curricular Activity:** Every college has extra-curricular activities. Most of them are student driven. They are organized by student councils and clubs. The extra-curricular activities going on in the college should be presented to the new students under the guidance of faculty advisors for such activity. The new students should be informed about how they can join the activities. Related facilities should be described to them. Presentation on the activities by the student council should be made.
10. **Feedback and Report on the Program:** A formal feedback at the end of the program should be collected from students by their filling a form in writing or online. Besides the above, each group (of 20 students) should write a report on the Induction Program towards the end of the semester. They would also have to make a presentation of their report. They should be encouraged to use slides while making a



Shree L. R. Finance Center, They would
Kanakiya Park, Mira Road (E)

presentation. Presentation of the report should be made in the language they are comfortable with, without any insistence that it should be in English. It is more important that they feel comfortable and confident. Each group may make the presentation through 4-5 of its group members or more. In case, the number of new students in a college is large, the presentation should be made by each group in front of 4 other groups besides their own, thus there would be about 100 students (in 5 groups) in the audience in a session. Several such sessions could run in parallel or serially. In each session, their faculty mentors and student guides, if any, should also be in the audience. These sessions would tell you how well the program ran, and what the students are feeling at the end of the program. This would also serve as a grand closure to the program.


A certificate shall be awarded to all the students, upon successful completion of the induction program based on their report and presentation.

Tentative schedule of 1st Week Induction Program:

| | | |
|--------------|------------|---|
| Day 1 | Session 1 | Orientation program |
| | Session 2 | Mentoring (group formation and introduction) |
| Day 2 | Session 3 | Diagnostic test (basic English, maths and computer operation) |
| | Session 4 | Familiarisation of Department and Institute (Visits to department, laboratory, Library, Examination cell, office etc) |
| Day 3 | Session 5 | Physical Activity (Yoga, sports etc) |
| | Session 6 | Universal human values session |
| Day 4 | Session 7 | Proficiency Modules (Short courses on basic maths, English and computer operation etc. for identified students) |
| | Session 8 | Physical Activity (Yoga, sports etc) |
| Day 5 | Session 9 | Proficiency Modules (Short courses on basic maths, English and computer operation etc. for identified students) |
| | Session 10 | Creative Arts, Cultural and Literary Activity |

A session may be conducted for around 2-3 hours each.




Principal

Shree L. R. Tiwari College of Engineering
Kanakiya Park, Mira Road (E.)

Minimum 12 sessions to be conducted from the following 20 sessions, from 2nd week to last week of academics, throughout the semester.

| | |
|------------|--|
| Session 11 | Physical Activity (Yoga, sports etc)- 1 |
| Session 12 | Extra-Curricular Activity- 1 |
| Session 13 | Physical Activity (Yoga, sports etc)-2 |
| Session 14 | Extra-Curricular Activity- 2 |
| Session 15 | Physical Activity (Yoga, sports etc)- 3 |
| Session 16 | Lectures /Workshops by Eminent People- 1 |
| Session 17 | Physical Activity (Yoga, sports etc)- 4 |
| Session 18 | Lectures /Workshops by Eminent People- 2 |
| Session 19 | Creative Arts, Cultural and Literary Activity- 1 |
| Session 20 | Lectures /Workshops by Eminent People- 3 |
| Session 21 | Creative Arts, Cultural and Literary Activity- 2 |
| Session 22 | Universal Human Values- 1(Group Discussion among students as per mentoring group on various aspects of life, values, ethics etc.) |
| Session 23 | Creative Arts, Cultural and Literary Activity- 3 |
| Session 24 | Universal Human Values- 2 (Group Discussion among students as per mentoring group on various aspects of life, values, ethics etc.) |
| Session 25 | Creative Arts, Cultural and Literary Activity- 4 |
| Session 26 | Universal Human Values- 3 (Group Discussion among students as per mentoring group on various aspects of life, values, ethics etc.) |
| Session 27 | Creative Arts, Cultural and Literary Activity- 5 |
| Session 28 | Physical Activity (Yoga, sports etc)- 5 |
| Session 29 | Feedback and Report on the Program- 1 |
| Session 30 | Feedback and Report on the Program- 2 |




Principal

Shree L. R. Tiwari College of Engineering
Kanakiya Park, Mira Road (E.)