# Curriculum and Syllabi

# B.E. Civil Engineering

# Semesters I to IV

# Regulations 2019

**Dr. Mahalingam College of Engineering and Technology, Pollachi – 642003.**
**(An autonomous institution approved by AICTE and affiliated to Anna University)**

## DEPARTMENT OF CIVIL ENGINEERING

### VISION

To develop Competent Civil Engineers to meet the infrastructure challenges of India and the world.

### MISSION

- To become one of the reputed departments offering Civil Engineering Program in the country.

- To produce excellent engineers to cope up with the changes through dynamic, innovative and flexible curriculum.

- To provide a conducive environment for teaching & learning and to develop leaders with effective communication skills.

- To conduct quality research driven by industry & societal needs and provide affordable engineering solutions.

OBE Coordinator          Programme Coordinator          Head of the Department

Head - OBE

**Dr. Mahalingam College of Engineering and Technology, Pollachi - 642 003.**

**(An Autonomous Institution approved by AICTE and affiliated to Anna University)**

## PROGRAMME: B.E. CIVIL ENGINEERING

### PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

The Graduate will

- **PEO 1 Technical Expertise:** Have successful professional careers dealing with analysis, design and management of construction projects globally.
- **PEO 2 Lifelong learning:** Exhibit attitude, professionalism, ability to communicate with team members and adapt to the latest trends by engaging themselves in continuous learning.
- **PEO3 Ethics:** Ethically apply their engineering knowledge and skills considering, societal, economic and environmental factors.

### PROGRAMME OUTCOMES (POs)

The graduates of Civil Engineering Programme will be able to:

**PO1.Engineering knowledge:** Apply knowledge of mathematics, science, engineering fundamentals and an engineering specialization in the field of Civil Engineering.

**PO2. Problem analysis:** Identify, formulate, analyse and solve complex problems in construction industries using principles of mathematics, natural sciences and engineering sciences.

**PO3. Design/development of solutions:** Design a solution for complex civil engineering problems and design system processes to meet specific needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.

**PO4. Conduct investigations of complex problems:** Conduct investigations of complex problems including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusion.

**PO5. Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

OBE Coordinator          Programme Coordinator          Head of the Department

Head - OBE

**PO6. The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

**PO7. Environment and sustainability:** Understanding the impact of engineering solutions in social environment and demonstrate the knowledge for sustainable expansion.

**PO8. Ethics:** Apply ethical principles and commit to professional ethics and the norms of engineering practices.

**PO9. Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams and in multidisciplinary settings.

**PO10. Communication:** Communicate with engineers and society to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions related to civil engineering professionals.

**PO11. Project management and finance:** Demonstrate and apply the knowledge of engineering and management principles to one's own work, as a team leader or a member to manage project in multidisciplinary environments.

**PO12. Life-long learning:** Recognize the need for, and have the ability to engage in independent and life-long learning in the context of technological change.

## PROGRAMME SPECIFIC OUTCOMES (PSOs)

**PSO1. Design process:** Design the fundamental elements of civil engineering systems, system components and processes considering safety, quality and cost consideration.

**PSO2. Quality and standards:** Able to plan and prepare design and construction documents such as specifications, contracts, engineering drawings and construction schedules

|  |  |  |
|---|---|---|
| OBE Coordinator | Programme Coordinator | Head of the Department |

Head - OBE

# Dr. Mahalingam College of Technology, Pollachi

## 2019 Regulations - Course Code Generation Procedure for UG Courses(v1)

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|----|
| 1 | 9 | A | U | B | G | 1 | 1 | 0 | 1 |

**Regulation**

**Mode of Assessment**

| Character Type – Number | |
|---|---|
| 1 | Theory |
| 2 | Theory with Practical |
| 3 | Practical |
| 4 | Practical with Theory |
| 5 | Theory with SSU |
| 6 | Customized |

**Semester Number**

| Character Type – Number | |
|---|---|
| 1 to 8 | Semester |
| 0 | Floating |

**Sequence Number**

| Character Type – Number |
|---|
| 01, 02, 03, ..., 99 |

**Board/Department/Programme**

| Character Type – Alphabet | |
|---|---|
| AU | Automobile |
| CE | Civil |
| CS | Computer Science |
| EC | Electronics and Communication |
| EE | Electrical and Electronics |
| EI | Electronics and Instrumentation |
| IT | Information Technology |
| MC | Mechatronics |
| ME | Mechanical |
| CH | Chemistry |
| EN | English |
| MA | Mathematics |
| PH | Physics |
| PS | Professional Skills |
| SH | Science and Humanities |

**Course Type**

| Character Type – Alphabet | |
|---|---|
| B | Basic Science |
| S | Engineering Science |
| H | Humanities |
| C | Professional Core |
| E | Professional Elective |
| O | Open Elective |
| N | Online |
| I | Industry Offered |
| V | One Credit |
| P | Project/Skill Development/ Internship |
| M | Mandatory Non-Credit |

**Common to any Programme**

| Character Type – Alphabet | |
|---|---|
| G | Generic |
| C | Common |
| N | Non-Common |

# Dr. MAHALINGAM
## COLLEGE OF ENGINEERING AND TECHNOLOGY

Affiliated to Anna University, Chennai; Approved by AICTE ; Accredited by NAAC with Grade 'A++'
Accredited by NBA - Tier1 (Mech, Auto, Civil, EEE, ECE, E&I and CSE)
Udumalai Road, Pollachi - 642 003, Tel: 04259-236030/40/50 Fax: 04259-236070 www.mcet.in

## Programme: B.E Civil Engineering
## 2019 Regulations
## Curriculum for Semesters I to II

| Course Code | Course Title | Duration | Credits | Marks |
|---|---|---|---|---|
| 19SHMG6101 | Induction Program | 3 Weeks | - | 100 |

## Semester I (2019 Batch)

| Course Code | Course Title | Hours/Week L | T | P | Credits | Marks | Common to Programmes |
|---|---|---|---|---|---|---|---|
| 19ENHG2101 | Communication Skills – I | 2 | 0 | 2 | 3 | 100 | All |
| 19MABC1101 | Matrices and Calculus | 3 | 1 | 0 | 4 | 100 | Except IT,CSE |
| 19PHBN2101 | Physics for Civil Engineering | 3 | 0 | 2 | 4 | 100 | - |
| 19EESN2101 | Basics of Electrical and Mechanical Engineering | 3 | 0 | 2 | 4 | 100 | - |
| 19CESN3101 | Engineering Drawing for Civil Engineering | 0 | 0 | 4 | 2 | 100 | - |
| 19PSHG3001 | Wellness for Student | 0 | 0 | 2 | 1 | 100 | All |
| **TOTAL** | | **12** | **1** | **11** | **18** | **600** | |

## Semester II (2019 Batch)

| Course Code | Course Title | Hours/Week L | T | P | Credits | Marks | Common to Programmes |
|---|---|---|---|---|---|---|---|
| 19ENHG2201 | Communication Skills – II | 2 | 0 | 2 | 3 | 100 | All |
| 19MABC1201 | Ordinary Differential Equation and Complex Variables | 3 | 1 | 0 | 4 | 100 | Except IT,CSE |
| 19CHBN2201 | Chemistry for Civil Engineering | 3 | 0 | 2 | 4 | 100 | - |
| 19CESN1201 | Engineering Mechanics | 3 | 1 | 0 | 4 | 100 | - |
| 19CSSC2001 | C - Programming | 3 | 0 | 2 | 4 | 100 | Except IT,CSE |
| 19CECN3201 | Computer Aided Building Drawing Laboratory | 0 | 0 | 4 | 2 | 100 | - |
| 19PSHG3002 | Personal Effectiveness | 0 | 0 | 2 | 1 | 100 | All |
| 19CHMG6201 | Environmental Sciences | 1 | 0 | 0 | - | - | All |
| **TOTAL** | | **15** | **2** | **12** | **22** | **700** | |

Passed in Board of Studies meeting          Approved in Academic Council meeting

BOS Convener                                              BOS Chairman

# Dr. MAHALINGAM
## COLLEGE OF ENGINEERING AND TECHNOLOGY

**MCET**
COLLEGE OF ENGINEERING AND TECHNOLOGY
Enlightening Technical Minds    Estd. 1998
An Autonomous Institution
(Since 2011)

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Udumalai Road, Pollachi - 642 003 Tel: 04259-236030/40/50 Fax: 04259-236070 www.mcet.in

**Programme: B.E CIVIL ENGINEERING**
**2019 Regulations**
**Curriculum for Semesters I to IV**

| Course Code | Course Title | Duration | Credits | Marks |
|---|---|---|---|---|
| 19SHMG6101 | Induction Program | 3 Weeks | - | 100 |

## SEMESTER I (2020Batch)

| Course Code | Course Title | Hours/Week L | T | P | Credits | Marks | Common to Programmes |
|---|---|---|---|---|---|---|---|
| 19ENHG2101 | Communication Skills – I | 2 | 0 | 2 | 3 | 100 | All |
| 19MABC1101 | Matrices and Calculus | 3 | 1 | 0 | 4 | 100 | Except IT,CSE |
| 19PHBN2101 | Physics for Civil Engineering | 3 | 0 | 2 | 4 | 100 | - |
| 19EESN2101 | Basics of Electrical and Mechanical Engineering | 3 | 0 | 2 | 4 | 100 | - |
| 19CESN3101 | Engineering Drawing for Civil Engineering | 0 | 0 | 4 | 2 | 100 | - |
| 19PSHG6001 | Wellness for Students * | 0 | 0 | 2 | - | - | All |
| **TOTAL** | | **11** | **1** | **12** | **17** | **500** | |

## SEMESTER II (2020Batch)

| Course Code | Course Title | Hours/Week L | T | P | Credits | Marks | Common to Programmes |
|---|---|---|---|---|---|---|---|
| 19ENHG2201 | Communication Skills – II | 2 | 0 | 2 | 3 | 100 | All |
| 19MABC1201 | Ordinary Differential Equation and Complex Variables | 3 | 1 | 0 | 4 | 100 | Except IT,CSE |
| 19CHBN2201 | Chemistry for Civil Engineering | 3 | 0 | 2 | 4 | 100 | - |
| 19CESN1201 | Engineering Mechanics | 3 | 1 | 0 | 4 | 100 | - |
| 19CSSC2001 | C - Programming | 3 | 0 | 2 | 4 | 100 | Except IT,CSE |
| 19CECN3201 | Computer Aided Building Drawing Laboratory | 0 | 0 | 4 | 2 | 100 | - |
| 19PSHG6001 | Wellness for Students * | 0 | 0 | 2 | 1 | 100 | All |
| 19CHMG6201 | Environmental Sciences | 1 | 0 | 0 | - | - | All |
| **TOTAL** | | **15** | **2** | **12** | **22** | **700** | |

*Annual Pattern

Passed in Board of Studies meeting          Approved in Academic Council meeting

BOS Convener                                BOS Chairman

## SEMESTER III

| Course Code | Course Title | Hours/Week L | T | P | Credits | Marks | Common to Programmes |
|---|---|---|---|---|---|---|---|
| 19MABN1301 | Transforms and Partial Differential Equations | 3 | 1 | 0 | 4 | 100 | All |
| 19CECN1301 | Construction Materials and Practices | 3 | 0 | 0 | 3 | 100 | - |
| 19CECN1302 | Transportation Engineering | 3 | 0 | 0 | 3 | 100 | - |
| 19CECN1303 | Surveying | 4 | 0 | 0 | 4 | 100 | - |
| 19CESN1301 | Solid Mechanics | 3 | 1 | 0 | 4 | 100 | - |
| 19CECN3301 | Surveying Practice Laboratory | 0 | 0 | 3 | 1.5 | 100 | - |
| 19CECN3302 | Materials Laboratory | 0 | 0 | 3 | 1.5 | 100 | - |
| XXXXXXXXXX | One Credit Course 1(OCC) | 0 | 0 | 2 | 1 | 100 | - |
| | TOTAL | 16 | 2 | 8 | 22 | 800 | |

Total hours per week: 26

## SEMESTER IV

| Course Code | Course Title | Hours/Week L | T | P | Credits | Marks | Common to Programmes |
|---|---|---|---|---|---|---|---|
| 19MABG1401 | Probability and Statistics | 3 | 1 | 0 | 4 | 100 | All |
| 19CECN1401 | Hydraulics Engineering | 3 | 1 | 0 | 4 | 100 | - |
| 19CECN1402 | Concrete Technology | 3 | 0 | 0 | 3 | 100 | - |
| 19CECN1403 | Structural Analysis | 3 | 1 | 0 | 4 | 100 | - |
| 19CECN3401 | Hydraulics Engineering Laboratory | 0 | 0 | 3 | 1.5 | 100 | - |
| 19CECN3402 | Concrete and Transportation Engineering Laboratory | 0 | 0 | 3 | 1.5 | 100 | - |
| 19PSHG6002 | Universal Human Values 2 : Understanding Harmony | 2 | 1 | 0 | 3 | 100 | All |
| 19CEPN3401 | Mini - Project | 0 | 0 | 4 | 2 | 100 | - |
| XXXXXXXXXX | One Credit Course 2(OCC) | 0 | 0 | 2 | 1 | 100 | - |
| | TOTAL | 14 | 4 | 12 | 24 | 900 | |

Total hours per week: 30
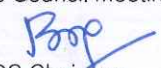
| Course Code | Course Title | Hours/Week | Credits | Marks |
|---|---|---|---|---|
| 19CEPN6001 | Internship | 2 weeks | 1 | 100 |

*Refer to clause:4.8 in UG academic regulations 2019

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BOS Convener           BOS Chairman

## Tentative Curriculum for Semesters V to VIII
### SEMESTER V

| Course Code | Course Title | Hours/Week | | | Credits | Marks | Common to Programmes |
|---|---|---|---|---|---|---|---|
| | | L | T | P | | | |
| 19CESN1501 | Geology and Soil Mechanics | 3 | 1 | 0 | 4 | 100 | - |
| 19CECN1502 | Design of RC Structures | 3 | 1 | 0 | 4 | 100 | - |
| 19CECN1503 | Environmental Engineering | 4 | 0 | 0 | 4 | 100 | - |
| 19CEEN10XX | Professional Elective 1 | 3 | 0 | 0 | 3 | 100 | - |
| 19CEEN10XX | Professional Elective 2 (online) | 3 | 0 | 0 | 3 | 100 | - |
| 19CEEN10XX | Open Elective 1 | 3 | 0 | 0 | 3 | 100 | - |
| 19CECN3501 | Soil Mechanics Laboratory | 0 | 0 | 3 | 1.5 | 100 | - |
| 19CECN3502 | Environmental EngineeringLaboratory | 0 | 0 | 3 | 1.5 | 100 | - |
| 19PSHG3005 | Employability Skills (by CPG) | 0 | 0 | 2 | 1 | 100 | - |
| | **TOTAL** | 19 | 2 | 8 | 22+3 | 800 | |

Total hours per week: 29

### SEMESTER VI

| Course Code | Course Title | Hours/Week | | | Credits | Marks | Common to Programmes |
|---|---|---|---|---|---|---|---|
| | | L | T | P | | | |
| 19CECN1601 | Foundation Engineering | 3 | 1 | 0 | 4 | 100 | - |
| 19CECN1602 | Design of Steel Structures | 3 | 1 | 0 | 4 | 100 | - |
| 19CEEN10XX | Professional Elective 3 | 3 | 0 | 0 | 3 | 100 | - |
| 19CEEN10XX | Professional Elective 4 (Online) | 3 | 0 | 0 | 3 | 100 | - |
| 19XXOC10XX | Open Elective 2 | 3 | 0 | 0 | 3 | 100 | - |
| 19CECN3601 | Building Drawing Laboratory | 0 | 0 | 3 | 1.5 | 100 | - |
| 19CECN3602 | Computer Aided Design and Drafting Laboratory | 0 | 0 | 3 | 1.5 | 100 | - |
| 19PSHG3006 | Employability Skills (by CPG) | 0 | 0 | 2 | 1 | 100 | - |
| 19CEPN6601 | Innovative and Creative Project | 0 | 0 | 4 | 2 | 100 | - |
| | **TOTAL** | 15 | 2 | 12 | 20+3 | 900 | |

Total hours per week: 29

| Course Code | Course Title | Duration | Credits | Marks |
|---|---|---|---|---|
| | Internship or Skill Development* | 2 or 4 weeks | 1 | 100 |

*Refer to clause: 4.8 in UG academic regulations 2019

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## SEMESTER VII

| Course Code | Course Title | Hours/Week | | | Credits | Marks | Common to Programmes |
|---|---|---|---|---|---|---|---|
| | | L | T | P | | | |
| 19CECN1701 | Hydrology and Water Resources Engineering | 4 | 0 | 0 | 4 | 100 | - |
| 19CECN1702 | Construction Project Management | 3 | 0 | 2 | 4 | 100 | - |
| 19CEEN10XX | Professional Elective 5 | 3 | 0 | 0 | 3 | 100 | - |
| 19CEEN10XX | Professional Elective 6 | 3 | 0 | 0 | 3 | 100 | - |
| 19XXOC10XX | Open Elective 3 /(MOOC) | 3 | 0 | 0 | 3 | 100 | - |
| 19CECN3702 | Quantity Surveying and Estimation Laboratory | 0 | 0 | 4 | 2 | 100 | - |
| | TOTAL | 16 | 0 | 6 | 19 | 600 | |

**Total hours per week: 22**

## SEMESTER VIII

| Course Code | Course Title | Hours/Week | | | Credits | Marks | Common to Programmes |
|---|---|---|---|---|---|---|---|
| | | L | T | P | | | |
| 19CEPN6801 | Project 3 | 0 | 0 | 16 | 8 | 200 | - |
| | Internship | (8 - 16 weeks) | | | 4 | 100 | - |
| | TOTAL | 0 | 0 | 16 | 12 | 500 | |

*Refer to clause: 4.8 in UG academic regulations 2019

**Total hours per week: 16**

**Total Credits (2019 Batch only): 167**

**Total Credits (2020 Batch onwards): 166**

Passed in Board of Studies meeting          Approved in Academic Council meeting

BOS Convener                                                    BOS Chairman

# PROFESSIONAL ELECTIVES

## V Semester

| Course Code | Course Title | Hours/Week | | | Credits | Marks | Common to Programmes |
|---|---|---|---|---|---|---|---|
| | | L | T | P | | | |
| | Remote Sensing & GIS | 3 | 0 | 0 | 3 | 100 | - |
| | Railway Airport and Harbour Engineering | 3 | 0 | 0 | 3 | 100 | - |
| | Numerical Methods | 3 | 0 | 0 | 3 | 100 | - |
| | Town planning and Architecture | 3 | 0 | 0 | 3 | 100 | - |

## VI Semester

| Course Code | Course Title | Hours/Week | | | Credits | Marks | Common to Programmes |
|---|---|---|---|---|---|---|---|
| | | L | T | P | | | |
| | Electronic Surveying | 3 | 0 | 0 | 3 | 100 | - |
| | Municipal Solid Waste Management | 3 | 0 | 0 | 3 | 100 | - |
| | Quality Control And Assurance | 3 | 0 | 0 | 3 | 100 | - |
| | Advanced RC Structures | 3 | 0 | 0 | 3 | 100 | - |

## VII Semester

| Course Code | Course Title | Hours/Week | | | Credits | Marks | Common to Programmes |
|---|---|---|---|---|---|---|---|
| | | L | T | P | | | |
| | Prestressed Concrete Structures | 3 | 0 | 0 | 3 | 100 | - |
| | Seismic Design of Structures | 3 | 0 | 0 | 3 | 100 | - |
| | Industrial Waste Management | 3 | 0 | 0 | 3 | 100 | - |
| | Ground Improvement Techniques | 3 | 0 | 0 | 3 | 100 | - |
| | Air Pollution Management | 3 | 0 | 0 | 3 | 100 | - |
| | Maintenance and Rehabilitation of Structures | 3 | 0 | 0 | 3 | 100 | - |

## VIII Semester

| Course Code | Course Title | Hours/Week | | | Credits | Marks | Common to Programmes |
|---|---|---|---|---|---|---|---|
| | | L | T | P | | | |
| | Advanced Construction Techniques | 3 | 0 | 0 | 3 | 100 | - |
| | Building Services | 3 | 0 | 0 | 3 | 100 | - |
| | Prefabricated Structures | 3 | 0 | 0 | 3 | 100 | - |
| | Safety in Construction | 3 | 0 | 0 | 3 | 100 | - |
| | Principles of Management | 3 | 0 | 0 | 3 | 100 | - |
| | Smart Structures And Smart Materials | 3 | 0 | 0 | 3 | 100 | - |

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BOS Convener                                  BOS Chairman

## OPEN ELECTIVES

| Course Code | Course Title | Hours/Week | | | Credits | Marks |
|---|---|---|---|---|---|---|
| | | L | T | P | | |
| 19CEOC1001 | Environmental Impact Assessment | 3 | 0 | 0 | 3 | 100 |
| 19CEOC1002 | Safety Engineering | 3 | 0 | 0 | 3 | 100 |
| 19CEOC1003 | Geographical Information System | 3 | 0 | 0 | 3 | 100 |

Passed in Board of Studies meeting    Approved in Academic Council meeting

BOS Convener                    BOS Chairman

| Course Code: 19SHMG6101 | Course Title: Induction Program (common to all B.E/B.Tech programmes) |
|---|---|
| Course Category: Mandatory Non-Credit Course | Course Level: Introductory |
| Duration: 3 Weeks | Max. Marks:100 |

**Pre-requisites**

> ➤ Nil

**Course Objectives**

The course is intended to:

1. Explain various sources available to meet the needs of self, such as personal items and learning resources
2. Explain various career opportunities, opportunity for growth of self and avenues available in the campus
3. Explain the opportunity available for professional development
4. Build universal human values and bonding amongst all the inmates of the campus and society

**List of Activities:**

1. History of Institution and Management: Overview on NIA Education Institutions-Growth of MCET – Examination Process-OBE Practices – Code of Conduct – Centre of Excellence
2. Lectures by Eminent People, Motivational Talk – Alumni, Employer
3. Familiarization to Dept./Branch: HoD Interaction – Senior Interaction – Department Association
4. Universal Human Value Modules: Module 1, Module 2, Module 3 and Module 4
5. Orientation on Professional Skill Courses
6. Proficiency Modules – Mathematics, English, Physics and Chemistry
7. Introduction to various Chapters, Cell, Clubs and its events
8. Creative Arts: Painting, Music and Dance
9. Physical Activity: Games and Sports, Yoga and Gardening
10. Group Visits: Visit to Local areas and Campus Tour

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| Course Outcomes | Cognitive Level |
|---|---|
| At the end of this course, students will be able to: | |
| CO1: Explain various sources available to meet the needs of self, such as personal items and learning resources through visit to local areas and campus | Understand |
| CO2: Explain various career opportunities and avenues available in the campus through orientation sessions | Understand |
| CO3: Explain the opportunity available for professional development through professional skills, curricular, co-curricular and extracurricular activities | Understand |
| CO4: Build universal human values and bonding amongst all the inmates of the campus and society for having a better life | Apply |

### Course Articulation Matrix

| CO | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | - | - | - | - | - | - | 2 | 1 | 2 | - | - | - | - |
| CO2 | 1 | - | - | - | - | - | - | 2 | 1 | 2 | - | - | - | - |
| CO3 | 1 | - | - | - | - | - | - | 2 | 1 | 2 | - | - | - | - |
| CO4 | 2 | - | - | - | - | - | - | 2 | 1 | 2 | - | - | - | - |

High-3; Medium-2; Low-1

### Assessment Pattern

| Component | Marks | Details |
|---|---|---|
| Attendance | 10 | Minimum 80% and 1 mark for every 2% observed |
| Knowledge Test | 40 | Objective type questions |
| Work plan for future | 50 | Career plan developed consulting mentor |
| Total | 100 | |

### Non-letter Grades

| Marks Scored | Performance Level |
|---|---|
| 70 & above | Good |
| 30 – 69 | Average |
| < 30 | Fair |

Passed in Board of Studies meeting        Approved in Academic Council meeting

BOS Convener        BOS Chairman

| Course Code: 19ENHG2101 | Course Title: COMMUNICATION SKILLS – I (Common to all B.E/B.Tech Programmes) | | |
|---|---|---|---|
| Course Category: Humanities | Course Level: Introductory | | |
| L:T:P (Hours/Week) 2: 0: 2 | Credits:3 | Total Contact Hours:60 | Max Marks:100 |

**Pre-requisites**

> ➤ The student should have undergone English as his/her first or second language in school.

**Course Objectives**

The course is intended to:

1. Listen and understand monologues and dialogues of a native speaker on par with B1 of CEFR level.
2. Speak in simple sentences to convey their opinions and ideas on par with B1 of CEFR level.
3. Read and infer a given text on par with B1 of CEFR level.
4. Draft basic formal written communication on par with B1 of CEFR level.

**UNIT I - LISTENING**                                          **15 Hours**

Importance of active listening –Physical condition needed for active listening-Identifying relevant points while taking notes.- Framing questions at different linguistic contexts - Listening for specific details of concrete monologues and dialogues –Listening to organize ideas - Developing ideas –Listening to compose paragraphs – Paraphrasing the aural input.

**UNIT II - SPEAKING**                                          **15 Hours**

Importance of note making to practice speaking - Traditional note making, developing Mind map  - Collecting points from various sources - Identifying relevant ideas needed for the speech -Using mind-map to organize thought processing  - Prioritizing the ideas - Types of sentences -Frequently used words (Institution, home and leisure) - Mother Tongue Influence - Expressing the thoughts in simple sentences - Tenses & Voices (Active & Passive) - Postures, gestures and eye contact - Intonation and Sentence stress - Express one's thoughts coherently.

**UNIT III - READING**                                          **15 Hours**

Reading strategies - Skimming -Scanning - Interpretation of visual data - Factual texts on subjects of relevance - Inferring texts –Reading to write a review –Checking the accuracy of reading while presenting the interpreted data – Reading to  comprehend

**UNIT IV - WRITING**                                          **15 Hours**

WritingSimple and short sentences - Writing E-mail, Memo, Note and Message - Letter Writing - Importance of punctuations -- Identifying the main points - Organising the main ideas - Writing a draft.

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## LABORATORY COMPONENT

### LIST OF TASKS:

1. BEC Preliminary Listening Test-I & Speaking Test-1.

2. BEC Preliminary Listening Test-2 &Speaking Test-2.

3. BEC Preliminary Listening Test-3 &Speaking Test-3.

4. BEC Preliminary Listening Test-4 &Speaking Test-4.

5. BEC Preliminary Listening Test-5 &Speaking Test-5.

6. BEC Preliminary Listening Test-6 &Speaking Test-6.

| Course Outcomes | Cognitive Level |
|---|---|
| At the end of this course, students will be able to: | |
| CO.1  Listen actively and paraphrase simple messages and specific details of concrete monologues and dialogues | Apply |
| CO.2  Express one's views coherently in a simple manner | Apply |
| CO.3  Read and comprehend factual texts on subjects of relevance | Understand |
| CO.4  Write texts bearing direct meanings for different contexts maintaining an appropriate style | Apply |

**Text Book(s):**

T 1.   Whitby Norman, Business Benchmark Pre-intermediate to Intermediate Students' Book CUP Publications, 2nd Edition, 2014.

T 2.   Wood Ian, Williams Anne, Cowper Anna, Pass Cambridge BEC Preliminary, Cengage Learning,2nd edition, 2015.

T 3.   Learners Book prepared by the Faculty members of Department of English

**Reference Book(s):**

R 1.   BEC-Preliminary - Cambridge Handbook for Language Teachers, 2nd Edition, CUP 2000

R 2.   Hewings Martin - Advanced Grammar in use - Upper-intermediate Proficiency, CUP, Third Edition, 2013

**Web References:**

1.   http://www.grammarinenglish.com -Jan 23,2018
2.   https://www.northshore.edu/support_centre /pdf/listen-notes.pdf
3.   http://www.examenglish.com/BEC/BEC_Vantage.html- Jan 23, 2018

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BOS Convener                                              BOS Chairman

## Course Articulation Matrix

| CO | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|-----|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| CO1 | 2 | - | - | - | - | - | - | - | 2 | 3 | - | - | - | - |
| CO2 | 2 | - | - | - | - | - | - | 1 | 2 | 3 | - | - | - | - |
| CO3 | 1 | - | - | - | - | - | - | 1 | - | 3 | - | - | - | - |
| CO4 | 2 | - | - | - | - | - | - | 1 | - | 3 | - | - | - | - |

High-3; Medium-2; Low-1

## Assessment Pattern

| | Assessment Component | CO.No. | Marks | Total |
|---|---|---|---|---|
| **Continuous Assessment** | CCET I | 1,2 | 50 | |
| | CCET II | 3,4 | 50 | 30 |
| | CCET III | 5 | 50 | |
| | Tutorials / Quiz / Assignments | 1,2,3,4,5 | 30 | 10 |
| **End Semester Examination** | ESE | 1,2,3,4,5 | 100 | 60 |
| | | Total | | 100 |

Passed in Board of Studies meeting    Approved in Academic Council meeting

BOS Convener                          BOS Chairman

| Course Code: 19MABC1101 | Course Title: MATRICES AND CALCULUS (Common to Automobile/Mechanical/Production/Civil/ Mechatronics/ EEE/ECE/ EIE Engineering) | | |
|---|---|---|---|
| Course Category: Basic Sciences | | Course Level: Introductory | |
| L:T:P (Hours/Week) 3: 1: 0 | Credits:4 | Total Contact Hours:60 | Max Marks:100 |

**Pre-requisites**

> NIL.

**Course Objectives**

The course is intended to:
1. Determine the canonical form of a Quadratic form using Orthogonal transformation
2. Use different testing methods to check the convergence of infinite series.
3. Apply differential and integral calculus to determine the evolutes of a curve and improper integrals
4. Apply partial derivatives to find extreme values of functions of two variables.
5. Apply multiple integrals to find area of plane curves and volume of solids.

**UNIT I - MATRICES** 9+3 Hours

Rank of a matrix - System of linear equations – Symmetric - Skew symmetric and orthogonal matrices-(Definitions and examples only) - Eigenvalues and Eigenvectors - Diagonalization of symmetric matrices through orthogonal transformation – Cayley-Hamilton Theorem - Transformation of quadratic forms to canonical forms through orthogonal transformation.

**UNIT II - SEQUENCES AND SERIES** 9+3Hours

Sequences - Definition and Examples - Series- Tests for convergence- Power series - series for exponential, trigonometric and logarithm functions - Comparison Test – Integral Test - Cauchy's root test - D Alembert's ratio test - Alternating series - Leibnitz's test.

**UNIT III - DIFFERENTIAL AND INTEGRAL CALCULUS** 9+3Hours

Reading strategies - Skimming -Scanning - Interpretation of visual data - Factual texts on subjects of relevance - Inferring texts –Reading to write a review –Checking the accuracy of reading while presenting the interpreted data – Reading to comprehend

**UNIT IV - MULTIVARIABLE DIFFERENTIATION** 9+3 Hours

Writing Simple and short sentences - Writing E-mail, Memo, Note and Message - Letter Writing - Importance of punctuations -- Identifying the main points - Organising the main ideas - Writing a draft.

**UNIT V - MULTIVARIABLE INTEGRATION** 9+3 Hours

Multiple Integration: Double integrals - Change of order of integration in double integrals - Change of variables (cartesian to polar, cartesian to spherical and cartesian to cylindrical) - Triple integrals - Applications: areas and volumes.

| Course Outcomes | Cognitive Level |
|---|---|
| At the end of this course, students will be able to: | |

| | | |
|---|---|---|
| CO.1 | Determine the canonical form of a Quadratic form using Orthogonal transformation | Apply |
| CO.2 | Use different testing methods to check the convergence of infinite series. | Apply |
| CO.3 | Determine the evolute of a curve and evaluate improper integrals using beta gamma functions | Apply |
| CO.4 | Apply partial derivatives to find extreme values of functions of two variables. | Apply |
| CO.5 | Apply multiple integrals to find area of plane curves and volume of solids | Apply |

**Text Book(s):**

T1.  Erwinkreyzig, Advanced Engineering Mathematics, 9th edition, John Wiley& Sons, 2006.

T2.  Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.

T3.  Ramana B.V., higher Engineering Mathematics, Tata McGraw-Hill, New Delhi, 11th Reprint, 2010.

**Reference Book(s):**

R 1. G.B.Thomas and R.L Finney, Calculus and Analytic Geometry, 9th edition, Pearson, Reprint, 2002.

R 2. N.P.Bali and Manish Goyel, A text book of Engineering Mathematics, Laxmi Publication, Reprint, 2008.

R 3. B.S.Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010

**Web References:**

1.  https://onlinecourses.nptel.ac.in/noc16_ma05

2.  https://nptel.ac.in/courses/122101003/2

3.  https://nptel.ac.in/syllabus/111104092/

### Course Articulation Matrix

| CO | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|-----|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| CO1 | 3 | - | - | - | - | - | - | 2 | 2 | 3 | - | 2 | - | - |
| CO2 | 3 | - | - | - | - | - | - | 2 | 2 | 3 | - | 2 | - | - |
| CO3 | 3 | - | - | - | - | - | - | 2 | 2 | 3 | - | 2 | - | - |
| CO4 | 3 | - | - | - | - | - | - | 2 | 2 | 3 | - | 2 | - | - |
| CO5 | 3 | - | - | - | - | - | - | 2 | 2 | 3 | - | 2 | - | - |

High-3; Medium-2; Low-1

Passed in Board of Studies meeting         Approved in Academic Council meeting

BOS Convener                                              BOS Chairman

## Assessment Pattern:

| | Assessment Component | CO .No. | Marks | Total |
|---|---|---|---|---|
| **Continuous Comprehensive Evaluation** | CCET 1 | 1,2 | 50 | 30 |
| | CCET 2 | 3,4 | 50 | |
| | CCET 3 | 5 | 50 | |
| | Tutorial | 1,2,3,4,5 | 30 | 10 |
| | Quiz | 1,2,3,4,5 | | |
| | Assignment | 1,2,3,4,5 | | |
| **End Semester Examination** | ESE | 1,2,3,4,5 | 100 | 60 |
| **Total** | | | | 100 |

Passed in Board of Studies meeting          Approved in Academic Council meeting

BOS Convener                                            BOS Chairman

| Course Code: 19PHBN2101 | Course Title: PHYSICS FOR CIVIL ENGINEERING | | |
|---|---|---|---|
| Course Category: Basic Sciences | Course Level: Introductory | | |
| L:T:P (Hours/Week) 3: 0: 2 | Credits:4 | Total Contact Hours:75 | Max Marks:100 |

**Pre-requisites**

> NIL

**Course Objectives**

The course is intended to:

1. Determine the equilibrium condition of particles and rigid bodies.
2. Inculcate the knowledge of elastic properties of materials.
3. Calculate geometric properties like centre of gravity, moment of inertia and mass moment of inertia for various sections.
4. Explain the principles of waves and acoustics for civil engineering applications.
5. Determine the quality of materials through Non Destructive Testing (NDT).

## UNIT I – BASICS OF MECHANICS
**9 Hours**

Review of fundamental laws of mechanics – scalars, vectors – Newton's law of mechanics, Gravitational law. Particles and rigid body, Concept of force and its effect on rigid body system of forces-Free body diagram-principle of transmissibility-equilibrium conditions-equilibrium of particles subjected to coplanar and non-coplanar force system – equilibrium of particles subjected to coplanar Triangle law, Parallelogram law and Lami's theorem.

## UNIT II – PROPERTIES OF MATTER
**9 Hours**

Elasticity - Stress strain diagram and its uses – Elastic constants - Factors affecting elastic modulus and tensile strength – Twisting couple - Torsion stress and deformations – Torsion pendulum: Theory and experiment – Bending of beams – Bending moment – Cantilever: Theory and experiment – I shaped girders – Stress due to bending in beams.
Viscosity: Coefficient of viscosity, streamline and turbulent flow, Reynold's number, Experimental determination of low and high viscous liquids: *Poiseuille's*and Stoke's method.

## UNIT III – PROPERTIES OF SURFACES AND SOLIDS
**9 Hours**

Centroid and centre of mass– Centroid of lines and areas - Area moments of inertia of plane areas –Theorems of Pappus – Rectangular, circular, triangular areas by integration – T section, I section, Angle section, Hollow section – Parallel axis theorem and perpendicular axis theorem –Principal moments of inertia of plane areas – Principal axes of inertia-Mass moment of inertia –mass moment of inertia for prismatic, cylindrical and spherical solids from first principle.

## UNIT IV - WAVES AND ACOUSTICS
**9 Hours**

Introduction to waves-Longitudinal and transverse waves, speed of wave motion. Seismic waves: P waves, S waves, Surface waves, Love waves, Rayleigh waves- isolation of structures against seismic waves.
Classification of sound - decibel- Weber–Fechner law – Sabine's formula- derivation using

growth and decay method – Absorption Coefficient and its determination –factors affecting acoustics of buildings and their remedies. Methods of sound absorptions - absorbing materials - noise and its measurements, sound insulation and its measurements, impact of noise in multi-storeyed buildings.

## UNIT V – NON DESTRUCTIVE TESTING (NDT)                    9 Hours

Liquid Penetrant Method – Characteristics of Liquid Penetrant Testing materials, X-Ray Radiographic testing: Tube shift method - Exposure factor - Attenuation -Principle of Ultrasonic testing: Ultrasonic transducer – Couplant – Ultrasonic flaw detector: Pulse echo system, transmission, A, B & C scan displays. Inspection standards.

| Course Outcomes | Cognitive Level |
|---|---|
| At the end of this course, students will be able to: | |
| CO.1  Use the laws of mechanics to determine the equilibrium condition of particles and rigid bodies. | Understand |
| CO.2  Explain the elastic properties of materials. | Understand |
| CO.3  Calculate geometric properties like centre of gravity, moment of inertia and mass moment of inertia for various sections. | Understand |
| CO.4  Explain the principles of waves and the factors affecting acoustics of buildings and their remedies. | Understand |
| CO.5  Apply the knowledge of Non Destructive Testing (NDT) methods to inspect the quality of materials. | Understand |

**Text Book(s):**

T 1.   F. P. Beer, E. R. Johnston Jr, " Vector Mechanics for Engineers (in SI Units): Statics and Dynamics", 8$^{th}$ Edition, Tata McGraw-Hill Publishing Co. Ltd., New Delhi (2005).

T 2.   M.N. Avadhanulu, P.G.Kshirsagar, "A Textbook of Engineering Physics", S. Chand & Co., New Delhi (2011).

**Reference Book(s):**

R 1.   D.S. Mathur , "Properties of Matter", S. Chand & Co.,  New Delhi, 2012.

R 2.   V.Rajendran, "Engineering Physics", Tata McGraw-Hill Publishing Co. Ltd., New Delhi (2012).

R 3.   R. C. Hibbeller, "Engineering Mechanics: Combined static and dynamics", Prentice Hall, 2010.

**Web References:**

1. http://www.physicsclassroom.com/

2. http://nptel.ac.in/course.php?disciplineId=115

## LIST OF EXPERIMENTS (ANY FIVE):

## ENGINEERING  PHYSICS LABORATORY

1. Determination of Young's Modulus of the material – Cantilever bending method.
2. Determination of Moment of inertia of the metallic disc – Torsional Pendulum method.
3. Determination of Rigidity modulus of the metallic wire – Torsional Pendulum method.
4. Determination of Viscosity of less viscous liquid -*Poiseuille's method.*
5. Determination of Viscosity of high viscous liquid –*Stoke's method.*

Passed in Board of Studies meeting          Approved in Academic Council meeting

BOS Convener                                 BOS Chairman

## Unit V - REFRIGERATION AND AIR CONDITIONING SYSTEMS    9 Hours

Refrigeration – terminologies, COP, Refrigerant – types and properties, Classifications-Vapour compression refrigeration system, vapour absorption refrigeration system, Layout of a typical domestic refrigerator. Air conditioning system-definition, classifications - working of the window, split and year-round air conditioning systems.

### LIST OF EXERCISES:

1. Making of two way staircase wiring for lamp and Making of internal wiring of tube light and checking connection.
2. Making of a domestic wiring circuit to connect a light, a fan with a regulator and a socket
3. VI Characteristics of PN Diode and common emitter configuration of BJT.
4. Study of wind turbine power plant and solar power plant
5. Study and performance analysis of vapour compression refrigeration system
6. Study and performance analysis of Air Conditioning system.

| Course Outcomes | Cognitive Level |
|---|---|
| At the end of this course, students will be able to: | |
| CO.1 Explain the concepts of Conventional and Non-conventional power sources | Understand |
| CO.2 Explain the concepts of Refrigeration and Air conditioning systems | Understand |
| CO.3 Explain the basic concepts and laws of electrical engineering | Understand |
| CO.4 Describe the basics of wiring | Understand |
| CO.5 Explain the basic concepts of electronics engineering | Understand |

### Text Book(s):

T1.    S.C. Arora and S Domkundwar, "A course in Power Plant Engineering" Dhanpatrai & Sons, New Delhi, 2008.

T2.    Muthusubramanian R, Salivahanan S and Muraleedharan K A, "Basic Electrical, Electronics and Computer Engineering", Tata McGraw Hill, Second Edition, (2006).

T3.    Kalsi .H.S, "Electronics Instrumentation", 3$^{rd}$Edition (copyright 2010, Second Reprint 2011) Tata McGraw Hill, New Delhi, 2010

### Reference Book(s):

R 1.    Manohara Prasad, "Refrigeration and Air conditioning", New Age International, 2004.

R 2.    Bhattacharya,"ElectricalMachines"Tata McGraw Hill, Second Edition (2008).

R 3.    Ray C. Mullin, Phil Simmons,"Electrical Wiring Commercial " Cengage learning 2011)

R 4.    John Cadick, Mary Capelli-Schellpfeffer, Dennis Neitzel, "Electrical Safety Handbook" Tata McGraw Hill third edition (2005).

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R 5. Ming L. Wang, Jerome P. Lynch, HoonSohn "Sensor Technologies for Civil Infrastructures, Volume 1: Sensing Hardware and data collection methods and performance assessment",Elsiver-2014

R 6. Millman J, Halkias .C andSatyabratajit, "Electronic Devices and Circuits", Second Edition, Tata McGraw-Hill, New Delhi, 2007

R 7. Jeyachandran.K, Natarajan.S. & Balasubramanian.S, "A Primeron Engineering Practices Laboratory", Anuradha Publications, 2007.

R 8. Electrical practices laboratory manual for civil engineers - MCET.

**Web References:**

1. https://www.jove.com/science-education/10114/electrical-safety-precautions-and-basic-equipment

### Course Articulation Matrix*

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|
| CO1 | 1 | - | - | - | - | - | - | 1 | 2 | 3 | - | - | - | - |
| CO2 | 1 | - | - | - | - | - | - | 1 | 2 | 3 | - | - | - | - |
| CO3 | 1 | - | - | - | - | - | - | 1 | 2 | 3 | - | - | - | - |
| CO4 | 1 | - | - | - | - | - | - | 1 | 2 | 3 | - | - | - | - |
| CO5 | 1 | - | - | - | - | - | - | 1 | 2 | 3 | - | - | - | - |

*Subject to change based on assessment.
High-3; Medium-2;Low-1
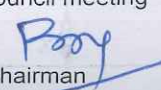
### Assessment pattern:

| | Assessment Component | CO .No. | Marks | Total |
|---|---|---|---|---|
| | CCET 1 | 1,4 | 50 | |
| | CCET 2 | 2,3 | 50 | 20 |
| | CCET 3 | 5 | 50 | |
| Continuous Comprehensive Evaluation | Continuous Evaluation of Laboratory Experiments | 1,2,3,4,5 | 10 | 20 |
| | Final Assessment of Laboratory Experiments | 1,2,3,4,5 | 10 | |
| **End Semester Examination** | ESE | 1,2,3,4,5 | 100 | 60 |
| **Total** | | | | 100 |

Passed in Board of Studies meeting          Approved in Academic Council meeting

BOS Convener                                             BOS Chairman

| Course Code: 19CESN3101 | Course Title: ENGINEERING DRAWING FOR CIVIL ENGINEERING | | |
|---|---|---|---|
| Course Category: Engineering Sciences | Course Level: Introductory | | |
| L:T:P (Hours/Week) 0: 0: 4 | Credits:2 | Total Contact Hours: 60 | Max Marks:100 |

**Pre-requisites**

> NIL

## Course Objectives

The course is intended to:

1. Sketch different symbols of civil engineering drawings.
2. Draw the orthographic views of building components.
3. Draw the isometric views of simple objects and buildings.
4. Draw the perspective view of simple building
5. Draw plan and elevation of simple buildings.

### UNIT I - INTRODUCTION TO ENGINEERING DRAWING                3+9 Hours

Importance of graphics in engineering applications – Size, layout and folding of drawing sheets – Lettering and dimensioning - Methods of Dimensioning - BIS standards and symbols in civil engineering drawing – building terminologies as per NBC - First angle projection - projection of points and lines.

### UNIT II - ORTHOGRAPHIC PROJECTION                3+9 Hours

Representation of Three Dimensional objects – General principles of orthographic projection – Need for importance of multiple views and their placement – layout of views - Orthographic projection of simple objects – drawing views of doors, windows, dog legged staircase.

### UNIT III - ISOMETRIC PROJECTIONS                3+9 Hours

Isometric Projection of solids – practices on simple solids like prisms, pyramids, cylinder& cone – practices on simple residential buildings.

### UNIT IV -PERSPECTIVE PROJECTIONS                3+9 Hours

Concepts of Perspective projection of simple solids like prisms, pyramids by Visual Ray Method - Concepts of Perspective projection of building by vanishing point method.

### UNIT V - BUILDING DRAWING                3+9 Hours

Introduction to types & Orientation of buildings – types of foundations - trusses. Drawing of different views of Isolated wall foundation – column footing (stepped footing, combined footing, trapezoidal footing) – drawing of plan and elevation view of two room building.

| Course Outcomes | Cognitive Level |
|---|---|
| At the end of this course, students will be able to: | |
| CO.1  Sketch different symbols of civil engineering drawings. | Understand |

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| | | |
|---|---|---|
| CO.2 | Draw the orthographic views of building components. | Understand |
| CO.3 | Draw the isometric views of simple objects and buildings. | Understand |
| CO.4 | Draw the perspective view of simple building | Apply |
| CO.5 | Draw plan and elevation of simple buildings. | Apply |

**Text Book(s):**

T 1.   Rangawala, "A text book of Civil Engineering Drawing", Charotar publishers, $3^{rd}$ edition, 2017.

T 2.   N. Kumaraswamy& A. KameswaraRao, "Building Planning and Drawing", Charotar publishers, $8^{th}$ edition, 2015

**Reference Book(s):**

R 1.   Anurag A. Kandya, "Elements of Civil Engineering" Charotar publishers, $3^{rd}$ edition, 2017 (Reprint)

R 2.   2. B.P. Verma, "Civil Engineering Drawing & House Planning", Khanna publishers, $12^{th}$ edition, 2006

## PUBLICATIONS OF BUREAU OF INDIAN STANDARDS

1. IS 10711 – 2001: Technical products Documentation – Size and lay out of drawing sheets.
2. IS 9609 (Parts 0 & 1) – 2001: Technical products Documentation – Lettering.
3. IS 10714 (Part 20) – 2001 & SP 46 – 2003: Lines for technical drawings.
4. IS 11669 – 1986 & SP 46 – 2003: Dimensioning of Technical Drawings.
5. IS 15021 (Parts 1 to 4) – 2001: Technical drawings – Projection Methods. The mode of delivery is like practical.
6. National building code of India (SP-7) Volume 1, Part 3 –"Development control rules and general building requirements", third revision 2016.

**Web References:**

1. http://www.me.umn.edu/courses/me2011/handouts/drawing/blanco-tutorial.html
2. http://web.iitd.ac.in/~achawla/public_html/201/lectures/sp46.pdf

**List of Experiments:**

1. Lettering, Dimensions & drawing of civil engineering drawing symbols.
2. Orthographic projection of simple solids
3. Drawing of elevation of doors & windows
4. Drawing of plan & elevation of dog legged staircase
5. Isometric projection of simple solids & buildings
6. Perspective projection of simple solids and buildings
7. Drawing of different views of foundation.
8. Drawing plan and elevation of two room building.

Passed in Board of Studies meeting          Approved in Academic Council meeting

BOS Convener                                   BOS Chairman

## Course Articulation Matrix

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|
| CO1 | 2 | - | - | - | 2 | - | - | 1 | 1 | 2 | - | - | - | - |
| CO2 | 2 | - | - | - | 2 | - | - | 1 | 1 | 2 | - | - | - | - |
| CO3 | 2 | - | - | - | 2 | - | - | 1 | 1 | 2 | - | - | - | - |
| CO4 | 2 | - | - | - | 2 | - | - | 1 | 1 | 2 | - | - | - | - |
| CO5 | 2 | - | - | - | 2 | - | - | 1 | 1 | 2 | - | - | - | - |

High-3; Medium-2; Low-1

## Assessment pattern:

| | Assessment Component | CO.No. | Marks | Total |
|---|---|---|---|---|
| **Continuous Assessment** | Each Lab Experiment | 1,2,3,4,5 | 75 | 75 |
| | Cycle Test 1 | 1,2,3 | 50 | 25 |
| | Cycle Test 2 | 3,4,5 | 50 | |
| | | | **Total** | 100 |

| Course Code: 19PSHG6001 | Course Title: Wellness for Students (Common to all B.E/B.Tech Programmes) (2019 Batch only) | | |
|---|---|---|---|
| Course Category: Humanities | Course Level: Introductory | | |
| L:T:P (Hours/Week) 0: 0 :2 | Credits: 1 | Total Contact Hours: 30 | Max Marks:100 |

**Pre-requisites**

> NIL

**Course Objectives**

The course is intended to:

1. Articulate the importance of wellness for success in life.
2. Understand the dimensions of wellbeing and relevant practices
3. Guide in adopting such practices to improve wellness
4. Reflect the impact of changes sensed on personal and social effectiveness

## UNIT I - WELLNESS - IMPORTANCE AND DIMENSIONS                 6 Hours

Values and aspirations – goals – SMART Goals – means for achieving goals – job Vs career – success in life – attributes of successful persons. Maslow's Hierarchy of needs motivation – Concept of wellness – impact of absence of wellness – Wellness as important component to achieve success.

Wellbeing as per WHO – Dimensions of Wellbeing: Physical, Mental, Social, Spiritual – indicators and assessment methods – Guna – causes and impact – multiple dimensions of human structure (physical, astral, causal bodies) – human-panchabootha relationship.

## UNIT II - PRACTICES FOR PHYSICAL WELLNESS THROUGH YOGA            6 Hours

Simplified Physical Exercises: Hand, Leg, Neuromuscular breathing, eye exercises, kapalabathy, makarasanam 1 & 2, body massage, 14-points acupressure – Suryanamaskar - relaxation. Simple asanas.

## UNIT III - PRACTICES FOR PHYSICAL WELLNESS THROUGH EXERCISES    6 Hours

Fitness as a subset of Wellness – health related physical fitness – skill related physical fitness. Exercises related ailment and injuries – safety and precautions – first aid.

Fitness development: Muscular strength – exercises (calisthenics): pull-up, sit-up, push-up and weight training; Explosive power – exercises: vertical jump, long jump; Cardio respiratory endurance– exercises: walking, jogging, treadmill, stair climbing, bicycling, skipping; Flexibility – exercises: stretching.

Speed, agility, balance and coordination – exercises: sprint, cone drill, ladder drill, hurdle drill, ball throw – mental agility exercises.

## UNIT IV - PRACTICES FOR MENTAL WELLNESS                      6 Hours

Meditation: Mind and its functions – mind wave frequency – Agna, Thuriyam and Shanthi meditation – introspection: analysis of thoughts, moralization of desire, neutralization of anger and eradication of worries – simple mindfulness exercises.

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## UNIT V - PRACTICES FOR SOCIAL AND SPIRITUAL WELLNESS  6 Hours

Kayakalpa yoga – youthfulness and life force - cultural education – greatness of guru – universal compassion – fivefold culture.Greatness of friendship and social welfare – individual, family and world peace – blessings and benefits.

Food & sleep for wellness: balanced diet – good food habits for better health (anatomic therapy) – hazards of junk food – food and the gunas.

| Course Outcomes | Cognitive Level |
|---|---|
| At the end of this course, students will be able to: | |
| CO.1 Explain the concept of wellness and its importance to be successful in career and Life | Understand |
| CO.2 Explain the dimensions of wellness and practices that can promote wellness | Understand |
| CO.3 Demonstrate the practices that can promote wellness | Respond |
| CO.4 Sense and improve the wellness periodically and its impact on personal Effectiveness | Value |
| CO.5 Maintain harmony with self, family, peers, society and nature | Internalize |

**Text Book(s):**

T 1.   Reading material and workbook prepared by PS team of the college

**Reference Book(s):**

R 1.   Vethathiri Maharishi Institute for Spiritual and Intuitional Education, Aliyar ,"Value education for harmonious life (Manavalakalai Yoga)", Vethathiri Publications, Erode, I Ed. (2010).

R 2.   Dr.R.Nagarathna, Dr.H.R.Nagendra, "Integrated approach of yoga therapy for positive health", Swami Vivekananda Yoga Prakashana, Bangalore, 2008 Ed.

R 3.   Tony Buzan, Harper Collins, The Power of Physical Intelligence (English).

**Course offering:**

Orientation programme (3 days)                          CO1 and CO2

Student practice (weekly review classes)                          CO3

Student journal writing (interim reviews)                          CO4 and CO5

### Course Articulation Matrix

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | - | - | - | - | - | - | 1 | 1 | - | - | - | - | - |
| CO2 | - | - | - | - | - | - | 1 | 1 | 1 | - | - | - | - | - |
| CO3 | - | - | - | - | - | 1 | 1 | 1 | 1 | - | - | 1 | - | - |
| CO4 | - | - | - | - | - | 1 | 1 | - | 1 | - | - | - | - | - |
| CO5 | - | - | - | - | - | 1 | 1 | - | 1 | - | - | 1 | - | - |

High-3; Medium-2; Low-1

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BOS Convener                          BOS Chairman

**Assessment Pattern**

| | Assessment Component | CO.No. | Marks | Total |
|---|---|---|---|---|
| **Continuous Assessment** | **Yoga:** | 1,2,3,4,5 | | 75 |
| | Physical Exercises, KayaKalpa | | 15 | |
| | Meditation | | 15 | |
| | Assessment of student's workbook | | 10 | |
| | **Sports:** | | | |
| | Physical Exercises, KayaKalpa | | 20 | |
| | Assessment of student's workbook | | 15 | |
| **End Semester Examination** (combined for yoga and sports) | Written test (MCQ and short answers) | 1,2,3,4,5 | 30 | Marks out of 100 is reduced to 25 |
| | Physical exercises | | 50 | |
| | Viva-voce | | 20 | |
| | | | **Total** | 100 |

Passed in Board of Studies meeting          Approved in Academic Council meeting

BOS Convener                                             BOS Chairman

| Course Code: 19ENHG2201 | Course Title: COMMUNICATION SKILLS – II (Common to all B.E/B.Tech Programmes) | | |
|---|---|---|---|
| Course Category: Humanities | | Course Level: Introductory | |
| L:T:P (Hours/Week) 2: 0: 2 | Credits:3 | Total Contact Hours:60 | Max Marks:100 |

**Pre-requisites**

> Communication Skills – I

## Course Objectives

The course is intended to:

1. Listen and understand monologues and dialogues of a native speaker on par with B2 of CEFR level.
2. Speak in simple sentences to convey their opinion and ideas on par with B2 of CEFR level.
3. Read and infer a given text on par with B2 of CEFR level.
4. Draft basic formal written communication on par with B2 of CEFR level.

### Unit I - LISTENING                                                    15 Hours

Importance and purpose of extensive listening and intensive listening -Body Language – Listening tasks on complex and abstract themes- Correlating Ideas related to listening input – importance of empathetic- listening for main ideas – Paraphrasing- Listening to native speakers English –Compound and Complex sentences - Developing ideas – Listening to compose paragraphs.

### Unit II - SPEAKING                                                    15 Hours

Jotting down ideas collected from listening to speak – organising the ideas – Expressing one's view coherently – Understanding grammatical elements (Noun – Pronoun Antecedent) – Expressing ideas assertively – Answering questions during presentations – Understanding the use of discourse markers – word stress and sentence stress – voice modulation and pauses – Highlighting significant points – interpretation of visual data – Using verbal cues  - Preparing simple hand - outs.

### Unit III – READING                                                    15 Hours

Reading strategies – Skimming &Scanning – Inferring meaning- Barriers to reading – sub vocalisation, Eye fixation, Regression – Speed Reading Techniques - Reading different types of texts and their contexts with speed – Note making – Reading a review – Paraphrasing – Reading to comprehend

### Unit IV - READING                                                    15 Hours
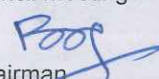
Reading strategies – Skimming &Scanning – Inferring meaning- Barriers to reading – sub vocalisation, Eye fixation, Regression – Speed Reading Techniques - Reading different

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BOS Convener                                 BOS Chairman

types of texts and their contexts with speed – Note making – Reading a review – Paraphrasing – Reading to comprehend.

## Unit V – WRITING                                                  15 Hours

Reported speech& Concord (Subject - verb Agreement) - Report writing - Different kinds of Report - Structure of the report - Writing Proposal - Plagiarism – References – Appendices – Techniques for Report writing – Registers.

## LABORATORY COMPONENT
### LIST OF TASKS:

1. BEC Vantage Listening Test-I & Speaking Test-1.

2. BEC Vantage Listening Test-2 & Speaking Test-2.

3. BEC Vantage Listening Test-3 & Speaking Test-3.

4. BEC Vantage Listening Test-4 & Speaking Test-4.

5. BEC Vantage Listening Test-5 & Speaking Test-5.

6. BEC Vantage Listening Test-6 & Speaking Test-6.

| Course Outcomes | Cognitive Level |
|---|---|
| At the end of this course, students will be able to: | |
| CO.1 Listen actively and empathetically, and paraphrase discussions and presentations on complex and abstract themes and topics | Apply |
| CO.2 Express one's views coherently, fluently and confidently highlighting the significant points with supporting details | Apply |
| CO.3 Read and comprehend different types of texts and their contexts reasonably at moderate speed | Understand |
| CO.4 Write detailed reports on variety of subjects synthesizing information gathered during listening & reading citing appropriate references | Apply |

**Text Book(s):**

T 1.   Whitby Norman, Business Benchmark Upper Intermediate Students' Book CUP Publications, 2nd Edition, 2014.

T 2.    Learners Book prepared by the Faculty members of Department of English

**Reference Book(s):**

R 1.   Cambridge BEC Vantage - Practice Tests, Self-study Edition, Cambridge University Press, 2002

R 2.   Hewings Martin - Advanced Grammar in use - Upper-intermediate Proficiency, CUP, Third Edition, 2013.

**Web References:**

1.  http://www.grammarinenglish.com - Jan 23, 2018

2.  https://www.northshore.edu/support  centre /pdf/listen-notes.pdf

3.  http://www.examenglish.com/BEC/BEC_Vantage.html- Jan 23, 2018

## Course Articulation Matrix

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|
| CO1 | 2 | - | - | - | - | - | - | - | 2 | 3 | - | - | - | - |
| CO2 | 2 | - | - | - | - | - | - | 1 | 2 | 3 | - | - | - | - |
| CO3 | 1 | - | - | - | - | - | - | 1 | - | 3 | - | - | - | - |
| CO4 | 2 | - | - | - | - | - | - | 1 | - | 3 | - | - | - | - |
| CO5 | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

High-3; Medium-2;Low-1

## Assessment Pattern

| | Assessment Component | CO. No. | Marks | Total |
|---|---|---|---|---|
| **Continuous Assessment** | CCET I | 2,3,4 | 50 | |
| | CCET II | 2,3,4 | 50 | 20 |
| | CCET III | 2,3,4 | 50 | |
| | Continuous Assessment – Practical | 1,2 | 75 | 10 |
| | Final Assessment - Practical | 1,2 | 50 | 10 |
| **End Semester Examination** | ESE | 2,3,4 | 100 | 60 |
| | | | Total | 100 |

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BOS Convener                                           BOS Chairman

| Course Code: 19MABC1201 | Course Title: ORDINARY DIFFERENTIAL EQUATION AND COMPLEX VARIABLES (Common to Automobile/Mechanical/ Production/Civil/ Mechatronics/EEE/ECE/EIE Engineering) | | |
|---|---|---|---|
| Course Category: Basic Sciences | | Course Level: Introductory | |
| L:T:P (Hours/Week) 3: 1: 0 | Credits: 4 | Total Contact Hours: 60 | Max Marks:100 |

### Pre-requisites

> Matrices and Calculus

### Course Objectives

The course is intended to:

1. Explain the concepts of vector differentiation and integration.

2. Determine the solution of second and higher order ordinary differential equations

3. Construct analytic functions

4. Use the concept of complex integration to evaluate definite integrals.

5. Apply Laplace transform techniques to solve ordinary differential equations

### UNIT I - VECTOR CALCULUS                                              9+3 Hours

Gradient – Divergence – Curl – Line integrals – Surface integrals – Volume integrals – Theorems of Green, Gauss and Stokes (without proof) and their applications.

### UNIT II - COMPLEX VARIABLES (DIFFERENTIATION)              9+ 3 Hours

Cauchy-Riemann equations – Analytic functions – Properties – Harmonic functions – Finding harmonic conjugate – Conformal mapping (w=z+a, w= az, w=1/z) – Mobius transformation and their properties.

### UNIT III - COMPLEX VARIABLES (INTEGRATION)                   9+3 Hours

Contour integrals – Cauchy Integral formula (without proof) – Cauchy Integral theorem – Taylor's series – Singularities of analytic functions – Laurent's series–Residues – Cauchy Residue theorem(without proof) – Evaluation of real definite integrals around unit circle and semi circle (Excluding poles on the real axis).

### UNIT IV - ORDINARY DIFFERENTIAL EQUATIONS OF HIGHER ORDERS   9+3 Hours

Second and higher order linear differential equations with constant coefficients – Second order linear differential equations with variable coefficients (Cauchy - Euler equation– Legendre's equation) – Method of variation of parameters – Solution of first order simultaneous linear ordinary differential equations

### Unit V - LAPLACE TRANSFORM                                          12 Hours

Laplace Transform – Properties of Laplace Transform – Laplace transform of integrals – Laplace transform of periodic functions -Inverse Laplace transforms - Convolution theorem – Solution of ordinary differential equations by Laplace Transform method – Applications on engineering problems.

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| Course Outcomes | Cognitive Level |
|---|---|
| At the end of this course, students will be able to: | |
| CO.1 Explain the concepts of vector differentiation and integration. | Apply |
| CO.2 Use the concept of complex variables to construct analytic functions | Apply |
| CO.3 Use the concept of complex integration to evaluate definite integrals | Apply |
| CO.4 Use the concept of complex integration to evaluate definite integrals | Apply |
| CO.5 Apply Laplace transform techniques to solve ordinary differential equations | Apply |

**Text Book(s):**

T1. Erwinkreyzig, Advanced Engineering Mathematics, 9th edition, John Wiley& Sons, 2006.

T2. Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.

T3. Ramana B.V., higher Engineering Mathematics, Tata McGraw-Hill, New Delhi, 11th Reprint, 2010.

**Reference Book(s):**

T1. G.B.Thomas and R.L Finney, Calculus and Analytic Geometry, 9th edition, Pearson, Reprint, 2002.

T2. N.P.Bali and Manish Goyel, A text book of Engineering Mathematics, Laxmi Publication, Reprint, 2008.

T3. B.S.Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.

**Web References:**

1. https://onlinecourses.nptel.ac.in/noc16_ma05
2. https://nptel.ac.in/courses/122101003/2
3. https://nptel.ac.in/courses/111105035/22

**Course Articulation Matrix**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | - | - | - | - | - | - | 2 | 2 | 3 | - | 2 | - | - |
| CO2 | 3 | - | - | - | - | - | - | 2 | 2 | 3 | - | 2 | - | - |
| CO3 | 3 | - | - | - | - | - | - | 2 | 2 | 3 | - | 2 | - | - |
| CO4 | 3 | - | - | - | - | - | - | 2 | 2 | 3 | - | 2 | - | - |
| CO5 | 3 | - | - | - | - | - | - | 2 | 2 | 3 | - | 2 | - | - |

High-3; Medium-2; Low-1

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BOS Convener                                 BOS Chairman

## Assessment Pattern

| | Assessment Component | CO. No. | Marks | Total |
|---|---|---|---|---|
| Continuous Assessment | CCET I | 1,2 | 50 | 30 |
| | CCET II | 3,4 | 50 | |
| | CCET III | 5 | 50 | |
| | Tutorials / Quiz / Assignments | 1,2,3,4,5 | 30 | 10 |
| End Semester Examination | ESE | 1,2,3,4,5 | 100 | 60 |
| | | | Total | 100 |

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BOS Convener               BOS Chairman

| Course Code: 19CHBN2201 | Course Title: CHEMISTRY FOR CIVIL ENGINEERING | | | |
|---|---|---|---|---|
| Course Category: Basic Sciences | | Course Level: Introductory | | |
| L:T:P (Hours/Week) 3: 0: 2 | Credits: 4 | Total Contact Hours:75 | | Max Marks:100 |

**Pre-requisites**

> Higher secondary Chemistry I and II

**Course Objectives**

The course is intended to:

1. Explain the chemistry of water and water conditioning methods.
2. Explain the mechanism of corrosion and corrosion control
3. Explain different renewable energy sources and storage devices.
4. Describe the preparation, properties and applications of engineering plastics
5. Describe the chemistry of building materials in modern construction.

## UNIT I - WATER TECHNOLOGY                                          9 Hours

. Water quality parameters–Types of water- Hardness of water – Types, expression, units, problems- determination of hardness by EDTA method – Boiler feed water- boiler troubles(scale, sludge, priming, foaming, caustic embrittlement, Boiler corrosion)- Water conditioning methods – Internal conditioning –phosphate , calgon and sodium aluminate conditioning, External conditioning – demineralization, Desalination of brackish water- reverse osmosis process

## UNIT II - CORROSION AND CONTROL                                    9 Hours

Corrosion- causes- consequences - types- chemical, electrochemical corrosion (galvanic, differential aeration-Pitting corrosion), factors influencing corrosion(Based on Metal and Environment)-corrosion control - material selection and design aspects - electrochemical protection – sacrificial anode method and impressed current cathodic method. Paints- constituents and function

## UNIT III - ENERGY SOURCES AND STORAGE DEVICES                      9 Hours

Introduction – Nuclear energy - nuclear fission- nuclear fusion- nuclear chain reactions- nuclear reactor power generation- classification of nuclear reactor- solar energy conversion- solar cells- wind energy., Batteries - Types of batteries- alkaline battery- lead storage battery - lithium-ion battery.

## UNIT IV - POLYMERS, PLASTICS AND COMPOSITES                        9 Hours
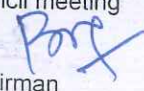
Polymers–definition-polymerization-types-addition and condensation polymerization- classification – Terminologies – Plastics – Classification, Engineering plastics
(PVC, Teflon, Polycarbonates, Polyurethanes, PET)– preparation, properties and uses, Compounding of plastics – Moulding technique – blow and extrusion. Polymer composites – FRP and ceramic matrix composites.

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# UNIT V - CHEMISTRY OF BUILDING MATERIALS                     9 Hours

Chemistry of lime and gypsum , Cement – chemical composition, classification, manufacture by wet and dry process, setting and hardening of cement, chemical reactions during the hydration of cement, waterproof and white cement–properties and uses, Chemistry and applications of ceramics, fly ash and glass in construction

## LABORATORY COMPONENT

## LIST OF EXPERIMENTS:

1. Estimation of hardness of water by EDTA method.

2. Determination of corrosion rate of mild steel by weight loss method.

3. Determination of molecular weight of polymer by viscometric method.

4. Determination of percentage of calcium oxide in cement by titrimetric method

5. Estimation of strength of hydrochloric acid by $p^H$metry.

6. Determination of iron in water by spectrophotometry.

| Course Outcomes | Cognitive Level |
|---|---|
| At the end of this course, students will be able to: | |
| CO.1 Calculate hardness of water based on water quality parameters associated with water conditioning methods | Apply |
| CO.2 Explain the mechanism of corrosion and its control techniques. | Understand |
| CO.3 Explain different renewable energy sources and storage devices. | Understand |
| CO.4 Identify a suitable plastic for a specific engineering application. | Understand |
| CO.5 Describe the chemistry of building materials in modern construction. | Understand |

## Text Book(s):

T 1.  Jain & Jain, Engineering Chemistry(All India),17th edition, Dhanpat Rai Publishing Company(P) Ltd, New Delhi(2018)

T 2.  Wiley Engineering Chemistry, Second Edition, Wiley India Pvt Ltd, New Delhi(2011)

## Reference Book(s):

R 1.  Dara S.S., and Umare S.S.,A text book of Engineering Chemistry, S.Chand & Co Ltd,New Delhi(2014)

R 2.  V.R.Gowariker, N.V.Viswanathan and Jayadev Sreedhar, Polymer Science, New Age International( P) Ltd, Chennai(2006)

R 3.  Renu Bapna and Renu Gupta, Engineering Chemistry, Macmillan India Publisher Ltd (2010)

R 4.  Jeffery G.H., Bassett J., Mendham J. and Denny R.C., Vogel's Text Book of Quantitative Chemical Analysis, Oxford, ELBS, London(2012.)

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R 5. Shoemaker D.P. and C.W.Garland., Experiments in Physical Chemistry, Tata McGraw-Hill Pub. Co., Ltd., London(2003)

**Web References:**

1. http://nptel.ac.in/courses/122101001/downloads/lec.23.pdf
2. https://nptel.ac.in/courses/104106075/Week1/MODULE%201.pdf
3. https://nptel.ac.in/courses/103102015/

## Course Articulation Matrix

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|
| CO1 | 2 | - | - | - | - | - | - | 1 | 2 | 3 | - | 1 | - | - |
| CO2 | 1 | - | - | - | - | - | - | 1 | 2 | 3 | - | 1 | - | - |
| CO3 | 1 | - | - | - | - | - | - | 1 | 2 | 3 | - | 1 | - | - |
| CO4 | 1 | - | - | - | - | - | - | 1 | 2 | 3 | - | 1 | - | - |
| CO5 | 1 | - | - | - | - | - | - | 1 | 2 | 3 | - | 1 | - | - |

High-3; Medium-2; Low-1

## Assessment Pattern

| | Assessment Component | CO. No. | Marks | Total |
|---|---|---|---|---|
| **Continuous Assessment** | CCET I | 1,2 | 50 | 20 |
| | CCET II | 3,4 | 50 | |
| | CCET III | 5 | 50 | |
| | Continuous Evaluation of Laboratory Experiments | 1,2,3,4,5 | 10 | 20 |
| | Final Assessment of Laboratory Experiments | 1,2,3,4,5 | 10 | |
| **End Semester Examination** | ESE | 1,2,3,4,5 | 100 | 60 |
| | | | **Total** | 100 |

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BOS Convener        BOS Chairman

| Course Code: 19CESN1201 | Course Title: ENGINEERING MECHANICS | | |
|---|---|---|---|
| Course Category: Engineering Sciences | Course Level: Introductory | | |
| L:T:P (Hours/Week) 3: 1: 0 | Credits:4 | Total Contact Hours: 60 | Max Marks:100 |

**Pre-requisites**

> NIL

**Course Objectives**

The course is intended to:

1. Analyze the forces in concurrent system
2. Calculate the resultant in non-concurrent system of forces.
3. Calculate geometric properties like centre of gravity, moment of Inertia and mass moment of inertia for various sections.
4. Apply equilibrium equations to find reactions in beams and member forces in trusses and explain the effect of dry friction in contact surfaces.
5. Apply the law of dynamics on particles.

### Unit I - EQUILIBRIUM OF RIGID BODIES                    9+3 Hours

Free body diagram – Types of supports –Action and reaction forces –stable equilibrium – Moments and Couples – Moment of a force about a point and about an axis – Vectorial representation of moments and couples – Scalar components of a moment – Varignon's theorem – Single equivalent force -Equilibrium of Rigid bodies in two dimensions – Equilibrium of Rigid bodies in three dimensions.

### Unit II - APPLICATION OF EQUILIBRIUM                    9+3 Hours

Types of Beams and Loads – Equilibrium of Rigid bodies in two dimensions– Introduction to Static determinacy and Indeterminacy of beams and trusses – Types of beams and its reactions from supports – Types of trusses – Analysis for member forces by method of joints and method of sections. Relationship between load, bending moment and shear force. Theory of simple bending, Analysis of Beams for Stresses – Stress Distribution at a cross Section due to bending moment and shear force for Cantilever, simply supported and overhanging beams with different loading conditions - Flitched Beams.

### Unit III – FRICTION                    9+3 Hours

Frictional force – Laws of Coulomb friction - Coefficient of Static and Kinematic friction – Block Friction - Motion Impending (Static and Kinematic) - Coplanar systems with friction (Ladder, Wedges and Screw).

### Unit IV - DYNAMICS OF PARTICLES                    9+3 Hours

 Kinematics of particles – Displacements, Velocity and acceleration, their relationship – Relative motion - Rectilinear and Curvilinear motions

### Unit V - DYNAMICS OF RIGID BODIES                    9+3 Hours

Kinetics of rigid bodies – Newton's law – D'Alemberts principle – Work, Energy equation of particles – Impulse and Momentum – Impact of elastic bodies - Natural Frequency - Time period - Mode shapes.

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BOS Convener          BOS Chairman

| Course Outcomes | Cognitive Level |
|---|---|
| At the end of this course, students will be able to: | |
| CO.1 Analyze the forces in concurrent system by applying laws of mechanics for rigid bodies. | Analyze |
| CO.2 Calculate the resultant in non-concurrent system of forces. | Apply |
| CO.3 Calculate geometric properties like centre of gravity, moment of Inertia and mass moment of inertia for various sections. | Apply |
| CO.4 Apply equilibrium equations to find reactions in beams and member forces in trusses. | Apply |
| CO.5 Apply the law of dynamics on particles. | Apply |

**Text Book(s):**

T 1.  Beer, F.P and Johnston Jr. E.R., "Vector Mechanics for Engineers (In SI Units): Statics and Dynamics", 8th Edition, Tata McGraw-Hill Publishing company, New Delhi (2012).

T 2.  Vela Murali, "Engineering Mechanics", Oxford University Press (2010)

T 3.  Beer, F.P and Johnson Jr. E.R., " Mechanics of Materials", 7th Edition, McGraw-Hill Education, New york (2015)

**Reference Book(s):**

R 1.  Hibbeller, R.C and Ashok Gupta, "Engineering Mechanics: Statics and Dynamics", 11th Edition, Pearson Education 2010.

R 2.  Irving H. Shames and Krishna Mohana Rao. G., "Engineering Mechanics – Statics and Dynamics", 4th Edition, Pearson Education 2006.

R 3.  Raghu Ramakrishnan, Johannes Gehrke. "Database Management Systems", Third Edition, McGraw Hill International Edition, New Delhi 2013

R 4.  Jefrey D.Ulman and Jenifer Widom, "A First Course in Database Systems", Third Edition, Prentice-Hall, New Delhi, 2012.

R 5.  Bhavikatti, S.S and Rajashekarappa, K.G., "Engineering Mechanics", New Age International (P) Limited Publishers, 1998.

R 6.  Kumar, K.L., "Engineering Mechanics", 3rd Revised Edition, Tata McGraw-Hill Publishing company, New Delhi 2008.

**Web References:**

1.  http://nptel.ac.in/courses/112103109/(updated 01-Mar-2019)
2.  http://www.iitg.ac.in/ssg/me101.html(updated 31-Jan-2015)
3.  https://www.coursera.org/learn/engineering-mechanics-statics(updated 01-Mar-2019)
4.  http://www.vssut.ac.in/lecture_notes/lecture1423904717.pdf (updated 01-Aug-2014)

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BOS Convener                                           BOS Chairman

## Course Articulation Matrix

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|
| CO1 | 3 | - | - | - | - | - | - | 1 | 1 | 2 | - | 1 | - | - |
| CO2 | 2 | - | - | - | - | - | - | 1 | 1 | 2 | - | 1 | - | - |
| CO3 | 2 | - | - | - | - | - | - | 1 | 1 | 2 | - | 1 | - | - |
| CO4 | 2 | - | -1 | - | - | - | - | 1 | 1 | 2 | - | 1 | - | - |
| CO5 | 2 | - | - | - | - | - | - | 1 | 1 | 2 | - | 1 | - | - |

High-3; Medium-2;Low-1

## Assessment Pattern

| | Assessment Component | CO. No. | Marks | Total |
|---|---|---|---|---|
| **Continuous Assessment** | CCET I | 1,2 | 50 | |
| | CCET II | 3,4 | 50 | 30 |
| | CCET III | 5 | 50 | |
| | Tutorials / Quiz / Assignments | 1,2,3,4,5 | 30 | 10 |
| **End Semester Examination** | ESE | 1,2,3,4,5 | 100 | 60 |
| | | | **Total** | 100 |

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BOS Convener                                      BOS Chairman

| Course Code: 19CSSC2001 | Course Title: C – PROGRAMMING (Common to Automobile/Mechanical/ Production/Civil/Mechatronics/EEE/ECE/EIE Engineering) | | |
|---|---|---|---|
| Course Category: Engineering Sciences | Course Level: Introductory | | |
| L:T:P (Hours/Week) 3: 0: 2 | Credits: 4 | Total Contact Hours:75 | Max Marks:100 |

**Pre-requisites**

> NIL

## Course Objectives

The course is intended to:

1. Explain about computer organization and problem solving techniques
2. Write programs using appropriate programming constructs
3. Develop programs using arrays, functions & strings
4. Implement programs using pointers, structures& unions
5. Write programs using files & preprocessor directives

### Unit I - INTRODUCTION                                    7 Hours

Generation and Classification of Computers –Basic Organization of a Computer – Software development life cycle – Problem Solving Techniques :Algorithm,Pseudocode and Flow Chart.

### Unit II - C PROGRAMMING BASICS                           10 Hours

Introduction to C programming – Structure of a C program – Keywords – Identifiers- Constants– Variables –Data Types– Operators and Expressions –Formatted & Unformatted I/O functions– Decision statements –Loop control statements.

### Unit III - ARRAYS, FUNCTIONSAND STRINGS                  10 Hours

Arrays: Characteristics –One-dimensional and Two-dimensional arrays – Functions: Declaration & Definition of function –Built in function – User defined function –Types of functions –Call by value &reference– Strings: Formatting strings–String handling functions.

### Unit IV - POINTERS, STRUCTURES & UNION                   9 Hours

Pointers: Features and Types of pointers – Arithmetic operations with pointers–Pointers and Arrays –Structures: Features– Operations on Structures–Array of structures – Unions.

### Unit V - FILES & PRE-PROCESSOR DIRECTIVES                9 Hours

Introduction to Files –Stream and File Types–File operations (Open, close, read, write) – Command line arguments–Pre-processor Directives: Macro Expansion, File Inclusion, Conditional Compilation.

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| Course Outcomes | Cognitive Level |
|---|---|
| At the end of this course, students will be able to: | |
| CO1: Explain about computer organization and problem solving techniques | Understand |
| CO2: Write programs for the given scenario using appropriate programming Constructs | Apply |
| CO3: Develop programs using arrays, functions & strings for the given Scenario | Apply |
| CO4: Implement programs for given application using pointers, structures& unions | Apply |
| CO5: Write programs using files & preprocessor directives for simple problems | Apply |

**Text Book(s):**

T1.    Ashok N. Kamthane, Amit.N. Kamthane, "Programming in C", Third Edition, Pearson Education, 2015.

**Reference Book(s):**

R 1.    Ajay Mittal, "Programming in C-A Practical Approach", Third Edition, Pearson Education, 2010.

R 2.    Yashavant P. Kanetkar, "Let Us C", Sixteenth Edition, BPB Publications,2018

R 3.    Pradip Dey, Manas Ghosh, "Computer Fundamentals and Programming in C", Second edition, Oxford University Press, 2013

**Web References:**

1.    http://www.cprogramming.com/

2.    http://www.c4learn.com/
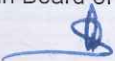
**C Programming Laboratory**                                    **30 Hrs**

1.  Programs to process data types, operators and expression evaluation(any 1)

    a.  To find area of rectangle/circle/square

    b.  To find the simple interest and compound interest

2.  Programs using decision and looping statements(any 2)

    a.  To find the maximum number among 3givennumbers

    b.  To check whether given year is leap year or not

    c.  To display the Fibonacci series

    d.  To find the factorial of a number

3.  Programs using Arrays

    a.  To search for particular number among N numbers(1D array)

    b.  To compute matrix addition  (2 D array)

4.  Programs using Functions and Strings(any 2)

    a.  To swap two numbers using call by reference

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b. To find the cube of a number

c. To manipulate strings using string functions

d. To check whether the string is palindrome or not

5. Programs using Pointer, Structure & Union

    a. To perform arithmetic operations using pointers

    b. To display the information of N students using Structure

    c. To display the employee details using Union

6. Programs using Files (any 1)

    a. To read the contents of a text file

    b. To copy the contents from one file into another

## Course Articulation Matrix

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|
| CO1 | 2 | - | - | - | - | - | - | 1 | 1 | 2 | - | - | - | - |
| CO2 | 2 | - | - | - | - | - | - | 1 | 1 | 2 | - | - | - | - |
| CO3 | 2 | - | - | - | - | - | - | 1 | 1 | 2 | - | - | - | - |
| CO4 | 2 | - | - | - | - | - | - | 1 | 1 | 2 | - | - | - | - |
| CO5 | 2 | - | - | - | - | - | - | 1 | 1 | 2 | - | - | - | - |

High-3; Medium-2; Low-1

## Assessment Pattern

| | Assessment Component | CO. No. | Marks | Total |
|---|---|---|---|---|
| **Continuous Assessment** | CCET I | 1,2 | 50 | |
| | CCET II | 3,4 | 50 | 20 |
| | CCET III | 5 | 50 | |
| | Tutorials / Quiz / Assignments | 1,2,3,4,5 | 10 | 20 |
| | Final Assessment of Laboratory Experiments | 1,2,3,4,5 | 10 | |
| **End Semester Examination** | ESE | 1,2,3,4,5 | 100 | 60 |
| | | | **Total** | 100 |

Passed in Board of Studies meeting    Approved in Academic Council meeting

BOS Convener             BOS Chairman

| Course Code: 19CECN3201 | Course Title: COMPUTER AIDED BUILDING DRAWING LABORATORY | | |
|---|---|---|---|
| Course Category: Professional Core | Course Level: Introductory | | |
| L:T:P (Hours/Week) 0: 0: 4 | Credits: 2 | Total Contact Hours:60 | Max Marks:100 |

**Pre-requisites**

> ➤ Engineering Drawing

**Course Objectives**

The course is intended to:

1. Draw plan, elevation and section of wall foundations and column footings (stepped, combined and trapezoidal) using CAD software
2. Draw plan, elevation of dog legged and bifurcated staircase using CAD software.
3. Draw the king post and Queen post wooden trusses using CAD software.
4. Draw plan, elevation and sectional view of residential buildings using CAD software.
5. Draw the perspective view of buildings using CAD software.

**List of Exercises**

1. Introduction to CAD commands and drawing of simple objects.
2. Drawing of plan, elevation and section of types of foundations. (Wall foundation, Column footing – Stepped, Combined and Trapezoidal)
3. Drawing of plan, elevation of dog legged staircase and bifurcated staircase.
4. Drawing of section of King post & Queen Post wooden truss.
5. Drawing of plan, elevation & section of simple buildings.
6. Drawing of plan, elevation & section of one BHK residential building with RCC flat roof – single storey – load bearing structure
7. Drawing of plan, elevation & section of one BHK residential building with RCC flat roof – single storey – framed structure
8. Drawing of plan, elevation & section of two BHK residential building with RCC flat roof – single storey – load bearing structure
9. Drawing of plan, elevation & section of two BHK residential building with RCC flat roof – single storey – framed structure
10. Drawing of plan, elevation & section of Commercial building.
11. Drawing of perspective view of a single storied building.
12. Drawing of perspective view of a two storied building.

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Passed in Board of Studies meeting          Approved in Academic Council meeting

BOS Convener                                              BOS Chairman

| Course Outcomes | Cognitive Level |
|---|---|
| At the end of this course, students will be able to: | |
| CO.1 Draw plan, elevation and section of wall foundations and column footings (stepped, combined and trapezoidal) using CAD software | Apply |
| CO.2 Draw plan, elevation of dog legged and bifurcated staircase using CAD software. | Apply |
| CO.3 Draw the king post and Queen post wooden trusses using CAD software. | Apply |
| CO.4 Draw plan, elevation and sectional view of residential buildings using CAD software. | Apply |
| CO.5 Draw the perspective view of buildings using CAD software. | Apply |

## Reference Book(s):

R 1. Rangawala, "A text book of Civil Engineering Drawing (including computer aided

R 2. N. Kumaraswamy & A. Kameswara Rao, "Building Planning and Drawing", Charotar

R 3. B.P. Verma, "Civil Engineering Drawing & House Planning", Khanna publishers, 12th

R 4. 19CECN3201- Computer Aided Building Drawing Laboratory Manual

### Course Articulation Matrix

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | - | - | - | - | - | - | - | 1 | 2 | - | - | - | - |
| CO2 | 2 | - | - | - | - | - | - | - | 1 | 2 | - | - | - | - |
| CO3 | 2 | - | - | - | - | - | - | - | 1 | 2 | - | - | - | - |
| CO4 | 2 | - | - | - | - | - | - | - | 1 | 2 | - | - | - | - |
| CO5 | 2 | - | - | - | - | - | - | - | 1 | 2 | - | - | - | - |

High-3; Medium-2; Low-1

### Assessment pattern

| | Assessment Component | CO.No. | Marks | Total |
|---|---|---|---|---|
| **Continuous Assessment** | Each Lab Experiment | 1,2,3,4,5 | 75 | 75 |
| | Cycle Test 1 | 1,2,3 | 50 | 25 |
| | Cycle Test 2 | 3,4,5 | 50 | |
| | | | Total | 100 |

Passed in Board of Studies meeting      Approved in Academic Council meeting

BOS Convener               BOS Chairman

| Course Code: 19PSHG6001 | Course Title: WELLNESS FOR STUDENTS (Common to all B.E/B.Tech Programmes) | | | |
|---|---|---|---|---|
| Course Category: Humanities | | Course Level: Introductory | | |
| L:T:P (Hours/Week) 0: 0: 2 | Credits:1 | Total Contact Hours:30 | | Max Marks:100 |

**Pre-requisites**

> NIL

**Course Objectives**

The course is intended to:

1. Set SMART goals for academic, career and life
2. Apply time management techniques
3. Articulate the importance of wellness for success in life.
4. Understand the dimensions of wellbeing and relevant practices

### Unit I - GOAL SETTING                                                    6 Hours

Understanding Vision and mission statements - Writing personal mission statements – 'Focus' as a way of life of most successful people. Clarifying personal values, interests and orientations – Awareness of opportunities ahead – Personal SWOT analysis - Principles driving goal setting: Principle of response and stimuli, Circle of influence and circle of concern, What you see depends on the role you assume. Potential obstacles to setting and reaching your goals - Five steps to goals setting: SMART goals, Inclusive goals, Positive stretch, Pain vs gain, Gun-point commitment.

### Unit II - TIME MANAGEMENT - TOOLS AND TECHNIQUES             6 Hours

Importance of planning and working to time. Pareto 80-20 principle of prioritization – Time quadrants as a way to prioritize weekly tasks – The glass jar principle - Handling time wasters – Assertiveness, the art of saying 'NO' – Managing procrastination

### Unit III - PRACTICES FOR PHYSICAL WELLNESS                      6 Hours

Concept of wellness – impact of absence of wellness - Wellness as important component to achieve success. Wellbeing as per WHO - Dimensions of Wellbeing: Physical, Mental, Social, Spiritual – indicators and assessment methods.
**Simplified Physical Exercises**. Fitness as a subset of Wellness – health related physical fitness - skill related physical fitness. Joint movements, Warm up exercises, simple asanas, WCSC simplified exercises.

### Unit IV - PRACTICES FOR MENTAL WELLNESS                        6 Hours

Meditation: Mind and its functions - mind wave frequency – Simple basic meditation – WCSC meditation and introspection tables. Greatness of friendship and social welfare – individual, family and world peace – blessings and benefits.
Food & sleep for wellness: balanced diet - good food habits for better health (anatomic therapy) – hazards of junk food - food and the gunas

### Unit V – PUTTING INTO PRACTICE                                   6 Hours

Practicals: Using the weekly journal – Executing and achieving short term goals – Periodic reviews.

| Course Outcomes | Cognitive Level |
|---|---|
| At the end of this course, students will be able to: | |
| CO.1 Set well-articulated goals for academics, career, and personal aspirations | Apply |
| CO.2 Apply time management techniques to complete planned tasks on time | Apply |
| CO.3 Explain the concept of wellness and its importance to be successful in career and life | Apply |
| CO.4 Explain the dimensions of wellness and practices that can promote wellness | Apply |
| CO.5 Demonstrate the practices that can promote wellness | Valuing |

**Text Book(s):**

T1.     Reading material, workbook and journal prepared by PS team of the college.

**Reference Book(s):**

R 1.    Stephen R Covey, "First things first", Simon & Schuster Uk, Aug 1997.

R 2.    Sean Covey, "Seven habits of highly effective teenagers", Simon & Schuster Uk, 2004.

R 3.    Vethathiri Maharishi Institute for Spiritual and Intuitional Education, Aliyar, "Value education for harmonious life (Manavalakalai Yoga)", Vethathiri Publications, Erode, I Ed. (2010).

R 4.    Dr. R. Nagarathna, Dr.H.R. Nagendra, "Integrated approach of yoga therapy for positive health", Swami Vivekananda Yoga Prakashana, Bangalore, 2008 Ed.

R 5.    Tony Buzan, Harper Collins, The Power of Physical Intelligence (English).

**Course Articulation Matrix**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | - | - | - | - | - | - | - | 1 | 1 | - | 1 | - | - |
| CO2 | - | - | - | - | - | - | - | - | 1 | - | 1 | 1 | - | - |
| CO3 | - | - | - | - | - | - | - | - | 1 | - | - | 1 | - | - |
| CO4 | - | - | - | - | - | - | - | - | 1 | - | - | 1 | - | - |
| CO5 | - | - | - | - | - | 1 | 1 | - | 1 | - | - | 1 | - | - |

High-3; Medium-2; Low-1

Passed in Board of Studies meeting          Approved in Academic Council meeting

BOS Convener                                                    BOS Chairman

## Assessment Pattern

| | Assessment Component | CO. No. | Marks | Total |
|---|---|---|---|---|
| **Continuous Assessment** | Personal Effectiveness | 1,2,5 | 35 | |
| | Yoga and physical Exercise: Physical Exercises | 3,4,5 | 20 | 75 |
| | Meditation | | 10 | |
| | Assessment of student's workbook | | 10 | |
| **End Semester Examination** | Written test (MCQ and short answers) | 1,2,3,4,5 | 30 | Marks out of 100 is reduced to 25 |
| | Physical exercises | | 50 | |
| | Viva-voce | | 20 | |
| | | | **Total** | 100 |

Passed in Board of Studies meeting        Approved in Academic Council meeting

BOS Convener                                              BOS Chairman

| Course Code: 19CHMG6201 | Course Title: ENVIRONMENTAL SCIENCES (Common to all B.E/B.Tech Programmes) | | |
|---|---|---|---|
| Course Category: Mandatory Non Credit Course | Course Level: Introductory | | |
| L:T:P (Hours/Week) 1: 0: 0 | Credits:- | Total Contact Hours:15 | Max Marks:100 |

**Pre-requisites**

> ➢ NIL

## Course Objectives

The course is intended to:

1. Create awareness for conservation and equitable use of natural resources.
2. Explain the measures of prevention of pollution and disaster management.
3. State the importance of environmental legislation in India.
4. Expose the general environmental issues relevant to human health.
5. Explain the innovative measures for day to day environmental issues.

## Unit I - NATURAL RESOURCES                                     2 Hours

Role of individual in conservation of natural resources; Equitable use of resources for sustainable lifestyles.

## Unit II - ENVIRONMENTAL POLLUTION AND DISASTER MANAGEMENT    2 Hours

Role of an individual in prevention of pollution; Disaster management : floods, earthquake, cyclone and landslides.

## Unit III - ENVIRONMENTAL ETHICS AND LEGISLATIONS             2 Hours

Environmental ethics : Environment Protection Act; Air Act; Water Act ; Wildlife Protection Act;    Forest Conservation Act;    Issues involved in enforcement of environmental legislation.

## Unit IV - ENVIRONMENTAL ISSUES AND PUBLIC AWARNESS           2 Hours

Public awareness - Environment and human health

## Unit V - ENVIRONMENTAL ACTIVITIES                            2 Hours
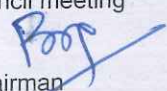
**(a) Awareness Activities:**
   i) Small group meetings about water management, promotion of recycle use, generation of less waste, avoiding electricity waste
   ii) Slogan making event
   iii) Poster making event

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BOS Convener                                BOS Chairman

**(b) Actual Activities:**
  - i) Plantation
  - ii) Cleanliness drive
  - iii) Drive for segregation of waste
  - iv) To know about the different varieties of plants
  - v) Shutting down the fans and ACs of the campus for an hour or so

| Course Outcomes | Cognitive Level |
|---|---|
| At the end of this course, students will be able to: | |
| CO.1 Describe the measures for conservation and equitable use of natural Resources | Understand |
| CO.2 Describe the measures for pollution prevention and disaster Management | Understand |
| CO.3 Brief the importance of environmental legislation in India | Understand |
| CO.4 Explain the general environmental issues in relevant to human health | Understand |
| CO.5 Demonstrate innovative measures for day to day environmental Issues | Understand |

## Text Book(s):

T 1.  Benny Joseph, "Environmental Studies", Tata McGraw Hill, New Delhi, 2006.

T 2.  Mackenzie Davis and Susan Masten, "Principles of environmental engineering and science", Mc-Graw Hill, 3$^{rd}$ Edition, 2014.

## Reference Book(s):

R 1.  Trivedi R.K. "Handbook of Environmental Laws, Rules, Guidelines, Compliances and

R 2.  . Standards", Vol.I and II, Enviro Media.

R 3.  Cunningham, W.P.Cooper, T.H. Gorhani, "Environmental Encyclopedia", Jaico

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BOS Convener          BOS Chairman

## Course Articulation Matrix

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|
| CO1 | 1 | - | - | - | - | - | - | 2 | 1 | 2 | - | - | - | - |
| CO2 | 1 | - | - | - | - | - | - | 2 | 1 | 2 | - | - | - | - |
| CO3 | 1 | - | - | - | - | - | - | 2 | 1 | 2 | - | - | - | - |
| CO4 | 1 | - | - | - | - | - | - | 2 | 1 | 2 | - | - | - | - |
| CO5 | 1 | - | - | - | - | - | - | 2 | 1 | 2 | - | - | - | - |

High-3; Medium-2; Low-1
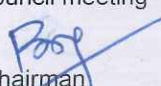
## Assessment Pattern

| Component | Marks | Details |
|-----------|-------|---------|
| Attendance | 10 | Minimum 80% and 1 mark for every 2% observed |
| Knowledge Test | 40 | Objective type questions |
| Activity(ies) | 50 | Report on the activity performed |
| Total | 100 | |

Passed in Board of Studies meeting          Approved in Academic Council meeting

BOS Convener                                        BOS Chairman

| Course Code: 19MABN1301 | Course Title: TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS | | |
|---|---|---|---|
| Course Category: Basic Sciences | Course Level: Practice | | |
| L:T:P (Hours/Week) 3: 1: 0 | Credits:4 | Total Contact Hours: 60 | Max Marks:100 |

## Pre-requisites

> Matrices and Calculus
> Ordinary Differential Equation and Complex variables

## Course Objectives

The course is intended to:

1. Determine the solution of first and higher order partial differential equations.
2. Compute the Fourier series expansion
3. Solve one dimensional wave equation.
4. Solve one dimensional and two dimensional heat flow equation.
5. Calculate the Fourier transformation for a periodic function

### UNIT I - PARTIAL DIFFERENTIAL EQUATIONS
9+3 Hours

Formation of partial differential equations — Solutions of standard types of first order partial differential equations — Lagrange's linear equation -- Linear partial differential equations of second and higher order with constant coefficients of both homogeneous and non-homogeneous types.

### UNIT II - FOURIER SERIES
9+3 Hours

Dirichlet's conditions — General Fourier series — Odd and even functions — Half range sine series — Half range cosine series — Parseval's identity — Complex form of Fourier series — Harmonic analysis.

### UNIT III - SOLUTION OF ONE DIMENSIONAL WAVE EQUATION
9+3 Hours

Method of separation of variables - Classification of second order linear partial differential equations, Solutions of one dimensional wave equation by Fourier series method.

### UNIT IV - SOLUTION OF ONE AND TWO DIMENSIONAL HEAT FLOW EQUATION
9+3 Hours

One dimensional equation of heat conduction - Steady state solution of two-dimensional equation of heat conduction (Insulated edges excluded), Solution by Fourier series method.

### UNIT V - FOURIER TRANSFORMS
9+3 Hours

Fourier transform pair — Fourier sine and cosine transforms — Properties — Transforms of simple functions — Convolution theorem — Parseval's identity.

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BOS Convener                    BOS Chairman

| Course Outcomes | Cognitive Level |
|---|---|
| At the end of this course, students will be able to: | |
| CO.1   Determine the solution of first and higher order partial differential equations. | Apply |
| CO.2   Compute the Fourier series expansion. | Apply |
| CO.3   Solve one dimensional wave equation. | Apply |
| CO.4   Solve one dimensional and two dimensional heat flow equation. | Apply |
| CO.5   Calculate the Fourier transformation for a periodic function | Apply |

**Text Book(s):**

T 1.   Erwinkreyzig, Advanced Engineering Mathematics, 10th edition, John Wiley& Sons, 2015.

T 2.   Veerarajan T., "Transforms and Partial Differential Equations", Tata McGraw Hill Education Pvt. Ltd., New Delhi, Second reprint, 2012.

T 3.   Ramana B.V., higher Engineering Mathematics, Tata McGraw-Hill, New Delhi, 11thReprint, 2010.

**Reference Book(s):**

R 1.   Glyn James, "Advanced Modern Engineering Mathematics", 3rd Edition, Pearson Education (2007).

R 2.   N.P.Bali and Manish Goyel, A text book of Engineering Mathematics, Laxmi Publication, Reprint, 2008.

R 3.   B.S.Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.

**Web References:**

1.   http://nptel.ac.in/courses/122107037/19 2

2.   http://nptel.ac.in/video.php?subjectIId=108106075

3.   https://nptel.ac.in/courses/111103021/

### Course Articulation Matrix

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 1 | - | 2 | 2 | - | - | 2 | 2 | 3 | - | 2 | - | - |
| CO2 | 2 | 1 | - | 2 | 2 | - | - | 2 | 2 | 3 | - | 2 | - | - |
| CO3 | 2 | 1 | - | 2 | 2 | - | - | 2 | 2 | 3 | - | 2 | - | - |
| CO4 | 2 | 1 | - | 2 | 2 | - | - | 2 | 2 | 3 | - | 2 | - | - |
| CO5 | 2 | 1 | - | 2 | 2 | - | - | 2 | 2 | 3 | - | 2 | - | - |

High-3; Medium-2; Low-1

Passed in Board of Studies meeting      Approved in Academic Council meeting

BOS Convener                  BOS Chairman

## Assessment pattern:

| | Assessment Component | CO .No. | Marks | Total |
|---|---|---|---|---|
| **Continuous Comprehensive Evaluation** | CCET 1 | 1,2 | 50 | |
| | CCET 2 | 3,4 | 50 | 30 |
| | CCET 3 | 5 | 50 | |
| | Tutorial | 1,2,3,4,5 | 30 | 10 |
| | Quiz | 1,2,3,4,5 | | |
| | Assignment | 1,2,3,4,5 | | |
| **End Semester Examination** | ESE | 1,2,3,4,5 | 100 | 60 |
| **Total** | | | | 100 |

Passed in Board of Studies meeting          Approved in Academic Council meeting

BOS Convener                                            BOS Chairman
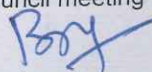
| Course Code: 19CECN1301 | Course Title: CONSTRUCTION MATERIALS AND PRACTICES | | |
|---|---|---|---|
| Course Category: Professional Core | Course Level: Practice | | |
| L:T:P (Hours/Week) 3: 0: 0 | Credits:3 | Total Contact Hours:45 | Max Marks:100 |

### Pre-requisites

> NIL

### Course Objectives

The course is intended to:

1. Identify the most common building materials like stones, bricks, blocks, cement and aggregates used in the civil engineering field.
2. Describe the importance of metals, timber and other materials and the potential applications of these materials.
3. Describe the construction activities in the sub structure.
4. Demonstrate knowledge and understanding of the principles and concepts relevant to construction techniques in super structure.
5. Identify the suitability of the equipments for various construction activities.

### UNIT I - BASIC CONSTRUCTION MATERIALS                         9 Hours

Stones –Bricks – Classification – Manufacturing of Clay Bricks –Bricks for Special Use – Cement Concrete blocks – Considerations for use – Lime – Types – Properties and Uses – Cement: Manufacture – Types – Characteristics – Properties – Fly ash. Aggregates – Characteristics – Types – Mortar: Classification – Preparation – Selection.

### UNIT II - METALS, TIMBER AND OTHER MATERIALS                 9 Hours

Steel – Types – Manufacturing process– Tests – Structural steel – Rebar – Alloy steels – Aluminium – Properties and Uses – Timber – Types –Characteristics – Seasoning – Defects – Timber products – Paints – Types– Glass – Characteristics – Selection – Ceramics – Composite materials – Geo-synthetics – properties and applications.

### UNIT III - SUB STRUCTURE CONSTRUCTION PRACTICES             9 Hours

Specifications, details and sequence of activities - Site Clearance - Marking - Earthwork - Excavation – Dewatering - Building foundations – Types of foundations - Plinth beam – Filling in foundation trenches– Anti-termite treatment – Damp-proofing and Waterproofing – Sand filling in basement.

### UNIT IV - SUPER STRUCTURE CONSTRUCTION PRACTICES           9 Hours

Masonry – Formwork - Scaffolding - Roofs and roof covering - Flooring - types of flooring - Joints in Concrete - Staircase: Types and Construction – Plastering – Plastering methods - Pointing – Types - Painting – Preparation and Process – Defects.

### UNIT V - CONSTRUCTION EQUIPMENTS                             9 Hours

Earthwork equipments- tractors, motor graders, scraper, front end loader, earth mover - Concreting equipments - batching, mixing, transportation, concreting and compaction - Equipment for material handling and erection of structures - Dewatering and pumping equipments.

| Course Outcomes | Cognitive Level |
|---|---|
| At the end of this course, students will be able to: | |
| CO.1 Identify the most common building materials like stones, bricks blocks, cement and aggregates used in the civil engineering field. | Understand |
| CO.2 Describe the importance of metals, timber and other materials and the potential applications of these materials. | Understand |
| CO.3 Describe the construction activities in the sub structure. | Understand |
| CO.4 Demonstrate knowledge and understanding of the principles and concepts relevant to construction techniques in super structure. | Understand |
| CO.5 Identify the suitability of the equipments for various construction activities. | Understand |

**Text Book(s):**

T 1. Punmia B.C., Ashok Kumar Jain, Arun Kumar Jain, "Building Construction", LaxmiPublications Pvt. Ltd., 2016

T 2. Bindra and Arora, "Building Materials and Construction", DhanpatRai& Sons, NewDelhi, 2015

T 3. Varghese. P.C, "Building Materials", 2nd Revised edition (2015)PHI Learning Pvt. Ltd, New Delhi.

**Reference Book(s):**

R 1. Roy Chudley, Roger Greeno, Advanced Construction Technology, Pearson Prentice Hall, 2006.

R 2. Rangwala S.C., "Engineering Materials" Charotar Publishing House, Anand, India, 2014

R 3. P.C. Varghese, "Building Construction", PHI Learning Private Limited, New Delhi, 2010.

R 4. M.S. Shetty, "Concrete Technology Theory and Practice", S. Chand and Company Ltd., 2008.

**Web References:**

1. www.understandconstruction.com

1. www.engineeringcivil.com

**Course Articulation Matrix***

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 1 | - | 1 | 1 | - | - | 2 | 1 | 2 | - | 1 | - | - |
| CO2 | 1 | 1 | - | 1 | 1 | - | - | 2 | 1 | 2 | - | 1 | - | - |
| CO3 | 1 | 1 | - | 1 | 1 | - | - | 2 | 1 | 2 | - | 1 | - | - |
| CO4 | 1 | 1 | - | 1 | 1 | - | - | 2 | 1 | 2 | - | 1 | - | - |
| CO5 | 1 | 1 | - | 1 | 1 | - | - | 2 | 1 | 2 | - | 1 | - | - |

High-3; Medium-2; Low-1

Passed in Board of Studies meeting          Approved in Academic Council meeting

BOS Convener          BOS Chairman

**Assessment pattern:**

| | Assessment Component | CO .No. | Marks | Total |
|---|---|---|---|---|
| **Continuous Comprehensive Evaluation** | CCET 1 | 1,2 | 50 | 30 |
| | CCET 2 | 3,4 | 50 | |
| | CCET 3 | 5 | 50 | |
| | Tutorial | 1,2,3,4,5 | 30 | 10 |
| | Quiz | 1,2,3,4,5 | | |
| | Assignment | 1,2,3,4,5 | | |
| **End Semester Examination** | ESE | 1,2,3,4,5 | 100 | 60 |
| **Total** | | | | 100 |

Passed in Board of Studies meeting          Approved in Academic Council meeting

BOS Convener                                              BOS Chairman

| Course Code: 19CECN1302 | Course Title: TRANSPORATION ENGINEERING | | |
|---|---|---|---|
| Course Category: Professional Core | Course Level: Practice | | |
| L:T:P (Hours/Week) 3: 0: 0 | Credits:3 | Total Contact Hours:45 | Max Marks:100 |

Pre-requisites

> ➤ NIL

## Course Objectives

The course is intended to:

1. Identify the correct alignment for the highway project

2. Describe the geometrics of highway
3. Describe the various pavement materials
4. Design the flexible and rigid pavement according to the IRC codes

5. Explain the elements of highway construction

### UNIT I - HIGHWAY ALIGNMENT                                           9 Hours

Different Modes of Transportation; Highway Development in India; Highway Alignment, Survey- Horizontal Profile, Vertical Profile, Factors Controlling the alignment, Survey for route location, and Detailed Project Report

### UNIT II - GEOMETRIC DESIGN OF HIGHWAYS                            9 Hours

Cross sectional elements, camber, shoulder, sight distance, horizontal curves, super elevation, extra widening, transition curves and gradient, vertical curves, summit and valley curves. introduction to Elements of Traffic Engineering

### UNIT III - PAVEMENT MATERIALS                                      9 Hours

Properties and testing of Sub grade soil, aggregates, bituminous binders

### UNIT IV - PAVEMENT DESIGN                                          9 Hours

Types of Pavements, Design factors, Design of bituminous paving mixes; Design of Flexible Pavement by CBR method (IRC : 37- Latest revision), Design of rigid pavement, Westerguard theory, load and temperature stresses, joints, IRC method of rigid pavement design (IRC:58-2015)

### UNIT V - ELEMENTS OF HIGHWAY CONSTRUCTION                          9 Hours

Embankment, subgrade, subbase and base courses, bituminous surface courses, concrete pavements, soil stabilization; Drainage; Evaluation and Maintenance of highways.

| Course Outcomes | Cognitive Level |
|---|---|
| At the end of this course, students will be able to: | |
| CO.1 Identify the correct alignment for the highway project | Understand |
| CO.2 Describe the geometrics of highway | Understand |
| CO.3 Describe the various pavement materials | Understand |
| CO.4 Design the flexible and rigid pavement according to the IRC codes | Apply |
| CO.5 Explain the elements of highway construction | Understand |

## Text Book(s)

T 1.  Khanna, S. K. and Justo, C.E.G., Highway Engineering, Nem Chand & Bros , 10th Edition 2015

T 2.  Kadiyali, L.R., Traffic Engineering and Transport Planning, Khanna Publishers,Eighth edition,2013

T 3.  Subhash C Saxena, Textbook of Highway and Traffic Engineering., CBS Publishers, 2014

## Reference Book(s):

R 1.  C.Venkatramaiah., Transportation Engineering-Highway Engineering, Universities Press (India) Private Limited, Hyderabad, 2015

R 2.  ParthaChakroborty and Animesh Das Principles of Transportation Engineering, PHI Learning Pvt. Ltd., 2005

R 3.  IRC : 37- Latest revision, "Tentative Guidelines for the design of Flexible Pavements" Indian Roads Congress, New Delhi

R 4.  IRC:58-2015 Guidelines for the Design of Plain Jointed Rigid Pavements for Highways (Fourth Revision) (with CD)

## Web References:

1.  https://www.vidyarthiplus.com/vp/attachment.php?aid=10395
2.  https://www.scribd.com/doc/119865487/Pavement-Engineering

## Course Articulation Matrix

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 1 | - | 1 | 1 | - | - | 2 | 1 | 2 | - | 1 | - | - |
| CO2 | 1 | 1 | - | 1 | 1 | - | - | 2 | 1 | 2 | - | 1 | - | - |
| CO3 | 1 | 1 | - | 1 | 1 | - | - | 2 | 1 | 2 | - | 1 | - | - |
| CO4 | 2 | 1 | - | 2 | 2 | - | - | 2 | 1 | 2 | - | 1 | - | - |
| CO5 | 1 | 1 | - | 1 | 1 | - | - | 2 | 1 | 2 | - | 1 | - | - |

High-3; Medium-2; Low-1.

**Assessment pattern:**

| | Assessment Component | CO .No. | Marks | Total |
|---|---|---|---|---|
| **Continuous Comprehensive Evaluation** | CCET 1 | 1,2 | 50 | |
| | CCET 2 | 3,4 | 50 | 30 |
| | CCET 3 | 5 | 50 | |
| | Tutorial | 1,2,3,4,5 | 30 | 10 |
| | Quiz | 1,2,3,4,5 | | |
| | Assignment | 1,2,3,4,5 | | |
| **End Semester Examination** | ESE | 1,2,3,4,5 | 100 | 60 |
| **Total** | | | | 100 |

Passed in Board of Studies meeting          Approved in Academic Council meeting

BOS Convener                                      BOS Chairman
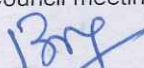
| Course Code: 19CECN1303 | Course Title: SURVEYING | | |
|---|---|---|---|
| Course Category: Professional Core | Course Level: Practice | | |
| L:T:P (Hours/Week) 4: 0: 0 | Credits: 4 | Total Contact Hours: 60 | Max Marks:100 |

**Pre-requisites**

> NIL

## Course Objectives

The course is intended to:

1. Calculate the areas and included angles based on the concepts of Chain, Compass and Plane table surveying
2. Determine the reduced levels various points and areas & Volumes of the earth surface.
3. Compute the heights and distances of various objects using Theodolite
4. Determine the elevation and distances using tacheometric principles
5. Compute the various elements of curves for setting out.

### UNIT I - BASICS OF SURVEYING                                    12 Hours

Definition - Principles – Classification. Introduction to Chain, Compass, Plane table – Errors and corrections in Chain/Tape, Compass – bearing, meridian – Open and closed traverse – Closing errors

### UNIT II - LEVELLING                                             12 Hours

Principles and theory of levelling - Types of levels, levelling staff and their types - Effect of curvature and refraction - Longitudinal, cross-sectional and reciprocal levelling - Reducing levels by rise and fall and height of collimation methods and check. Definition - Contour interval and horizontal equivalent - Characteristics - Uses of contour maps - Computation of area and volume from contour map

### UNIT III - THEODOLITE SURVEYING                                 12 Hours

Theodolite - types, features and fundamental axes - Adjustments; horizontal angles - Vertical angles - Heights and distances of inaccessible points - Methods of traversing - Problems on omitted measurements – Gale's Traversing method for closing error correction.

### UNIT IV - TACHEOMETRIC SURVEYING                                12 Hours

Methods - Determination of constants of the tacheometer - Use of anallactic lens - Distance and elevation formulae for inclined sights with vertical and normal holding staff - Movable hair method - principles of tangential tacheometry - Problems in tacheometry - Subtense bar method.

### UNIT V - CURVES AND MODERN SURVEYING                            12 Hours

Elements of simple curve - Location of tangent points - Setting out of simple curve by offset and Rankine's methods. Vertical curves – Types – grades. Total Station – Electronic Theodolite – Laser alignment instrument – Global Positioning System.Introduction to remote sensing (RS) and Geographical Information System (GIS).

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Passed in Board of Studies meeting          Approved in Academic Council meeting

BOS Convener                                BOS Chairman

| Course Outcomes | Cognitive Level |
|---|---|
| At the end of this course, students will be able to: | |
| CO.1 Calculate the areas and included angles based on the concepts of Chain, Compass and Plane table surveying | Apply |
| CO.2 Determine the reduced levels various points and areas & Volumes of the earth surface. | Apply |
| CO.3 Compute the heights and distances of various objects using Theodolite | Apply |
| CO.4 Determine the elevation and distances using tacheometric principles | Apply |
| CO.5 Compute the various elements of curves for setting out. | Apply |

**Text Book(s)**

T 1.    Punmia B C, "Surveying" - vol. 1, vol. 2 and vol 3, Laxmi Publications (P) Ltd., New Delhi, 2016.

T 2.    Agor. R, "A Text Book of Surveying and Levelling", Khanna Publishers, 2009.

T 3.    Duggal R K, "Surveying", Vol I & II, Tata McGraw Hill Publishing Company Ltd., New Delhi, 2017.

**Reference Book(s):**

R 1.    Kanetkar T P, "Surveying and Levelling", Part I and II, Pune Vidyarthi Griha Prakashan, 2006.

R 2.    Bannister A and Raymond S, "Surveying", 7th Edition, Addison Wesley Longman ltd, England, 1998.

R 3.    Gopi. S, Sathikumar. R, Madhu. N, "Advanced Surveying", Dorling Kindersley (India) Pvt. Ltd.., 2008.

R 4.    Chandra. A.M., "Surveying", New Age International Private Ltd Publishers, 2015.

**Web References:**

1.    http://www.aboutcivil.org/surveying-levelling%20II.html

2.    http://civil.engineering.webservices.utoronto.ca/Assets/Civil+Engineering+Digital+Assets/

3.    http://www.nptel.ac.in/courses/105107122/

4.    http://www.vssut.ac.in/lecture_notes/lecture1428642587.pdf

5.    www.scribd.com/doc/63716977/Surveying-1-Lecture-Notes

**Course Articulation Matrix**
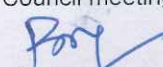
| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 1 | - | 2 | 2 | - | - | 2 | 1 | 2 | - | 1 | - | - |
| CO2 | 2 | 1 | - | 2 | 2 | - | - | 2 | 1 | 2 | - | 1 | - | - |
| CO3 | 2 | 1 | - | 2 | 2 | - | - | 2 | 1 | 2 | - | 1 | - | - |
| CO4 | 2 | 1 | - | 2 | 2 | - | - | 2 | 1 | 2 | - | 1 | - | - |
| CO5 | 2 | 1 | - | 2 | 2 | - | - | 2 | 1 | 2 | - | 1 | - | - |

High-3; Medium-2; Low-1.

Passed in Board of Studies meeting            Approved in Academic Council meeting

BOS Convener                                                    BOS Chairman

## Assessment Pattern

| | Assessment Component | CO .No. | Marks | Total |
|---|---|---|---|---|
| Continuous Comprehensive Evaluation | CCET 1 | 1,2 | 50 | 30 |
| | CCET 2 | 3,4 | 50 | |
| | CCET 3 | 5 | 50 | |
| | Tutorial | 1,2,3,4,5 | 30 | 10 |
| | Quiz | 1,2,3,4,5 | | |
| | Assignment | 1,2,3,4,5 | | |
| End Semester Examination | ESE | 1,2,3,4,5 | 100 | 60 |
| Total | | | | 100 |

Passed in Board of Studies meeting    Approved in Academic Council meeting

BOS Convener               BOS Chairman

| Course Code: 19CESN1301 | Course Title: SOLID MECHANICS | | |
|---|---|---|---|
| Course Category: Engineering Science | Course Level: Practice | | |
| L:T:P (Hours/Week) 3: 1: 0 | Credits:4 | Total Contact Hours:60 | Max Marks:100 |

**Pre-requisites**
> 19CESN1201- ENGINEERING MECHANICS

**Course Objectives**

The course is intended to:
1. Apply different methods to find slope and deflection in determinate beams
2. Calculate the stresses in oblique plane and draw SFD & BMD for continuous beams.
3. Apply energy theorems to calculate deflection.
4. Apply Euler's & Rankine's theory to calculate critical load in columns and to find stresses in thin and thick cylinders.
5. Calculate the dimensions of shafts based on given parameters.

**UNIT I – DEFLECTION OF STATICALLY DETERMINATE BEAMS**　　　　**9+3 Hours**

Deflection and slope of cantilever, simply supported and overhanging beams – Double integration method, Macaulay's method, Moment area method and Conjugate beam method.

**UNIT II – PRINCIPAL STRESSES AND STATICALLY INDETERMINATE**　　　　**9+3 Hours**
**BEAMS**

Biaxial state of stress – Stress at a point – Stress on inclined plane – Principal stresses and principal planes – Mohr's circle of stresses. Theorem of three Moments – Analysis of continuous beam (up to two spans)-Shear force and B.M diagrams for continuous beams.

**UNIT III – ENERGY PRINCIPLES**　　　　**9+3 Hours**

Strain energy and Strain energy density - Strain energy in axial load, flexure, Shear and Torsion - Strain energy and complimentary energy - Castigliano's and Engessor's Energy theorems - Principle of virtual work - Application of Energy theorem for computing deflection - Simple beams, plane trusses and simple rigid plane frames - Maxwell's reciprocal theorem-Williot Mohr diagram.

**UNIT IV – COLUMNS AND CYLINDERS**　　　　**9+3 Hours**

Type of columns, eccentrically loaded short columns, combined bending and direct stresses, crushing load – middle third rule – Euler's theory – Limitations of Euler's theory - critical loads for prismatic columns with different end conditions; Rankine's formula - Thin cylinders - Circumferential stress, longitudinal stress, volumetric strain under internal pressure – Thick cylinders.

**UNIT V – TORSION OF SHAFTS AND SPRINGS**　　　　**9+3 Hours**
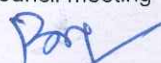
Elastic theory of torsion -Stresses and deformation in circular solid and hollow shafts - Combined bending moment and torsion of shafts - Strain energy due to torsion - Modulus of Rupture – Power transmitted to shaft – Shaft in series and parallel - Design of shafts - Closed coiled and open coiled helical springs subjected to axial load, leaf springs, deflection of springs.

| Course Outcomes | Cognitive Level |
|---|---|
| At the end of this course, students will be able to: | |
| CO1 Determine the slope and deflection in determinate beams. | Apply |
| CO2 Determine the stresses in oblique plane and illustrate SFD & BMD for | Apply |

| continuous beams. | |
| :--- | :--- |
| CO3 Determine deflection using energy theorems. | Apply |
| CO4 Determine the critical load in columns and stresses in cylinders. | Apply |
| CO5 Design shafts to transmit required power. | Apply |

## Text Book(s)

T 1. R.K. Rajput, "Strength of Materials", Sixth Edition, S. Chand & Company Pvt. Ltd., New Delhi, 2015.

T 2. R.K. Bansal, "A Text Book of Strength of Materials", Sixth Edition, Laxmi Publications (P) Ltd., New Delhi, 2017.

T 3. Egor P Popov, Engineering Mechanics of Solids, Second Edition, Prentice Hall of India, New Delhi, 2005.

## Reference Book(s):

R 1. Timoshenko. S.P. and Young D.H., "Elements of Strength of Materials", 5th edition (SI Units), Affiliated East-West Press Ltd., New Delhi, 2012

R 2. Ferdinand P. Beer, E. Russell Johnston Jr., John T. DeWolf and David F. Mazurek "Mechanics of Materials", Seventh Edition, McGraw Hill Education, New York, 2015.

R 3. R.C. Hibbeler, "Mechanics of Materials", Nineth Edition, Pearson-Prentice Hall, New Delhi, 2014.

## Web References:

1. http://nptel.ac.in/courses/105106116

2. http://web.mit.edu/emech/dontindex-build/

3. http://www.aboutcivil.org/solid-mechanics.html

## Course Articulation Matrix

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| CO1 | 2 | 1 | - | 2 | 2 | - | - | 2 | 1 | 2 | - | 2 | - | - |
| CO2 | 2 | 1 | - | 2 | 2 | - | - | 2 | 1 | 2 | - | 2 | - | - |
| CO3 | 2 | 1 | - | 2 | 2 | - | - | 2 | 1 | 2 | - | 2 | - | - |
| CO4 | 2 | 1 | - | 2 | 2 | - | - | 2 | 1 | 2 | - | 2 | - | - |
| CO5 | 2 | 1 | - | 2 | 2 | - | - | 2 | 1 | 2 | - | 2 | - | - |

High-3; Medium-2; Low-1.

## Assessment pattern:

| | Assessment Component | CO .No. | Marks | Total |
| :--- | :--- | :--- | :--- | :--- |
| Continuous Comprehensive Evaluation | CCET 1 | 1,2 | 50 | |
| | CCET 2 | 3,4 | 50 | 30 |
| | CCET 3 | 5 | 50 | |
| | Tutorial | 1,2,3,4,5 | 30 | 10 |
| | Quiz | 1,2,3,4,5 | | |
| | Assignment | 1,2,3,4,5 | | |
| End Semester Examination | ESE | 1,2,3,4,5 | 100 | 60 |
| Total | | | | 100 |

Passed in Board of Studies meeting          Approved in Academic Council meeting

BOS Convener                          BOS Chairman

| Course Code: 19CECN3301 | Course Title: SURVEYING PRACTICE LABORATORY | | |
|---|---|---|---|
| Course Category: Professional Core | Course Level: Practice | | |
| L:T:P (Hours/Week) 0: 0: 3 | Credits:1.5 | Total Contact Hours:45 | Max Marks:100 |

**Pre-requisites**

> NIL

**Course Objectives**

The course is intended to:

1. Draw and Compute the distances and areas

2. Determine the reduced levels of various points on the given field

3. Determine the elevation and gradients of any objects with the concepts of trigonometric levelling.
4. Set out simple curves

5. Set out foundation layout for a given building.
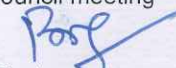
**List of Experiments:**

1.  Study of Instruments – chains, compass, plane table and dumpy levels.

2.  Determination of the area of a closed traverse after eliminating the closing error using Compass Surveying
3.  Determination of RL of different points on the earth surface using dumpy level

4.  Verifying the accuracy of levelling using method of Check Levelling

5.  To plot the LS & CS of a given length of road using Profile levelling.

6.  Determination of horizontal angles by Method of repetition and reiteration.

7.  Determination of elevation of an object whose base is inaccessible by Single Plane method
8.  Determination of elevation of an object whose base is inaccessible by Double Plane method
9.  Determination of gradients between given points by stadia method

10. Set out a simple circular curve by Rankine's method

| Course Outcomes | Cognitive Level |
|---|---|
| At the end of this course, students will be able to: | |
| CO.1 Draw and Compute the distances and areas | Apply |
| CO.2 Determine the reduced levels of various points on the given field | Apply |
| CO.3 Determine the elevation and gradients of any objects with the concepts of trigonometric leveling. | Apply |
| CO.4 Set out simple curves | Apply |
| CO.5 Set out foundation layout for a given building. | Apply |

**Reference(s):**

R 1. Punmia B C, "Surveying" - vol. 1, vol. 2 and vol 3, Laxmi Publications (P) Ltd., New Delhi, 2016.
R 2. Agor. R, "A Text Book of Surveying and Levelling", Khanna Publishers, 2009.
R 3. Duggal R K, "Surveying", Vol I & II, Tata McGraw Hill Publishing Company Ltd., New Delhi, 2017.
R 4. Surveying Practice Laboratory Manual, Department of Civil Engineering, MCET, Pollachi.

### Course Articulation Matrix

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 1 | - | 2 | 2 | - | - | - | 2 | 2 | - | - | - | - |
| CO2 | 2 | 1 | - | 2 | 2 | - | - | - | 2 | 2 | - | - | - | - |
| CO3 | 2 | 1 | - | 2 | 2 | - | - | - | 2 | 2 | - | - | - | - |
| CO4 | 2 | 1 | - | 2 | 2 | - | - | - | 2 | 2 | - | - | - | - |
| CO5 | 2 | 1 | - | 2 | 2 | - | - | - | 2 | 2 | - | - | - | - |

High-3; Medium-2; Low-1

### Assessment pattern

| | Assessment Component | CO.No. | Marks | Total |
|---|---|---|---|---|
| **Continuous Assessment** | Each Lab Experiment | 1,2,3,4,5 | 75 | 75 |
| | Cycle Test 1 | 1,2,3 | 50 | 25 |
| | Cycle Test 2 | 3,4,5 | 50 | |
| | | | Total | 100 |

Passed in Board of Studies meeting        Approved in Academic Council meeting

BOS Convener        BOS Chairman

| Course Code: 19CECN3302 | Course Title: MATERIALS LABORATORY | | |
|---|---|---|---|
| Course Category: Professional Core | | Course Level: Practice | |
| L:T:P (Hours/Week) 0: 0: 3 | Credits:1.5 | Total Contact Hours:45 | Max Marks:100 |

**Pre-requisites**

➢ NIL

**Course Objectives**

The course is intended to:

1. Conduct the test and to determine strength and moduli of given metal and concrete ingredients
2. Verify various theorems for beam and column members
3. Determine hardness and impact strength of various metals.
4. Determine impact strength of various metals.
5. Conduct test to find out flexural rigidity of a beam
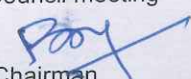
**List of Exercises**

1. Determination of modulus of elasticity for a given metal specimen
2. Determine the properties of bricks
3. Determine the properties of cement
4. Determine the properties of coarse aggregates
5. Determination of torsional strength and modulus of rigidity for a given metal specimen.
6. Verification of Maxwell reciprocal theorem
7. Determination of hardness and impact strength
8. Determination of spring constant on a given spring specimen
9. Determination of slope and deflection of a beam by moment area theorems
10. Determination of Flexural Rigidity (EI) for a given specimens
11. Determination of shear strength of metals (Double Shear test).
12. Determination of buckling load for a given end condition of a column.

Passed in Board of Studies meeting      Approved in Academic Council meeting

BOS Convener                 BOS Chairman

| Course Outcomes | Cognitive Level |
|---|---|
| At the end of this course, students will be able to: | |
| CO.1  Conduct the test and to determine strength and moduli of given metal and concrete ingredients | Apply |
| CO.2  Verify various theorems for beam and column members | Apply |
| CO.3  Determine hardness and impact strength of various metals. | Apply |
| CO.4  Determine impact strength of various metals. | Apply |
| CO.5  Conduct test to find out flexural rigidity of a beam | Apply |

### Reference Book(s):

R 1.   Bansal, R.K., "A Text Book of Strength of Materials", Laxmi Publications (P) Ltd., New Delhi 2010.

R 2.   Timoshenko. S.P. and Young D.H., "Elements of Strength of Materials", 5th edition (SI Units), Affiliated East-West Press Ltd., New Delhi, 2012.

R 3.   19CELN3302 - Materials Laboratory Manual

### Course Articulation Matrix

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 1 | - | 2 | 2 | - | - | - | 2 | 2 | - | - | - | - |
| CO2 | 2 | 1 | - | 2 | 2 | - | - | - | 2 | 2 | - | - | - | - |
| CO3 | 2 | 1 | - | 2 | 2 | - | - | - | 2 | 2 | - | - | - | - |
| CO4 | 2 | 1 | - | 2 | 2 | - | - | - | 2 | 2 | - | - | - | - |
| CO5 | 2 | 1 | - | 2 | 2 | - | - | - | 2 | 2 | - | - | - | - |

High-3; Medium-2; Low-1

### Assessment pattern

| | Assessment Component | CO.No. | Marks | Total |
|---|---|---|---|---|
| **Continuous Assessment** | Each Lab Experiment | 1,2,3,4,5 | 75 | 75 |
| | Cycle Test 1 | 1,2,3 | 50 | 25 |
| | Cycle Test 2 | 3,4,5 | 50 | |
| | | | Total | 100 |

Passed in Board of Studies meeting         Approved in Academic Council meeting

BOS Convener                                          BOS Chairman
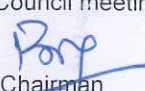
| Course Code: 19MABG1401 | Course Title: PROBABILITY AND STATISTICS (Common to EEE/ECE/Automobile/ CSE/Mechanical/ IT/ Civil Engineering) | | |
|---|---|---|---|
| Course Category: Basic Sciences | Course Level: Practice | | |
| L:T:P (Hours/Week) 3: 1: 0 | Credits:4 | Total Contact Hours:60 | Max Marks:100 |

## Pre-requisites

> Matrices and Calculus

> Ordinary Differential Equation and Complex Variables

## Course Objectives

The course is intended to:

1. Calculate expectations and variances of random variables
2. Apply the concepts of standard distributions to solve practical problems
3. Calculate the correlation and regression for two variables
4. Test the samples based on hypothesis
5. Analyze the samples based on variance

## UNIT I - PROBABILITY AND RANDOM VARIABLES

**9+3 Hours**

Axioms of Probability- Conditional Probability- Total Probability -Baye's Theorem- Random Variables- Probability Mass Function- Probability Density Functions- Properties - Moments- Moment generating functions and their properties.

## UNIT II - STANDARD DISTRIBUTIONS

**9+3 Hours**

Binomial- Poisson- Uniform –Exponential- Normal Distributions and their properties-Functions of a random variable.

## UNIT III - TWO DIMENSIONAL RANDOM VARIABLES

**9+3 Hours**

Joint distributions – Marginal and conditional distributions – Covariance – Correlation and regression – Transformation of random variables.

## UNIT IV - TESTING OF HYPOTHESES

**9+3 Hours**

Sampling Distributions- Testing of hypotheses for mean, variance, proportions and differences using Normal, t, Chi-Square and F distributions – Tests for independence of attributes and Goodness of fit.

## UNIT V - DESIGN OF EXPERIMENTS
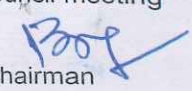
**9+3 Hours**

Analysis of Variance (ANOVA)- One way Classification – Completely Randomized Design(CRD) – Two way Classification – Randomized Block Design (RBD) – Latin square.

Passed in Board of Studies meeting

Approved in Academic Council meeting

BOS Convener

BOS Chairman

| Course Outcomes | Cognitive Level |
|---|---|
| At the end of this course, students will be able to: | |
| CO.1  Calculate expectations and variances of random variables | Apply |
| CO.2  Apply the concepts of standard distributions to solve practical problems | Apply |
| CO.3  Calculate the correlation and regression for two variables | Apply |
| CO.4  Test the samples based on hypothesis | Apply |
| CO.5  Analyze the samples based on variance | Apply |

**Text Book(s):**

T 1.  Veerajan T, "Probability, Statistics and Random process", 4$^{th}$ Edition, Tata McGraw-Hill, New Delhi, 2013.

T 2.  Dr.J.Ravichandran, "Probability and Statistics for Engineers", 1$^{st}$ Edition, Wiley India Pvt.Ltd.2010.

**Reference Book(s):**
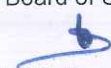
R 1.  R.E. Walpole, R.H. Myers, S.L. Myers, and K Ye, "Probability and Statistics for Engineers and Scientists", 9$^{th}$ Edition Pearson Education, Asia, 2016.

R 2.  M.R. Spiegel,J. Schiller and R.A. Srinivasan, "Schaum's Outlines Probability and Statistics", 3$^{rd}$ Edition,Tata McGraw Hill edition, 2009.

R 3.  Morris DeGroot, Mark Schervish, "Probability and Statistics", Pearson Educational Ltd, 4$^{th}$ Edition, 2014.

R 4.  Johnson and C.B. Gupta, "Probability and Statistics for Engineers", 9$^{th}$ Edition, Pearson Education, Asia, 2016.

**Web References:**

1.  https://onlinecourses.nptel.ac.in/111105041/

2.  https://nptel.ac.in/downloads/111105041/

3.  https://nptel.ac.in/courses/111105090/

Passed in Board of Studies meeting        Approved in Academic Council meeting

BOS Convener        BOS Chairman

## Course Articulation Matrix

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|
| CO1 | 2 | 1 | - | 2 | 2 | - | - | 2 | 2 | 3 | - | 2 | - | - |
| CO2 | 2 | 1 | - | 2 | 2 | - | - | 2 | 2 | 3 | - | 2 | - | - |
| CO3 | 2 | 1 | - | 2 | 2 | - | - | 2 | 2 | 3 | - | 2 | - | - |
| CO4 | 2 | 1 | - | 2 | 2 | - | - | 2 | 2 | 3 | - | 2 | - | - |
| CO5 | 2 | 1 | - | 2 | 2 | - | - | 2 | 2 | 3 | - | 2 | - | - |

High-3; Medium-2;Low-1

## Assessment Pattern

| | Assessment Component | CO. No. | Marks | Total |
|---|---|---|---|---|
| **Continuous Assessment** | CCET I | 1,2 | 50 | |
| | CCET II | 3,4 | 50 | 30 |
| | CCET III | 5 | 50 | |
| | Tutorials / Quiz / Assignments | 1,2,3,4,5 | 30 | 10 |
| **End Semester Examination** | ESE | 1,2,3,4,5 | 100 | 60 |
| | | | Total | 100 |

Passed in Board of Studies meeting          Approved in Academic Council meeting

BOS Convener                                        BOS Chairman

| Course Code: 19CECN1401 | | Course Title: HYDRAULICS ENGINEERING | |
|---|---|---|---|
| Course Category: Professional Core | | Course Level: Practice | |
| L:T:P (Hours/Week)<br>3: 1: 0 | Credits:4 | Total Contact Hours:60 | Max Marks:100 |

**Pre-requisites**

> NIL

## Course Objectives

The course is intended to:

1. Determine the static pressure, buoyant force and metacentric height
2. Explain the flow properties through velocity potential function and stream function and apply the Bernoulli's theorem for pipe flow
3. Compute the major and minor losses in pipe flow
4. Design the most economical channel section
5. Estimate the performance of pumps and turbines

## UNIT I - FLUID PROPERTIES AND FLUID STATICS      12 Hours

Fluid – definition, distinction between solid and fluid – Units and dimensions – Properties of fluid. Fluid statics – concepts of fluid static pressure, absolute and gauge pressure – Pressure measurements using manometers and pressure gauges – Forces on planes – centre of pressure – Buoyancy – Metacentric height - Floatation.

## UNIT II - FLUID KINEMATICS AND DYNAMICS      12 Hours

**Fluid kinematics:** Flow visualisation – Lines of flow – Types of flow- Velocity field and acceleration – Continuity (one dimensional and three dimensional form)- stream function – velocity potential function – flow net
**Fluid dynamics:** Euler's equation along a streamline – Bernoulli's equation – Applications – Venturimeter, orificemeter. Linear momentum equation and its applications. Boundary layer concept- displacement, energy and momentum thickness.

## UNIT III - FLOW THROUGH PIPES      12 Hours

Laminar flow through circular pipes(Hagen Poiseulle's equation)- Hydraulic and energy gradient – flow through pipes – Darcy Weisbach equation – friction factor – Moody's diagram – Major and minor losses of flow in pipes – Pipes in series and in parallel.

## UNIT IV - FLOW THROUGH OPEN CHANNELS      12 Hours

Definition - Differences between pipe flow and open channel flow –Types open channels - Types of Flow – Properties of open channel - Fundamental equations - Velocity distribution in open channel – Steady uniform flow: Chezy equation, Manning equation - Best hydraulic sections for uniform flow - Computation in Uniform Flow - Specific energy and specific force.

## UNIT V - PUMPS AND TURBINES                                    12 Hours

Centrifugal pump – components – working principle – priming of centrifugal pump – specific speed- reciprocating pump – components – working principles – single and double acting reciprocating pump – discharge through a pump- work done – pump efficiency – negative slip. Turbines – classification – impulse and reaction turbines – head and efficiencies of hydraulic turbines – components and functions of Pelton wheel turbine, Francis turbine, Kaplan turbine – Velocity triangle – specific speed

| Course Outcomes | Cognitive Level |
|---|---|
| At the end of this course, students will be able to: | |
| CO.1   Determine the static pressure, buoyant force and metacentric height | Apply |
| CO.2   Explain the flow properties through velocity potential function and stream function and apply the Bernoulli's theorem for pipe flow | Apply |
| CO.3   Compute the major and minor losses in pipe flow | Apply |
| CO.4   Design the most economical channel section | Apply |
| CO.5   Estimate the performance of pumps and turbines | Apply |

**Text Book(s):**

T 1.   R.K. Rajput, "A text book of fluid mechanics", S. Chand Publishing, 2019

T 2.   Subramanya, K., "Flow in open channels", Tata McGraw Hill Publishing Company Ltd, New Delhi (2015)

T 3.   Som S., Biswas G., and Chakraborty S., "Introduction to fluid mechanics and fluid machines", Tata McGraw Hill Education private Ltd.,New Delhi, 2011.

T 4.   R.K. Rajput,"A text book of hydraulic machines", S. Chand Publishing, 2019.

**Reference Book(s):**

R 1.   Chow VenTe, "Open Channel hydraulics", Tata McGraw Hill Book company Ltd, New Delhi (2009)

R 2.   Modi, P.N., and Seth, S.M., "Hydraulics and Fluid Mechanics", Standard book house, New Delhi (2019)

R 3.   Srivastava, R., "Flow through open channels", Oxford University Press, New Delhi (2007)

R 4.   Chanson, H., "The Hydraulics of open channel flow: An Introduction", Elsevier (2013)

R 5.   Frank M White, "Fluid mechanics", Tata McGraw Hill, New Delhi, 2008.

R 6.   John F Douglas, Janusz M, Gasiorek and John A. Swaffield. "Fluid mechanics", Fourth edition, Pearson education limited, New Delhi, 2001.
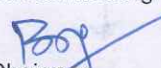
**Web References:**

1.   http://nptel.ac.in/courses/105103095
2.   http://www.vidhyarthiplus.com/vp/Thread-ME2204-Fluid-Mechanics-and-Machinery-

Passed in Board of Studies meeting          Approved in Academic Council meeting

BOS Convener                                      BOS Chairman

3. http://www.et.byu.edu/~2014/che374/lectureNotes/lectureNotes.html
4. http://www.annaunivupdates.com/2015/01/ce6403-applied-hydraulic-engineering-ahe-
5. http://nptel.ac.in/courses/105106114/
6. http://web.itu.edu.tr/~bulu/hydraulics_files/lecture_notes_05.pdf

## Course Articulation Matrix

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|
| CO1 | 2 | 1 | - | 2 | 2 | - | - | 2 | 2 | 3 | - | 2 | - | - |
| CO2 | 2 | 1 | - | 2 | 2 | - | - | 2 | 2 | 3 | - | 2 | - | - |
| CO3 | 2 | 1 | - | 2 | 2 | - | - | 2 | 2 | 3 | - | 2 | - | - |
| CO4 | 2 | 1 | - | 2 | 2 | - | - | 2 | 2 | 3 | - | 2 | - | - |
| CO5 | 2 | 1 | - | 2 | 2 | - | - | 2 | 2 | 3 | - | 2 | - | - |

High-3; Medium-2;Low-1

## Assessment Pattern

| | Assessment Component | CO. No. | Marks | Total |
|---|---|---|---|---|
| **Continuous Assessment** | CCET I | 1,2 | 50 | |
| | CCET II | 3,4 | 50 | 30 |
| | CCET III | 5 | 50 | |
| | Tutorials / Quiz / Assignments | 1,2,3,4,5 | 30 | 10 |
| **End Semester Examination** | ESE | 1,2,3,4,5 | 100 | 60 |
| | | | **Total** | 100 |

Passed in Board of Studies meeting

Approved in Academic Council meeting

BOS Convener

BOS Chairman
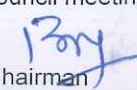
| Course Code: 19CECN1402 | Course Title: CONCRETE TECHNOLOGY | | |
|---|---|---|---|
| Course Category: Professional Core | Course Level: Practice | | |
| L:T:P (Hours/Week) 3: 0: 0 | Credits:3 | Total Contact Hours:45 | Max Marks:100 |

**Pre-requisites**

> NIL

**Course Objectives**

The course is intended to:

1. Explain about the ingredients of concrete.

2. Explain the applications of chemical and mineral admixtures.

3. Design concrete mix as per IS and ACI code of practices.

4. Explain the fresh and hardened properties of concrete.

5. Describe the various special concretes and their application.

## UNIT I - CONCRETE CONSTITUENTS 9 Hours

Composition of cement - Hydration of cement - Structure of hydrated cement - Aggregate - Classification - Testing - Methods of combining aggregates - Grading requirements as per BIS - Quality of water.

## UNIT II - ADMIXTURES 9 Hours

Chemical admixture - Accelerators, Retarders, Plasticisers, Super plasticisers, Water proofers - Effects on fresh and hardened properties - Mineral admixture - Fly ash, Silica fume, Ground granulated blast furnace slag, Metakaoline - Effects on fresh and hardened properties.

## UNIT III - CONCRETE MIX PROPORTIONING 9 Hours

Basic considerations - Principles of mix proportioning – Quality control - Methods of mix proportioning - BIS and ACI mix design procedure - Mix design examples - Correction for moisture content and bulking.

## UNIT IV - PROPERTIES OF CONCRETE 9 Hours

Fresh concrete properties - Workability and factors affecting it - Segregation - Bleeding - Hardened concrete properties - Factors affecting strength - curing - methods of curing - Dimensional stability - Creep, Shrinkage, Permeability - Tests on permeability - RCPT, Half cell - Non Destructive Testing - Rebound hammer test, Ultrasonic pulse velocity method.
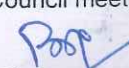
## UNIT V - SPECIAL CONCRETES 9 Hours

Light weight concrete - High strength concrete - High performance concrete - Fibre reinforced concrete - Ferrocement - Polymer Concrete - Ready mix concrete - Shotcrete - Self compacting concrete - their production, properties and application.

| Course Outcomes | Cognitive Level |
|---|---|
| At the end of this course, students will be able to: | |

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BOS Convener                                        BOS Chairman

| | | Understand |
|---|---|---|
| CO.1 | Explain about the ingredients of concrete. | Understand |
| CO.2 | Explain the applications of chemical and mineral admixtures. | Understand |
| CO.3 | Design concrete mix as per IS and ACI code of practices. | Apply |
| CO.4 | Explain the fresh and hardened properties of concrete. | Understand |
| CO.5 | Describe the various special concretes and their application. | Understand |

**Text Book(s):**

T 1.   Shetty. M.S, "Concrete Technology", S. Chand and Company Ltd., New Delhi, 2010.

T 2.   Gambhir. M.L, "Concrete Technology", Tata Mc-Graw Hill Company, New Delhi, 2013.

**Reference Book(s):**

R 1.   Santhakumar. A.R, "Conrete Technology", Oxford university press, New Delhi, 2007.

R 2.   Neville A.M "Properties of Concrete", Pearson Education Asia Pvt Ltd., New Delhi, 2012.

R 3.   Povindar K. Mehta, Paulo J. M. Monteiro, "Concrete: Microstructure, Properties, and Materials", Mc-Graw Hill Company, 2011.

**Web References:**

1. http://nptel.ac.in/courses/105102012/

2. http://freevideolectures.com/Course/3357/Concrete-Technology/1

## Course Articulation Matrix

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 1 | - | 1 | 1 | - | - | 2 | 1 | 2 | - | 1 | - | - |
| CO2 | 1 | 1 | - | 1 | 1 | - | - | 2 | 1 | 2 | - | 1 | - | - |
| CO3 | 2 | 1 | - | 2 | 2 | 1 | 1 | 3 | 1 | 2 | - | 1 | - | - |
| CO4 | 1 | 1 | - | 1 | 1 | - | - | 2 | 1 | 2 | - | 1 | - | - |
| CO5 | 1 | 1 | - | 1 | 1 | - | - | 2 | 1 | 2 | - | 1 | - | - |

High-3; Medium-2;Low-1

## Assessment Pattern

| | Assessment Component | CO. No. | Marks | Total |
|---|---|---|---|---|
| **Continuous Assessment** | CCET I | 1,2 | 50 | 30 |
| | CCET II | 3,4 | 50 | |
| | CCET III | 5 | 50 | |
| | Tutorials / Quiz / Assignments | 1,2,3,4,5 | 30 | 10 |
| **End Semester Examination** | ESE | 1,2,3,4,5 | 100 | 60 |
| | | | Total | 100 |

Passed in Board of Studies meeting        Approved in Academic Council meeting

BOS Convener                                              BOS Chairman

| Course Code: 19CECN1403 | Course Title: STRUCTURAL ANALYSIS | | |
|---|---|---|---|
| Course Category: Professional Core | Course Level: Practice | | |
| L:T:P (Hours/Week) 3: 1: 0 | Credits:4 | Total Contact Hours:60 | Max Marks:100 |

## Pre-requisites

> Solid Mechanics

## Course Objectives

The course is intended to:

CO.1 Calculate Bending moment and Shear force by consistent deformation and flexibility matrix method.

CO.2 Calculate Bending moment and Shear force by moment distribution and stiffness matrix method.

CO.3 Compute the Moving Load deflections.

CO.4 Determine the forces and settlement of arches.

CO.5 Calculate the maximum load carrying by plastic analysis

## UNIT I - CONSISTENT DEFORMATION AND FLEXIBILITY MATRIX METHOD
9+3 Hours

Analysis of statically indeterminate structures by the method of consistent deformations-analysis of rigid frames - Analysis of statically indeterminate trusses by the method of consistent deformations - Flexibility Matrix method Concept of flexibility matrix - analysis of continuous beams - plane frames and pin jointed plane trusses.

## UNIT II - MOMENT DISTRIBUTIONAND STIFFNESS MATRIX METHODS   9+3 Hours

Analysis of Statically Determinate Structures; Distribution and carryover of moments - Stiffness and carry over factors - Analysis of continuous beams - Plane rigid frames with and without sway. Stiffness Matrix method Stiffness matrix for beam element - analysis of continuous beams - plane frames & pin jointed plane trusses.

## UNIT III - INFLUENCE LINES FOR MOVING LOAD   9+3 Hours

System of moving loads- Equivalent UDL - Influence lines for reactions, shear force and bending moment in statically determinate beams for concentrated and uniformly distributed moving loads - Influence lines for member forces in statically determinate pin-jointed plane frames - Influence lines for three hinged arches.

## UNIT IV - ARCHES AND CABLE STRUCTURES   9+3 Hours

Arches as structural forms - Examples of arch structures - Types of arches - Analysis of three hinged, two hinged and fixed arches - Settlement and temperature effects. Cables, Suspension bridges and Space frames: Suspension cables – Cables with two and three hinged stiffening girders.

# UNIT V - PLASTIC ANALYSIS                                       9+3 Hours

True and idealized stress - strain curve for mild steel in tension, stress distribution in elastic, elasto-plastic and plastic stage - Plastic moment of resistance — Plastic modulus — Shape factor — Load factor — Concept of plastic hinge and collapse mechanism - Static and kinematic methods - Upper bound, lower bound and uniqueness theorems- Plastic analysis of determinate and indeterminate beams, single bay single storied portal frames.

| Course Outcomes | Cognitive Level |
|---|---|
| At the end of this course, students will be able to: | |
| CO.1  Calculate Bending moment and Shear force by consistent deformation and flexibility matrix method | Apply |
| CO.2  Calculate Bending moment and Shear force by moment distribution and stiffness matrix method | Apply |
| CO.3  Compute the Moving Load deflections | Apply |
| CO.4  Determine the forces and settlement of arches. | Apply |
| CO.5  Calculate the maximum load carrying by plastic analysis | Apply |

## Text Book(s):

T 1.   Vaidyanadhan, R and Perumal, "Comprehensive Structural Analysis - Vol. 1 & Vol. 2", P, Laxmi Publications, New Delhi, 2008

T 2.   B. C. Punmia, Ashok Kumar Jain, Arun K. Jain, "Theory of Structures", Laxmi Publications Pvt. Ltd, 2003.

T 3.   S.S. Bhavikatti, Structural Analysis, Vol I & II, Vikas Publishing House Pvt. Ltd, 2011.

## Reference Book(s):

R 1.   Wang, C.K., Intermediate Structural Analysis, McGraw Hill

R 2.   Vazirani, V.N. and Ratwani, M.M., Analysis of Structures Vol-1, Vol-2, Khanna Publishers

R 3.   Ramamrutham, S. and Narayan, R., Theory of Structures, Dhanpat Rai Publishing Co (P) Ltd.

## Web References:

1.   https://nptel.ac.in/courses/105101085/
2.   https://nptel.ac.in/courses/105105109/
3.   http://www.iste.co.uk/book.php?id=1367

Passed in Board of Studies meeting          Approved in Academic Council meeting

BOS Convener                                 BOS Chairman

## Course Articulation Matrix

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|
| CO1 | 2 | 1 | - | 2 | 2 | - | - | 2 | 2 | 3 | - | 2 | - | - |
| CO2 | 2 | 1 | - | 2 | 2 | - | - | 2 | 2 | 3 | - | 2 | - | - |
| CO3 | 2 | 1 | - | 2 | 2 | - | - | 2 | 2 | 3 | - | 2 | - | - |
| CO4 | 2 | 1 | - | 2 | 2 | - | - | 2 | 2 | 3 | - | 2 | - | - |
| CO5 | 2 | 1 | - | 2 | 2 | - | - | 2 | 2 | 3 | - | 2 | - | - |

High-3; Medium-2;Low-1

## Assessment Pattern

| | Assessment Component | CO. No. | Marks | Total |
|---|---|---|---|---|
| **Continuous Assessment** | CCET I | 1,2 | 50 | |
| | CCET II | 3,4 | 50 | 30 |
| | CCET III | 5 | 50 | |
| | Tutorials / Quiz / Assignments | 1,2,3,4,5 | 30 | 10 |
| **End Semester Examination** | ESE | 1,2,3,4,5 | 100 | 60 |
| | | | Total | 100 |

Passed in Board of Studies meeting     Approved in Academic Council meeting

BOS Convener             BOS Chairman

| Course Code: 19CECN3401 | Course Title: HYDRAULICS ENGINEERING LABORATORY | | |
|---|---|---|---|
| Course Category: Professional Core | | Course Level: Practice | |
| L:T:P (Hours/Week) 0: 0: 3 | Credits:1.5 | Total Contact Hours:45 | Max Marks:100 |

**Pre-requisites**

> Nil

**Course Objectives**

The course is intended to:

1. Identify the laminar and turbulent flow using Reynolds apparatus

2. Verify the Bernoulli s Theorem

3. Determine the losses for different pipes and fittings

4. Measure the flow through pipe and open channel

5. Calculate the efficiency and draw the characteristic curves of the Hydraulic Machines

**List of Exercises**

1. Determination of metacentric height of a floating body

2. Classification of flow based on Reynolds number

3. Verification of Bernoulli's theorem

4. Measurement of flow using venturi meter and orifice meter

5. Measurement of flow through orifice

6. Determination of friction factor of various pipe materials

7. Determination of losses of different pipe fittings

8. Measurement of flow through notches

9. Measure the performance of centrifugal pump

10. Measure the performance of reciprocating pump

11. Measure the performance of Kaplan turbine

12. Measure the performance of Pelton Wheel turbine

**Experiments beyond syllabus**

1. Measure the efficiency of a multistage centrifugal pump

2. Measure the performance of Francis turbine

3. Measure the efficiency of a submersible pump

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Passed in Board of Studies meeting      Approved in Academic Council meeting

BOS Convener          BOS Chairman

| Course Outcomes<br>At the end of this course, students will be able to: | Cognitive Level |
|---|---|
| CO.1  Identify the laminar and turbulent flow using Reynolds apparatus | Apply |
| CO.2  Verify the Bernoulli s Theorem | Apply |
| CO.3  Determine the losses for different pipes and fittings | Apply |
| CO.4  Measure the flow through pipe and open channel | Apply |
| CO.5  Calculate the efficiency and draw the characteristic curves of the Hydraulic Machines | Apply |

**Reference Book(s):**

R 1.   R.K. Rajput., "A textbook of hydraulic machines", S. Chand Publishing, New Delhi, 2019.

R 2.   Bansal, R.K., "Fluid mechanics and hydraulic machines:, Laxmi Publications Ltd, New Delhi, 2010.

**Course Articulation Matrix**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 1 | - | 2 | 2 | - | - | - | 2 | 2 | - | - | - | - |
| CO2 | 2 | 1 | - | 2 | 2 | - | - | - | 2 | 2 | - | - | - | - |
| CO3 | 2 | 1 | - | 2 | 2 | - | - | - | 2 | 2 | - | - | - | - |
| CO4 | 2 | 1 | - | 2 | 2 | - | - | - | 2 | 2 | - | - | - | - |
| CO5 | 2 | 1 | - | 2 | 2 | - | - | - | 2 | 2 | - | - | - | - |

High-3; Medium-2; Low-1

**Assessment pattern**

| | Assessment Component | CO.No. | Marks | Total |
|---|---|---|---|---|
| **Continuous Assessment** | Each Lab Experiment | 1,2,3,4,5 | 75 | 75 |
| | Cycle Test 1 | 1,2,3 | 50 | 25 |
| | Cycle Test  2 | 3,4,5 | 50 | |
| | | | Total | 100 |

Passed in Board of Studies meeting        Approved in Academic Council meeting

BOS Convener                                          BOS Chairman

| Course Code: 19CECN3402 | Course Title: CONCRETE AND TRANSPORTATION ENGINEERING LABORATORY | | |
|---|---|---|---|
| Course Category: Professional Core | Course Level: Practice | | |
| L:T:P (Hours/Week)<br>0: 0: 3 | Credits:1.5 | Total Contact Hours:45 | Max Marks:100 |

**Pre-requisites**

➢ Concrete Technology

➢ Transportation Engineering

The course is intended to:

1. Prepare concrete mix design and determine the fresh and hardened properties of concrete as per IS codes of practice.
2. Determine the quality of hardened concrete using Non-destructive tests.
3. Perform workability and flow ability tests on self-compacting concrete.
4. Determine ductile and elastic properties on bitumen.
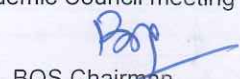5. Determine the optimum content of bitumen for bituminous mix.

**List of Exercises**

1. Preparation of concrete mix design using IS code of practice.
2. Determination of workability of fresh concrete.
3. Determination of compressive, split tensile and flexural strength on hardened concrete.
4. Determination of modulus of elasticity of concrete.
5. Determination of strength & quality of concrete using NDT.
6. Determination of workability of self-compacting concrete.
7. Determination of specific gravity of bitumen.
8. Determination of softening point of bitumen.
9. Determination of ductility test on bitumen.
10. Determination of flash and fire point of bitumen.
11. Determination of binder content of bitumen using binder recovery extraction test.
12. Determination of optimum bitumen content using Marshall Stability test.

| Course Outcomes | Cognitive Level |
|---|---|
| At the end of this course, students will be able to: | |
| CO.1 Determine the fresh and hardened properties of concrete as per IS codes of practice | Apply |
| CO.2 Determine the quality of hardened concrete using Non destructive tests. | Apply |
| CO.3 Determine workability and flow ability tests on self compacting concrete. | Apply |
| CO.4 Determine ductile and elastic properties on bitumen. | Apply |
| CO.5 Determine the optimum content of bitumen for Bituminous mix. | Apply |

**Reference Book(s):**

R 1. M. S. Shetty & A K Jain, "Concrete Technology: Theory and practice", S. Chand publishers, 2018.

R 2. S.K.Khanna and C.E.G Justo, "Highway Engineering" Nem Chand & Brothers publishers, 2015.

R 3. Concrete and transportation engineering laboratory manual, MCET, Pollachi

**Course Articulation Matrix**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 1 | - | 2 | 2 | 1 | 1 | - | 2 | 2 | - | - | - | - |
| CO2 | 2 | 1 | - | 2 | 2 | - | - | - | 2 | 2 | - | - | - | - |
| CO3 | 2 | 1 | - | 2 | 2 | - | - | - | 2 | 2 | - | - | - | - |
| CO4 | 2 | 1 | - | 2 | 2 | - | - | - | 2 | 2 | - | - | - | - |
| CO5 | 2 | 1 | - | 2 | 2 | - | - | - | 2 | 2 | - | - | - | - |

High-3; Medium-2; Low-1

**Assessment pattern**

| | Assessment Component | CO.No. | Marks | Total |
|---|---|---|---|---|
| **Continuous Assessment** | Each Lab Experiment | 1,2,3,4,5 | 75 | 75 |
| | Cycle Test 1 | 1,2,3 | 50 | 25 |
| | Cycle Test 2 | 3,4,5 | 50 | |
| | | | Total | 100 |

| Course Code: 19PSHG6002 | Course Title: Universal Human Values 2 :Understanding Harmony | | |
|---|---|---|---|
| Course Category: Humanities | | Course Level: Practice | |
| L:T:P (Hours/Week) 2:1: 0 | Credits:3 | Total Contact Hours:45 | Max Marks:100 |

## Pre-requisites

> ➤ Induction Program (UHV 1)

## Course Objectives

The course is intended to:

1. Development of a holistic perspective based on self-exploration about themselves (human being), family, society and nature/existence.
2. Strengthening of self-reflection
3. Understanding (or developing clarity) of the harmony in the human being, family, society and nature/existence
4. Development of commitment and courage to act
5. Development of a holistic perspective based on self-exploration about themselves (human being), family, society and nature/existence.

## UNIT I - INTRODUCTION TO VALUE EDUCATION                9 Hours

Need for the Value Education; Self -exploration as the process    for value education ; Continuous Happiness and Prosperity: A look at basic Human Aspirations; Right understanding: Relationship and Physical Facilities ; Happiness and Prosperity: current scenario ; Method to fulfill the Basic  human aspirations

## UNIT II - HARMONY IN HUMAN BEING                9 Hours

Human being as a co-existence of self ('I') and the material 'Body'; needs of Self ('I') and 'Body'; The Body as an instrument of 'I'; Harmony in the self ('I'); Harmony of the self ('I') with body; Sanyam and Swasthya; correct appraisal of Physical needs, meaning of Prosperity in detail. Programs to ensure Sanyam and Swasthya.

## UNIT III - HARMONY IN THE FAMILY AND SOCIETY                9 Hours

Harmony in the Family the basic unit of human interaction; Values in human to human relationship; Trust as the foundational values of relationship; Respect as the right evaluation ;Understanding  harmony in the society ( society being an extension of family); Vision for the universal human order.

## UNIT IV - HARMONY IN THE NATURE                9 Hours

Understanding the harmony in the Nature Interconnectedness, self-regulation and mutual fulfillment among the four orders of nature; Existence as Co-existence at all levels; Holistic perception of harmony in existence.

## UNIT V - HARMONY ON PROFESSIONAL ETHICS                9 Hours

Natural acceptance of human values ;Definitiveness of Ethical Human Conduct; Basic for

Humanistic Education, Humanistic Constitution and Humanistic Universal Order; Competence in professional ethics ;Case study: holistic technologies, management models and production systems ;Strategy for transition towards value based life and profession

| Course Outcomes<br>At the end of this course, students will be able to: | Cognitive Level |
|---|---|
| CO.1 Reflect on values, aspiration, relationships and hence identify strengths and weaknesses. | Responding |
| CO.2 Appraise physical, mental and social wellbeing of self and practice techniques to promote wellbeing. | Responding |
| CO.3 Value human relationships in family and society and maintain harmonious relationships. | Valuing |
| CO.4 Respect nature and its existence for survival and sustainable of all life forms and hence practice conservation of nature | Valuing |
| CO.5 Appreciate ethical behaviour as a result of value system in personal and professional situations | Receiving |

**Text Book(s):**

T 1.   Human Values and Professional Ethics by R R Gaur, R Sangal, G P Bagaria, Excel Books, New Delhi, 2010.

**Reference Book(s):**

R 1.   Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.

R 2.   Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.

R 3.   The story of stuff, Annie Leonard, Free Press, New York 2010.

**Web References:**

1.   https://aktu.ac.in/hvpe/ResourceVideo.aspx

2.   http://hvpenotes.blogspot.com/

3.   https://nptel.ac.in/courses/109/104/109104068/

**Course Articulation Matrix**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | - | - | - | - | - | - | 1 | 2 | 2 | - | - | 2 | - | - |
| CO2 | - | - | - | - | - | 1 | 2 | 2 | 2 | 1 | - | 2 | - | - |
| CO3 | - | - | - | - | - | 2 | 2 | 2 | 2 | 1 | - | 2 | - | - |
| CO4 | - | - | - | - | - | 2 | 2 | 2 | 2 | - | - | 2 | - | - |
| CO5 | - | - | - | - | - | 1 | 2 | 2 | 2 | - | - | 2 | - | - |

High-3; Medium-2;Low-1

Passed in Board of Studies meeting          Approved in Academic Council meeting

BOS Convener                                BOS Chairman

## Assessment Pattern

| | Assessment component | CO No. | Marks | Total marks weightage |
|---|---|---|---|---|
| **Continuous assessment** | Socially relevant project/Group Activities/ Assignments | 1,2,3,4,5 | 20 | 75% |
| | Assessment by faculty mentor | | 10 | |
| | Self-assessment | | 10 | |
| | Assessment by peers | | 10 | |
| **End Semester Examination** | Part A – Objective type – 20x1=20 marks <br> Part B – Short answer questions – 15x 2 = 30 marks <br> Part C – Descriptive Type Questions (Either or Pattern) – 5 x 10 = 50 marks | 1,2,3,4,5 | 100 | 25% |
| | | | **Total** | 100% |

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BOS Convener             BOS Chairman