

KONGU ENGINEERING COLLEGE
PERUNDURAI ERODE – 638 052
(Autonomous)

VISION

To be a centre of excellence for development and dissemination of knowledge in Applied Sciences, Technology, Engineering and Management for the Nation and beyond.

MISSION

We are committed to value based Education, Research and Consultancy in Engineering and Management and to bring out technically competent, ethically strong and quality professionals to keep our Nation ahead in the competitive knowledge intensive world.

QUALITY POLICY

We are committed to

- Providing value based quality education for the development of students as competent and responsible citizens.
- Contributing to the nation and beyond through research and development
- Continuously improving our services

DEPARTMENT OF CIVIL ENGINEERING

VISION

To develop the department as a center of excellence to take care of the local and regional needs related to Civil Engineering and to meet acute needs of trained specialists in the diverse field of Civil Engineering.

MISSION

Department of Civil Engineering is committed to:

- MS1: Encourage students and faculty to undertake research programmes and projects of multi-disciplinary nature.
- MS2: Conduct summer and winter schools for faculty members and short-term course for technicians.
- MS3: Produce Engineers who can participate in technical advancement and social upliftment of the country and to meet the growing global challenges.
- MS4: Prosper in academic activities by continual improvement in teaching methods, laboratory facilities and research activities.
- MS5: Develop consultancy for various industries

2011 REGULATIONS

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

Graduates of Civil Engineering will

- PEO1: Implement optimum solution for societal problems using professional knowledge resulting in sustainable development of construction industry
- PEO2: Analyse, solve, design and execute projects with the fundamental knowledge of Civil Engineering.
- PEO3: Exhibit professional and ethical attitude, communication skills and the life-long learning skills needed for the successful professional career.

MAPPING OF MISSION STATEMENTS (MS) WITH PEOs

| MS\PEO | PEO1 | PEO2 | PEO3 |
|---------------|-------------|-------------|-------------|
| MS1 | 1 | 1 | 2 |
| MS2 | 2 | 2 | 1 |
| MS3 | 1 | 2 | 1 |
| MS4 | 1 | 1 | 2 |

1 – Slight, 2 – Moderate, 3 – Substantial

PROGRAM OUTCOMES (POs)

Graduates of Civil Engineering will be able to

- a. an ability to apply knowledge of mathematics, science, and engineering.
- b. an ability to design and conduct experiments, as well as to analyze and interpret data.
- c. an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability and sustainability.
- d. an ability to function on multidisciplinary teams.
- e. an ability to identify, formulate, and solve engineering problems.
- f. an understanding of professional and ethical responsibility.
- g. an ability to communicate effectively.
- h. the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context .
- i. a recognition of the need for, and an ability to engage in life-long learning.
- j. a knowledge of contemporary issues.
- k. an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice
- l. an ability to acquire proficiency in the application of modern techniques such as GIS, GPS and remote sensing in various modes of transportation.
- m. an ability to acquire knowledge about different types of philosophies related to design of basic elements of concrete structures.

MAPPING OF PEOs WITH POs

| PEO\PO | a | b | c | d | e | f | g | h | i | j | k | l | m |
|-------------|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PEO1 | 3 | 2 | 3 | 1 | 2 | 2 | | 3 | 2 | | 2 | 1 | 1 |
| PEO2 | 3 | 2 | 2 | 2 | 3 | | | | 2 | | 3 | 3 | 3 |
| PEO3 | | | 3 | | | 3 | 3 | | 3 | 2 | | 3 | 3 |

1 – Slight, 2 – Moderate, 3 – Substantial

CURRICULUM BREAKDOWN STRUCTURE UNDER REGULATION 2011

| Curriculum Breakdown Structure(CBS) | Curriculum Content (% of total number of credits of the program) | Total number of contact hours | Total number of credits |
|-------------------------------------|--|-------------------------------|-------------------------|
| Basic Sciences(BS) | 13.04 | 420 | 24 |
| Engineering Sciences(ES) | 13.58 | 435 | 25 |
| Humanities and Social Sciences(HS) | 8.69 | 270 | 16 |
| Program Core(PC) | 50.00 | 1680 | 92 |
| Program Electives(PE) | 09.23 | 255 | 17 |
| Open Electives(OE) | - | - | - |
| Project(s)/Internships(PR) | 05.43 | 180 | 10 |
| | | Total | 184 |

KONGU ENGINEERING COLLEGE, PERUNDURAI, ERODE- 638 052
(Autonomous Institution affiliated to Anna University of Technology, Coimbatore)

B.E. DEGREE IN CIVIL ENGINEERING

CURRICULUM

(For the candidates admitted from academic year 2011-12 onwards)

SEMESTER – I

| Course Code | Course Title | Hours / Week | | | Credit | Maximum Marks | | | CBS |
|--------------|--|--------------|---|---|-----------|---------------|-----|-------|-----|
| | | L | T | P | | CA | ESE | Total | |
| | THEORY | | | | | | | | |
| 11EL101 | Technical English | 3 | 0 | 0 | 3 | 50 | 50 | 100 | HS |
| 11MA101 | Engineering Mathematics-I | 3 | 1 | 0 | 4 | 50 | 50 | 100 | BS |
| 11PH101 | Applied Physics | 3 | 0 | 0 | 3 | 50 | 50 | 100 | BS |
| 11CY101 | Applied Chemistry | 3 | 0 | 0 | 3 | 50 | 50 | 100 | BS |
| 11CS101 | Problem Solving and Programming | 3 | 0 | 0 | 3 | 50 | 50 | 100 | ES |
| 11EE101 | Basics of Electrical and Electronics Engineering | 3 | 0 | 0 | 3 | 50 | 50 | 100 | ES |
| | PRACTICAL | | | | | | | | |
| 11PH102 | Physical Sciences Laboratory-I | 0 | 0 | 3 | 1 | 50 | 50 | 100 | BS |
| 11CS102 | Programming Laboratory | 0 | 0 | 3 | 1 | 50 | 50 | 100 | BS |
| Total | | | | | 21 | | | | |

CA- Continuous Assessment, ESE- End Semester Examination

CBS – Curriculum Breakdown Structure

KONGU ENGINEERING COLLEGE, PERUNDURAI, ERODE- 638 052
(Autonomous Institution affiliated to Anna University of Technology, Coimbatore)

B.E. DEGREE IN CIVIL ENGINEERING

CURRICULUM

(For the candidates admitted from academic year 2011-12 onwards)

SEMESTER – II

| Course Code | Course Title | Hours / Week | | | Credit | Maximum Marks | | | CBS |
|--------------|--|--------------|---|---|-----------|---------------|-----|-------|-----|
| | | L | T | P | | CA | ESE | Total | |
| | THEORY | | | | | | | | |
| 11EL201 | Communication Skills | 3 | 0 | 0 | 3 | 50 | 50 | 100 | HS |
| 11MA201 | Engineering Mathematics-II | 3 | 1 | 0 | 4 | 50 | 50 | 100 | BS |
| 11PH201 | Materials Science | 3 | 0 | 0 | 3 | 50 | 50 | 100 | ES |
| 11CY201 | Environmental Science | 3 | 0 | 0 | 3 | 50 | 50 | 100 | HS |
| 11ME101 | Basics of Civil and Mechanical Engineering | 3 | 0 | 0 | 3 | 50 | 50 | 100 | ES |
| 11ME102 | Engineering Drawing | 2 | 0 | 3 | 3 | 50 | 50 | 100 | ES |
| | PRACTICAL | | | | | | | | |
| 11PH202 | Physical Sciences Laboratory-II | 0 | 0 | 3 | 1 | 50 | 50 | 100 | BS |
| 11ME103 | Engineering Practices Laboratory | 0 | 0 | 3 | 1 | 50 | 50 | 100 | ES |
| 11EL202 | Communication Skills Laboratory | 0 | 0 | 3 | 1 | 50 | 50 | 100 | HS |
| Total | | | | | 22 | | | | |

CA - Continuous Assessment, ESE - End Semester Examination

CBS – Curriculum Breakdown Structure

KONGU ENGINEERING COLLEGE, PERUNDURAI, ERODE- 638 052
(Autonomous Institution affiliated to Anna University of Technology, Coimbatore)

B.E. DEGREE IN CIVIL ENGINEERING

CURRICULUM

(For the candidates admitted from academic year 2011-12 onwards)

SEMESTER – III

| Course Code | Course Title | Hours / Week | | | Credit | Maximum Marks | | | CBS |
|-------------|---|--------------|---|---|-----------|---------------|-----|-------|-----|
| | | L | T | P | | CA | ESE | Total | |
| | THEORY | | | | | | | | |
| 11MA301 | Engineering Mathematics – III | 3 | 1 | 0 | 4 | 50 | 50 | 100 | BS |
| 11CE301 | Engineering Geology | 3 | 0 | 0 | 3 | 50 | 50 | 100 | PC |
| 11ME301 | Engineering Mechanics | 3 | 1 | 0 | 4 | 50 | 50 | 100 | ES |
| 11CE302 | Mechanics of Fluids | 3 | 1 | 0 | 4 | 50 | 50 | 100 | PC |
| 11CE303 | Construction Materials, Methods and Equipment | 3 | 0 | 0 | 3 | 50 | 50 | 100 | PC |
| 11CE304 | Surveying | 3 | 0 | 0 | 3 | 50 | 50 | 100 | PC |
| | PRACTICAL | | | | | | | | |
| 11CE305 | Survey Practical | 0 | 0 | 3 | 1 | 50 | 50 | 100 | PC |
| 11CE306 | Computer Aided Building Drawing | 0 | 0 | 3 | 1 | 50 | 50 | 100 | PC |
| | Total | | | | 23 | | | | |

CA - Continuous Assessment, ESE - End Semester Examination

CBS – Curriculum Breakdown Structure

KONGU ENGINEERING COLLEGE, PERUNDURAI, ERODE- 638 052
(Autonomous Institution affiliated to Anna University of Technology, Coimbatore)

B.E. DEGREE IN CIVIL ENGINEERING

CURRICULUM

(For the candidates admitted from academic year 2011-12 onwards)

SEMESTER – IV

| Course Code | Course Title | Hours / Week | | | Credit | Maximum Marks | | | CBS |
|-------------|--|--------------|---|---|-----------|---------------|-----|-------|-----|
| | | L | T | P | | CA | ESE | Total | |
| | THEORY | | | | | | | | |
| 11MA401 | Numerical Methods | 3 | 1 | 0 | 4 | 50 | 50 | 100 | BS |
| 11CE401 | Mechanics of Materials | 3 | 1 | 0 | 4 | 50 | 50 | 100 | ES |
| 11CE402 | Concrete Technology | 3 | 0 | 0 | 3 | 50 | 50 | 100 | PC |
| 11CE403 | Applied Hydraulic Engineering | 3 | 1 | 0 | 4 | 50 | 50 | 100 | PC |
| 11CE404 | Environmental Engineering - I (Including Drawing) | 3 | 1 | 0 | 4 | 50 | 50 | 100 | PC |
| 11CE405 | Advanced Surveying | 3 | 0 | 0 | 3 | 50 | 50 | 100 | PC |
| | PRACTICAL | | | | | | | | |
| 11CE406 | Advanced Surveying Laboratory | 0 | 0 | 3 | 1 | 50 | 50 | 100 | PC |
| 11ME305 | Fluid Mechanics and Machinery Laboratory | 0 | 0 | 3 | 1 | 50 | 50 | 100 | PC |
| | | Total | | | 24 | | | | |

CA - Continuous Assessment, ESE - End Semester Examination

CBS – Curriculum Breakdown Structure

KONGU ENGINEERING COLLEGE, PERUNDURAI, ERODE- 638 052
(Autonomous Institution affiliated to Anna University of Technology, Coimbatore)

B.E. DEGREE IN CIVIL ENGINEERING

CURRICULUM

(For the candidates admitted from academic year 2011-12 onwards)

SEMESTER – V

| Course Code | Course Title | Hours / Week | | | Credit | Maximum Marks | | | CBS |
|-------------|---|--------------|---|---|-----------|---------------|-----|-------|-----|
| | | L | T | P | | CA | ESE | Total | |
| | THEORY | | | | | | | | |
| 11CE501 | Soil Mechanics | 3 | 1 | 0 | 4 | 50 | 50 | 100 | PC |
| 11CE502 | Structural Analysis - I | 3 | 1 | 0 | 4 | 50 | 50 | 100 | PC |
| 11CE503 | Highway Engineering | 3 | 0 | 0 | 3 | 50 | 50 | 100 | PC |
| 11CE504 | Environmental Engineering – II (Including Drawing) | 3 | 1 | 0 | 4 | 50 | 50 | 100 | PC |
| 11CE505 | Basic RCC Design | 3 | 1 | 0 | 4 | 50 | 50 | 100 | PC |
| 11CE506 | Irrigation Engineering (Including Drawing) | 3 | 1 | 0 | 4 | 50 | 50 | 100 | PC |
| | PRACTICAL | | | | | | | | |
| 11CE507 | Material Testing Laboratory | 0 | 0 | 3 | 1 | 50 | 50 | 100 | PC |
| 11CE508 | Environmental Engineering Laboratory | 0 | 0 | 3 | 1 | 50 | 50 | 100 | PC |
| 11CE509 | Survey Camp | 0 | 0 | 3 | 1 | 50 | 50 | 100 | PC |
| | | Total | | | 26 | | | | |

CA – Continuous Assessment, ESE – End Semester Examination

CBS – Curriculum Breakdown Structure

KONGU ENGINEERING COLLEGE, PERUNDURAI, ERODE- 638 052
(Autonomous Institution affiliated to Anna University of Technology, Coimbatore)

B.E. DEGREE IN CIVIL ENGINEERING

CURRICULUM

(For the candidates admitted from academic year 2011-12 onwards)

SEMESTER – VI

| Course Code | Course Title | Hours / Week | | | Credit | Maximum Marks | | | CBS |
|-------------|--|--------------|---|---|-----------|---------------|-----|-------|-----|
| | | L | T | P | | CA | ESE | Total | |
| | THEORY | | | | | | | | |
| 11GE601 | Economics and Management for Engineers | 3 | 0 | 0 | 3 | 50 | 50 | 100 | HS |
| 11CE601 | Foundation Engineering | 3 | 1 | 0 | 4 | 50 | 50 | 100 | PC |
| 11CE602 | Structural Analysis – II | 3 | 1 | 0 | 4 | 50 | 50 | 100 | PC |
| 11CE603 | Railways, Airport and Harbour Engineering | 3 | 0 | 0 | 3 | 50 | 50 | 100 | PC |
| 11CE604 | Advanced RCC Design (Including Drawing) | 3 | 1 | 0 | 4 | 50 | 50 | 100 | PC |
| 11CE605 | Design of Steel Structures (Including Drawing) | 3 | 1 | 0 | 4 | 50 | 50 | 100 | PC |
| | PRACTICAL | | | | | | | | |
| 11CE606 | Concrete and Highway Engineering Laboratory | 0 | 0 | 3 | 1 | 50 | 50 | 100 | PC |
| 11CE607 | Soil Mechanics Laboratory | 0 | 0 | 3 | 1 | 50 | 50 | 100 | PC |
| | | Total | | | 24 | | | | |

CA – Continuous Assessment, ESE – End Semester Examination

CBS – Curriculum Breakdown Structure

KONGU ENGINEERING COLLEGE, PERUNDURAI, ERODE- 638 052
(Autonomous Institution affiliated to Anna University of Technology, Coimbatore)

B.E. DEGREE IN CIVIL ENGINEERING

CURRICULUM

(For the candidates admitted from academic year 2011-12 onwards)

SEMESTER – VII

| Course Code | Course Title | Hours / Week | | | Credit | Maximum Marks | | | CBS |
|-------------|-----------------------------------|--------------|---|---|-----------|---------------|-----|-------|-----|
| | | L | T | P | | CA | ESE | Total | |
| | THEORY | | | | | | | | |
| 11CE701 | Basics of Earthquake Engineering | 3 | 0 | 0 | 3 | 50 | 50 | 100 | PC |
| 11CE702 | Estimation and Quantity Surveying | 3 | 0 | 0 | 3 | 50 | 50 | 100 | PC |
| 11CE703 | Pre-stressed Concrete Structures | 3 | 1 | 0 | 4 | 50 | 50 | 100 | PC |
| 11CE704 | Construction Management | 3 | 0 | 0 | 3 | 50 | 50 | 100 | PC |
| | Elective – I | 3 | 1 | 0 | 4 | 50 | 50 | 100 | PE |
| | Elective – II | 3 | 0 | 0 | 3 | 50 | 50 | 100 | PE |
| | PRACTICAL | | | | | | | | |
| 11CE705 | Computer Aided Design Laboratory | 0 | 0 | 3 | 1 | 50 | 50 | 100 | PC |
| 11CE706 | Design Project | 0 | 0 | 3 | 1 | 50 | 50 | 100 | PR |
| | | Total | | | 22 | | | | |

CA – Continuous Assessment, ESE – End Semester Examination
CBS – Curriculum Breakdown Structure

KONGU ENGINEERING COLLEGE, PERUNDURAI, ERODE- 638 052
(Autonomous Institution affiliated to Anna University of Technology, Coimbatore)

B.E. DEGREE IN CIVIL ENGINEERING

CURRICULUM

(For the candidates admitted from academic year 2011-12 onwards)

SEMESTER – VIII

| Course Code | Course Title | Hours / Week | | | Credit | Maximum Marks | | | CBS |
|-------------|--------------------------------------|--------------|---|----|-----------|---------------|-----|-------|-----|
| | | L | T | P | | CA | ESE | Total | |
| | THEORY | | | | | | | | |
| 11GE801 | Professional Ethics and Human Values | 3 | 0 | 0 | 3 | 50 | 50 | 100 | HS |
| | Elective - III | 3 | 0 | 0 | 3 | 50 | 50 | 100 | PE |
| | Elective – IV | 3 | 0 | 0 | 3 | 50 | 50 | 100 | PE |
| | Elective - V | 3 | 1 | 0 | 4 | 50 | 50 | 100 | PE |
| | PRACTICAL | | | | | | | | |
| 11CE801 | Project Work | 0 | 0 | 18 | 9 | 100 | 100 | 200 | PR |
| | | Total | | | 22 | | | | |

CA – Continuous Assessment, ESE – End Semester Examination
CBS – Curriculum Breakdown Structure

Total Credits: 184

LIST OF ELECTIVES

| Course Code | Course Title | L | T | P | C | CBS |
|--------------------|--|----------|----------|----------|----------|------------|
| 11CE011 | Remote Sensing and GIS | 3 | 0 | 0 | 3 | PE |
| 11CE012 | Municipal Solid Waste Management | 3 | 0 | 0 | 3 | PE |
| 11CE013 | Hydrology | 3 | 1 | 0 | 4 | PE |
| 11CE014 | Ground Improvement Techniques | 3 | 0 | 0 | 3 | PE |
| 11CE015 | Water Power Engineering | 3 | 0 | 0 | 3 | PE |
| 11CE016 | Advanced Steel Design | 3 | 1 | 0 | 4 | PE |
| 11CE017 | Air Pollution Control Engineering | 3 | 0 | 0 | 3 | PE |
| 11CE018 | Repair and Rehabilitation of Structures | 3 | 0 | 0 | 3 | PE |
| 11CE019 | Advanced Strength of Materials | 3 | 1 | 0 | 4 | PE |
| 11CE020 | Environmental Impact Assessment | 3 | 0 | 0 | 3 | PE |
| 11CE021 | Health Monitoring of Structure | 3 | 0 | 0 | 3 | PE |
| 11CE022 | Traffic Engineering | 3 | 0 | 0 | 3 | PE |
| 11CE023 | Design of Bridges | 3 | 1 | 0 | 4 | PE |
| 11CE024 | Operation and Maintenance of Irrigation Structures | 3 | 0 | 0 | 3 | PE |
| 11CE025 | Reinforced Soil Structures | 3 | 0 | 0 | 3 | PE |
| 11CE026 | Optimization in Structural Design | 3 | 1 | 0 | 4 | PE |
| 11CE027 | Infrastructure Project Planning | 3 | 0 | 0 | 3 | PE |
| 11CE028 | Finite Element Method | 3 | 1 | 0 | 4 | PE |
| 11GE701 | Total Quality Management | 3 | 0 | 0 | 3 | HS |

11EL101 TECHNICAL ENGLISH
(Common to all Engineering and Technology branches)

3 0 0 3

MODULE – I

17

Grammar and Vocabulary: Word formation with prefixes and suffixes – Synonyms and Antonyms – Verb Patterns – Tenses (simple and compound tenses) - Simple, Compound and Complex Sentences - Voice – Use of Conditionals - Comparative Adjectives (affirmative and negative) – Expanding Nominal compounds - Articles - Use of Prepositions – Identifying Odd Words – Acronyms.

MODULE – II

13

Listening: Listening for General Content – Intensive Listening – Listening for Specific Information : Retrieval of Factual Information – Listening to Identify Topic, Context, Function, Speaker’s Opinion, Attitude, etc. – Global Understanding Skills and Ability to infer, extract gist and understand main ideas – Note-taking: Guided and unguided- Listening to fill up gapped texts.

Writing: Introduction to the Characteristics of Technical Style - Writing Definitions and Descriptions - Paragraph Writing (topic sentence and its role, unity, coherence and use of cohesive expressions) - Process Description(use of sequencing connectives)– Comparison and Contrast - Classifying the data - analysing / interpreting the data – Personal letter - Formal letter writing (Inviting Guest Speakers, letter to the editor, letter for seeking practical training, and letter for undertaking project works in industries) – editing (punctuation, spelling and grammar) – Recommendations & Suggestions.

MODULE- III

15

Reading: Exposure to different Reading Techniques - Reading for Gist and global meaning - Predicting the content - Skimming the text – Identifying the Topic Sentence and its role in each paragraph - Scanning - Inferring / identifying lexical and contextual meanings - Reading for structure and detail - Transfer of information / guided note-making - Understanding discourse coherence - Sequencing of sentences.

Speaking: Verbal and Non Verbal Communication - Pronunciation drills/ Tongue Twisters – Formal and Informal English - Oral practice – Developing Confidence - Introducing Oneself - Asking for or Eliciting Information - Describing Objects – Offering Suggestions and Recommendations – expressing opinions (agreement / disagreement).

TOTAL : 45

TEXT BOOK

1. “English for Engineers and Technologists”, Combined Edition, Volume. I & II, Orient Longman, Oxford University Press, New Delhi, 2006.

REFERENCE BOOKS

1. Aysha Viswamohan, “English for Technical Communication”, Tata McGraw-Hill, New Delhi, 2008.
2. Rizvi M Ashraf, "Effective Technical Communication", Fifth Edition, Tata McGraw- Hill, New Delhi, 2007.
3. Mark Ibbotson, “Cambridge English for Engineering”, Cambridge University Press, New Delhi, 2009.
4. Rama Krishna Rao, A, “Learning English: A Communicative Approach” Orient Black Swan, Hyderabad, 2008.

COURSE OUTCOMES

On completion of the course the students will be able to

- CO1: Improve their vocabulary and appropriate usage of words in different academic and professional contexts.
- CO2: Familiarize with different rhetorical functions of technical English.
- CO3: Develop strategies that could be adopted while reading texts.
- CO4: Speak effectively in English and career related situations.
- CO5: Acquire knowledge in academic and professional writing.

Mapping of COs with POs

| COs/POs | a | b | c | d | e | f | g | h | i | j | k | l | m |
|---------|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | | | | | | | | | 2 | 3 | | 1 | |
| CO2 | | | | | | | | | 2 | 3 | | | |
| CO3 | | | | 2 | | | | | 2 | 3 | | 1 | |
| CO4 | | | | | | | | | 2 | 3 | | | |
| CO5 | | | | 1 | | | | | 1 | 3 | | 1 | |

1 – Slight, 2 – Moderate, 3 – Substantial

11MA101 ENGINEERING MATHEMATICS – I
(Common to all Engineering and Technology branches)

3 1 0 4

MODULE – I

15

Matrices: Linear independent and dependent of vectors – Characteristic equation – Eigen values and Eigen vectors of a real matrix – Properties of eigen values and eigen vectors (without proof) – Cayley – Hamilton theorem (without proof).
Diagonalisation: Similarity transformation (concept only) – Orthogonal matrices – Orthogonal transformation of a symmetric matrix to diagonal form – Nature of quadratic form – Reduction of quadratic form to canonical form by orthogonal transformation.

MODULE – II

15

Differential Calculus: Curvature – Cartesian co-ordinates – Centre and radius of curvature – Circle of curvature. Involutives and evolutes – Envelopes – Properties of envelopes and evolutes.
Functions of several variables: Functions of two variables – Partial derivatives – Total differential – Maxima and minima – Constrained maxima and minima – Lagrange’s multiplier method – Jacobians.

MODULE - III

15

Differential Equations: Linear differential equations of Second and higher order with constant coefficients when the R.H.S is e^{ax} , x^n , $n > 0$, $\sin ax$, $\cos ax$, $e^{ax}x^n$, $e^{\alpha x} \sin \beta x$, $e^{\alpha x} \cos \beta x$, $x^n \sin \alpha x$ and $x^n \cos \alpha x$ – Differential Equations with variable coefficients (Cauchy’s form). Method of variation of parameters - Simultaneous first order linear equations with constant coefficients.
Applications of Differential Equations: Solution of specified differential equations connected with electric circuits, simple harmonic motion (Differential equations and associated conditions need to be given).

Lecture: 45, Tutorial: 15, TOTAL: 60

TEXT BOOKS

1. Kandasamy. P, Thilagavathy. K and Gunavathy. K., “Engineering Mathematics For First Year B.E/B.Tech”, Reprint Edition 2011, S.Chand and Co., New Delhi.
2. Veerarajan. T., “Engineering Mathematics, (for first year)”, Reprint Edition 2011, Tata McGraw-Hill, New Delhi.

REFERENCE BOOKS

1. Grewal. B.S, “Higher Engineering Mathematics”, 40th Edition, Khanna Publications, New Delhi, 2007.
2. Jain R.K and Iyengar S.R.K, “Advanced Engineering Mathematics”, 3rd Edition, Narosa Publishing House, New Delhi, 2007.
3. Bali N.P and Manish Goyal, “Text Book of Engineering Mathematics”, 3rd Edition, Laxmi Publications, New Delhi, 2008.

COURSE OUTCOMES

On completion of the course the students will be able to

- CO1: Solve engineering problems which needs matrix computations.
- CO2: Utilize the geometrical aspects of differential calculus and extremal problems which arise in function of several variables.
- CO3: Apply the concept of ordinary differential equations for modeling and finding solutions to engineering problems.

Mapping of COs with POs

| COs/POs | a | b | c | d | e | f | g | h | i | j | k | l | m |
|---------|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 3 | | 1 | 2 | | | | | | | 1 | |
| CO2 | 3 | 3 | | | | | | | | | | 1 | |
| CO3 | 3 | 3 | | 1 | 2 | | | | | | | 1 | |

1 – Slight, 2 – Moderate, 3 – Substantial

11PH101 APPLIED PHYSICS
(Common to all Engineering and Technology branches)

3 0 0 3

MODULE – I

15

Acoustics : Classification of sound – Characteristics of musical sound – Weber-Fechner law – Absorption Coefficient – Reverberation – Reverberation time – Sabine’s formula (growth & decay) – Factors affecting acoustics of buildings (reverberation time, loudness, focusing, echo, echelon effect, resonance and noise) and their remedies.

Ultrasonics : Introduction – Production – Magnetostriction effect – Magnetostrictive generator - Inverse piezoelectric effect - Piezoelectric generator - Detection of ultrasonics - Properties – Cavitation - Industrial applications – drilling, welding, soldering and cleaning – SONAR - Non destructive testing – Ultrasonic pulse echo system - Medical applications – A, B and C Scan displays – Ultrasonic imaging technique.

MODULE – II

15

Lasers: Introduction – Principle of spontaneous emission and stimulated emission - Population inversion, Pumping, Einstein’s Coefficients (A&B) - Types of lasers – Nd:YAG, CO₂, Semiconductor lasers: Homojunction and Heterojunction – Laser Applications – Industrial applications – Laser welding, Laser cutting, Laser drilling – Holography – Construction and reconstruction of images.

Fiber Optics & Applications: Principle – Classification based on materials, Modes of propagation, Refractive index profile - Crucible-crucible technique of fiber fabrication - Light sources for fiber optics - Detectors - Fiber optical communication links - Losses in optical fibers – Fiber optic sensors – Temperature, displacement, voltage and magnetic field measurement.

MODULE - III

15

Quantum Physics and Applications: Black body radiation – Planck’s theory (derivation)– Deduction of Wien’s displacement law and Rayleigh – Jean’s Law from Planck’s theory – Compton effect – Theory and experimental verification - Matter waves – Uncertainty principle - Experimental verification – Schroedinger’s wave equations – Time independent and time dependent equation – Physical Significance of wave function – Particle in a box (One dimensional) - Optical microscope – Limitations of optical microscopy - Scanning electron microscope - Transmission electron microscope.

TOTAL : 45

TEXT BOOKS

1. Avadhanalu M N and Kshirsagar P G, “A Text Book of Engineering Physics”, S.Chand & company Ltd, New Delhi, 2007.
2. Palanisamy P K, “Engineering Physics”, Scitech Publications, Chennai, 2008.

REFERENCE BOOKS

1. Gaur R K and Gupta S L, “Engineering Physics”, Dhanpat Rai and Sons, New Delhi, 2006.
2. Rajendran V, “Engineering Physics”, Prentice Hall of India, New Delhi, 2008.
3. Rajagopal K, “Textbook of Engineering Physics”, Part I, PHI Learning Pvt. Ltd., New Delhi, 2008.
4. Personick S D, “Fibre Optics, Technology and Applications”, Khanna Publishers New Delhi, 1987.

COURSE OUTCOMES

On completion of the course the students will be able to

- CO1: design acoustically good buildings. Applications of laser in engineering and technology
- CO2: have basic knowledge in Fiber optic concepts and fiber optic communication link
- CO3: understand Applications of quantum physics to optical and electrical phenomena

Mapping of COs with POs

| COs/POs | a | b | c | d | e | f | g | h | i | j | k | l | m |
|---------|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 2 | 2 | | | | 3 | | | 3 | | 3 | 3 |
| CO2 | 3 | 3 | 3 | | | | 1 | 3 | | 3 | | 3 | 3 |
| CO3 | 3 | 1 | 1 | | | | 3 | | | | | 3 | 3 |

1 – Slight, 2 – Moderate, 3 – Substantial

11CY101 APPLIED CHEMISTRY
(Common to all Engineering and Technology branches)

3 0 0 3

MODULE – I

15

Water: Introduction - Sources of water - impurities in water - Types of water - Water quality standards - Water quality parameters (Discussion not required) - Hardness of water- Expression of hardness - Units of hardness –Estimation of Hardness of water by EDTA method – Determination of alkalinity - Disadvantages of using hard water - Boiler troubles due to hard water - scale and sludge formation – Boiler corrosion – caustic embrittlement- priming and foaming-Softening of water- External treatment methods - Lime soda, zeolite and demineralization process (principle, process, advantages and disadvantages only) Internal treatment process - colloidal, carbonate, calgon and phosphate conditioning (brief discussion only) - desalination by reverse osmosis method. **Electrochemistry:** Introduction - Cells – Representation of a galvanic cell - EMF measurements and its applications – Electrode potential - Nernst Equation – Reference electrodes (hydrogen and calomel electrodes) – Electrochemical series and its applications – Conductometric titrations (strong acid Vs strong base only) - Batteries – Lead acid and Ni-Cd batteries.

MODULE – II

15

Corrosion and Its Control: Introduction – Mechanism of dry and wet corrosion – galvanic corrosion - concentration cell corrosion – Galvanic series - Factors influencing rate of corrosion – corrosion control methods - Sacrificial anode and impressed current cathodic method – Corrosion inhibitors - Protective coatings - classifications - Pretreatment of metal surface - Metallic coating -electroplating and electrolessplating (General discussion) - Hot dipping (Tinning and galvanising) - Nonmetallic coating - surface conversion coating (phosphate coating and anodized coating) - Organic coating - paints – constituents and their function – Special paints (Fire retardant, temperature indicating, water repellent and luminescent paints) **Combustion:** Introduction – Calorific Values – Gross and net – Theoretical calculation of minimum air for combustion (Theoretical aspects only) – flue gas analysis – Orsat’s method - Explosive range and Spontaneous Ignition Temperature.

MODULE - III

15

Fuels: coal – proximate and ultimate analysis – their importance – metallurgical coke - Otto-Hoffman byproduct method - Liquid fuel - refining of petroleum - Straight run, cracked and polymer petrol – Manufacture of synthetic petrol - polymerization (thermal and catalytic methods) - Hydrogenation of coal (Fisher Tropsch and Bergius methods) - knocking - octane number – improving octane number by additives – Diesel – cetane number – Gaseous fuels (Water gas, producer gas and biogas)

Polymers: Introduction – Nomenclature of polymers – functionality – polymerization - types – addition, condensation and co-polymerization with examples – Effect of polymer structure on properties (strength, plastic deformation, crystallinity and chemical resistance) - plastics – types (thermo and thermosetting plastics) - individual polymers - Polyethylene, polypropylene, PVC, Teflon, Bakelite and epoxy resin (preparation, properties and uses only) - Compounding of plastics- Fabrication of plastics (compression, injection and extrusion moulding methods) – conducting polymers

TOTAL : 45

TEXT BOOK

- Jain PC and Monica Jain, “Engineering Chemistry”, 15th Edition, Dhanpat Rai publication Co., New Delhi, 2008.

REFERENCE BOOKS

- Dara S.S., “A Text Book of Engineering Chemistry”, S.Chand & Co. Ltd., New Delhi, 2006.
- Sharma B.K., “Engineering Chemistry”, Krishna Prakasan Media (P) Ltd., Meerut, 2001.
- Sivasankar B., “Engineering Chemistry”, Tata McGraw-Hill, New Delhi, 2008.
- Krishnamurthy N., “Engineering Chemistry”, 2nd Edition, PHI Learning private Limited, New Delhi, 2008.

COURSE OUTCOMES

On completion of the course the students will be able to

- CO1: characterize water and its treatment
- CO2: measure EMF with the principles of electro chemistry, electrochemical cells and EMF.
- CO3: Understand the prevention methods for corrosion
- CO4: Understand the developments in polymers and plasters

Mapping of COs with POs

| COs/POs | a | b | c | d | e | f | g | h | i | j | k | l | m |
|---------|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 2 | 3 | | | 3 | 3 | | | 3 | 3 | 2 | |
| CO2 | 3 | 3 | 2 | | | 3 | 3 | 3 | | 3 | 3 | 1 | |
| CO3 | 3 | 3 | 2 | | | 3 | 1 | 3 | | 3 | 3 | 1 | |
| CO4 | 3 | 3 | 3 | | | 3 | 3 | 3 | | 3 | 3 | | |

1 – Slight, 2 – Moderate, 3 – Substantial

11CS101 PROBLEM SOLVING AND PROGRAMMING
(Common to all Engineering and Technology branches)

3 0 0 3

MODULE – I **15**

Basics: Evolution of computers- Generations of computers- Classification of computers- Applications of computers- Hardware - Software-Information Technology-Internet Problem-Solving Techniques- Program Control Structures- Programming Paradigms and Languages-Generations of Programming Languages.

Problem Solving: Introduction – Problem Solving Aspects- Top-Down Design-Implementation of Algorithms-Program Verification- Efficiency of Algorithms- Analysis of Algorithms- Fundamental algorithm- Factorial Computation - Generation of Fibonacci Sequence.

MODULE – II **15**

C Fundamentals and Arrays: Introduction to C – C programming structure – C character set – Identifiers – keywords. Data types – Constants – variables- Operators – Expressions – Library functions Managing Input and Output – formatted input and output. Control statements – Decision making and branching – Looping structures- Arrays – One dimensional array – Two dimensional arrays – Multidimensional arrays. Character arrays and strings.

MODULE - III **15**

Functions, Structures and Files: Functions - User defined functions: declaration, definition function call and parameter passing mechanisms – Recursion –Array and Functions - User defined data types –typedef - Structures – Unions –File operations in C- Introduction to pointer –Pointer Declaration and Initialization-Accessing a Variable through a pointer- Difference between array and Pointers.

TOTAL : 45

TEXT BOOKS

1. Kamthane, Ashok N. “Computer Programming”, Pearson Education, New Delhi, 2007.
2. Dromey, R.G., “How to solve it by Computers”, Pearson Publishers, New Delhi, 2007.

REFERENCE BOOKS

1. Gottfried Byron S, “Programming with C”, Second Edition, Tata McGraw-Hill, New Delhi, 2006.
2. Kanetkar Yashavant P., “Let us C”, Fifth Edition, BPB publications, New Delhi, 2005.
3. Schildt Herbert, “The Complete Reference C”, Fourth Edition, Tata McGraw-Hill, New Delhi, 2000.

COURSE OUTCOMES

On completion of the course the students will be able to

- CO1: Outline the changes in hardware and software technologies with respect to evolution of computers and programming languages
- CO2: Apply fundamental principles of problem solving techniques
- CO3: Develop programs using basic programming principles of C language
- CO4: Design simple applications using structured programming techniques and file concepts

Mapping of COs with POs

| COs/POs | a | b | c | d | e | f | g | h | i | j | k | l | m |
|---------|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 1 | 1 | | 1 | | | | 2 | | 1 | | |
| CO2 | 3 | 2 | 2 | | 3 | | | | | 1 | | | |
| CO3 | | 3 | | | 3 | | | | | | 2 | | |
| CO4 | | 3 | | | 3 | | | | | | | | |

3 – Substantial, 2 – Moderate, 1 – Slight

11EE101 BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING

(Common to Civil, Mechanical, Chemical, Food Technology, Computer Science and Information Technology branches)

3 0 0 3

MODULE – I

15

Electrical Systems: Kirchhoff's Laws – Resistors in series and Parallel, Voltage and Current division Rule, Mesh Analysis of Simple Resistive networks – Introduction to AC Circuits – Sinusoidal Voltage, Current, R.M.S and Average value.

Power System: Introduction- Structure of electric power system- Transmission and Distribution systems – Various levels of Transmission and Distribution Voltages.

Electrical Machines: DC Machines Construction, Principle of Operation, Basic Equation and Applications of: DC Generators (EMF equation), DC Motors (Torque equation).

MODULE – II

15

AC Machines: Single Phase Transformer- Construction and Working Principle of Three Phase Induction Motors- Single Phase Induction Motors: Split Phase and Capacitor Start Motors.

Semiconductor Devices and Applications: Semiconductors and Junction Diodes : Distinction between Conductors, Semiconductors and Insulators – Properties of Semiconductors – PN Junction Diode- Rectifiers and Filters- Zener Diodes – Zener Diode Voltage Regulator– LEDs. Junction Transistors: Principle of Operation – CE,CB and CC Configurations – Static Characteristics – CE Transistor as an Amplifier – Characteristics and Applications of SCR and UJT.

Digital Electronics: Introduction– Binary Number Systems and Conversions – Binary Addition and Subtraction -Logic Gates and Truth tables.

MODULE - III

15

Digital Electronics: Boolean Algebra: Basic laws and Demorgan's theorem – Simplification of Boolean Functions —Full Adder and Full Subtractor – Flip-Flops: RS,JK,D and T – Counter: 4 Bit Binary Ripple Counter.

Linear IC'S: OPAMPs: – Ideal Characteristics –Applications of OP-Amps: Inverting and Non-Inverting Amplifier, Voltage Follower, Adder and Subtractor.

Fundamentals of Communication Engineering: Introduction – Need for Modulation – Amplitude Modulation – Frequency Modulation – Comparison of AM & FM Communication Systems (Block Diagram approach): Radio, TV: Standards, Transmitter and Receiver- Satellite and Optical Fibre Communication

Powersupplies (Block Diagram Approach) : Regulators, UPS and SMPS

TOTAL : 45

TEXT BOOKS

1. Hughes Edward., Smith Mckenzie., Hiley John and Brown Keith., "Electrical and Electronic Technology", 9th Edition, Pearson Education, New Delhi.
2. Muthusubramanian, Salivahanan R.S. and Muraleedharan K.A., "Basic Electrical, Electronics and Computer Engineering", Tata McGraw-Hill, New Delhi, 2007.

REFERENCE BOOKS

1. Millman and Halkias, "Integrated Electronics", Tata McGraw-Hill, New Delhi, 1998.
2. Kennedy, David, "Electronic Communication Systems", Tata McGraw – Hill, New Delhi, 2000.
3. Gayakward, Ramakant A. "Op-Amps and Linear Integrated Circuits", Pearson Education, New Delhi, 2002.
4. Metha, V.K and Rohit Mehta, "Principles of Power System", S. Chand & Company Ltd., New Delhi, 2006.
5. Smarajit Ghosh, "Electrical and Electronics Engineering", Second Edition, Prentice Hall of India, New Delhi, 2009.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Develop a basic understanding of the concept of electrical systems

CO2: Illustrate the construction and working of different types of electric machines

CO3: Gain basic knowledge of analog and digital electronics

Mapping of COs with POs

| COs/POs | a | b | c | d | e | f | g | h | i | j | k | l | m |
|---------|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 2 | 2 | | | | | | | | | 1 | |
| CO2 | 3 | 1 | | | | | | | | | | 1 | |
| CO3 | 3 | | | | | | | | | | | 1 | |

3 – Substantial, 2 – Moderate, 1 – Slight

11PH102 PHYSICAL SCIENCES LABORATORY – I
(Common to all Engineering and Technology branches)

0 0 3 1

PART-A: APPLIED PHYSICS LABORATORY
(Any five experiments)

LIST OF EXPERIMENTS /EXERCISES

1. (a) Particle size determination using Diode Laser.
(b) Determination of Laser parameters – Wavelength and angle of divergence.
(c) Determination of acceptance angle in an optical fiber.
2. Determination of thickness of a thin wire – Air wedge method.
3. Determination of velocity of sound and compressibility of liquid – Ultrasonic interferometer.
4. Determination of specific resistance of a given coil of wire – Carey Foster Bridge.
5. Determination of dispersive power of a prism using spectrometer.
6. Determination of Young’s modulus of the material – non uniform bending.

PART-B: APPLIED CHEMISTRY LABORATORY
(Any five experiments)

LIST OF EXPERIMENTS /EXERCISES

1. Estimation of Total, Temporary and Permanent hardness of water by EDTA method.
2. Estimation of Ca²⁺ and Mg²⁺ hardness separately by EDTA method.
3. Estimation of Alkalinity of a water Sample.
4. Conductometric titration - Mixture of acids.
5. Estimation of Hydrochloric acid using PH meter.
6. Estimation of Ferrous ion by Potentiometric titration.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: have the basic idea of diode and LASER Estimate the Laser parameters

CO2: familiarize the concepts of thermal conductivity of a bad conductor material.

CO3: estimate the water sample and hydrochloric acid

Mapping of COs with POs

| COs/POs | a | b | c | d | e | f | g | h | i | j | k | l | m |
|---------|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 3 | | | | | | | | | | 1 | |
| CO2 | 3 | 3 | | | | | | | | | | 1 | |
| CO3 | 3 | 3 | | | | | | | | | | 1 | |

3 – Substantial, 2 – Moderate, 1 – Slight

LIST OF EXPERIMENTS /EXERCISES

A) APPLICATION PACKAGES

1. To create an advertisement using word
2. To illustrate the concept of mail merging using word
3. To create a spread sheet to analyse the marks of the students of a class and also to create appropriate charts using excel
4. To create the presentation for the department using power point
5. To create the presentation for digital computers using power point

B) C PROGRAMMING (ANY TWO PROGRAMS IN EACH SECTION)

6. Simple programs using decision making and branching:
 - a. Program to find biggest of three numbers
 - b. Design of simple menu driven calculator
 - c. Program to find the roots of the quadratic equation
 - d. Program to convert the given decimal number to binary
 - e. Program to print the prime numbers between 100 to 500
 - f. Program to print the electricity bill in a specified format applying specified rules
7. Programs using arrays:
 - a. Program to find the biggest number in the array
 - b. Menu driven program to insert and delete a specified element from the array
 - c. Program to arranged the elements of the array in ascending order
 - d. Program to merge given two one dimensional arrays and to remove the duplicates
 - e. Program for multiplication of two matrices
8. String manipulations:
 - a. Program to find the length of the string, copy one string to another and compare two strings, concatenate two strings without using library functions.
 - b. Program to check whether the given string is a palindrome or not without reversing
 - c. Program to find the occurrence of a substring in a main string and replace the substring by another string.
 - d. Arranging the list of names in alphabetical order
 - e. Program to count the number of occurrences of vowels, consonants, words, white spaces and special characters in the given statement.
9. Functions:
 - a. Program to swap the contents of two variables using functions (Pass by address and pass by reference)
 - b. Program to print the Fibonacci series using recursive function
 - c. Program to print the average and standard deviation of the elements of the one- dimensional array using function.
 - d. Program to print the transpose of a matrix using functions
 - e. Menu driven program to perform string operations using functions
10. Structures and file operations:
 - a. Define a structure to store the student details viz., Roll no, name, marks in three subjects, total, avg and class obtained. Read the first three fields and write your logic to calculate the total, average and class obtained for ten students. Print the results in the order of ran obtained.
 - b. Structure based program to print the pay slip of an employee.
 - c. Program using files to copy the contents of one file to another

REFERENCES / MANUALS/SOFTWARE:

Software requirements

Operating System : Windows / Linux

Compiler : C compiler

Packages: MS office or Equivalent

COURSE OUTCOMES

On completion of the course the students will be able to

- CO1: Utilize the features of MS office package to create documents, presentation and reports
- CO2: Write and execute programs to illustrate decision making and branching
- CO3: Develop programs using 1D and 2D arrays
- CO4: Create programs for manipulating strings
- CO5: Demonstrate the use of functions and structures to develop applications

Mapping of COs with POs

| COs/POs | a | b | c | d | e | f | g | h | i | j | k | l | m |
|---------|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | | | | | | | | | | | 3 | | |
| CO2 | 3 | 2 | | | 2 | | | | | | | | |
| CO3 | 3 | 2 | | | 2 | | | | | | | | |
| CO4 | 3 | 2 | | | 2 | | | | | | | | |
| CO5 | 3 | 1 | | | 3 | | | | | | | | |

3 – Substantial, 2 – Moderate, 1 – Slight

11EL201 COMMUNICATION SKILLS
(Common to all Engineering and Technology branches)

3 0 0 3
15

MODULE – I

Focus on language: Cause and effect expressions - indicators of purpose and function - connectives -imperatives - modal verbs - infinitives and gerunds - reporting verbs - homonyms - commonly confused (mispronounced and misspelt) words - phrasal verbs - British and American Vocabulary.- rules for writing SI [system international] units - concord.

MODULE – II

Listening: Listening practice - Radio / TV news - documentaries - listening to short and long conversations in different domains of activity/ live speech - new inventions, products, announcements, casual conversation, and academic lectures.
Writing: Formal letter writing (letter of application - job application) , Business (calling for quotation, placing orders , letter of complaint) - structure of memorandum and technical reports (reports on visits made to industries, report on an accident in the factory, meeting report) – notices - agenda - instructions - e-mails - Preparing Checklist- note taking and note making.

MODULE- III

Speaking: Communication – accuracy, fluency, appropriateness – levels of formality – oral practice activities related to professional skills – role play using different functions (persuasion, negotiation, giving directions and guidance) – conversational etiquette (greetings, making requests, permission, accepting, denying, declining, politeness strategies, turn-taking, body language) – making speeches – describing people, place, things and events.
Reading: Reading comprehension – guided note- making – providing a suitable title - identifying main points, supporting ideas – evaluating the style (argumentative / descriptive etc) – drawing inferences separating facts from opinions – interpreting text in different genres.

TOTAL : 45

TEXT BOOK

1. Department of Science and Humanities, Anna University, Chennai. “English for Engineers and Technologists”, Combined Edition Volumes (I & II), Orient Longman, Oxford University Press, New Delhi, 2006.

REFERENCE BOOKS

1. Kiranmai. Dutt P, Geetha Rajeevan and Prakash, C. L. N., “A Course in Communication Skills”, Cambridge University Press, New Delhi, 2007.
2. Meenakshi Raman and Sangeetha Sharma, “Technical Communication”, Oxford University Press, New Delhi, 2006.
3. Sangeetha Sharma and Binod Mishra, “Communication Skills for Engineers and Scientists”, PHI Learning, New Delhi, 2009.

COURSE OUTCOMES

On completion of the course the students will be able to

- CO1: Improve their vocabulary and appropriate usage of words.
CO2: Familiarize with different rhetorical functions of technical English.
CO3: Speak effectively in English in real-life and career-related situations.
CO4: Acquire knowledge in academic and professional writing.

Mapping of COs with POs

| COs/POs | a | b | c | d | e | f | g | h | i | j | k | l | m |
|---------|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | | | | | | | | | 2 | 3 | | 1 | |
| CO2 | | | | | | | | | 2 | 3 | | | |
| CO3 | | | | | | | | | 1 | 3 | | | |
| CO4 | | | | 1 | | | | | 1 | 3 | | 1 | |

3 – Substantial, 2 – Moderate, 1 – Slight

11MA201 ENGINEERING MATHEMATICS – II
(Common to all Engineering and Technology branches)

3 1 0 4
15

MODULE – I

Multiple Integrals: Double integration in Cartesian coordinates – Change of order of integration – Area between two curves – Area as double integrals – Triple integration in Cartesian coordinates –Volume as Triple integrals (Simple problems only).

Vector Calculus: Gradient, divergence and curl – Line, surface integral (Concept Only) and volume integrals (Concept Only) – Green’s, Gauss divergence and Stoke’s theorems (without proof) – Verification of the above theorems and evaluation of integrals using them (Simple problems only).

MODULE – II

Analytic Functions: Functions of a complex variable – Analytic functions – Necessary conditions and Sufficient conditions (excluding proof) – Cauchy– Riemann equations — Properties of analytic function (Statement only) –

Harmonic functions – Construction of Analytic functions – Conformal mapping: $w = z + a, az, \frac{1}{z}$ - Bilinear transformation.

Complex Integration: Cauchy’s theorem (without proof) – Cauchy’s integral formula – Taylor and Laurent’s series (without proof) – Singularities – Classification – Cauchy’s residue theorem (Statement only) – Contour integration – circular and semi-circular contours (excluding poles on real axis).

MODULE – III

Laplace Transforms: Conditions for existence – Transform of elementary functions –Basic properties – Derivatives and integrals of transforms – Transforms of derivatives and integrals – Initial and final value theorems – Transform of unit step function – Transform of periodic functions.

Inverse Laplace transforms: Inverse Transform of elementary functions – Partial fraction method – Convolution theorem (without proof) – Solution of linear ODE of second order with constant coefficients.

Lecture: 45, Tutorial: 15, TOTAL: 60

TEXT BOOKS

1. Kandasamy. P, Thilagavathy. K and Gunavathy. K, “Engineering Mathematics For First Year B.E/B.Tech”, Reprint Edition 2011, S.Chand and Co., New Delhi.
2. Veerarajan. T., “Engineering Mathematics, (for first year), Reprint Edition 2011, Tata McGraw-Hill New Delhi.

REFERENCE BOOKS

1. Grewal. B.S, “Higher Engineering Mathematics”, 40th Edition, Khanna Publications, New Delhi, 2007.
2. Jain R.K and Iyengar S.R.K, “Advanced Engineering Mathematics”, Third Edition, Narosa Publishing House, New Delhi, 2007.
3. Bali. N.P and Manish Goyal, “Text Book of Engineering Mathematics”, Third Edition, Laxmi Publications, New Delhi, 2008.

COURSE OUTCOMES

On completion of the course the students will be able to

- CO1: Identify problems involving vectors, double and triple integrals
- CO2: Measure the knowledge of analytic functions.
- CO3: Evaluate complex integrals which are extensively applied in engineering.
- CO4: Adapt Laplace transforms to solve practical problems.

Mapping of COs with POs

| COs/POs | a | b | c | d | e | f | g | h | i | j | k | l | m |
|---------|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 3 | | 1 | 2 | | | | | | | 1 | |
| CO2 | 3 | | | | | | | | | | | 1 | |
| CO3 | 3 | 3 | | 1 | 2 | | | | | | | 1 | |
| CO4 | 3 | 3 | | 1 | 2 | | | | | | | 1 | |

3 – Substantial, 2 – Moderate, 1 – Slight

11PH201 MATERIALS SCIENCE
(Common to all Engineering and Technology branches)

3 0 0 3

MODULE – I

15

Crystal Physics: Introduction – Lattice – Unit cell – Crystal systems – Bravais lattice – Lattice planes – Miller indices – d spacing in cubic lattice – Atomic radius – Coordination number – Packing factor for SC, BCC, FCC and HCP structures – Crystal imperfections : Point, line and surface imperfections.

Conducting Materials: Conductors – Classical free electron theory of metals – Electrical and thermal conductivity – Wiedemann – Franz law – Lorentz number – Draw backs of classical theory – Quantum theory – Fermi distribution function – Effect of temperature on Fermi Function – Density of energy states – Carrier concentration in metals.

MODULE – II

15

Semiconducting Materials: Intrinsic semiconductor – Carrier concentration derivation – Extrinsic semiconductors – Carrier concentration derivation in n-type and p-type semiconductors – Hall effect – Determination of Hall coefficient – Applications – Semiconductor devices – Solar cells - LDR.

Magnetic and Dielectric Materials: Types of magnetic materials – Domain theory – Hysteresis – Soft and hard magnetic materials - Magnetic devices – Transformer core - Magneto optical recording - Dielectric constant - Qualitative study of polarization – Frequency and temperature dependence of polarization – Dielectric loss – Dielectric breakdown – Uses of dielectric materials (capacitor and transformer) – Ferro electric materials.

MODULE- III

15

Smart Materials : Metallic glasses: Preparation, properties and applications - Shape memory alloys (SMA): Characteristics, properties, applications, advantages and disadvantages of SMA – Superconductors: Properties – Types of superconductors – BCS theory of superconductivity(Qualitative) - High T_c superconductors – Applications of superconductors – SQUID – cryotron - magnetic levitation.

Nano Materials: Synthesis: Lithographics – Vapour phase physical and chemical deposition methods - Colloidal and solgel methods - Properties of nanoparticles and applications - Carbon nanotubes: Structure – Properties – Fabrication by Laser ablation – Applications.

TOTAL : 45

TEXT BOOKS

1. Kittel. Charles, “Introduction to Solid State Physics”, Seventh Edition, John Wiley & sons, Singapore, 2007.
2. Poole. Charles P and Ownen. Frank J., “Introduction to Nanotechnology”, Wiley India, 2007. (For Module III).

REFERENCE BOOKS

1. Pillai. S O, “Solid State Physics”, Fifth Edition, New Age International, New Delhi, 2003.
2. Rajendran. V, “Engineering Physics”, Prentice Hall of India, New Delhi, 2008.
3. Palanisamy. P K, “Engineering Physics - II”, SciTech publications (India), Chennai 2008.
4. Raghavan. V, “Materials Science and Engineering: A first course”, Fifth Edition, Prentice Hall of India, New Delhi, 2009.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: gain fundamental knowledge in Crystal Physics Conducting and superconducting materials

CO2: acquire basic knowledge of Semiconducting materials, Magnetic materials and Dielectric materials

CO3: understand the applications of Smart materials and Nano materials

Mapping of COs with POs

| COs/POs | a | b | c | d | e | f | g | h | i | j | k | l | m |
|---------|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 3 | 1 | 3 | 3 | | | | | | | 3 | 3 |
| CO2 | 3 | 3 | 1 | 1 | 3 | | | | | | | 2 | 3 |
| CO3 | 3 | 3 | 3 | 3 | 3 | | | | | | | 2 | 3 |

3 – Substantial, 2 – Moderate, 1 – Slight

11CY201 ENVIRONMENTAL SCIENCE
(Common to all Engineering and Technology branches)

3 0 0 3

MODULE – I

15

Introduction to Environmental Studies and Natural Resources: Introduction to Environmental Science – Forest resources: Use and over-exploitation, deforestation, case studies. – Water resources: Use and over-utilization of surface and ground water, dams - benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture - effects of modern agriculture, fertilizer and pesticide problems, water logging, salinity, case studies – Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources, case studies – Land resources: Land as a resource – Conservation Practices - Role of an individual in conservation of natural resources. **Ecosystems:** Concept of an ecosystem – Structural features – Functional attributes (Food chain and Food web only) – Introduction, types, characteristic features, structure and functions of the (a) Forest ecosystem (b) Aquatic ecosystems (ponds, rivers and oceans). **Biodiversity:** Introduction to Biodiversity – Definition - genetic, species and ecosystem diversity – Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic, option values and ecosystem service value– Hot-spots of biodiversity – Threats to biodiversity: habitat loss, poaching of wildlife – Endangered and endemic species of India – In-situ and Ex-situ conservation of biodiversity.

MODULE – II

15

Pollution: Definition – Causes, effects and control measures of: (a) Air pollution - Climate change, global warming, acid rain, ozone layer depletion (b) Water pollution (c) Soil pollution (d) Radioactive Pollution - Solid waste Management - Disaster management: floods, earthquake, cyclones and landslides - Role of an individual in prevention of pollution - Case studies. **Water Treatment methods:** Treatment of Water for Domestic Supply (Screening, Aeration, Sedimentation with Coagulation, Filtration and Disinfection methods) - Break point chlorination –Estimation of dissolved oxygen, BOD and COD - Bacteriological examination of water - Sewage treatment (Primary, Secondary & Tertiary methods) - Miscellaneous methods of Sewage treatments (Oxidation Ponds, Aerated Lagoons, Oxidation ditch, Anaerobic Lagoons, Septic tanks) – Methods of Sewage treatment by activated sludge process – Introduction to industrial waste water treatment using Reverse Osmosis Technology- Self purification of Natural Waters - Membrane Technology for wastewater treatment - Activated carbon in pollution abatement of wastewater.

MODULE- III

15

Social Issues and the Environment: From Unsustainable to Sustainable development – Urban problems related to energy – Water conservation, rain water harvesting, watershed management – Resettlement and rehabilitation of people - case studies – Environmental ethics - Issues and possible solutions - Wasteland reclamation – Consumerism and waste products – Environment Production Act – Air (Prevention and control of pollution) Act – Water (Prevention and control of pollution) Act – Wildlife protection Act – Forest conservation Act – Issues involved in enforcement of environmental legislation – Public awareness. **Human Population and the Environment:** Introduction - Population growth - Variation of population based on age structure - Variation among nations – Population explosion – Family welfare programme – Environment and human health – Human Rights – Value Education – HIV / AIDS – Women and Child welfare – Role of Information Technology in Environment and human health – Case studies.

TOTAL : 45

TEXT BOOK

- 1 Anubha Kaushik, and Kaushik C P, “Environmental Science and Engineering”, Third Edition: 2008, (Reprint 2010), New Age International (P) Ltd, New Delhi.

REFERENCE BOOKS

- 1 B.K.Sharma, “ Industrial Chemistry”, Tenth Edition, Krishna Prakashan Media(P) Ltd, Meerut 250001(UP), India.
- 2 B Uppal M M revised by S C Bhatia, “Environmental Chemistry”, Sixth Edition Khanna Publishers, New Delhi, 2002.
- 3 Trivedi R.K. and Goel P. K., “Introduction to Air Pollution”, Techno-Science Publications, Jaipur, 2003.
- 4 Masters. Gilbert M, “Introduction to Environmental Engineering and Science”, Second Edition, Pearson Education, New Delhi, 2004.
- 5 Miller, T.G., “Environmental Science”, Wadsworth Publishing Co.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: gain basic knowledge of conservation of resources, role of a human being in maintaining a clean environment future generations

CO2: learn the importance of maintaining ecological balance and preservation of biodiversity

Mapping of COs with POs

| COs/POs | a | b | c | d | e | f | g | h | i | j | k | l | m |
|---------|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 3 | 3 | 2 | | 3 | 3 | 3 | 3 | 3 | 3 | 1 | 2 |
| CO2 | 3 | 3 | 3 | 3 | | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 1 |

3 – Substantial, 2 – Moderate, 1 – Slight

11ME101 BASICS OF CIVIL AND MECHANICAL ENGINEERING

(Common to all Engineering and Technology branches)

3 0 0 3**PART-A: CIVIL ENGINEERING****MODULE – I** **7****Construction Materials:** Introduction – Civil Engineering – Materials – bricks – stones – sand – cement – concrete – steel sections – Site selection for foundations – Bearing capacity – loads – Types of foundations – requirements.**MODULE – II** **7****Elements of Structures:** Superstructure – brick masonry – stone masonry – beams – columns – lintels – roofing – flooring – plastering – Types of Bridges and Dams.**MODULE - III** **8****Elements of Surveying:** Surveying – Objects – types – classification – principles – measurements of distances – Determination of areas – Building area calculation – illustrative examples – Basics of Interior and Landscaping.**PART-B: BASIC MECHANICAL ENGINEERING****MODULE – I** **Metal Forming and Joining Processes** **7****Foundry:** Introduction- patterns – molding – casting - cupola furnace.**Forming:** Introduction-Classification- Rolling, extrusion, and drawing.**Welding:** Introduction-Classification - TIG, MIG welding, Gas welding, soldering and brazing.**Machining process:** Introduction-Classification – lathe and drilling machines.**MODULE – II** **Boilers and Power Plants** **8****Steam Boilers:** Introduction-Classification- Working Principle of Cochran boiler, Babcock and Wilcox boiler- Benson boiler - Boiler Mountings and accessories.**Power Plants:** Classification of power plants – working principle of steam, Diesel, Hydro-electric and Nuclear Power plants- Merits and Demerits.**MODULE – III** **IC Engines, Refrigeration and Air-conditioning** **8****IC Engines:** Classification-components - Working principle of Petrol and Diesel Engines- Four stroke and two stroke cycles- Comparison of four stroke and two stroke engines. Working principle of carburetor, fuel pump and multi point fuel injector.**Refrigeration and Air Conditioning System:** Terminology of Refrigeration and Air conditioning, Properties of refrigerant - Principle of vapour compression and absorption system - Layout of typical domestic refrigerator - Window and Split type room Air conditioner.**TOTAL : 45****TEXT BOOKS**

1. Palanichamy, M S., “Basic Civil Engineering”, Tata McGraw-Hill, New Delhi, 2006.
2. Shanmugam, G, “Basic Mechanical Engineering”, 4th Edition, Tata McGraw-Hill, New Delhi, 2011.

REFERENCE BOOKS

1. Rao, M.S., “Basics of Civil Engineering”, Dhanpat Rai and Co, New Delhi, 2006.
2. Venugopal, K and Prabhu Raja, V, “Basic Mechanical Engineering”, Sixth Edition, Anuradha Publishers, Kumbakonam, 2005.
3. Rao, P N, “Manufacturing Technology: Foundry, Forming And Welding”, Tata McGraw-Hill, New Delhi, 2008.
4. Rajan, T.S, “Basic Mechanical Engineering, 3rd Edition, New Age International Publishers, NewDelhi, 2009.

COURSE OUTCOMES

On completion of the course the students will be able to

- CO1: select the suitable construction materials and foundation required for a building
- CO2: recall the various elements of the super structure
- CO3: point out the various elements of surveying and landscaping
- CO4: demonstrate the ability to describe the basics of metal forming and joining processes.
- CO5: demonstrate the knowledge on patterns, molding, casting, rolling, extrusion, drawing, TIG, MIG welding, gas welding, soldering and brazing.
- CO6: describe basics of boilers and power plants.
- CO7: explain the working principle of steam, Diesel, Hydro-electric and Nuclear power plants.
- CO8: demonstrate the working of IC engines, Refrigeration and Air-conditioning systems.

Mapping of COs with POs

| COs/POs | a | b | c | d | e | f | g | h | i | j | k | l | m |
|---------|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 2 | 2 | 2 | 2 | 1 | | | | | | | 2 |
| CO2 | 3 | 2 | 2 | 2 | 2 | 1 | | | | | | | 2 |
| CO3 | 3 | 2 | 2 | 2 | 2 | 1 | | | | | | | 2 |
| CO4 | 3 | | | | 2 | | | 1 | | | | 3 | |
| CO5 | 3 | | | | 2 | | | 3 | | | | 2 | |
| CO6 | 3 | | | | 2 | | | 1 | | | | 3 | |
| CO7 | 3 | | | | 3 | | | 2 | | | | 3 | |
| CO8 | 3 | | | | 2 | | | 1 | | | | 3 | |

3 – Substantial, 2 – Moderate, 1 – Slight

11ME102 ENGINEERING DRAWING
(Common to all Engineering and Technology branches)

2 0 3 3

Concepts (Not for Exam)

Importance of graphics in engineering applications – Use of drafting instruments – BIS conventions and specifications – Size, layout and folding of drawing sheets – Lettering and dimensioning.

MODULE – I

15

Projections of Points, Lines, Planes and Solids:

General principles of orthographic projection – First angle projection – Layout of views – Projection of points, located in all quadrant and straight lines located in the first quadrant – Determination of true lengths and true inclinations and location of traces – Projection of polygonal surface and circular lamina inclined to both reference planes. Projections of simple solids like prisms, pyramids, cylinder and cone when the axis is inclined to one reference plane by change of position method.

MODULE – II

15

Sectioning and development of solids:

Sectioning of solids- prisms, pyramids, cylinder and cone in simple vertical position by cutting planes inclined to one reference plane and perpendicular to the other – Obtaining true shape of section.

Development of lateral surfaces of simple and truncated solids – prisms, pyramids, cylinders and cone with cutout, perpendicular and inclined to the horizontal axis.

15

MODULE- III

Isometric projection and Perspective projection :

Principles of isometric projection – isometric scale – isometric projections of simple solids, truncated prisms, pyramids, cylinders and cones

Conversion of isometric projection into orthographic projection.

Perspective projection of prisms, pyramids and cylinders by visual ray method.

TOTAL: 45

TEXT BOOKS

1. Venugopal K. and Prabhu Raja V. “Engineering Graphics”, New Age International (P) Limited, New Delhi, 2008.
2. Dhananjay A. Jolhe, “Engineering Drawing with an introduction to AutoCAD”, Tata McGraw Hill, New Delhi, 2008.

REFERENCE BOOKS

1. Bhatt N.D, “Engineering Drawing”, 46th Edition, Charotar Publishing House, Anand, 2003.
2. Gopalakrishnana K.R., “Engineering Drawing”, Volume. I & II, Subhas Publications, Bangaluru, 2006.
3. Basant Agarwal and Agarwal C.M., “Engineering Drawing”, Tata McGraw-Hill, New Delhi, 2008.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: prepare elementary sketches of 2D and 3D objects with correct interpretation and mark dimensions properly.

CO2: draw multi-view orthographic and other projections including isometric, sectional, true and perspective.

CO3: read, understand, interpret drawings and communicate effectively.

Mapping of COs with POs

| COs/POs | a | b | c | d | e | f | g | h | i | j | k | l | m |
|---------|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | | | | 2 | | | | 3 | | | | |
| CO2 | 3 | | | | 2 | | | | 2 | | | | |
| CO3 | 3 | | | | 2 | | | | 2 | | | | |

3 – Substantial, 2 – Moderate, 1 – Slight

11PH202 PHYSICAL SCIENCES LABORATORY – II

(Common to all Engineering and Technology branches)

0 0 3 1**PART - A: APPLIED PHYSICS LABORATORY****(Any five experiments)****LIST OF EXPERIMENTS /EXERCISES**

1. Determination of band gap of a semiconductor material.
2. Determination of wavelength of mercury spectrum – spectrometer grating.
3. Determination of thermal conductivity of a bad conductor – Lee’s Disc method.
4. Determination of hysteresis loss in a ferromagnetic material.
5. Determination of Young’s modulus of the material – uniform bending.
6. Determination of viscosity of liquid – Poiseuille’s method.

PART - B: APPLIED CHEMISTRY LABORATORY**(Any five experiments)****LIST OF EXPERIMENTS /EXERCISES**

1. Estimation of Chloride in a given water sample.
2. Determination of Dissolved Oxygen in a sample of water / sewage.
3. Estimation of Chromium in Industrial waste water.
4. Estimation of Ferrous ion in rust solution.
5. Estimation of percentage of Copper present in brass.
6. Estimation of ferric ion by Spectrophotometric method.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Determine the features of conducting materials

CO2: Familiarize the concepts of thermal conductivity

CO3: Estimate DO, chloride, chromium, ferrous ion and copper in wastewater

Mapping of COs with POs

| COs/POs | a | b | c | d | e | f | g | h | i | j | k | l | m |
|---------|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 3 | 3 | 3 | 3 | | | 2 | | 3 | | 3 | 3 |
| CO2 | 3 | 2 | 3 | 3 | 3 | | | 1 | | | | 3 | 3 |
| CO3 | 3 | 2 | 1 | 3 | 3 | | | 1 | | | | 3 | 3 |

3 – Substantial, 2 – Moderate, 1 – Slight

11ME103 ENGINEERING PRACTICES LABORATORY

(Common to all Engineering and Technology branches)

0 0 3 1

PART-A: CIVIL & MECHANICAL

LIST OF EXPERIMENTS

1.FITTING

Tools & Equipments – Practice in Filing and Drilling.
Making Vee Joints, Square, dovetail joints, Key Making.

2. PLUMBING

Tools & Equipments - Pipe connection for a bath room, Pipe connection for multi-storey building,
Pipe connection with different components like valves, tap, coupling, union, reducers, elbows etc.
Plumbing work with metal, PVC and flexible hoses (Threading, joining of pipes)

3.CARPENTRY

Tools and Equipments- Planning practice. Making Half Lap, dovetail, Mortise & Tenon joints, a mini model of a single door window frame.

Making of Pen stand, Box, etc. from plywood. (Use of modern power tools for cutting)

4.SHEET METAL

Tools and equipments - Fabrication of a small cabinet, Rectangular Hopper, etc.

5.WELDING

Tools and equipments - Arc and Gas welding of butt joint, Lap Joint and Tee Fillet.

REFERENCES / MANUALS / SOFTWARE:

1. Suyambazhahan, S, “Engineering Practices Laboratory Manual”, PHI Learning, NewDelhi, 2010.
2. John, K. C., “Mechanical Workshop Practice”, Second Edition, PHI Learning, NewDelhi, 2009.

PART-B: ELECTRICAL & ELECTRONICS

1. Safety aspects of Electrical wiring.
2. Wiring circuit for a lamp using single and two way switches (stair case).
3. Wiring circuit for fluorescent lamp.
4. Study of Electronic components and equipment – Resistor-colour coding, measurement of AC Signal parameter (Peak-Peak, RMS Value, Frequency and Power factor) using CRO
5. Assembling electronic components on a small PCB (Etching, Fabrication and Testing)
6. Measurement of earth resistance and insulation resistance of an electrical equipment
7. Study of Telephone, FM radio & Transducers.
8. Study of Mixie, Iron box, Ceiling & Table Fans.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: understand the functions of different tools used in fitting, carpentry, sheet metals and welding.

CO2: prepare different types of joints in metal pieces, sheet metals and wooden pieces.

CO3: plan and fabricate simple models.

CO4: utilize the basic laboratory equipment

CO5: build the layout of domestic wiring circuits and troubleshoot it.

CO6: estimate Earth Resistance, assemble electronic components in PCB and understand operation of various domestic appliances

Mapping of COs with POs

| COs/POs | a | b | c | d | e | f | g | h | i | j | k | l | m |
|---------|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | | | | | | | 2 | | | 1 | | |
| CO2 | 2 | | | | | | | 3 | | | 2 | | |
| CO3 | 3 | | | | | | | 2 | | | 2 | | |
| CO4 | 3 | | 1 | | 3 | | | | | | 2 | 3 | |
| CO5 | 3 | 2 | | | 2 | 3 | | | | | | 3 | |
| CO6 | 3 | | | | | 2 | | | | | | 3 | |

3 – Substantial, 2 – Moderate, 1 – Slight

11EL202 COMMUNICATION SKILLS LABORATORY

(Common to all Engineering and Technology branches)

0 0 3 1

LIST OF EXPERIMENTS

English Lab

1. Listening Comprehension
Listening to instructional software packages in the communication laboratory, using them, understanding the mechanics of language like grammar, listening to native speakers' presentation, and developing oral communication by imitating the model dialogues. Listening for specific information – listening to improve pronunciation – Listening and typing – Filling the blanks – TV programmes and News.
2. Reading comprehension and vocabulary:
Reading for getting information and understanding; scanning, skimming and identifying topic sentences – reading for gaining knowledge, looking for transitions, understanding the attitude of the writer – Filling the blanks – Cloze exercises – vocabulary building – Comprehension.
3. Speaking:
Group discussion; verbal and non-verbal communication; speaking on situational topics – maintaining eye contact, speaking audibly, clearly and with confidence – Common errors in English
Conversations – face-to-Face conversation – Telephone Conversation – Roll play.
4. Writing Skills:
Writing job application: resume, applications for jobs, making complaint letters – Projects: report writing – editing and proof reading – research paper and translating numerical data from charts and diagrams into verbal communication.

Career Lab

1. Letter Writing / Resume / Report preparation:
Structuring Letter Writing / Resume / Report preparation / E-Mail
2. Presentation skills
Elements and structure effective presentation – presentation tools – voice
Modulation – Body language – Video samples
3. Group Discussion
Structure of Group Discussion – Strategies in GD – Team work – Video
Samples
4. Interview skills
Kinds of Interview- corporate culture – video samples
5. Soft Skills
Time management – stress management – assertiveness – case study

Communication Software Package:

- a. Presentation Skills
 - b. Interview Skills
 - c. Group Discussion
- From Globarena Software

COURSE OUTCOMES

On completion of the course the students will be able to

- CO1: Write, read and listen English effectively
CO2: Communicate efficiently in English in real life and career related situations
CO3: Demonstrate good presentation skill.
CO4: Use the modern communication software package to enhance the soft skills

Mapping of COs with POs

| COs/POs | a | b | c | d | e | f | g | h | i | j | k | l | m |
|---------|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | | | | 2 | | | | | 2 | 3 | | 1 | |
| CO2 | | | | 2 | | | | | 2 | 3 | | 1 | |
| CO3 | | | | 2 | | | | | 2 | 3 | | 1 | |
| CO4 | | | | | | | | | 2 | 3 | | | |

3 – Substantial, 2 – Moderate, 1 – Slight

11MA301 ENGINEERING MATHEMATICS – III
(Common to all Engineering and Technology branches)

3 1 0 4

MODULE – I

15

Fourier Series: Dirichlet’s conditions – General Fourier series – Odd and even functions – Half range sine series – Half range cosine series – Change of interval - Parseval’s Identity - Harmonic analysis.

MODULE - II

15

Partial Differential Equations: Formation – By elimination of arbitrary constants and arbitrary functions – Standard types– Lagrange’s linear equation- Linear partial differential equations of second order with constant coefficients.

Applications of Partial Differential Equations: Classification of second order quasi linear partial differential equations – Solutions of one dimensional wave equation – One dimensional heat equation – Steady state solution of two-dimensional heat equation (Insulated edges excluded).

MODULE - III

15

Fourier transform: Fourier integral theorem (Statement only) – Fourier transform pair – Properties – Transforms of simple functions – Sine and Cosine transforms – Convolution theorem and Parseval’s identity (Statement only).

Z-transform: Elementary properties – Transforms of simple functions - Inverse Z – transform(Partial Fraction Method and Residue method) – Convolution theorem (Statement Only) – Solution of Difference Equations.

Lecture : 45, Tutorial : 15, TOTAL : 60

TEXT BOOKS

1. Kandasamy, P., Thilagavathy, K., and Gunavathy, K., “Engineering Mathematics”, Volume - III, S. Chand & Co, New Delhi, 2008.
2. Veerarajan, T., “Engineering Mathematics”, Tata McGraw-Hill, New Delhi, Reprint 2010.

REFERENCE BOOKS

1. Grewal, B.S., “Higher Engineering Mathematics”, Thirty Sixth Edition, Khanna Publishers, New Delhi, 2007.
2. Wylie, C. Ray and Barrett, Louis, C., “Advanced Engineering Mathematics”, Sixth Edition, McGraw-Hill, New York, 2004.
3. Andrews, L. A. and Shivamoggi, B. K., “Integral Transforms for Engineers and Applied Mathematicians”, Macmillan, New York, 2004.

COURSE OUTCOMES

On completion of the course the students will be able to

- CO1: Utilize Fourier series to solve engineering problems.
- CO2: Formulate and solve higher order partial differential equations.
- CO3: Interpret the basic knowledge of Fourier transforms and Z-transforms in engineering field.

Mapping of COs with POs

| COs/POs | a | b | c | d | e | f | g | h | i | j | k | l | m |
|---------|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 3 | | 1 | 2 | | | | | | | 1 | |
| CO2 | 3 | 3 | | 2 | 2 | | | | | | | 1 | |
| CO3 | 3 | 3 | | 1 | 2 | | | | | | | 1 | |

3 – Substantial, 2 – Moderate, 1 – Slight

MODULE – I**15**

General Geology: Importance of Geology - Branches of geology – Interior of the earth - Elementary knowledge on continental drift and plate tectonics. Earth processes: Weathering - Work of rivers, wind, earthquake and their engineering importance. Groundwater - Mode of occurrence.

MODULE - II**15**

Mineralogy and Petrology: Mineralogy: Elementary knowledge on symmetry elements of normal class of crystallographic systems - Physical properties of minerals - Study of the following minerals: Quartz, Feldspar, Biotite, Muscovite, Calcite, Garnet – Properties and uses.

Petrology: Classification of rocks – Distinction between Igneous, Sedimentary and Metamorphic rocks – Description of the following rocks: Granite, Syenite, Basalt, Sandstone, Limestone, Conglomerate, Breccia, Shale, Quartzite, Marble, Gneiss Slate and Schist

MODULE - III**15**

Structural Geology and Geological Investigations in Civil Engineering: Dip and Strike - Outcrops – Study of structures: Folds, Faults, joints and their bearing on engineering construction, Electrical methods for Civil Engineering investigations. Geological conditions for construction of dam and tunnel landslides - Elementary knowledge on Remote sensing technique and field of applications of remote sensing data.

TOTAL : 45**TEXT BOOK**

1. Parbin Singh “Engineering and General Geology” Garg, S.K..Kataria & Sons, New Delhi, 8th Edn. 2010.

REFERENCE BOOKS

1. Legeet, “Geology and Engineering”, McGraw-Hill Book, New York, 1998.
2. Blyth., “Geology for Engineers”, ELBS, London, 1995.
3. Garg, S.K., “Physical and Engineering Geology”, Khanna Publishers, New Delhi, 2005.

COURSE OUTCOMES

On completion of the course the students will be able to

- CO1: Understand the formation of earth and its structure
 CO2: Acquire the knowledge about mineral and rock formation
 CO3: Understand the methods the used in field investigation

Mapping of COs with POs

| COs/POs | a | b | c | d | e | f | g | h | i | j | k | l | m |
|---------|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | | | | | | | 2 | | 3 | | | |
| CO2 | | | | | | | | 2 | 3 | | | | |
| CO3 | | | | | 3 | | | 2 | | | | 3 | |

3 – Substantial, 2 – Moderate, 1 – Slight

11ME301 ENGINEERING MECHANICS
(Common to Civil, Mechanical, Mechatronics Engineering branches)

3 1 0 4

MODULE – I

15

Statics of Particles and Rigid Bodies: Introduction - Laws of Mechanics – Parallelogram and triangular Law of forces – Principle of transmissibility- Coplanar Forces – Resolution and Composition of forces -Free body diagram- Equilibrium of a particle- Forces in space -Vectorial representation of forces- Equilibrium of a particle in space. Moments – Moment of a force about a point and about an axis – Vectorial representation of moments and couples – Scalar component of moments – Varignon’s theorem– Equivalent systems of forces – Single equivalent force. Types of supports and their reactions – requirements of stable equilibrium – Equilibrium of Rigid bodies in two dimensions – Equilibrium of Rigid bodies in three dimensions – Examples.

MODULE - II

15

Friction: Surface Friction – Laws of dry friction – Sliding friction – Static and Kinetic friction–ladder friction – Wedge friction – Rolling resistance – Belt friction.

Properties of Surfaces and Solids: Determination of Areas and Volumes – First moment of area and the Centroid of sections – Rectangle, circle, triangle areas from integration – T section, I section, Angle section, Hollow section from primary simpler sections – second moments of plane area – Parallel axis theorem and Perpendicular axis theorem- Rectangle, triangle, circle from integration - T section, I section, Angle section, Hollow sections – Polar moment of inertia – Principle Moment of inertia of plane area-Principle axis of inertia- Mass moment of inertia – Derivation of mass moment of inertia for prism, cylinder and sphere from first principle – Relation to area moments of inertia.

MODULE - III

15

Dynamics of Particles and Rigid Body: Rectilinear motion of particles - Relative motion – Curvilinear motion – Newton’s law – Energy and momentum Equation of particles – Impulse – Impact of elastic bodies – Motion of connected particles. Kinematics of Rigid body, Kinetic equation of motion, Translation, Rotation about a fixed axis- General plane motion.

Lecture : 45, Tutorial : 15, TOTAL : 60

TEXT BOOKS

1. Rajasekaran, S, and Sankarasubramanian, G., “Fundamentals of Engineering Mechanics”, Vikas Publishing House, New Delhi, 2008.
2. Beer, F. P and Johnson, E. R., “Vector Mechanics for Engineers- Statics and Dynamics, Tata McGraw-Hill, 8th Edition, New Delhi, 2008.

REFERENCE BOOKS

1. Shames, Irving H., “Engineering Mechanics: Statics and Dynamics”, Fourth Edition, Pearson Education Asia, Singapore, 2003.
2. Hibbeler, R. C., “Engineering Mechanics”, Volume - I: Statics, Volume - II: Dynamics, Pearson Education Asia, Singapore, 2006.
3. Timoshenko, Stephen and Young, D. H., “Engineering Mechanics”, Tata McGraw-Hill, New Delhi, 2006.

COURSE OUTCOMES

On completion of the course the students will be able to

- CO1: represent the forces in vector components (both 2D and 3D) and apply equilibrium conditions
- CO2: calculate the moment produced by various force systems and develop static equilibrium equations for rigid body system
- CO3: evaluate the centroid, centre of gravity and moment of inertia of geometrical shapes and solids respectively
- CO4: comprehend the effect of dry friction and its applications
- CO5: apply the different principles to study the motion of a body and analyse their constitutive equations

Mapping of COs with POs

| COs/POs | a | b | c | d | e | f | g | h | i | j | k | l | m |
|---------|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 3 | 3 | 2 | 2 | | | | | | 2 | 2 | |
| CO2 | 3 | 3 | 3 | 2 | 2 | | | | | | 2 | 2 | |
| CO3 | 3 | 3 | 3 | 2 | 2 | | | | | | 2 | 2 | |
| CO4 | 3 | 3 | 3 | 2 | 2 | | | | | | 2 | 2 | |
| CO5 | 3 | 3 | 3 | 2 | 2 | | | | | | 2 | 2 | |

3 – Substantial, 2 – Moderate, 1 – Slight

MODULE – I**15**

Fluid Properties and Statics: Definitions – Fluid and fluid mechanics – Dimensions and units – Fluid properties – Continuum Concept of system and control volume - Pascal’s Law and Hydrostatic equation – Forces on plane and curved surfaces – Buoyancy – Meta centre – Pressure measurement – Fluid mass under relative equilibrium.

MODULE - II**15**

Fluid Kinematics and Dynamics: Fluid Kinematics - Stream, streak and path lines – Classification of flows – Continuity equation (one, two and three dimensional forms) – Stream and potential functions – flow nets – Velocity measurement - Euler and Bernoulli’s equations – Application of Bernoulli’s equation – Discharge measurement – Laminar flows through pipes and between plates – Hagen Poisuille equation – Turbulent flow – Darcy-Weisbach formula – Moody diagram – Momentum Principle.

MODULE - III**15**

Boundary Layer and Flow Through Pipes: Definition of boundary layer – Thickness and classification – Displacement and momentum thickness – Development of laminar and turbulent flows in circular pipes – Major and minor losses of flow in pipes – Pipes in series and in parallel – Pipe network.

Similitude and Model Study: Dimensional Analysis – Rayleigh’s method, Buckingham’s Pi-theorem – Similitude and models – Scale effect and distorted models.

Lecture : 45, Tutorial : 15, TOTAL : 60**TEXT BOOK**

1. Bansal, R.K., “Fluid Mechanics and Hydraulic Machines”, Laxmi Publications (P) Ltd., New Delhi, 2008.

REFERENCE BOOKS

1. Modi, P.M. and Seth, S.M., “Hydraulics, Fluid Mechanics and Hydraulic Machinery”, Standard Book House, New Delhi, 2005.
2. Streeter, Victor L and Wylie, Benjamin E., “Fluid Mechanics”, McGraw-Hill, New York, 1998.
3. Kumar, K.L., “Engineering Fluid Mechanics”, Eurasia Publishing House (P) Ltd., New Delhi, 1995.

COURSE OUTCOMES

On completion of the course the students will be able to

- CO1: Understand the fluid properties and statics
 CO2: Apply fluid kinematics and dynamics in all fields
 CO3: Analyse the boundary layer fluid and similitude

Mapping of COs with POs

| COs/POs | a | b | c | d | e | f | g | h | i | j | k | l | m |
|---------|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | | | | 3 | | | | | | | | |
| CO2 | 3 | | | | 3 | | | | 3 | | | | |
| CO3 | 3 | | | | 3 | | | 1 | | 2 | | | |

3 – Substantial, 2 – Moderate, 1 – Slight

11CE303 CONSTRUCTION MATERIALS, METHODS AND EQUIPMENT**3 0 0 3****MODULE – I****15****Construction Materials**

Stones, Bricks, Timber, Steel and Modern Materials: Stone, Brick, Mortar, Cement and Concrete Testing and Properties – Timber – Market forms– Industrial timber – Steel – Aluminum and other Metallic Materials– Market forms –Glass – Ceramics – Sealants for joints – Fiber Glass Reinforced Plastic – Clay Products – Composites Materials – Types – Applications of laminar composites – Geo synthetics for Civil Engineering Applications.

MODULE - II**15**

Construction Methods: Formwork – requirements – IS Standards – Shoring – Underpinning – Scaffolding – Types – Ventilations – Requirements – Air Conditioning Systems – Acoustics – Materials – Requirements – Acoustical Design – Sound Insulation – Materials – Methods.

MODULE - III**15**

Introduction To Construction Equipments: Factors involved in the Selection of Equipments – Types of Earth Work Equipment – Tractors, Scrapers – Equipments for Dredging, Tunneling, Trenching, Drilling, and Blasting – Compaction Equipments. Pumps used in Construction – Dewatering Equipments – Pile Drilling Equipments. Equipments used for RM Concreting – Batching – Concrete Mixers and Pumps.

TOTAL : 45**TEXT BOOKS**

1. Arora, S.P. and Bindra, S.P., “Building Construction, Planning Techniques and Methods of Construction”, Dhanpat Rai Publications, New Delhi, 2007.
2. Sharma, S.C. "Construction Equipment and Management", Khanna Publishers, New Delhi, 2006.

REFERENCE BOOKS

1. Rajput, R.K., “Engineering Materials”, S. Chand and Company Ltd, New Delhi, 2008.
2. Punmia, P.C., “Building Construction”, Lakshmi Publications, New Delhi, 2007.
3. Deodhar, S.V. "Construction Equipment and Job Planning". Khanna Publishers, New Delhi, 1988.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Learn about various construction materials.

CO2: Understand the basic construction methods.

CO3: Gain fundamental knowledge about various equipments used in construction.

Mapping of COs with POs

| COs/POs | a | b | c | d | e | f | g | h | i | j | k | l | m |
|---------|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | | | 3 | | 2 | 1 | | 2 | 3 | 1 | | | 3 |
| CO2 | | | | | 3 | | | 2 | 3 | | 3 | | |
| CO3 | | | | | 2 | | | | 3 | | | | |

3 – Substantial, 2 – Moderate, 1 – Slight

MODULE – I

15

Chain Surveying, Compass Surveying and Plane Table Surveying: Definition - Principles - Classification - Field and office work - Scales - Conventional signs - Survey instruments, their care and adjustment - Ranging and chaining - Reciprocal ranging - Setting perpendiculars - well - conditioned triangles - Traversing - Plotting - Enlarging and reducing figures – Prismatic compass - Surveyor’s compass - Bearing - Systems and conversions - Local attraction - Magnetic declination - Dip - Traversing - Plotting - Adjustment of errors - Plane table instruments and accessories - Merits and demerits - Methods - Radiation - Intersection - Resection – Traversing-Two Point Problem and Three Point Problem.

MODULE - II

15

Levelling and Applications: Level line - Horizontal line - Levels and Staves - Spirit level - Sensitiveness - Bench marks - Temporary and permanent adjustments - Fly and check levelling - Booking - Reduction - Curvature and refraction - Reciprocal levelling - Longitudinal and cross sections - Plotting - Calculation of areas and volumes - Contouring - Methods - Characteristics and uses of contours - Plotting - Earth work volume - Capacity of reservoirs.

MODULE - III

15

Theodolite Surveying and Engineering Surveys: Theodolite - Vernier and microptic - Description and uses - Temporary and permanent adjustments of vernier transit - Horizontal angles - Vertical angles - Heights and distances - Traversing - Closing error and distribution - Gale’s tables - Omitted measurements - Reconnaissance, preliminary and location surveys for engineering projects - Lay out - Setting out works - Route Surveys for highways, railways and waterways - Curve ranging - Horizontal and vertical curves - Simple curves - Setting with chain and tapes, tangential angles by theodolite, double theodolite - Compound and reverse curves - Transition curves - Functions and requirements - Vertical curves - Sight distances - Mine Surveying - instruments - Tunnels - Correlation of under ground and surface surveys - Shafts - Adits.

TOTAL : 45

TEXT BOOK

1. Punmia, B.C., “Surveying”, Volume. I and II, Laxmi Publications, New Delhi, 2008.

REFERENCE BOOKS

1. Duggal, “Surveying”, Volumes - I and II, Tata McGraw-Hill, New Delhi, 2007.
2. Kanetkar, T. P., “Surveying and Levelling”, Volumes - I and II, United Book Corporation, Pune, 1994.
3. Subramanian R, “Surveying and Levelling”, Oxford University Press, New Delhi, 2007.

COURSE OUTCOMES

On completion of the course the students will be able to

- CO1: Gain knowledge about Chain surveying, Compass surveying, Plane table surveying
- CO2: Impart the skill to do the Levelling, contouring & the calculation of Areas and volumes
- CO3: Gain the knowledge about Theodolite surveying and Engineering surveys

Mapping of COs with POs

| COs/POs | a | b | c | d | e | f | g | h | i | j | k | l | m |
|---------|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | | | | 2 | | | | 2 | | 3 | 3 | |
| CO2 | 3 | | | | 2 | | | | 2 | | 2 | 3 | |
| CO3 | 2 | | | | 2 | | | | 2 | | 3 | 2 | |

3 – Substantial, 2 – Moderate, 1 – Slight

LIST OF EXPERIMENTS /EXERCISES:

1. Study of chains and its accessories.
2. Ranging and Chaining.
3. Chain Traversing.
4. Compass Traversing.
5. Plane table surveying: Radiation
6. Plane table surveying: Intersection
7. Plane table surveying: Traversing
8. Plane table surveying: Resection –Three point problem
9. Plane table surveying: Resection – Two point problem
10. Study of levels and levelling staff
11. Levelling using Dumpy level
12. LS and CS leveling
13. Contouring
14. Curve Setting

REFERENCES / MANUALS / SOFTWARE:

1. Punmia, B.C., “Surveying”, Volumes – I and II, Laxmi Publications, New Delhi, 2008.
2. Surveying Practical Manual.

COURSE OUTCOMES

On completion of the course the students will be able to

- CO1: Develop the ability to study chains. traversing, plan table surveying, levelling, contouring and curve setting

Mapping of COs with POs

| COs/POs | a | b | c | d | e | f | g | h | i | j | k | l | m |
|---------|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | | 3 | | | 3 | | | | | | 3 | 3 | |

1 – Slight, 2 – Moderate, 3 – Substantial

LIST OF EXPERIMENTS /EXERCISES

1. Functional planning of buildings (Residential, Institutional, hospitals and Library Buildings)
2. Buildings with load bearing walls - Flat roof & Pitched roof – Including details of doors and windows
3. RCC framed structures
4. Industrial buildings – North light roof structures – Trusses
5. Perspective view of one and two storey buildings
6. Study on application of Software

REFERENCES / MANUALS / SOFTWARES:

1. Auto CAD 2007
2. Varma, B.P, “Civil Engineering Drawing & House Planning”, Khanna Publishers, New Delhi, 2006.

COURSE OUTCOMES

On completion of the course the students will be able to

- CO1: Draft on computer building drawings in accordance with development and control rules satisfying orientation and functional requirements for various buildings

Mapping of COs with POs

| COs/POs | a | b | c | d | e | f | g | h | i | j | k | l | m |
|---------|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | | 3 | | | | | | | | | 3 | | |

1 – Slight, 2 – Moderate, 3 – Substantial

11MA401 NUMERICAL METHODS

(Common to all Engineering and Technology branches except ECE & CSE)

3 1 0 4

MODULE - I

15

Linear Algebraic Equations: Method of false position - Newton's method - Solution of linear system of equations by Gaussian elimination and Gauss - Jordan methods – Iterative methods: Gauss Jacobi and Gauss – Seidel methods.

Interpolation: Newton's forward and backward difference formulae – Bessel's formula - Lagrange's interpolation formula - Newton's divided difference formula.

MODULE - II

15

Numerical Differentiation: Differentiation Using Newton's forward, backward and divided difference interpolation formula - Single step Methods - Taylor Series, Euler and Modified Euler methods - Fourth order Runge-Kutta method for solving first order equations - Multistep methods – Milne's and Adam's predictor and corrector methods.

Numerical Integration: Trapezoidal rule – Simpson's 1/3 – Double integrals using Trapezoidal and Simpson's rules.

MODULE - III

15

Boundary Value Problems in PDE: Finite difference approximations to partial derivatives - Two dimensional Laplace equations - Poisson equations – One dimensional heat equation by implicit and explicit methods – One dimensional wave equation.

Lecturer: 45, Tutorial: 15, TOTAL: 60

TEXT BOOKS

1. Kandasamy, P., Thilakavathy, K. and Gunavathy, K., "Numerical Methods", S.Chand & Co, New Delhi, reprint 2010.
2. Venkatraman, M. K., "Numerical Methods", National Publishing Company, Chennai, 2000.

REFERENCE BOOKS

1. Balagurusamy, E., "Numerical Methods", Tata McGraw-Hill, New Delhi, 1999.
2. Jain, M. K., Iyengar, S. R. K. and Jain, R. K., "Numerical Methods for Scientific and Engineering Computation", Fourth Edition, New Age International (P) Ltd., New Delhi, 2006.
3. Sankara Rao, K., "Numerical Methods for Scientists and Engineers", Second Edition, Prentice Hall India, New Delhi, 2004.
4. Thangaraj, P., "Computer – Oriented Numerical Methods", Prentice Hall of India, New Delhi, 2008.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Discuss the various methods of solving linear algebraic and transcendental equations.

CO2: Estimate the intermediate values using interpolation concepts.

CO3: Interpret the knowledge of numerical differentiations and integration

CO4: Apply various numerical techniques in solving complex partial differential equations.

Mapping of COs with POs

| COs/POs | a | b | c | d | e | f | g | h | i | j | k | l | m |
|---------|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 3 | | 1 | 2 | | | | | | | 1 | |
| CO2 | 3 | 3 | | | | | | | | | | 1 | |
| CO3 | 3 | 3 | | 1 | 2 | | | | | | | 1 | |
| CO4 | 3 | 3 | | 1 | 2 | | | | | | | 1 | |

1 – Slight, 2 – Moderate, 3 – Substantial

11CE401 MECHANICS OF MATERIALS

3 1 0 4

MODULE – I 15

Stress and Strain: Rigid bodies and deformable solids – stability, strength, stiffness – tension, compression and shear stresses – strain, elasticity, Hooke’s law, limit of proportionately, modulus of elasticity, stress-strain curve, lateral strain – temperature stresses – deformation of simple and compound bars – shear modulus, bulk modulus, relationship between elastic constants.

MODULE - II 15

Statically Determinate Beams: Beams - Types and transverse loading on beams – shear force and bending moment in beams - Slope and Deflection of beams - Double integration method - Macaulay's method – Moment Area Method - Conjugate beam method.

Theory of simple bending – Derivation – Assumptions - Analysis of stresses – load carrying capacity – Proportioning sections - Shear Stress Distribution.

Torsional Equation – Derivation – Assumptions - Stresses in circular and hollow shafts.

MODULE - III 15

Columns and Trusses:

Columns: Columns - types - short column - long column – Euler’s - Rankine and Secant formulae.

Analysis of Plane Trusses: Stability and equilibrium of plane frames – perfect frames – types of trusses – analysis of forces in truss members – method of joints – method of tension coefficients – method of sections.

Lecture : 45, Tutorial : 15, TOTAL : 60

TEXT BOOK

- Rajput, R.K., “Strength of Materials”, Revised Edition, S. Chand & Co, New Delhi, 2006.

REFERENCE BOOKS

- Laudner, T.J. and Archer, R.R., “Mechanics of Solids: an Introduction”, McGraw-Hill, New York, 1994.
- Bansal, R.K., “Strength of Materials”, Laxmi Publications, New Delhi, 2007.
- Hibbeler., “Mechanics of Materials”, Pearson Edition, New Delhi, 2007.

COURSE OUTCOMES

On completion of the course the students will be able to

- CO1: Analyse the various elastic constant relationship.
- CO2: Understand the slope and deflection of beams
- CO3: Analyse simple bending and torsional equation.
- CO4: Analyse the forces and their effects along with some suitable protective measures for the safe working condition.
- CO5: Solve the truss problems.

Mapping of COs with POs

| COs/POs | a | b | c | d | e | f | g | h | i | j | k | l | m |
|---------|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | | | | 3 | | | | 3 | | 3 | | 3 |
| CO2 | 3 | | | | 3 | | | | 3 | | 3 | | 3 |
| CO3 | 3 | | | 2 | 3 | | | | 3 | | 3 | | 3 |
| CO4 | 3 | | | 2 | 3 | | | | 3 | | 3 | | 3 |
| CO5 | 3 | | | 2 | 3 | | | | 3 | | 3 | | 3 |

1 – Slight, 2 – Moderate, 3 – Substantial

MODULE – I**15**

Fresh Concrete: Introduction – Concrete – Advantages over steel – Concrete ingredients – Cement – Chemical composition – Hydration of cement – Structure of hydrated cement paste – Aggregates – Types – Grading of aggregates – Water – Admixtures – Construction chemicals and corrosion inhibitors – Properties of fresh concrete – Water cement ratio – Workability – Factors affecting workability-Mix proportioning – Statistical quality control – Concrete mix design – IS code method – ACI method.

MODULE - II**15**

Hardened Concrete: Strength of concrete – Maturity concept of concrete – Properties of hardened concrete – Elastic modulus – Relation between compressive strength and elastic modulus – Creep and shrinkage – Non destructive testing of concrete (Rebound hammer and UPV Test) - Durability of concrete - Definition – Strength and durability relationship – Permeability – Cracks – Concrete subjected to high temperature – Alkali aggregate reaction – Freezing and thawing – Chemical attack – Carbonation – Corrosion of reinforcement in concrete and its control measures – Methods of improving durability of concrete.

MODULE- III**15**

Special Concretes: High strength concrete - High performance Concrete – Self compacting concrete - Light weight concrete – No fines concrete – Fiber reinforced concrete – Polymer concrete – Vacuum concrete – Ferrocement – High volume fly ash concrete – Roller compacted concrete – Geopolymer concrete – Pervious concrete – Bacterial concrete - Basalt fibre concrete.

TOTAL : 45**TEXT BOOKS**

1. Santhakumar, A.R, “Concrete Technology”, Oxford University Press Publications, New Delhi, 2006.
2. Shetty, M.S. “Concrete Technology Theory and Practice” S.Chand & Company Ltd., New Delhi, Revised edition, 2008.

REFERENCE BOOKS

1. Neville, A.M and Brooks, J.J. “Concrete Technology”, Addition Wesley Longman Limited, London, 1999.
2. Gambhir, M.L. “Concrete Technology”, Tata McGraw-Hill Publishing Company Ltd., New Delhi, Third edition, 2004.
3. Kumar Mehta, P. and Paulo J.M.Monteiro, “Concrete: Microstructure, Properties and Materials”, McGraw Hill, Singapore, 2006.

COURSE OUTCOMES

On completion of the course the students will be able to

- CO1: Learn about various ingredients, properties and tests to be conducted on fresh concrete.
- CO2: Gain knowledge on mechanical and durability properties of hardened concrete.
- CO3: Understand various special concretes used and their applications.

Mapping of COs with POs

| COs/POs | a | b | c | d | e | f | g | h | i | j | k | l | m |
|---------|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | | 3 | | 2 | | | | 3 | | | | 3 |
| CO2 | 3 | | 3 | | | | | 2 | | 3 | | | |
| CO3 | 3 | | 3 | 3 | 3 | | | | 3 | 2 | 3 | | |

1 – Slight, 2 – Moderate, 3 – Substantial

MODULE – I**15**

Open Channel and Uniform Flow: Open channel flow – Types and regimes of flow – Velocity distribution in open channel – Wide open channel – Specific energy – Critical flow and its computation- Uniform flow – Velocity measurement – Manning’s and Chezy’s formula – Determination of roughness co-efficients – Determination of normal depth and velocity – Most economical sections – Non-erodible channels.

MODULE - II**15**

Varied Flow: Dynamic equations of gradually varied flow – Assumptions – Characteristics of flow profiles – Draw down and back water curves – Profile determination – Graphical integration, direct step and standard step method – Flow through transitions – Hydraulic jump – Types – Energy dissipation – Surges – Surge channel transitions.

MODULE - III**15**

Pumps and Turbines: Application of momentum principle – Impact of jets on plane and curved plates – Centrifugal pump – Minimum speed to start the pump – Multistage pumps – Jet and submersible pumps – Positive displacement pumps – Reciprocating pump – Negative slip – Flow separation conditions – Air vessels – Indicator diagram and its variation – Savings in work done – Rotary pumps - Turbines – Classification – Radial flow turbines – Axial flow turbines – Impulse and reaction turbines – Draft tube and cavitations – Performance of turbines – Similarity laws.

Lecture : 45, Tutorial : 15, TOTAL : 60**TEXT BOOK**

1. Modi, P.M. and Seth, S.M., “Hydraulics, Fluid Mechanics and Hydraulic Machinery”, Standard Book House, New Delhi, 2005.

REFERENCE BOOKS

1. Subramanya , K., “Flow in Open Channels”, Tata McGraw-Hill, New Delhi 1994.
2. Kumar, K.L., “Engineering Fluid Mechanics”, Seventh Edition, Eurasia Publishing House (P) Ltd., New Delhi 1995.
3. Srivastava. Rajesh, “Flow Through Open Channels”, Oxford University Press, New Delhi, 2008.

COURSE OUTCOMES

On completion of the course the students will be able to

- CO1: Solve the open channel flow characteristics including hydraulic jumps and surges
- CO2: Analyse the flow characteristics in open channel flow and design hydraulic machines
- CO3: Evaluate flow through turbines and pumps including their performance characteristics

Mapping of COs with POs

| COs/POs | a | b | c | d | e | f | g | h | i | j | k | l | m |
|---------|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | | | | 3 | | | | | | | | |
| CO2 | 3 | | | | 3 | | | | 3 | | | | |
| CO3 | 3 | | | | 3 | | | 1 | | 2 | | | |

1 – Slight, 2 – Moderate, 3 – Substantial

MODULE – I**15**

Objectives, Importance and Sources of Water: Objectives and importance of Public Water Supply systems – Factors influencing Water Supplies in India – Water Analysis – Population Forecasts – Variations in Demands – Continuous and Intermittent water supplies - Surface and Ground Water Sources – Source selection – Computation of storage requirements – Mass Curve Analysis – Intake Structures – Wells, Infiltration Galleries – Deep Tube wells – Sanitary Protection of Wells – Hydraulics of Ground Water Flow – Darcy’s Law - Estimating Yields of Wells – Drinking water standards

MODULE - II**15**

Conveyance, Storage and Distribution: Pipes and Channels for Transmitting water – Hydraulics of Pipe Flow – Materials for Pipes and Conduits – Selection of Materials – Laying, Jointing and Testing of G.I, C.I, R.C.C, A.C and Plastic Pipes – Appurtenances of Pipes & distribution system - Pumps and Pumping Stations – Selection of Pumps – Series and Parallel Operation – Automatic Control - Analysis of Distribution networks using Hardy Cross Method – Equivalent Pipes – Elementary Methods for Pipe sizing – Operation and Maintenance – Leak Detection, Corrosion control, lining of pipes – Elevated and ground level reservoirs – Location – Determination of Storage Capacity – Software applications

MODULE - III**15**

Design Principles of Water Treatment: Characteristics of surface and ground water sources – Unit process of Water Treatment – Principles, functions and design of flash mixers, Flocculators, Sedimentation Tanks and Sand Filters – Principles of Disinfection, Water Softening Methods, Aeration, iron and Manganese Removal, Fluoride Removal.

Lecture : 45, Tutorial : 15, TOTAL : 60**Note: Drawings not for end semester examination****TEXT BOOK**

1. Garg, S.K., “Water Supply Engineering”, Khanna Publishers, New Delhi, 2007.

REFERENCE BOOKS

1. Babbitt, H.E and Donald J.J., “Water Supply Engineering”, McGraw-Hill, New Delhi, 2007.
2. Hussain, S.K., “A Text Book on Water Supply and Sanitary Engineering”, Oxford & IBH Publishing Co, New Delhi, 2006.
3. “Manual on Water Supply and Treatment”, CPHEEO, Government of India, New Delhi, 1999.

COURSE OUTCOMES

On completion of the course the students will be able to

- CO1: Understand the importance and sources of water, water supply system and also the storage requirements with detailed drawings.
- CO2: Acquire knowledge about the distribution system , analysis of networks and drawings
- CO3: Understand the principles of water treatment along with their drawing specifications

Mapping of COs with POs

| COs/POs | a | b | c | d | e | f | g | h | i | j | k | l | m |
|---------|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | | 3 | | 3 | | | 3 | 2 | | | 3 | |
| CO2 | 3 | | 3 | | 3 | | | | 2 | | | | |
| CO3 | 3 | 3 | | | | | | 3 | 2 | 2 | | | |

1 – Slight, 2 – Moderate, 3 – Substantial

MODULE – I**15**

Tachometric and Control Surveying: Tacheometric systems - Tangential, stadia and subtense methods - Stadia systems - Horizontal and inclined sights - Vertical and normal staffing - Fixed and movable hairs – Stadia constants - Anallactic lens - Working from whole to part - Horizontal and vertical control methods - Triangulation - Signals - Base line - Instruments and accessories - Corrections - Satellite station - Reduction to centre - Trigonometric Levelling - Single and reciprocal observations.

MODULE - II**15**

Survey Adjustments, Astronomical Surveying and Modern Surveying Equipments: Errors - Sources, precautions and corrections - Classification of errors - True and most probable values - weighted observations - Method of equal shifts - Principle of least squares - Normal equation - Correlates - Adjustment of simple triangulation networks - Celestial sphere - Astronomical terms and definitions - Introduction to total station – Introduction to GPS - Basics of remote sensing.

MODULE - III**15**

Photogrammetry and Hydrographic Surveying: Photogrammetry - Introduction - Terrestrial and aerial Photographs - Stereoscopy - Parallax – Electromagnetic distance measurement - Carrier waves – Principles - Instruments (Geodimeter and tellurometer) - Trilateration - Hydrographic Surveying - Tides - MSL - Sounding methods - Location of soundings and methods - Three point problem - Strength of fix - Sextants and station pointer - River surveys - Cartography - Cartographic concepts and techniques - Cadastral surveying - Definition - Uses - Scales and accuracies.

TOTAL : 45**TEXT BOOK**

1. Punmia, B.C., “Surveying”, Volume. I and II, Laxmi Publications, New Delhi, 2008.

REFERENCE BOOKS

1. Duggal, “Surveying”, Volume. I and II, Tata McGraw-Hill, New Delhi, 2007.
2. Kanetkar, T. P., “Surveying and Levelling”, Volume. I and II, United Book Corporation, Pune, 1994.
3. Subramanian R, “Surveying and Levelling”, Oxford University Press, New Delhi, 2007.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Gain knowledge about tachometric surveying, control surveying & trigonometric leveling

CO2: Enable the students to do the survey adjustments, astronomical surveying

CO3: Understand basic knowledge about the photogrammetry & Hydrographic surveying

Mapping of COs with POs

| COs/POs | a | b | c | d | e | f | g | h | i | j | k | l | m |
|---------|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | | | | 3 | | | | 3 | | 2 | 2 | |
| CO2 | 2 | | | | 2 | | | | 3 | | 3 | 3 | |
| CO3 | 3 | | | | 3 | | | | 2 | | 2 | 2 | |

1 – Slight, 2 – Moderate, 3 – Substantial

LIST OF EXPERIMENTS / EXERCISES:

1. Study of Theodolite.
2. Determination of Length of Building.
3. Determination of Constants K and C.
4. Determination of area by measurement of horizontal angles by (Repetition method and Reiteration method)
5. Determination of distance and elevation of two points by (Tacheometric method and Tangential system method)
6. Tacheometric Contouring.
7. Setting out works - Foundation marking
8. Demonstration of Total Station.
9. Demonstration of GPS
10. Demonstration of Pocket Stereoscope.

REFERENCES / MANUALS / SOFTWARE:

1. Punmia, B.C., "Surveying", Volume. I and II, Laxmi Publications, New Delhi, 2008.
2. Surveying Practical Manual.
3. Advanced Total Station Manual.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Posses knowledge about Advanced Survey in Civil Engineering field.

Mapping of COs with POs

| COs/POs | a | b | c | d | e | f | g | h | i | j | k | l | m |
|---------|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | | 3 | | | 3 | | | | | | 3 | 3 | |

1 – Slight, 2 – Moderate, 3 – Substantial

11ME305 FLUID MECHANICS AND MACHINERY LABORATORY
(Common to Civil, Mechanical and Mechatronics)

0 0 3 1

LIST OF EXPERIMENTS

1. Determination of co-efficient of discharge for venturimeter
2. Determination of co-efficient of discharge for orifice meter
3. Study on impact of jet on flat plate (normal / inclined)
4. Study on friction losses in pipes
5. Study on minor losses in pipes
6. Study on performance characteristics of Pelton turbine (constant head method)
7. Study on performance characteristics of Francis turbine (constant head method)
8. Study on performance characteristics of Kaplan turbine (constant head method)
9. Study on performance characteristics of Centrifugal pump
10. Study on performance characteristics of reciprocating pump.
11. Study on performance characteristics of submersible pump.
12. Study on performance characteristics of Jet pump.
13. Study on performance characteristics of Gear pump

REFERENCES / MANUALS / SOFTWARE:

1. Cengel, Yunus A. and Cimbala, John M., “Fluid Mechanics”, Tata McGraw- Hill, New Delhi, 2nd Edition, 2010.
2. Bansal, R.K., “Fluid Mechanics and Hydraulics Machines”, Fifth Edition, Laxmi publications, New Delhi, 2010.
3. Som, S.K. and Biswas, G., “Introduction to Fluid Mechanics and Fluid Machines”, Second Edition, Tata McGraw-Hill, New Delhi, 2nd Edition, 2007.
4. Lab Manuals

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Analyse the principles studied in theory by conducting the experiments.

Mapping of COs with POs

| COs/POs | a | b | c | d | e | f | g | h | i | j | k | l | m |
|---------|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 3 | | | 3 | | | | | | 2 | | |

1 – Slight, 2 – Moderate, 3 – Substantial

MODULE – I

15

Water – Air Relationship, Classification of Soils, Effective Stress and Permeability: Nature of soil - Soil description and classification for engineering purposes - IS Classification system – Phase relationships - Soil Water: Various forms – Capillary rise – Suction. Effective stress concepts in soils – Total, Neutral and effective stress distribution in soil. Permeability – Darcy’s law- Permeability measurement in the laboratory and field.

MODULE - II

15

Seepage, Flow Nets, Soil Compaction and Vertical Stress due to applied Loads: Seepage - Introduction to flow nets – properties and uses. Soil compaction - Theory, comparison of laboratory and field compaction methods – Ground improvement by compaction. Stress distribution in soil media – Basic Assumptions - Boussinesque formula – Stress due to line load, Circular and Rectangular loaded area – Approximate methods - Use of Newmarks influence charts – Introduction to Westergaard Analysis.

MODULE - III

15

Compressibility and Shear Strength : Compressibility: Effect of soil type, Role of Stress History - Time Rate of Consolidation: Mechanics of Consolidation, Terzaghi's theory of one dimensional consolidation, governing differential equation (except solution for basic differential equation) – Laboratory consolidation test –Shear strength of cohesive and cohesionless soils - Mohr - Coulomb failure theory - Measurement of shear strength, direct shear - Triaxial compression, UCC and Vane shear tests –Types of shear test based on drainage conditions – Factors affecting shear strength of soils.

Lecture: 45, Tutorial: 15, TOTAL: 60

TEXT BOOKS

1. Gopal Ranjan and Rao, A.S.R., “Basic and Applied Soil Mechanics”, New age International (P) Limited, Publishers, New Delhi, 2000.
2. Arora, K.R., “Soil Mechanics and Foundation Engineering”, Standard Publishers and Distributors, New Delhi, 1997.

REFERENCE BOOKS

1. Murthy. V.N.S, “Principles of Soil Mechanics and Foundation Engineering”, Fifth Edition, UBS Publishers, New Delhi, 2001.
2. Venkataramaiah, C., “Geotechnical Engineering”, Second Edition, New Age International (P) Limited, Publishers, New Delhi, 1995.

COURSE OUTCOMES

On completion of the course the students will be able to

- CO1: Gain Knowledge about soil classifications, effective stress and permeability concepts.
- CO2: Understand and analyze the concepts of seepage, stress distribution theory and compaction theory
- CO3: Understand the concepts of compressibility and shear strength parameters.

Mapping of COs with POs

| COs/POs | a | b | c | d | e | f | g | h | i | j | k | l | m |
|---------|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | | | | 3 | | | 3 | 3 | | | | |
| CO2 | 3 | | | | 3 | | | 3 | 3 | | | | |
| CO3 | 3 | | | | 3 | | | 3 | 3 | | | | |

1 – Slight, 2 – Moderate, 3 – Substantial

MODULE -I

Slope Deflection Method: Formation of slope deflection equations-Analysis of continuous beams and rigid frames with and without sway – Support settlement.

Moment Distribution Method: Analysis of continuous beams – Plane rigid orthogonal frames with and without sway

MODULE -II

Moving Loads and Influence Lines: Influence Lines for reactions in statically determinate structures – Influence lines for member forces in pin-jointed frames – Influence lines for shear force and bending moment in beam sections. Muller Breslau's principle – Influence lines for continuous beams and single storey rigid frames- Qualitative approach for multistoried frames.

MODULE -III

Deflection of Determinate Structures: Principles of virtual work for deflections – Deflections of pin-jointed plane frames and rigid frames.

Arches: Arches as structural forms– Types of arches – Analysis of three hinged, two hinged and fixed arches, parabolic and circular arches – Settlement and temperature effects.

Lecture : 45, Tutorial : 15, TOTAL : 60

TEXT BOOKS

- Vaidyanathan, R and Perumal, P., "Comprehensive Structural Analysis," Volume I and II, Laxmi Publications Pvt. Ltd., Chennai, Fourth edition 2008.
- Roy, Sujit Kumar., "Fundamentals of Structural Analysis", S.Chand & Company Ltd, New Delhi, 2003.

REFERENCE BOOKS

- Punmia, B.C., Jain, Asok Kumar and Jain, Arun Kumar., "Theory of Structures", Laxmi Publications, New Delhi, 2004.
- Wang, C.K., "Analysis of Indeterminate Structures", Tata McGraw-Hill, New Delhi, 2000.
- Negi, L.S. and Jangid, R.S., "Structural Analysis", Tata McGraw-Hill Publications, New Delhi, 2003.

COURSE OUTCOMES

On completion of the course the students will be able to

- CO1: Analyze the structure using conventional methods
- CO2: Analyze the internal forces like axial forces, shearing forces, bending and torsional moments while transferring the loads acting on the structure
- CO3: Conversant with classical methods of analysis
- CO4: Analyze of arches

Mapping of COs with POs

| COs/POs | a | b | c | d | e | f | g | h | i | j | k | l | m |
|---------|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | | | | 3 | | | | 3 | | 2 | | |
| CO2 | 3 | | | | 3 | | | | 3 | | 2 | | |
| CO3 | 3 | | | 2 | 3 | | | | 3 | | 2 | | |
| CO4 | 3 | | | 2 | 3 | | | | 3 | | 2 | | |

1 – Slight, 2 – Moderate, 3 – Substantial

11CE503 HIGHWAY ENGINEERING
(IRC:37-2001 & IRC:58-2002 Code of Practices are to be Permitted)

3 0 0 3

MODULE - I

15

Highway Planning, Alignment and Geometric Design: Merits and demerits of highway transportation - Highway development in India - Jayakar Committee 1927 - Classifications of roads - Highway alignment - Engineering surveys and use of modern methods for highway locations such as GIS, GPS and Remote sensing - Re-alignment - Geometric design - Highway cross-sectional elements - Sight distance - Design of horizontal alignments - Design of vertical alignments.

MODULE - II

15

Highway Materials, Design of Flexible and Rigid Pavements: Highway materials – Testing - Desirable properties - Objectives and requirements of pavements - Flexible and Rigid pavements - Components and their functions - Design principles of Flexible and Rigid pavements - Factors considered for design of pavements - Design of flexible pavements - Design of rigid pavements – Design of joints.

MODULE - III

15

Construction Practice and Maintenance: Construction practice for water bound macadam road, bituminous road and cement concrete road (as per IRC and MORTH specification) – Highway drainage (as per IRC recommendations) – Causes and defects of pavement failure – Distress of flexible and rigid pavements - Evaluation and strengthening of existing pavement – Maintenance of highways.

TOTAL: 45

TEXT BOOKS

1. Khanna, K and Justo, C E G., “Highway Engineering”, Nem Chand and Brothers, Roorkee, 2007.
2. Kadiyali, L R., “Principles and Practice of Highway Engineering”, Khanna Technical Publications, New Delhi, 2007.

REFERENCE BOOKS

1. Rattan Chand Sharma and Sharma S. K., “Principles and Practice of Highway Engineering”, Asia Pub. House, New Delhi, 2007.
2. Rangwala, K S., “Highway Engineering”, Charotar Publishing House Pvt. Ltd., 2004.

COURSE OUTCOMES

On completion of the course the students will be able to

- CO1: Conduct surveys involved in planning of highway alignment
- CO2: Design cross section elements, sight distance, horizontal and vertical alignments
- CO3: Recommend pavement materials based on characteristics and design flexible and rigid pavements as per IRC
- CO4: Recommend construction methodology based on the pavement type
- CO5: Develop drainage pattern and evaluate distresses in pavements and suggest remedial measures

Mapping of COs with POs

| COs/POs | a | b | c | d | e | f | g | h | i | J | k | l | m |
|---------|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | | | | 2 | | | 3 | | 2 | 3 | 3 | |
| CO2 | 3 | 3 | | | 3 | 2 | | 2 | | | | | |
| CO3 | 2 | 3 | | | 3 | 2 | | 3 | | | 2 | 2 | |
| CO4 | 2 | | 2 | 2 | | 2 | | | | 2 | 3 | 2 | |
| CO5 | 2 | | 2 | 2 | 2 | 2 | | | | 2 | 3 | 2 | |

1 – Slight, 2 – Moderate, 3 – Substantial

11CE504 ENVIRONMENTAL ENGINEERING – II (Including Drawing)

3 1 0 4

Objective: This subject deals with treatment of wastewater including estimation of sanitary sewage (excluding industrial wastewater). On completion of the course, the student is expected to know about the design principles and drawings involved in construction and treatment of municipal sewage.

MODULE – I

15

Introduction to Sewerage System: Definitions - Classification - Sources of wastewater -Quantity of sewage - Fluctuations in flow pattern - Estimation of storm runoff - Design flow for separate and combined systems - Hydraulics of sewers - Self cleansing velocities-Full flow/partial flow condition of sewer sections-Sewer appurtenances - Investigations-Design principles and procedures - Materials for sewers- Sewer joints - Jointing materials-Specifications/tests - Sewer laying under various conditions - Loads on sewers - Test for sewers - Sewer maintenance - Sewage pumping - Types of pumps - Pump selection - Characteristics and composition of sewage - Physical and chemical analysis – DO, BOD, COD and their significance - Cycles of decomposition.

MODULE - II

15

Sewage Treatment: Objectives and basic principles of sewage treatment - Primary, secondary, tertiary - Fundamentals of microbiology of waste water - Basic principles of biological treatment - Trickling filter - Description and principles of operation of standard/High rate filters –Recirculation - Activated sludge process - Diffuser/mechanical aeration - conventional, high rate and extended aeration process - Modifications - Oxidation Ditch - Principles and design of waste stabilization ponds - Principles and design of aerated lagoon - Septic tanks.

MODULE - III

15

Sludge Treatment And Sewage Disposal: Objectives Of Sludge Treatment - Properties And Characteristics Of Sludge - Conventional And High Rate Digestions - Sludge Lagooning- Disposal Of Sewage Farming Practices - Dilution - Discharge into Rivers, Lakes, Estuaries and Ocean- River Pollution - Oxygen Sag Curve - Eutrophication-Recycle And Reuse Of Waste Effluents.

House Drainage Systems: Sanitary Fixtures/Fittings - One Pipe System, Two Pipes Systems - General Layout Of House Drainage - Street Connections.

Lecture : 45, Tutorial : 15, TOTAL : 60

Note: Drawings not for end semester examination

TEXT BOOKS

- Garg, S.K., “Environmental Engineering - II”, Khanna Publishers, New Delhi, 2007.
- Modi, P.N., “Environmental Engineering - II”, Standard Book House, Delhi, 2006.

REFERENCE BOOKS

- SP35, “Hand book on Water Supply and Drainage”, B.I.S., New Delhi, 1987.
- Metcalf and Eddy. M.C., “Wastewater Engineering – Treatment & Reuse”, Tata McGraw-Hill Publications, New Delhi, 2003.
- “Manual on Sewerage and Sewage Treatment”, CPHEEO, Government of India, New Delhi, 1993.

COURSE OUTCOMES

On completion of the course the students will be able to

- CO1: Acquire the knowledge about design and materials of sewerage systems. And also to gain a knowledge about sewer appurtenances and their drawing specifications.
- CO2: Understand the detailed concept, methods and advancement related to sewage treatment along with their drawing specifications.
- CO3: Understand the methods involved in sludge treatment and disposal. And also understand the house drainage systems

Mapping of COs with POs

| COs/POs | a | b | c | d | e | f | g | h | i | j | k | l | m |
|---------|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | | 3 | | 3 | | | 3 | | | | | |
| CO2 | | | | 3 | | | | | 2 | | | | |
| CO3 | | | | | | | 3 | 3 | 2 | | | | |

1 – Slight, 2 – Moderate, 3 – Substantial

11CE505 BASIC RCC DESIGN
[IS 456 -2000 & Design Aids are to be permitted]

3 1 0 4
15

MODULE – I

Design of Beams for Flexure, Shear and Torsion: Materials for concrete – Stress – Strain curve for concrete in compression – Types of reinforcement – Plain and deformed bars – Stress – Strain curve for reinforcing steel. Concept of WSD (No problems) and LSD –Characteristic loads and strengths – Partial safety factors – Various limit states – Design of singly and doubly reinforced rectangular and flanged sections for flexure, shear and torsion.

MODULE - II

Design of Slabs: Types of slabs – Design of cantilever, simply supported, one-way and continuous slab - Design of two way slabs with and without continuous edges.

MODULE - III

Design of Columns and Footings: Design of short columns subjected to axial compressive load and bending moments using design aids (SP 16). Design of wall footing. Design of axially and eccentrically loaded rectangular footing – Design of combined rectangular footing for two columns only.

Lecture: 45, Tutorial: 15, TOTAL : 60

TEXT BOOKS

1. Krishna Raju, N., “Design of Reinforced Concrete Structures”, CBS Publishers & Distributors, New Delhi, Reprint 2006.
2. Varghese, P.C., “Limit State Design of Reinforced Concrete”, Second Edition, Prentice Hall of India, New Delhi, 2007.

REFERENCE BOOKS

1. Jain, A.K., “Limit State Design of RC Structures”, Nemchand Publications, Roorkee, 2003.
2. Sinha, S.N., “Reinforced Concrete Design”, Tata McGraw-Hill., New Delhi, 2002.
3. Unnikrishna Pillai, S. and Devdas Menon, “Reinforced Concrete Design”, Second Edition, Tata McGraw-Hill, New Delhi, 2001.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Attain knowledge in the design of beams under flexure, shear and torsion

CO2: Understand the concept in the design of different types of slabs

CO3: Gain knowledge in the design of columns and footings

Mapping of COs with POs

| COs/POs | a | b | c | d | e | f | g | h | i | j | k | l | m |
|---------|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | | | | 3 | | | | | | | | 3 |
| CO2 | 3 | | | | 3 | | | | | | | | 3 |
| CO3 | 3 | | | | 3 | | | | | | | | 3 |

1 – Slight, 2 – Moderate, 3 – Substantial

MODULE – I

15

Basic Concepts and Methods of Irrigation: Irrigation – Need and mode of irrigation – Merits and demerits of irrigation – Crop and crop seasons – consumptive use of water – Duty – Factors affecting duty – Irrigation efficiencies – Planning and development of irrigation projects – Lift irrigation – Tank irrigation – Flooding methods – Sprinkler irrigation – Drip irrigation – Merits and demerits.

MODULE - II

15

Diversion and Impounding Structures: Weirs – elementary profile of a weir – weirs on pervious foundations – Types of impounding structures – Tanks, sluices and weirs – Gravity dams – Earthen dams – Arch dams – Spillways – Factors affecting location and type of dams – Forces on a dam – Hydraulic design of dams.

MODULE - III

15

Canal Irrigation and Management: Alignment of canals – Classification of canals – Canal drops – Hydraulic design of drops – Cross drainage works – Hydraulic design of cross drainage works – Canal head works – Canal regulators – River training works – Need for optimisation of water use – Minimising irrigation water losses – On farm development works – Percolation ponds – Participatory irrigation management – Water users associations – Changing paradigms in water management – Performance evaluation.

Lecture : 45, Tutorial : 15, TOTAL : 60

Note: Drawings not for end semester examination

TEXT BOOKS

1. Garg, S.K., “Irrigation Engineering & Hydraulic Structures” Khanna Publishers, New Delhi, 2002.
2. Sharma, R.K. and Sharma, T.K., “Irrigation Engineering”, S. Chand and Company, New Delhi, 2001.

REFERENCE BOOKS

1. Majumdar, Dilip Kumar., “Irrigation Water Management: Principles and Practices”, Prentice Hall of India, New Delhi, 2003.
2. Basak, N.N., “Irrigation Engineering”, Tata McGraw-Hill, New Delhi, 2004.
3. Asawa, G.L., “Irrigation Engineering”, Wiley Eastern Limited, New Delhi, 1996.
4. Punmia, B.C., Pande and Lal, B.B., “Irrigation and Water Power Engineering”, Laxmi Publications, 2007.

COURSE OUTCOMES

On completion of the course the students will be able to

- CO1: Understand the basic concept and methods of irrigation
- CO2: Gain knowledge about diversion and impounding structures
- CO3: Understand the concept of canal irrigation and management and design & drawing irrigation structures

Mapping of COs with POs

| COs/POs | a | b | c | d | e | f | g | h | i | j | k | l | m |
|---------|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | | | | 3 | | | | 3 | | 3 | | |
| CO2 | 3 | | | | | | | | 3 | | 3 | | 3 |
| CO3 | 3 | | | | | | | | 3 | | 3 | | 3 |

1 – Slight, 2 – Moderate, 3 – Substantial

LIST OF EXPERIMENTS**1. Test on Bricks**

- a) Compressive strength
- b) Water absorption
- c) Efflorescence

2. Test on Cement

- a) Specific gravity
- b) Consistency
- c) Setting time
- d) Soundness

3. Test on Steel and other materials

- a) Tension test on mild steel rods
- b) Double shear test on mild steel and Aluminium rods
- c) Hardness test on metals like mild steel, brass, copper and aluminium
- d) Test on helical springs
- e) Deflection test on Cantilever Beam & Simply Supported Beam.
- f) Impact test on metal specimen
- g) Compression test on wooden specimen.
- h) Fatigue Test (Study Experiment).

TOTAL: 45**REFERENCES / MANUALS / SOFTWARE:**

1. Bansal, R.K., "Strength of Materials", Laxmi Publications, New Delhi, 2007.
2. Santhakumar A.R., "Concrete Technology", Oxford University Press Publications, New Delhi, 2006.

COURSE OUTCOMES

On completion of the course the students will be able to

- CO1: Gain knowledge about various test on fresh and hardened concrete that is commonly used in civil engineering construction. Further he should be able to know the criteria for choice of the appropriate material and the various tests on quality control in the use of these materials.

Mapping of COs with POs

| COs/POs | a | b | c | d | e | f | g | h | i | j | k | l | m |
|---------|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | | 3 | | | 3 | | | | | | 3 | 3 | |

1 – Slight, 2 – Moderate, 3 – Substantial

LIST OF EXPERIMENTS

1. Sampling and preservation methods of water and wastewater.
2. Determination of
 - i) pH and turbidity
 - ii) Hardness
3. Determination of iron & fluoride
4. Determination of residual chlorine
5. Determination of Chlorides
6. Determination of Ammonia Nitrogen
7. Determination of Sulphate
8. Determination of Optimum Coagulant Dosage
9. Determination of available Chlorine in Bleaching powder
10. Determination of dissolved oxygen
11. Determination of Total Dissolved Solids and Suspended Solids
12. B.O.D test
13. C.O.D test
14. Introduction to Bacteriological Analysis (Demonstration only)

TOTAL: 45

REFERENCES / MANUALS

1. Garg, S.K, “Environmental Engineering”, Volume - I and II’, Khanna Publishers, New Delhi, 2007.
2. “Manual on Water Supply and Treatment”, CPHEEO, New Delhi, 1999 (Published by Ministry of Urban Development)
3. “Standard Methods for Examination of Water and Wastewater Engineering”, American Public Health Association, Washington, 1998.

COURSE OUTCOMES

On completion of the course the students will be able to

- CO1: Determine physical, chemical and biological characteristics of water and wastewater and Assess the quality of water and wastewater
- CO2: Determine optimum dosage of coagulant and Assess the quality of water and wastewater

Mapping of COs with POs

| COs/POs | a | b | c | d | e | f | g | h | i | j | k | l | m |
|---------|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | | 3 | 3 | | | | | | 2 | 2 | 3 | | |
| CO2 | | 3 | 3 | | | | | | 2 | 2 | 3 | | |

1 – Slight, 2 – Moderate, 3 – Substantial

LIST OF EXERCISES

1. Triangulation
2. Highway project
3. Irrigation project
4. Water supply project

REFERENCES

1. Lab Manual

MARKS

1. Internal Marks : 30 marks
(Based on observation of students field work)
 2. Evaluation of Survey Camp Report : 20 marks
 3. Viva Voce Examination : 50 marks
- TOTAL : 100 Marks**

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Identify the dumpy level, compass, theodolite, total station etc..

CO2: Know original field observations calculations and plotting for the projects

Mapping of COs with POs

| COs/POs | a | b | c | d | e | f | g | h | i | j | k | l | m |
|---------|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 3 | | | 3 | 3 | | 3 | 3 | | 3 | | 3 |
| CO2 | 3 | 3 | | | 3 | 3 | | 3 | 3 | | 3 | | 3 |

1 – Slight, 2 – Moderate, 3 – Substantial

11GE601 ECONOMICS AND MANAGEMENT FOR ENGINEERS
(Common to all Engineering and Technology branches)

3 0 0 3

MODULE – I

15

Economics – Basics Concepts and Principles – Demand and Supply – Law of demand – Determinants of demand, Law of supply – market Equilibrium – National Income – Circular Flow of Economic activities and Income –National Income and its measurement techniques – Inflation – Causes of Inflation – Controlling Inflation –Business Cycle .

MODULE – II

15

Forms of business – Management Functions: Planning, Organizing, Staffing, Leading and Controlling- Managerial Skills - Levels of Management - Roles of manager.

Marketing – Core Concepts of Marketing, Four P’s of Marketing, New product development, Product Life Cycle, Pricing Strategies and Decisions. Operations Management – Resources – Site selection, Plant Layout, Steps in Production Planning and Control – EOQ Determination

MODULE – III

15

Accounting Principles – Financial Statements and its uses – Time value of Money – Depreciation methods — Break Even Analysis – Capital budgeting techniques – Introduction to FDI, FII, Mergers & Acquisition.

TOTAL : 45

TEXT BOOKS

1. Geetika, Plyali Ghosh, Purba Roy Choudhury, “Managerial Economics”, 1st Edition, Tata McGraw-Hill, New Delhi, 2008.
2. Jeff Madura, “Fundamentals of Business”, Cengage Learning Inc, India, 2007.

REFERENCE BOOKS

1. Stanley L. Brue and Campbell R McConnell, “Essentials of Economics”, Tata McGraw-Hill, New Delhi, 2007.
2. S.P.Jain, K.L.Narang, Simi Agrawal, “Accounting for Management”, First Edition, Tata McGraw-Hill, New Delhi, 2009

COURSE OUTCOMES

On completion of the course the students will be able to

- CO1: estimate market equilibrium and interpret national income calculation and inflation issues
- CO2: categorize the forms of business and analyse the functions of management
- CO3: appraise marketing and operations management decisions
- CO4: interpret financial and accounting statements

Mapping of COs with POs

| COs/POs | a | b | c | d | e | f | g | h | i | j | k | l | m |
|---------|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | 1 | 2 | | | 3 | | 2 | 2 | 2 | 3 | 2 | |
| CO2 | | 1 | 2 | | | 2 | 2 | 2 | 2 | 2 | 3 | 2 | |
| CO3 | 1 | 2 | 1 | | | 2 | | 2 | 2 | 2 | 3 | 2 | |
| CO4 | 2 | 2 | | | | 2 | | 2 | 2 | 2 | 3 | 2 | |

3 – Substantial, 2 – Moderate, 1 – Slight

11CE601 FOUNDATION ENGINEERING

[IS 6403 -1987 & IS 2911 - 1999 Code of practices are to be permitted]

3 1 0 4
15

MODULE – I

Site Investigation and Selection of Foundation, Slope Stability: Introduction – Scope and objectives – Method of exploration boring – Sampling – disturbed and undisturbed sampling – sampling techniques – Bore log and report – Penetration tests (SPT and SCPT) – Data interpretation – Selection of foundation based on soil condition. Slope failure mechanisms – Types: Infinite slopes - Finite slopes - Stability analysis for purely cohesive and cohesionless soils. Method of slices -Use of stability number.

MODULE - II

Bearing Capacity and Design of Shallow Foundation: Introduction – Location and depth of foundation – Codal provisions – bearing capacity of shallow foundation on homogeneous deposits – bearing capacity from in-situ tests – Factors influencing bearing capacity – Codal provisions – Settlement – Components of settlement – Settlement of foundations on granular and clay deposits – Allowable and maximum differential settlements of buildings – Codal provision – Methods of minimizing settlement. Types of foundation – structural design of spread footing – Design aspects of combined and mat foundation – Contact Pressure distribution below footings and rafts - Codal provisions

MODULE - III

Pile Foundations and Earth Pressure Theory: Types of piles – Factors influencing the selection of pile – Carrying capacity in granular and cohesive soils – Static and dynamic formulae – Capacity from in-situ tests (SPT and SCPT) – Piles subjected to uplift – Negative skin friction – Group capacity – Settlement of pile groups – Interpretation of pile load test – Pile caps – Codal provisions. Earth pressure theory – Plastic equilibrium in soils – active and passive states – Rankine’s theory – Coloumb’s wedge theory – Classical and limit equilibrium solution – Earth pressure on retaining walls of simple configurations – pressure on the wall due to single line load – Graphical method (Rebhann and Culmann’s method) – Stability of retaining wall.

Lecture: 45, Tutorial: 15, TOTAL: 60

TEXT BOOKS

1. Arora, K.R., “Soil Mechanics and Foundation Engineering”, Standard Publishers and Distributors, New Delhi, 1997.
2. Gopal Ranjan and Rao, A.S.R., “Basic and Applied Soil Mechanics”, New age International (P) Limited, Publishers, New Delhi, 1997.

REFERENCE BOOKS

1. Punmia, B.C., “Soil Mechanics and Foundations”, Laxmi Publications Pvt. Ltd., New Delhi, 1995
2. Venkatramaiah, C., “Geotechnical Engineering”, New age International (P) Limited, Publishers, New Delhi, 1995
3. Murthy, V.N.S., “Principles of Soil Mechanics and Foundation Engineering”, Fifth Edition, UBS Publishers, New Delhi, 2001.

COURSE OUTCOMES

On completion of the course the students will be able to

- CO1: Acquires the capacity to investigate the site condition and to select suitable foundation also to analyze the stability of slopes
- CO2: Understand the bearing capacity concepts in design of shallow foundations
- CO3: Analyze the suitability of various types of pile foundations and earth pressure theories

Mapping of COs with POs

| COs/POs | a | b | c | d | e | f | g | h | i | j | k | l | m |
|---------|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | | | | 3 | | | | 3 | | | | 3 |
| CO2 | 3 | | | | 3 | | | | 3 | | | | 3 |
| CO3 | 2 | | | | 2 | | | | 2 | | | | 2 |

1 – Slight, 2 – Moderate, 3 – Substantial

MODULE -I

15

Plastic Analysis of Structures: - Plastic modulus - Shape factor - Load factor – Plastic hinge and mechanism – Plastic moment of resistance – Upper and lower bound theorems - Plastic analysis of indeterminate beams and frames.

MODULE -II

15

Matrix Methods of Analysis: Equilibrium and compatibility conditions & equations –Indeterminacy – Element flexibility & stiffness matrices - System to Element – Force & Displacement Transformation Matrices. Analysis of determinate structures, indeterminate structures (with redundancy restricted to two) – pin jointed plane frames, continuous beams, rigid jointed plane frames

MODULE -III

15

Cable Structures and Finite Element Analysis: Suspension Cables - cables with two and three hinged stiffening girders. Introduction to FEM – Discretisation of a structure – Displacement functions – Truss element – Beam element – Plane stress and plane strain triangular elements.

Lecture : 45, Tutorial : 15, TOTAL : 60

TEXT BOOKS

1. Pandit, G.S and Gupta, S.P., “Structural Analysis: A Matrix Approach”, Tata McGraw-Hill, New Delhi, 2008.
2. Negi, L.S. and Jangid, R.S., “Structural Analysis”, Tata McGraw-Hill Publications, New Delhi, 2003.

REFERENCE BOOKS

1. Ghali, A., Neville, A.M. and Brown, T.G., “Structural Analysis: A Unified Classical and Matrix Approach”, Spon Press, London, 2003
2. Vazirani, V.N and Ratwani, M.M., “Analysis of Structures”, Khanna Publishers, Delhi, 2002.
3. Weaver, William and Gere, James M., “Matrix Analysis of Framed Structures”, CBS Publishers and Distributors, Delhi, 2003.
4. Hutton, D.V., “Fundamentals of Finite Element Analysis”, Tata McGraw-Hill, New Delhi, 2004.

COURSE OUTCOMES

On completion of the course the students will be able to

- CO1: Analysis the structure by matrix method
- CO2: Gain knowledge about the method of plastic analysis
- CO3: Understand the concept of finite element method
- CO4: Perform the analysis of cable structures

Mapping of COs with POs

| COs/POs | a | b | c | d | e | f | g | h | i | j | k | l | m |
|---------|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | | | | 3 | | | | 3 | | 2 | | 3 |
| CO2 | 3 | | | | 3 | | | | 3 | | 2 | | 3 |
| CO3 | 3 | | | 2 | 3 | | | | 3 | | 2 | | 3 |
| CO4 | 3 | | | 2 | 3 | | | | 3 | | 2 | | 3 |

1 – Slight, 2 – Moderate, 3 – Substantial

MODULE – I**15**

Railway Engineering: Role of Indian Railways in national development - Engineering surveys for track alignment – Obligatory points - Components of permanent way and functions of each component - Geometric design of railway tracks – Gradients and grade compensation, super-elevation, widening of gauges in curves, transition curves, horizontal and vertical curves - Points and Crossings - Turnouts - Working principle - Signaling and its types, interlocking and track circuiting - Construction and maintenance – Track drainage - Level crossings.

MODULE – II**15**

Airport Engineering: Advantages and limitations of air transport - Components of an airport - Airport planning – Airport obstructions – Runway designs – Airport capacity and configuration – Taxiway design – Design of airfield rigid pavement – Maintenance and rehabilitation of airfield pavement – Terminal area and airport layout – Visual aids – Air traffic control - Airport grading and drainage- Helipads and hangars.

MODULE – III**15**

Harbour Engineering: Advantages and disadvantages of water transportation – Port – Requirements of a port – Harbours – Requirements of harbour – Classification – Site investigation – Planning of harbour – Harbour size – Natural phenomena – Harbour works – Navigational aids – Docks and repair facilities – Port facilities – Dredging – Coastal protection

TOTAL: 45**TEXT BOOKS**

1. Saxena, Subhash. C. and Arora, Satyapal., “A Course in Railway Engineering”, Dhanpat Rai and Sons, Delhi, 2008.
2. Khanna, S K., Arora, M.G. and Jain, S S., “Airport Planning and Design”, Nemchand and Brothers, Roorkee, 2009.
3. Bindra, S P., “A Course in Docks and Harbour Engineering”, Dhanpat Rai and Sons, New Delhi, 2009.

REFERENCE BOOKS

1. Rangwala., “Railway Engineering”, Charotar Publishing House, Anand, 2005.
2. Rangwala., “Airport Engineering”, Charotar Publishing House, Anand, 2006.
3. Oza and Oza., “A Course in Docks and Harbour Engineering”, Charotar Publishing House, Anand, 2005.

COURSE OUTCOMES

On completion of the course the students will be able to

- CO1: Gain knowledge of planning, design, construction and maintenance of railway tracks.
- CO2: Acquires skills on airport planning and design with the prime focus on runway and taxiway geometrics.
- CO3: Gain knowledge on site investigation for location and planning of harbours.

Mapping of COs with POs

| COs/POs | a | b | c | d | e | f | g | h | i | j | k | l | m |
|---------|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | | | | 3 | | | | 3 | 2 | 2 | 3 | |
| CO2 | 3 | | | | 3 | | | | 3 | 2 | 2 | 3 | |
| CO3 | 3 | | | | 3 | | | | 3 | 2 | 2 | 3 | |

1 – Slight, 2 – Moderate, 3 – Substantial

11CE604 ADVANCED RCC DESIGN (Including Drawing)

[Use of IS 456 -2000 and IS 3370 – 2009 (Part-II &IV), IRC 5-1998, IRC 6-2001, IRC 21-1978]

3 1 0 4**MODULE -I****15****Design of Retaining Walls And Staircase:** Design and detailing of cantilever and counter fort retaining walls & Design of staircases (ordinary and dog legged) (Limits State Design only)-Basic concepts of Bridge Design.**MODULE -II****15****Design of Flat Slab, Domes And Water Tanks:** Design of flat slab - Design of spherical domes – Circular water tank with flexible base underground and resisting on the ground – Rectangular or square water tanks underground and resisting on the ground – Introduction to the design of circular or rectangular over head tanks with staging and foundation.**MODULE -III****15****Yield Line Theory, Design of RC Walls And Portal Frames:** Application of virtual work method to square, rectangular, circular and triangular slabs for fixed and simply supported conditions - Design of reinforced concrete walls – Design of single bay and single storey portal frame.**Lecture: 45, Tutorial: 15, TOTAL: 60****Note: Drawings not for end semester Examination****TEXT BOOKS**

1. Varghese. P.C. “Limit State Design of Reinforced Concrete Structures”, Prentice Hall of India, New Delhi, 2002.
2. Krishna Raju. N., “Structural Design and Drawing”, University Press (India) Pvt. Limited. New Delhi, 2006.

REFERENCE BOOKS

1. Krishna Raju. N., “Design of RC Structures”, CBS Publishers, Delhi, 1996.
2. Syal. I.C. and Goel A.K., “Reinforced Concrete Structures” A.H.Wheelers & Co. Pvt. Ltd. Allahabad, 1999.
3. Sinha. N.C. and Roy. S.K., “Fundamentals of Reinforced Concrete”, S.Chand & Company Ltd., New Delhi. 1991.
4. Unnikrishnan Pillai. S and Menon. Devadas, “Reinforced Concrete Design”, Tata McGraw Hill, New Delhi, 2003.

COURSE OUTCOMES

On completion of the course the students will be able to

- CO1: Analysis, Design and detailing of Reinforced concrete structures like Retaining Walls, Staircase and Bridges
- CO2: Analysis, Design and detailing of Flat Slab, Spherical Domes And circular & Rectangular Water Tanks
- CO3: Analysis, Design and detailing of slabs with varying end condition by using yield line theory, RC walls and portal frames.

Mapping of COs with POs

| COs/POs | a | b | c | d | e | f | g | h | i | j | k | l | m |
|---------|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | | 3 | | 3 | | | | 3 | 3 | | | 3 |
| CO2 | 3 | | 3 | | 3 | | | | 3 | 3 | | | 3 |
| CO3 | 3 | | 3 | | 3 | | | | 3 | 3 | | | 3 |

1 – Slight, 2 – Moderate, 3 – Substantial

11CE605 DESIGN OF STEEL STRUCTURES (Including Drawing)

[IS 800-2007 & SP-06 are to be permitted]

3 1 0 4
15**MODULE -I****Introduction:** Mechanical properties of steel – Structural steel sections – Limit State Design concepts – Loads on structures - Metal joining methods using welding and bolting – Design of bolted and welded joints –Efficiency of joints.**MODULE -II****Tension and Compression Members:** Types of tension members – Net area – Net effective sections for angles and Tee in tension – Design of tension members – Design of tension splice - lug angles. Types of compression members – Theory of columns – Basics of current codal provision for compression member design – Slenderness ratio – Design of simple section and built-up compression members – Design of lacing and battens.**MODULE -III****Beams and Industrial Structures:** Lateral stability of beam - Design of laterally supported and unsupported beams – Built up beams. Roof trusses – Types of roof trusses –Design of purlins - End bearings.**Note: Drawings not for end semester Examination****Lecture : 45, Tutorial : 15, TOTAL : 60****TEXT BOOKS**

1. Ramachandra, S. and Virendra Gehlot, “Limit State Design of Steel Structures”, Scientific Publishers (India), Jodhpur, 2010.
2. Subramanian, N., “Design of Steel Structures”, Oxford University Press, New Delhi, 2009.

REFERENCE BOOKS

1. “Teaching Resources for Structural Steel Design” - Vol. I, II & III, INSDAG, Kolkatta.
2. Bhavikatti, S.S, “Design of Steel Structures”, I.K. International Publishing House Pvt. Ltd, New Delhi, 2009.

COURSE OUTCOMES

On completion of the course the students will be able to

- CO1: Understand the mechanical properties of steel and design concepts of bolted and welded joints.
- CO2: Design the structural steel members subjected to compressive, tensile loads.
- CO3: Design the structural elements such as beams due to bending moments, as per current codal provisions including connections and design of structural elements such as roof trusses and bearings.

Mapping of COs with POs

| COs/POs | a | b | c | d | e | f | g | h | i | j | k | l | m |
|---------|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | | | | 3 | | | | | | | | 3 |
| CO2 | 3 | | | | 3 | | | | | | | | 3 |
| CO3 | 3 | | | | 3 | | | | | | | | 3 |

1 – Slight, 2 – Moderate, 3 – Substantial

LIST OF EXPERIMENTS**1. Test on Aggregates**

- a) Water absorption and Specific gravity
- b) Sieve analysis and fineness modulus
- c) Aggregate impact value
- d) Aggregate crushing strength
- e) Attrition and Abrasion test on aggregates
- f) Flakiness index and Elongation index

2. Test on Concrete

- a) Workability of concrete by Slump value, Compaction factor and Flow value
- b) Compressive strength
- c) Splitting tensile strength
- d) Flexural strength test
- e) NDT on concrete (Rebound hammer test and UPV test)

3. Test on Bituminous materials

- a) Penetration and
- b) Viscosity test
- c) Specific gravity and
- d) Flash and Fire point test
- e) Ductility test
- f) Softening point test

REFERENCES / MANUALS / SOFTWARE:

1. Shetty M.S., "Concrete Technology Theory and Practice", S.Chand & Company Ltd., New Delhi, 2008.
2. Khanna, S.K. and Justo, C.E.G., "Highway Material Testing Laboratory Manual", Nem Chand and Brothers, Roorkee, 1997.

COURSE OUTCOMES

On completion of the course the students will be able to

- CO1: Test the basic concrete ingredients
- CO2: Perform the various workability tests on concrete
- CO3: Examine experimentally the strength characteristics of concrete
- CO4: Perform the advanced NDT on existing concrete structures
- CO5: Test the various grades of bituminous materials

Mapping of COs with POs

| COs/POs | a | b | c | d | e | f | g | h | i | j | k | l | m |
|---------|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 3 | | | 2 | | | | | | 3 | | |
| CO2 | 2 | 3 | | | 2 | | | | | | 3 | | |
| CO3 | 2 | 3 | | | 2 | | | | | | 3 | | |
| CO4 | 2 | 3 | | | 2 | | | | | | 3 | | |
| CO5 | 2 | 3 | | | 2 | | | | | | 3 | | |

1 – Slight, 2 – Moderate, 3 – Substantial

LIST OF EXPERIMENTS

1. Grain size distribution - sieve analysis
2. Grain size distribution - hydrometer analysis
3. Specific gravity of cohesive and cohesionless soils
4. Relative density of cohesionless soils
5. Consistency limits test
6. Determination of moisture - density relationship using standard proctor compaction test
7. Determination of co-efficient of permeability
8. Determination of shear strength parameters
 - i) Direct shear Test
 - ii) Unconfined compression test
 - iii) Triaxial compression test
9. One dimensional consolidation test (Determination of co-efficient of consolidation only)
10. Field density test (Core cutter and sand replacement methods)

TOTAL: 45

REFERENCE BOOKS

1. Head, K.H., “Manual of Soil Laboratory Testing(Vol-1 to 3)”, John Wiley & Sons, Chichester, 1998.
2. Lambe, T.W., “Soil Testing for Engineers”, John Wiley and Sons, New York, 1990.
3. Compendium of Indian Standards on Soil Engineering, SP 36 (Part 1 & 2), 1988.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Acquires the capacity to test the soil to assess its engineering, index, strength, consolidation and compressibility properties

Mapping of COs with POs

| COs/POs | a | b | c | d | e | f | g | h | i | j | k | l | m |
|---------|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | | 3 | | | | | | 3 | 3 | | | | |

1 – Slight, 2 – Moderate, 3 – Substantial

11CE701 BASICS OF EARTH QUAKE ENGINEERING
[IS 1893, IS 13920 and IS 4326 are to be Permitted]

3 0 0 3
15

MODULE – I

Theory of Vibrations: Concept of inertia and damping – Types of Damping – Difference between static forces and dynamic excitation – Degrees of freedom – SDOF idealisation –Free vibration of SDOF system – Response to harmonic excitation – Impulse and response to unit impulse –Two degree of freedom system – Normal modes of vibration – Natural frequencies - Mode shapes .

MODULE - II

15

Elements of Seismology: Causes of Earthquake – Geological faults – Tectonic plate theory – Elastic rebound – Epicentre – Hypocentre – Primary, shear and Raleigh waves – Seismogram – Magnitude and intensity of earthquakes – Magnitude and Intensity scales – Spectral Acceleration - Information on some disastrous earthquakes.

MODULE - III

15

Response of Structures to Earthquake: Response and design spectra – concept of peak acceleration – Site specific response spectrum – Effect of soil properties and damping – Liquefaction of soils – Importance of ductility – Methods of introducing ductility into RC structures. IS 1893, IS 13920 and IS 4326 – Codal provisions – Base isolation techniques – Vibration control measures – Important points in mitigating effects of earthquake on structures.

TOTAL:45

TEXT BOOKS

1. Pankaj Agarwal and Manish Shrikhande, “Earthquake Resistant Design of Structures”, PHI Learning Private Ltd, 2009.
2. Chopra, A.K., “Dynamics of Structures: Theory and Applications to Earthquake Engineering”, Second Edition, Pearson Education, 2003.

REFERENCE BOOKS

1. Dowrick, D.J., “Earthquake Resistant Design”, John Wiley & Sons, London, 1977.
2. Paz, M., “Structural Dynamics: Theory & Computation”, CSB Publishers & Distributors, Shahdara, Delhi, 1985.
3. NPEEE Publications.

COURSE OUTCOMES

On completion of the course the students will be able to

- CO1: understand the various concepts of vibrations and its characteristics
 CO2: acquire the knowledge of various elements seismology with some case studies
 CO3: acquire the knowledge of response of structures to various earthquakes

Mapping of COs with POs

| COs/POs | a | b | c | d | e | f | g | h | i | j | k | l | m |
|---------|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | | | | 3 | | 3 | 3 | | | 3 | | |
| CO2 | 3 | | | | 3 | | 3 | 3 | | | 3 | | |
| CO3 | 3 | | | | 3 | | 3 | 3 | | | 3 | | |

1 – Slight, 2 – Moderate, 3 – Substantial

11CE702 ESTIMATION AND QUANTITY SURVEYING

3 0 0 3

MODULE – I

15

Estimation of Buildings: Types of estimates – Units of measurements – Methods of estimates – Advantages – problems – Load bearing and framed structures – Calculation of quantities of various items for shops, rooms, residential building with flat and pitched roof – Various types of arches – Calculation of brick work and RCC works in arches – Estimate of joineries for paneled and glazed doors, windows, ventilators and handrails.

MODULE - II

15

Estimation of other Structures and Specifications: Estimating of septic tank, soak pit – sanitary and water supply installations – water supply pipe line – sewer line – tube well – open well – estimate of bituminous and cement concrete roads – estimate of retaining walls – culverts – Data – Schedule of rates – Analysis of rates – Specifications – sources – Detailed and general specifications – Measurement books.

MODULE - III

15

Tenders, Valuation and Report Preparation: Tenders – Contracts – Types of contracts – Arbitration and legal requirements – Basics of value engineering – Capitalised value – Depreciation – Escalation – Value of building – Calculation of stand: rent – Mortgage – Lease – Principles for report preparation – report on estimate of residential building – Culvert – Road: Water supply and sanitary installations.

TOTAL: 45

TEXT BOOKS

1. Dutta, B.N., “Estimating and Costing in Civil Engineering”, UBS Publishers & Distributors Pvt. Ltd., Chennai, 2006.
2. Kohli, D.D and Kohli, R.C., “A Text Book of Estimating and Costing (Civil)”, S.Chand & Company Ltd., New Delhi, 2004.

REFERENCE BOOKS

1. Kanagasabapathy, B., “Practical Valuation Engineering”, Volume. I, II & III, K. Ehilaalarasi Kanagasabapathy Publications, Trichy, 2006.
2. Malhotra, J.C., “Quantity Surveying and Costing”, Khanna Publishers, New Delhi, 1986.
3. “Schedule of Rates”, PWD, Government of Tamilnadu, Chennai, 2009-10.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Acquire the capacity to estimate the building.

CO2: Understand the specifications and estimation of other structures.

CO3: Gain knowledge about Tenders, Valuation and Report Preparations.

Mapping of COs with POs

| COs/POs | a | b | c | d | e | f | g | h | i | j | k | l | m |
|---------|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | | | | 3 | | | | | | 3 | | |
| CO2 | 3 | | | | 3 | | | | | | 3 | | |
| CO3 | 3 | | | | 3 | | | | | | 3 | | |

1 – Slight, 2 – Moderate, 3 – Substantial

11CE703 PRE-STRESSED CONCRETE STRUCTURES

[IS 1343-1980, IS 3370-2009 (Part IV) & IS 784-2001, IRC 5-1998, IRC 6-2001, IRC 21-1978

Code of practices are to be permitted]

3 1 0 4

MODULE – I

15

Fundamental Principles and Behaviour: Basic concepts of prestressing - Need for high strength steel and concrete - Terminology - Advantages of prestressed concrete - Application of prestressed concrete - Materials for prestressed concrete - Prestressing systems - Analysis of prestress and bending stresses - Losses of prestress - Factors affecting the losses of prestress - Deflections of prestressed concrete members - Factors influencing deflections – Short-term deflections of uncracked members - Prediction of long term deflections.

MODULE - II

15

Design of Beams: Flexural strength of prestressed concrete sections - Types of flexural failure - Simplified procedures as per codes - Shear and torsional resistance of prestressed concrete members - Design of sections for flexure - Design of sections for axial tension -Design of prestressed sections for shear and torsion - Design of pretensioned beams - Design of post-tensioned beams.

MODULE - III

15

Composite Construction: Composite structural members - Types of composite construction - Analysis of stresses - Differential shrinkage - Deflection of composite members - Stresses at serviceability limit state - Flexural strength of composite sections - Shear strength of composite sections - Design of composite sections.

Circular Prestressing - Prestressed concrete tanks - Poles - Sleepers.

Lecture : 45, Tutorial: 15 TOTAL:60

TEXT BOOKS

1. Krishna Raju, N., “Prestressed Concrete”, Tata McGraw Hill Company, New Delhi, 2006.
2. Rajagopalan.N, “Prestressed Concrete”, Narosa Publications, New Delhi, 2008.

REFERENCE BOOKS

1. Ramaswamy, G.S., “Modern Prestressed Concrete Design”, Arnold Heinimen, New Delhi, 1990.
2. Edward. G. Nawy, “Prestressed Concrete – A fundamental Approach”, Prentice Hall –Gale, 2000.
3. Nilson, Arthur. H., “Design of Prestressed Concrete”, New York: John wiley & sons, 1987.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Understand fundamental principles and behavior of various Pre-stressing methods

CO2: Design flexural members for different types of forces

CO3: Design composite members for serviceability condition and design of tanks, poles and sleeper for actual stress condition.

Mapping of COs with POs

| COs/POs | a | b | c | d | e | f | g | h | i | j | k | l | m |
|---------|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 3 | 2 | | | | | | | | | 2 | |
| CO2 | 3 | 3 | 2 | | | | | | | | | 2 | |
| CO3 | 3 | 3 | 2 | | | | | | | | | 2 | |

1 – Slight, 2 – Moderate, 3 – Substantial

11CE704 CONSTRUCTION MANAGEMENT**3 0 0 3 15****MODULE –I**

Planning, Scheduling and Organising: Planning for Construction projects - Objectives - principles - Stages of planning, Scheduling - Methods - Project management through networks - CPM & PERT – Time – Cost Trade off
Job layout - Work Breakdown Structure - Types of Construction organizations.

MODULE-II**15**

Resource Management and Quality Control: Types of resources - Estimating resource requirements - Material management - Effective utilization of machineries and equipments -Manpower planning.
Quality control in construction - Importance - Elements - Quality control methods - Statistical quality control - Sampling by attributes - Sampling by variables.

MODULE-III**15**

Cost Control and Safety Management: Cost control in construction - objectives - cost control systems - Direct & indirect cost control - Project budgetary control - Risk cost management.
Safety in construction projects - Accidents - Causes-classification - Safety measures -Approaches to improve safety in construction - Safety codes and standards - Introduction to Project management software.

TOTAL:45**TEXT BOOKS**

1. Chitkara, K.K., “Construction Project Management, Planning, Scheduling and Control”, Tata McGraw-Hill Publishing Co., New Delhi, 1998.
2. Seetharaman, S., “Construction Engineering and Management”, Umesh Publications, Delhi, 2005.

REFERENCE BOOKS

1. Halpin, D.W., “Financial and cost concepts for Construction Management”, John Wiley and Sons, New York, 1985.
2. Modar. J., Phillips, C. and Davis., “Project Management with CPM, PERT and Precedence Diagramming”, Third Edition, Van Nostrand Reinhold Co., 1983.

COURSE OUTCOMES

On completion of the course the students will be able to

- CO1: Understand the basic concepts of planning, scheduling and organizing construction projects.
CO2: Gain fundamental knowledge on resource management and quality control in projects
CO3: Execute control on control costs and implement safety practices in construction projects.

Mapping of COs with POs

| COs/POs | a | b | c | d | e | f | g | h | i | j | k | l | m |
|---------|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | | | | | | 2 | 3 | | | | 3 | 3 | |
| CO2 | 1 | | | 3 | | | 3 | | | | 3 | 3 | |
| CO3 | | | | 3 | | 2 | 3 | 3 | 2 | | 3 | 3 | |

1 – Slight, 2 – Moderate, 3 – Substantial

LIST OF EXERCISES

1. Design of plane & space trusses - Reinforcement details.
2. Design of slab - simply supported & continuous slab - Reinforcement details.
3. Design of circular, rectangular water tank – Reinforcement details.
4. Design of plane & space frames with different end conditions- Reinforcement details. .
5. Design of rectangular and hemispherical bottomed steel tank.

TOTAL: 30

REFERENCES / MANUALS / SOFTWARE

1. STRAP / STAAD Pro / SAP 2000.
2. Krishnaraju, N., “Structural Design & Drawing”, (Concrete & Steel – Volume II and III) CBS Publishers, 2004.
3. Punmia B.C., Jain, Ashok Kumar and Jain, Arun Kumar., “Comprehensive Design of Steel Structures”, Laxmi Publications Pvt. Ltd., 2003.
4. Krishnamurthy, D., “Structural Design and Drawing”, Vol. II& III, CBS, Publishers & Distributors, Delhi, 1992.

COURSE OUTCOMES

On completion of the course the students will be able to

- CO1: Develop the ability to design steel and concrete structural components and transfer the design into drawings as per Indian Standard Codes using commercially available software.

Mapping of COs with POs

| COs/POs | a | b | c | d | e | f | g | h | i | j | k | l | m |
|---------|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 3 | | | 3 | 3 | | 3 | 3 | | 3 | | 3 |

1 – Slight, 2 – Moderate, 3 – Substantial

11CE706 DESIGN PROJECT

0 0 3 1

This course is to impart and improve the design capability of the student. This course conceives purely a design problem in any one of the disciplines of Civil Engineering; e.g., Design of an RC structure, Design of a waste water treatment plant, Design of a foundation system, Design of traffic intersection etc. The design problem can be allotted to either an individual student or a group of students comprising of not more than three. At the end of the course the group should submit a complete report on the design problem consisting of the data given, the design calculations, references, literature review, specifications if any and complete set of drawings which follow the design. In building design, the results of Manual design should be compared with design results obtained by using soft wares like STAAD PRO, STRAP etc.

EVALUATION PROCEDURE

The method of evaluation will be as follows:

1. Internal Marks : 30 marks
(decided by conducting 3 reviews by the guide appointed by the Institution)
2. Evaluation of Project Report : 20 marks
(Evaluated by the external examiner appointed by the University).
Every student belonging to the same group gets the same mark
3. Viva voce examination : 50 marks
(evaluated by the internal examiner appointed by the HOD with the approval of HOI, external examiner appointed by the University and Guide of the course – with equal Weightage)

Total :100 Marks

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Impact and improve the design and research capability of the student.

CO2: Conceives purely a problem in any one of the disciplines of civil engineering: e.g., Environmental engineering, Structural Engineering, Transportation engineering, etc., and the problem can be allotted to either an individual student or a group of students comprising of not more than three and submit a complete report on the problem selected.

Mapping of COs with POs

| COs/POs | a | b | c | d | e | f | g | h | i | j | k | l | m |
|---------|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 3 | 3 | | | | | | 3 | 2 | | 2 | 3 |
| CO2 | 3 | 3 | 3 | | | | | | 3 | 2 | | 2 | 3 |

1 – Slight, 2 – Moderate, 3 – Substantial

11GE801 PROFESSIONAL ETHICS AND HUMAN VALUES

(Common to all Engineering and Technology branches)

3 0 0 3

MODULE – I

15

Introduction to Human Values and Engineering Ethics: Understanding: Morals- Values-Ethics– Honesty – Integrity – Work Ethic – Service Learning – Civic Virtue –caring – Sharing– Courage – Valuing Time – Co-operation – Commitment – Empathy –Self-Confidence – Character – Spirituality- Senses of 'Engineering Ethics' - variety of moral issues - types of inquiry - moral dilemmas - moral autonomy - Kohlberg's theory - Gilligan's theory - consensus and controversy – Models of Professional Roles - theories about right action - Self-interest –customs and religion- uses of ethical theories.

MODULE - II

15

Safety, Responsibilities and Rights: Meaning of Engineering experimentation - engineers as responsible experimenters - codes of ethics for engineers - a balanced outlook on law - the challenger case study. Safety and risk - assessment of safety and risk - risk benefit analysis and reducing risk - the Three Mile Island and Chernobyl case studies. Collegiality and loyalty - respect for authority - collective bargaining - confidentiality - conflicts of interest - occupational crime - professional rights - employee rights – discrimination- Intellectual Property Rights (IPR)

MODULE - III

15

Global Ethical Issues and Codes : Multinational corporations - Environmental ethics - computer ethics – weapons development-engineers as managers-consulting engineers-engineers as expert witnesses and advisors -moral leadership-sample code of Ethics like ASME, ASCE, IEEE, Institution of Engineers (India), Indian Institute of Materials Management, Institution of Electronics and Telecommunication Engineers(IETE),India. etc.

TOTAL: 45

TEXT BOOKS

1. Martin Mike and Schinzinger Roland., “Ethics in Engineering”, Tata McGraw-Hill, New Delhi,2003.
2. Govindarajan M, Natarajan S, and Senthil Kumar V. S., “Engineering Ethics”, Prentice Hall of India, New Delhi, 2004.

REFERENCE BOOKS

1. Fleddermann, Charles D., “Engineering Ethics”, Pearson Education/Prentice Hall, New Jersey, 2004.
2. Harris, Charles E., Protchard, Michael S. and Rabins,Michael J., “Engineering Ethics: Concepts and Cases”, Wadsworth Thompson Learning, United States, 2000.
3. Seebauer Edmund G and Barry Robert L., “Fundamentals of Ethics for Scientists and Engineers”, Oxford University Press, Oxford, 2001.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: examine the various aspects of human values

CO2: develop as responsible experimenters particularly with reference to safety

CO3: apply appropriate code of ethics to evaluate the probable consequences of actions

Mapping of COs with POs

| COs/POs | a | b | c | d | e | f | g | h | i | j | k | l | m |
|---------|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | | | | | | 3 | | 3 | | 2 | | 3 | |
| CO2 | 1 | 2 | 2 | 2 | | 2 | 2 | 3 | 3 | 2 | | 3 | |
| CO3 | | | | 1 | | 2 | 1 | 3 | 3 | | | 3 | |

3 – Substantial, 2 – Moderate, 1 – Slight

11CE801 PROJECT WORK

0 0 18 9

Objective: The objective of this course is to impart and improve the design capability of the student. This course conceives purely a problem in any one of the disciplines of Civil Engineering; e.g., Environmental engineering, Structural Engineering, Transportation engineering, etc., The problem can be allotted to either an individual student or a group of students comprising of not more than three. At the end of the course the group should submit a complete report on the design problem consisting of the data given, the design calculations, specifications if any and complete set of drawings which follow the design.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Impact and improve the design and research capability of the student.

CO2: Conceives purely a problem in any one of the disciplines of civil engineering: e.g., Environmental engineering, Structural Engineering, Transportation engineering, etc., and the problem can be allotted to either an individual student or a group of students comprising of not more than three and submit a complete report on the problem selected.

Mapping of COs with POs

| COs/POs | a | b | c | d | e | f | g | h | i | j | k | l | m |
|---------|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 3 | 3 | | | | | | 3 | 2 | | 2 | 3 |
| CO2 | 3 | 3 | 3 | | | | | | 3 | 2 | | 2 | 3 |

1 – Slight, 2 – Moderate, 3 – Substantial

MODULE- I**15**

Principles of Remote Sensing and Aerial Photography: Definition – Historical Importance of remote sensing – Principles and methods of remote sensing – Electromagnetic spectrum – Electromagnetic Radiation and radiation sources – Interference – Atmospheric effects on remote sensing – Energy interaction with earth surface features – Definition – Types of aerial photographs – Geometry of air photo – Parallax – Pair of photos – Height determination – Flight planning – Stereoscapy – Monovision – Binocular vision.

MODULE - II**15**

Aerial Photo Interpretation and Imagery: Aerial photo interpretation – Basic elements – Techniques of photo interpretation – Application of aerial photo interpretation – Photographs versus maps – Landsat imagery – Thermal infrared imagery – Radar imagery – Digital image processing – Comparison with aerial photographs.

MODULE- III**15**

Instrumentation for Remote Sensing and GIS Applications: Imaging devices – Aerial camera – Panoramic camera – Multiband camera – Films for recording images – Black and white and colour serial films – Optical and electronic colour combiner – Photogrammetric equipments – GIS in water resources engineering, land use studies, soil sciences, geology, agriculture, forestry and oceanography. Survey, Mapping, Land use.

TOTAL : 45**TEXT BOOKS**

1. Lillesand, Thomas. M and Raiph, W. Kiefer., “Remote Sensing and Image Interpretation”, John Wiley Sons, New York 2002.
2. Sabins, Floyd F., “Remote Sensing Principles Interpretation”, Freeman and Company, France, 1996.

REFERENCE BOOKS

1. Burrough, P.A, “Principles of GIS for Land Resources Assessment”, Oxford Publication, Singapore, 2000.
2. Demers, Michael N, “Fundamentals of Geographical Information Systems”, Second Edition, John Wiley Publications, New York, 2002.
3. Longley, Paul A, Goodchild, Michael F and et.al, “Geographical Information Systems”, Volume I and II”, Second Edition, John Wiley Publications, New York 1999.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Gain the knowledge on principles of Remote sensing and aerial photography

CO2: Acquires skills on interpretation of aerial photo and imageries

CO3: Gain knowledge on various applications of Remote sensing and GIS

Mapping of COs with POs

| COs/POs | a | b | c | d | e | f | g | h | i | j | k | l | m |
|---------|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | | | | 2 | | | 3 | 3 | | 2 | 3 | |
| CO2 | 3 | | | | 2 | | | | 3 | 2 | 2 | 3 | |
| CO3 | 3 | | | | 2 | | | | 3 | 3 | 2 | 3 | |

1 – Slight, 2 – Moderate, 3 – Substantial

MODULE – I**15**

Sources, Types and Storage of Municipal Solid Wastes: Sources and types of solid wastes - Quantity - Factors affecting generation of solid wastes; characteristics - Methods of sampling and characterization; Effects of improper disposal of solid wastes - Public health effects - Principle of solid waste management - Social & economic aspects; Public awareness; Role of NGOs; Legislation - On-site storage methods - Materials used for containers.

MODULE - II**15**

On-Site Processing, Collection and Transfer: On-site segregation of solid wastes - Public health & economic aspects of storage - Options under Indian conditions - Critical Evaluation of Options - Methods of Collection - Types of vehicles - Manpower requirement - Collection routes; transfer stations - Selection of location, operation & maintenance; options under Indian conditions.

MODULE- III**15**

Off-Site Processing and Disposal: Processing techniques and Equipment; Resource recovery from solid wastes - Composting, incineration, Pyrolysis - Options under Indian conditions - Dumping of solid waste; sanitary landfills - Site selection, design and operation of sanitary landfills - Leachate collection & treatment.

TOTAL : 45**TEXT BOOKS**

1. Tchobanoglous, George et.al. "Integrated Solid Waste Management", McGraw-Hill Publishers, New Delhi, 1993.
2. Bilitewski, B., HardHe, G., K., Weissbach, Marek, A., and Boeddicker, H., "Waste Management", Springer, New York, 1994.

REFERENCE BOOKS

1. "Manual on Municipal Solid Waste Management", CPHEEO, Ministry of Urban Development, Government of India, New Delhi, 2000.
2. Landreth, R.E. and Rebers, P. A., "Municipal Solid Wastes - Problems and Solutions", Lewis Publishers, Boca Raton, US, 1997.
3. Bhide, A.D. and Sundaresan, B.B., "Solid Waste Management in Developing Countries", INSDOC, New Delhi, 1993.

COURSE OUTCOMES

On completion of the course the students will be able to

- CO1: identify basic deficiencies of various soil deposits and he/she is in a position to decide various ways and means of improving the soil and implementing techniques of improvement.
- CO2: select suitable method of accumulating and handover of municipal solid waste
- CO3: generate responsiveness among people about the various off site handling techniques

Mapping of COs with POs

| COs/POs | a | b | c | d | e | f | g | h | i | j | k | l | m |
|---------|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | | | 3 | | | 3 | | 3 | 2 | 2 | | | |
| CO2 | 2 | 2 | | 2 | | 2 | | 2 | 1 | | | 2 | 1 |
| CO3 | 2 | | | 2 | | | | | 3 | 2 | 1 | | 1 |

1 – Slight, 2 – Moderate, 3 – Substantial

MODULE- I

Hydrometeorology: Hydrological cycle – Hydro meteorological factors – Cloud formation – Winds and their movement – Types of precipitation – Forms of precipitation – Density and adequacy of rain gauges – Recording and non-recording gauges – Spatial distribution – Consistency analysis – Frequency analysis – Intensity, duration and frequency relationships.

MODULE- II

Hydrograph Analysis: Factors affecting shape of hydrograph – Components of direct runoff hydrograph – Baseflow – Unit hydrograph – S curve hydrograph – Synthetic unit hydrograph – Evaporation – Infiltration – Horton’s equation – Infiltration indices.

MODULE- III

Groundwater Hydrology and Flood Analysis: Occurrence of ground water – Types of aquifer – Dupuit’s assumptions – Darcy’s law – Estimation of aquifer parameters – Pump tests flood estimation – Gumbel’s method – Log Pearson type III method – Reservoir flood routing – Channel routing – Other methods of routing.

Lecture:45, Tutorial:15, TOTAL : 60

TEXT BOOKS

- Jayarami Reddy, P, “Hydrology”, Laxmi Publications Ltd., New Delhi, 2011.
- Subramanya, K., “Engineering Hydrology”, Third Edition, Tata McGraw-Hill, New Delhi, 2007.

REFERENCE BOOKS

- Raghunath, H M., “Hydrology”, New Age International (P) Ltd., Chennai, 2000.
- Singh, Vijay P., “Elementary Hydrology”, Prentice Hall of India, New Delhi, 1998.
- Mutreja, K N, “Applied Hydrology”, Tata McGraw Hill, New Delhi, 1998.

COURSE OUTCOMES

On completion of the course the students will be able to

- CO1: Understand the Hydro meteorological factors
- CO2: Analyse the various hydrographs
- CO3: Understand and analyse the Groundwater Hydrology and Flood routing

Mapping of COs with POs

| COs/POs | a | b | c | d | e | f | g | h | i | j | k | l | m |
|---------|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | | | | 3 | | 2 | | | | | | |
| CO2 | 3 | | | | 3 | | | 1 | | | | | |
| CO3 | 3 | | | | 3 | | | | | | | | |

1 – Slight, 2 – Moderate, 3 – Substantial

11CE014 GROUND IMPROVEMENT TECHNIQUES

3 0 0 3

MODULE – I

15

Drainage and Dewatering Techniques: Role of ground improvement in foundation engineering - methods of ground improvement - Geotechnical problems in alluvial, laterite and black cotton soils - Selection of suitable ground improvement techniques based on soil condition - Drainage techniques - Well points - Vacuum and electro-osmotic methods - Seepage analysis for two dimensional flow-fully and partially penetrating slots in homogenous deposits (Simple cases only).

MODULE - II

15

In-situ Treatment of Cohesionless and Cohesive Soils: In-situ densification of cohesionless and consolidation of cohesive soils - Dynamic compaction and consolidation - Vibrofloatation - Sand pile compaction - Preloading with sand drains and fabric drains - Stone columns - Lime piles (Installation techniques only) - relative merits of various methods and their limitations.

MODULE - III

15

Earth Reinforcement and Grout Techniques: Concept of reinforcement - Types of reinforcement material - Applications of reinforced earth-use of Geotextiles for filtration, drainage and separation in road and other works - Types of grouts - Grouting equipment and machinery - Injection methods - Grout monitoring - Stabilisation with cement, lime and chemicals - Stabilisation of expansive soils.

TOTAL: 45

TEXT BOOKS

1. Koerner, R.M., "Construction and Geotechnical Methods in Foundation Engineering", McGraw-Hill, New Jersey, 1994.
2. Purushothama Raj, P., "Ground Improvement Techniques", Tata McGraw-Hill, New Delhi, 1995.

REFERENCE BOOKS

1. Moseley, M.P., "Ground Improvement", Blockie Academic and Professional, Chapman and Hall, Glasgow, 1993.
2. Jones, J.E.P., "Earth Reinforcement and Soil Structure", Advanced series in Geotechnical Engineering, Butterworths, London, 1985.
3. Jewell, R.A., "Soil Reinforcement with Geotextiles", CIRIA special publication, London, 1996.
4. Haussman, "Principles of Ground Modification", Tata McGraw-Hill, New Delhi, 1993.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Identify the basic deficiencies of various soil deposits

CO2: Decide various ways of improving soil implementing techniques.

CO3: Study the different types of soil stabilizing methods.

Mapping of COs with POs

| COs/POs | a | b | c | d | e | f | g | h | i | j | k | l | m |
|---------|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | | | | 1 | | | 3 | 3 | | | | |
| CO2 | 3 | | | | 3 | | | 3 | 3 | 2 | | | |
| CO3 | 3 | | | | 3 | | | 3 | 3 | 2 | | | |

1 – Slight, 2 – Moderate, 3 – Substantial

MODULE – I**15**

Water Power and Electrical Load on Hydro Turbines: Introduction – Sources of energy – Status of power in world – Hydro power – Transmission voltages and Hydro power – Estimation of water power potential – Load curve – Load factors – Capacity factor – Utilization factors – Diversity factor – Load duration curve – Firm power – Secondary power – Prediction of load – Illustrative examples.

MODULE - II**15**

Hydro Power Plants and Water Conveyance: Classification of hydel plants – Run-off – River plants – General arrangements – Valley dam plants – Diversion canal plants – High head diversion plants – Storage and pondage – Pumped storage plants – Types – Advantages – Two unit arrangement, three unit arrangement – Reversible pump turbines – Problems in operation – Efficiency of pumped storage plants – Penstock – Types – Design criteria – Anchor blocks – Valves, bends and manifolds – Intakes – Types – Losses – Aeration – Fore bays – Canals – Tunnels – Water hammer – Surge tanks.

MODULE - III**15**

Tidal Power and Power House Planning: Tidal phenomenon – Tidal power – Basic principle – Location – Difficulties – Components – Modes of generation – Constructional aspects – Estimate of energy and power – Regulation of power output – Economic feasibility – Promising sites – Surface power stations – Power House structure – Dimensions – Lighting and ventilations – Design variations – Under ground power stations – Location – Types – Advantages – Components – Layout types – Limitations – Environmental impact of hydel power projects – Introduction to economic analysis of hydro power projects.

TOTAL : 45**TEXT BOOKS**

1. Sharma, R.K. and Sharma, T.K., “A Text Book of Water Power Engineering”, S.Chand & Co. Ltd., New Delhi, 2003.
2. Dandekar, M.M. and Sharma, K.N., “Water Power Engineering”, Vikas Publishing House, New Delhi, 1998.

REFERENCE BOOKS

1. Creager and Justin, “Hydro Electric Hand Book”, John Wiley sons, London, 1989.
2. Douglas, J.L. and Lee, R.R., “Economics of Water Resources Planning”, Tata McGraw-Hill, New Delhi, 2000.
3. Duggal, K.N. and Soni, J.P., “Elements of Water Resources Engineering”, New Age International Publishers, Chennai, 1996.

COURSE OUTCOMES

On completion of the course the students will be able to

- CO1: Understand different phases of water resources engineering.
- CO2: Plan and collect relevant data's on water resources and national water policy.
- CO3: Study the different aspects such as reservoir planning, management and economic analysis.

Mapping of COs with POs

| COs/POs | a | b | c | d | e | f | g | h | i | j | k | l | m |
|---------|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | | | | 3 | | | 3 | | 3 | | | |
| CO2 | 1 | | | | 3 | | | 3 | | 3 | | | |
| CO3 | 1 | | | | 2 | | | 3 | | 3 | | | |

1 – Slight, 2 – Moderate, 3 – Substantial

11CE016 ADVANCED STEEL DESIGN
[IS 800, IS 801, IS 811 & SP-06 are to be permitted]

3 1 0 4 15

MODULE -I

Light Gauge Sections and Plastic Analysis & Design: Light gauge sections – Types of sections, material - Local buckling of tl elements – Stiffened and multiple stiffened compression elements - Unstiffened elements - compression members - Connectio Plastic hinges – Plastic collapse load – Design as per IS 800 – Simple cases only – Continuous beams – frames.

MODULE -II

Design of Chimneys, Bunkers and Silos: Self-supporting chimneys - Pressure on side walls of bunkers and silos – Janssen’s and Airy’s theories – Design of single cell circular silos including their supporting structures and foundation – Design of rectangular and square bunkers

MODULE -III

Plate Girders and Gantry Girders: Design of Welded Plate Girder- Intermediate and bearing stiffeners – Design of Beam Columns – Design of Gantry Girders.

Lecture : 45, Tutorial: 15, TOTAL : 60

Note: Drawings not for end semester Examination

TEXT BOOKS

1. Ramachandra, S. and Virendra Gehlot., “Limit State Design of Steel Structures”, Scientific Publishers (India), Jodhpur, 2010.
2. Subramanian, N., “Design of Steel Structures”, Oxford University Press, New Delhi, 2009.

REFERENCE BOOKS

1. “Teaching Resources for Structural Steel Design”, Vol. I, II & III, INSDAG, Kolkatta.
2. Bhavikatti, S.S., “Design of Steel Structures”, I.K. International Publishing House Pvt. Ltd, New Delhi, 2009.

COURSE OUTCOMES

On completion of the course the students will be able to

- CO1: Analyse and Design of various light gauge sections and plastic analysis of compression members
- CO2: Design Chimneys, Bunkers and silos
- CO3: Analyse and Design of plate girders and gantry girders

Mapping of COs with POs

| COs/POs | a | b | c | d | e | f | g | h | i | j | k | l | m |
|---------|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | | 3 | | 3 | | 3 | | 3 | 3 | | | 3 |
| CO2 | 3 | | 3 | | 3 | | 3 | | 3 | 3 | | | 3 |
| CO3 | 3 | | 3 | | 3 | | 3 | | 3 | 3 | | | 3 |

1 – Slight, 2 – Moderate, 3 – Substantial

11CE017 AIR POLLUTION CONTROL ENGINEERING**3 0 0 3**

Objective: This subject covers the sources, characteristics and effects of air and noise pollution and the methods of controlling the same. The student is expected to know about source inventory and control mechanism.

MODULE – I**15**

Sources, Effects and Dispersion of Air Pollutants: Classification of air pollutants -Particulates and gaseous pollutants - Sources of air pollution - Source inventory - Effects of air pollution on human beings, materials, vegetation, animals - Global warming - Ozone layer depletion - Sampling and Analysis - Basic principles of sampling - Source and ambient sampling - Analysis of pollutants - Principles - Elements of atmosphere - Meteorological factors - Wind roses - Lapse rate - Atmospheric stability and turbulence - Plume rise - Dispersion of pollutants - Dispersion models - Applications.

MODULE - II**15**

Air Pollution Control and Quality Management: Concepts of control - Principles and design of control measures - Particulates control by gravitational, centrifugal, filtration, scrubbing, electrostatic precipitation - Selection criteria for equipment - gaseous pollutant control by adsorption, absorption, condensation, combustion - Pollution control for specific major industries - Air quality standards - Air quality monitoring - Preventive measures - Air pollution control efforts - Zoning.

MODULE- III**15**

Air Quality Regulations and Noise Pollution: Town planning regulation for new industries - Legislation and enforcement - Environmental impact assessment and air quality - Sources of noise pollution - Effects - Assessments - Standards - Control methods - Prevention.

TOTAL : 45**TEXT BOOKS**

1. Anjaneyulu, D., "Air Pollution and Control Technologies", Allied Publishers, Mumbai, 2002.
2. Rao, C.S., "Environmental Pollution Control Engineering", Wiley Eastern Ltd., New Delhi, 1996.

REFERENCE BOOKS

1. Heumann, W.L., "Industrial Air Pollution Control Systems", Mc Graw-Hill, New York, 1997
2. Peavy, S.W., Rowe, D.R. and Tchobanoglous, G., "Environmental Engineering", McGraw Hill, New Delhi, 1985.
3. Rao, M.N. and Rao, H. V. N., "Air Pollution Control", Tata-McGraw-Hill, New Delhi, 1996.

COURSE OUTCOMES

On completion of the course the students will be able to

- CO1: Understand the sources, effects dispersion of Air pollutants.
- CO2: Gain the knowledge about Quality management and control of air pollutants.
- CO3: Acquire the knowledge about laws & regulations of air quality and standards & control methods of noise pollution.

Mapping of COs with POs

| COs/POs | a | b | c | d | e | f | g | h | i | j | k | l | m |
|---------|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | | | 3 | | 3 | | | 3 | | | | | |
| CO2 | | | 3 | | | | | 3 | | | | | |
| CO3 | | | 3 | | 3 | 2 | | 3 | 2 | 2 | | | |

1 – Slight, 2 – Moderate, 3 – Substantial

11CE018 REPAIR AND REHABILITATION OF STRUCTURES

3 0 0 3

MODULE – I

15

Influence on Serviceability and Durability: Quality assurance for concrete construction – Concrete properties – strength, permeability, thermal properties and cracking. Effects due to climate, temperature, chemicals and corrosion – Methods of corrosion protection - Design and construction errors – Effect of cover thickness

MODULE - II

15

Material and Techniques for Repair: Concrete chemicals – Special elements for accelerated strength gain – Rust eliminators and polymer coating for rebars during repair – Foamed concrete, mortar and dry pack. – Guniting and shotcrete – Epoxy injection – Mortar for repair cracks – Shoring and Underpinning- Repair of structures distressed due to earthquake – Strengthening using FRP - Strengthening and stabilization techniques for repair.

MODULE - III

15

Repairs, Rehabilitation and Retrofitting of Structures: Assessment procedure for evaluating a damaged structure - Causes of deterioration - Repair to overcome low member strength, deflection, cracking, chemical disruption, weathering, wear, corrosion, fire, leakage and marine exposure – Demolition techniques – Some case studies.

TOTAL : 45

TEXT BOOKS

1. Campbell-Allen, Denison, and Roper, Harold., “Concrete Structures: Materials, Maintenance and Repair”, ELBS, London, 1991.
2. Allen, R.T. and Edwards, S.C., “Repair of Concrete Structures”, Blakie and Sons, London, UK, 1994.

REFERENCE BOOKS

1. Neville, A.M., “Concrete Technology”, John Wiley and Sons, New York, 2008.
2. Shetty, M.S., “Concrete Technology”, S.Chand & Co, New Delhi, 2008.

COURSE OUTCOMES

On completion of the course the students will be able to

- CO1: impart fundamental knowledge on Quality, serviceability and durability criteria
- CO2: acquire the knowledge of various materials, methods and techniques for repair of structures
- CO3: gain knowledge about the techniques of repair, rehabilitation and retrofitting of structures

Mapping of COs with POs

| COs/POs | a | b | c | d | e | f | g | h | i | j | k | l | m |
|---------|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | | 3 | | | | | 3 | 3 | | | 3 | |
| CO2 | 3 | | 3 | | | | | 3 | 3 | | | 3 | |
| CO3 | 3 | | 3 | | | | | 3 | 3 | | | 3 | |

1 – Slight, 2 – Moderate, 3 – Substantial

11CE019 ADVANCED STRENGTH OF MATERIALS

3 1 0 4

MODULE – I

15

Unsymmetrical Bending: Symmetrical and unsymmetrical bending, stress at any point in cross section – Sign convention – Direction of neutral axis – Determination of stress in beams with unsymmetrical sections – Deflection of beams subjected to unsymmetrical bending.

Shear Centre: Shear centre for sections symmetrical about both axis and about only one axis – Location of shear centre for unsymmetrical sections.

MODULE - II

15

Curved Beams: Bending of beams with small initial curvature - Strain energy of a beam with small initial curvature – Deflection of beams having small initial curvature – Curved beams with large initial curvature.

MODULE - III

15

Theory of Elasticity: Analysis of stress – Analysis of strain in a two dimensional case; stress - strain relationships – Equilibrium equations – Boundary conditions – Compatibility conditions – Airy’s stress function.

Lecture: 45, Tutorial: 15 TOTAL: 60

TEXT BOOKS

1. Srinath, L.S., “Advanced Mechanics of Solids”, Tata McGraw Hill, New Delhi, 2007.
2. Kamalkumar and Ghai, “Advanced Mechanics of Materials”, Khanna publishers, New Delhi, 2007.

REFERENCE BOOKS

1. Borg, S.F and Gennaro, J J., “Advanced Structural Analysis”, Van Nostrand, New York.2003.
2. Sinha, N.C and Gayen, P.K., “Advanced Theory of Structures”, Dhanpat Rai Publications, Delhi 2007.
3. Bansal, R.K., “Strength of Materials”, Laxmi Publications, New Delhi, 2007.

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Understand the concept of symmetrical and unsymmetrical bending and shear centre

CO2: Gain knowledge about curved beams

CO3: Understand the basic concepts of theory of Elasticity

Mapping of COs with POs

| COs/POs | a | b | c | d | e | f | g | h | i | j | k | l | m |
|---------|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | | | | | | | | 3 | | | | |
| CO2 | 3 | | | | 3 | | | | | 2 | | | 1 |
| CO3 | 3 | | | | | | | | 3 | 2 | | | 1 |

1 – Slight, 2 – Moderate, 3 – Substantial

MODULE -I**15**

Introduction and Methodologies: Impact of development on environment and Environmental Impact Assessment (EIA) - Environmental Impact Statement (EIS) - Objectives - Historical development - EIA capability and limitations - Legal provisions on EIA - Methods of EIA - Strengths, weaknesses and applicability - Appropriate methodology - Case studies.

MODULE -II**15**

Prediction, Assessment and Models for Assessment: Socio Economic Impact - Assessment of Impact on land, water and air, energy impact; impact on flora and fauna; mathematical models; public participation - Reports - Exchange of Information - Post Audit - Rapid EIA.

MODULE -III**15**

Environmental Management Plan: Plan for mitigation of adverse impact on environment - Options for mitigation of impact on water, air and land, flora and fauna; Addressing the issues related to the Project Affected People.

TOTAL :45**TEXT BOOKS**

1. Canter, R.L., "Environmental Impact Assessment", McGraw Hill Inc., New Delhi, 1996.
2. Shukla, S.K. and Srivastava, P.R., "Concepts in Environmental Impact Analysis", Common Wealth Publishers, New Delhi, 1992.

REFERENCE BOOKS

1. Rau, John G. and Hooten, David C., "Environmental Impact Analysis Handbook", McGraw Hill Book Company, 1990.
2. "Environmental Assessment Source book", Volume - I, II & III, The World Bank, Washington, D.C. 1991.
3. Petts, Judith., "Handbook of Environmental Impact Assessment", Volume - I & II, Blackwell Science, 1999.

COURSE OUTCOMES

On completion of the course the students will be able to

- CO1: Understand the concept and methods adopted for environmental impact assessment.
- CO2: Predict the impact of environment on land, water and air, flora and fauna by mathematical models.
- CO3: Acquire the knowledge about environmental management plan.

Mapping of COs with POs

| COs/POs | a | b | c | d | e | f | g | h | i | j | k | l | m |
|---------|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | | | | 2 | | | | | | | | |
| CO2 | 3 | | | | | | | 3 | | | 2 | 3 | |
| CO3 | 3 | | 1 | | | | | | 3 | 3 | | | |

1 – Slight, 2 – Moderate, 3 – Substantial

MODULE – I

Composition and Smart Materials for Structural Health Monitoring: Definition of Structural Health Monitoring (SHM) – Advantages, concepts, methods, applications of SHM - Data Acquisition - Data Transmission - Data Processing - Storage of processed data - Remote Structural Health Monitoring - Strain Gauges –(Basic study)-Accelerometers – (Principles and Construction), Temperature Sensors (Thermistors, Thermocouples), Displacement Transducers - LVDTs - Electrical resistance/capacitance based displacement transducers - Humidity Sensors, Crack growth Measuring Sensors, Corrosion Monitoring Sensors (Principles and Construction - Types – Issues)

MODULE - II

Field Testing: Static Field Testing - Requirements for carrying out static field testing - Types of static tests - Behavioural/ Diagnostic tests - Proof tests - Simulation and loading methods - Static response measurement; Dynamic Field Testing - Stress history data - Dynamic load allowance tests – Ambient & Lateral vibration tests - Forced Vibration Method - Dynamic response methods - Long term performance monitoring using integrated sensing methods - Monitoring through ambient vibration - Monitoring through testing under service load conditions - Loss of prestress; Data Acquisition Systems – Static & Dynamic data acquisition systems

MODULE - III

NDT Methods for Structural Integrity Assessment: UPV Method - Schmidt Hammer - Carbonation, Chloride testing - Core strength evaluation - Corrosion evaluation in rebars - Impact Echo - GPR Method - IR Thermography.

TOTAL : 45

TEXT BOOKS

- Chase, S.B. and Aktan, A.E., ‘Health Monitoring and Management of Civil Infrastructure Systems’, Proceedings of SPIE, USA, Vol.4337, 2001.
- Eric Udd., ‘Fiber Optic Smart Structures’, John Wiley & Sons, Inc., New York, 1995.

REFERENCE BOOKS

- Measures, Raymond M., “Structural Monitoring with Fiber Optic Technology”, Academic press, California, 2001.
- Ansari, Farhad., ‘Sensing Issues in Civil Structural Health Monitoring’, Springer, The Netherlands, 2005.
- Mufti, Aftab A., ‘Structural Health Monitoring’, SHM-ISIS Workshop, ISIS Canada Research Network, September 2002.

COURSE OUTCOMES

On completion of the course the students will be able to

- CO1: impart fundamental knowledge on structural health monitoring and the procedures involved.
- CO2: gain knowledge on various field tests available to monitor the structure.
- CO3: have a understanding about the various Non-destructive tests available in monitoring the health of the structure.

Mapping of COs with POs

| COs/POs | a | b | c | d | e | f | g | h | i | j | k | l | m |
|---------|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | | | 3 | | | | 3 | | | 3 | 3 | |
| CO2 | 2 | | | 2 | | | | 2 | | | 2 | 2 | |
| CO3 | 3 | | | 3 | | | | 3 | | | 3 | 3 | |

1 – Slight, 2 – Moderate, 3 – Substantial

MODULE -I**15**

Introduction and Geometric Design of Roads: Significance and scope - characteristics of vehicles and road users, skid resistance and braking efficiency (problems). Road alignment - lane width, grades, camber and gradient, curves - Super elevation and sight distances. Conflicts at intersections, classification of intersections at grade - Grade separators (concept only).

MODULE -II**15**

Traffic Surveys, Analysis and Control: Surveys and analysis - volume, capacity, speed and delays, origin and destination, parking, pedestrian studies, accident studies and safety level of services. Traffic signs, road markings, design of traffic signals and signal co-ordination (Problems). Traffic control aids and street furniture and street lighting.

MODULE -III**15**

Traffic Management: Restrictions on turning movements, one way streets, traffic segregation, tidal flow operations, exclusive bus lanes, cycle tracks, off-street and on-street parking control and traffic control at intersections.

TOTAL : 45**TEXT BOOKS**

1. Khanna, K and Justo, C.E.G., "Highway Engineering", Khanna Publishers, Roorkee, 2001.
2. Kadiyali, L R., "Traffic Engineering and Transport Planning", Khanna Technical Publications, Delhi, 2000.

REFERENCE BOOKS

1. Saxena, Subhash C., "A Course in Traffic Planning and Design", Dhanpat Rai Publication, New Delhi, 1989.
2. Bindra, S.P., "A Course in Highway Engineering", Dhanpat Rai Publication, New Delhi, 1989.

COURSE OUTCOMES

On completion of the course the students will be able to

- CO1: Understand concept of planning and design of roads.
 CO2: Acquires skills on analysis of traffic surveys and control
 CO3: Gain knowledge on Traffic management.

Mapping of COs with POs

| COs/POs | a | b | c | d | e | f | g | h | i | j | k | l | m |
|---------|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | | | | 3 | | | 2 | 3 | | 2 | 3 | |
| CO2 | 3 | | | | 2 | | | | 3 | 2 | 2 | 3 | |
| CO3 | 3 | | | | 3 | | | | 3 | 2 | 2 | 3 | |

1 – Slight, 2 – Moderate, 3 – Substantial

11CE023 DESIGN OF BRIDGES

[IS 456-2000, IS 458-1971, IRC 5-1998, IRC 6-2001 and IRC 21-2000 are to be permitted]

3 1 0 4

MODULE – I

15

Introduction to Bridges and Bridge Bearings: Highway and railway bridge loading standards. Bridge bearings - general features, types of bearings, design principles of steel rocker bearings, reinforced concrete rocker bearings and elastomeric pad bearings. Stone masonry bridges - design of masonry arched bridge with splayed wing walls.

MODULE - II

15

Pipe and Box Culvert Bridges, Bridge Foundations and Curved Bridge Decks: Pipe culvert - classification of reinforced cement concrete pipes and reinforcement requirements in pipes. Design of R.C.C pipe culvert and box culvert – design loads, design moments, shears and thrusts and design of critical sections. Bridge foundations – Types of foundations, only design procedure of pile foundations. Curved bridge decks – methods of analysis. Bridge vibrations.

MODULE - III

15

Balanced Cantilever Bridges & Piers and Abutments: Balanced cantilever bridges – general features, arrangement of supports, design features, shear variation, articulation and only the design procedure of double cantilever bridge. Piers– bed block, materials for piers and abutments, types of piers, forces acting on piers and design of pier. Abutments – forces acting on abutments, design of abutment, types of wing walls and approaches.

Lecture: 45, Tutorial: 15, TOTAL : 60

TEXT BOOKS

1. Krishna Raju, N., “Design of Bridges”, Third Edition, Oxford and IBH Publishing Company, New Delhi, 2006.
2. Gupta, B. L., “Text Book of Road, Railway, Bridge and Tunnel Engineering”, Second Edition, Standard Publishers, New Delhi, 2004.

REFERENCE BOOKS

1. Johnson, Victor D., “Essentials of Bridge Engineering”, Third Edition, Oxford and IBH Publishing Company, New Delhi, 2005.
2. Alagia, J. S., “Elements of Bridge Engineering”, Fifth Edition, Charotar Publishing House, Mumbai, 2004.
3. Phatak, D. R., “Bridge Engineering”, Seventh Edition, Satya Prakasan, New Delhi, 2001.
4. Krishna Raju. N., “Structural Design and Drawing”, Third Edition, University Press (India) Pvt. Limited, New Delhi, 2006.
5. Sinha, N.C. and Roy, S.K., “Fundamentals of Reinforced Concrete”, Second Edition, S.Chand & Company Ltd., New Delhi, 1991.

COURSE OUTCOMES

On completion of the course the students will be able to

- CO1: Design of Stone masonry bridges, design principles of bearing and different loading standards in bridge design
- CO2: Analyse & Design of pipe and box culvert, different types of bridge foundation, bridge vibration and curved bridge deck
- CO3: Understand principles of balanced cantilever bridge, stability analysis of piers and abutment

Mapping of COs with POs

| COs/POs | a | b | c | d | e | f | g | h | i | j | k | l | m |
|---------|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | | 3 | | 3 | | | | 3 | 3 | | | 2 |
| CO2 | 3 | | 3 | | 3 | | | | 3 | 3 | | | 3 |
| CO3 | 3 | | 3 | | 3 | | | | 3 | 3 | | | 3 |

1 – Slight, 2 – Moderate, 3 – Substantial

11CE024 OPERATION AND MAINTENANCE OF IRRIGATION STRUCTURES**3 0 0 3****MODULE -I****15**

Diversion Head Works and Dams: Weirs and barrages – layout of a diversion head works and its components – failures of hydraulic structures founded on previous foundations creep theory for seepage flow – (Bligh’s lanes and Khosla’s) – Design of gravity dams –mode of failure and criteria for structural stability of gravity dams – Diversion problems in dam construction of galleries – joints – foundation treatment – Types of earthen dams –method of construction – Causes of failure of earthen dams – seepage analysis – seepage control in earthen dams.

MODULE -II**15**

Canal Regulation Works and Flood Forecasting: Types of falls – Design principles – Canal regulation works – Alignment of the off taking canal – Design of cross regulator and distributory head regulator – Types of canal escapes – Types of canal outlets – criteria for judging the performance of outlet – Basic data requirements – Procedure – specialized forecasting techniques – flood regulation – Regulation of flood plain use.

MODULE -III**15**

Reservoir Regulation: Purpose – classification – Reservoir design studies – operating schedules and guides operating organization – Hydrologic network – Maintenance of hydraulic structures – types – procedure – charts – annual maintenance.

TOTAL :45**TEXT BOOK**

- Garg, S.K., “Irrigation Engineering and Hydraulic Structures”, Khanna publishers, New Delhi, 1977.

REFERENCE BOOKS

- Chow, V. T., “Applied Hydrology”, McGraw-Hill Book Co., 1998
- Davis, C.V. and Sorensen, K.E., “Handbook of Applied Hydraulics”, McGraw-Hill Book Co., New York, 1969.

COURSE OUTCOMES

On completion of the course the students will be able to

- CO1: Understand the layout, components and problems in diversion head works and dams.
- CO2: Design canal regulation works and flood forecasting.
- CO3: Understand the reservoir regulation and the maintenance of hydraulic structures.

Mapping of COs with POs

| COs/POs | a | b | c | d | e | f | g | h | i | j | k | l | m |
|---------|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | | 3 | | 3 | | | | 3 | | 3 | | |
| CO2 | 3 | | 3 | | | | | 2 | 3 | | 3 | | 3 |
| CO3 | 3 | | 3 | | | | | | 3 | | 3 | | 3 |

1 – Slight, 2 – Moderate, 3 – Substantial

11CE025 REINFORCED SOIL STRUCTURE

3 0 0 3

MODULE – I

15

Principles, Mechanism of Soil Reinforcement and Properties of Reinforcing Materials: Historical background, Principles, Concept and Mechanism of reinforced earth, Materials used in reinforced soil structures, fill materials, Reinforced materials, Metal Strips, Geogrids, Geomembrane, Geocomposites and Geo Jutes, Geofoam, Natural Fibres – Facing elements – properties and method of testing.

MODULE - II

15

Design of Soil Reinforcement, Separation and Filtration: Reinforcing the soils-Geotextiles and Geogrids – Embankments and Slopes – Reinforcing walls - Bearing Capacity – Road way Reinforcement – Slope Stabilisation, Requirements for design of separation- Filtration – General behaviour, Filtration behind retaining wall, Under drains, Drainage design – Liners for Liquid Containment.

MODULE - III

15

Durability of Reinforcement Materials: Measurement of corrosion factors, resistivity – Redox potential, water content, pH, Electrochemical corrosion, Bacterial corrosion – Influence of environmental factors on the performance of Geosynthetic materials.

TOTAL : 45

TEXT BOOKS

1. Sivakumar Babu, G.L., “An Introduction to Soil Reinforcement and Geosynthetics,” University Press (India) Pvt. Limited, Hyderabad, 2006
2. Ramanatha Ayyar, T.S., Ramachandran Nair, C.G. and Balakrishna Nair, N., “Comprehensive Reference Book on Coir Geotextile,” Centre for Development for Coir Technology, 2002.

REFERENCE BOOKS

1. Jewell, R.A., “Soil Reinforcement with Geotextile”, CIRIA, London, 1996
2. Jones, C.J.F.P., “Earth Reinforcement and Soil Structure”, Earthworks, London, 1982.
3. Koerner, R.M., “Designing with Geosynthetics”, Third Edition, Prentice Hall, 1997

COURSE OUTCOMES

On completion of the course the students will be able to

CO1: Know Principles, Mechanism of Soil Reinforcement and Properties of Reinforcing Materials

CO2: Design Soil Reinforcement, Separation and Filtration

CO3: Understand Durability of Reinforcement Materials

Mapping of COs with POs

| COs/POs | a | b | c | d | e | f | g | h | i | j | k | l | m |
|---------|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | | | | | | | | | | | | |
| CO2 | | 3 | 3 | | 1 | | | | | | | | |
| CO3 | | | 1 | | 3 | | | 1 | | | | | |

1 – Slight, 2 – Moderate, 3 – Substantial

MODULE – I

Optimization Techniques and Algorithms: Basic concepts of minimum weight - minimum cost design - objective function – constraints - classical methods. Linear programming - Integer Programming and geometric Programming methods for optimal design of structural elements.

MODULE - II

Computer Search Methods and Optimization Theorems: Linear Programming methods for plastic design of frames - Computer search for univariate and multivariate minimization. Optimization by structural theorems - Maxwell, Mitchell and Heymans Theorem for trusses and frames - fully stressed design with deflection constraints - optimality criterion methods.

MODULE - III

Non-Traditional Optimization Techniques: Methods land on natural evolution - Genetic Algorithm - simulated annealing - Truss problem - Hand simulation for simple problems.

Lecture:45, Tutorial:15, TOTAL : 60

TEXT BOOKS

- Spunt, “Optimum Structural design, Civil Engineering and Mechanics Services”, Prentice -Hall, New Jersey 1971.
- Rao, S.S., “Optimization theory and Applications”, Wiley Eastern Limited, New Delhi, 1977.

REFERENCE BOOKS

- Uri Krisch, “Optimum Structural design”, McGraw-Hill Book Co. 1981.
- Bronson, Richard, “Operation Research”, Schaum's Outline series, McGraw-Hill book Co, Singapore, 1983.

COURSE OUTCOMES

On completion of the course the students will be able to

- CO1: Know optimization techniques and algorithms
- CO2: Analyse Computer search methods and various optimization theorems
- CO3: Understand Non-traditional optimization techniques

Mapping of COs with POs

| COs/POs | a | b | c | d | e | f | g | h | i | j | k | l | m |
|---------|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 1 | | 1 | | 3 | | | 3 | | | | | |
| CO2 | 2 | | 1 | | 3 | | | | | | | | |
| CO3 | | | 1 | | 3 | | | | | | | | |

1 – Slight, 2 – Moderate, 3 – Substantial

MODULE – I**15**

Overview Of Indian Infrastructure Assets: Introduction to Infrastructure - An overview of Infrastructure management - An over view of power sector in India- An over view of water supply and sanitation sector in India- An over view of Road, Rail, Air and port transportation sectors in India - An over view of Telecommunications sector in India- An over view of Urban Infrastructure in India- An over view of Rural Infrastructure in India- An Introduction to special economic zones- infrastructure privatization – benefits, challenges and problems.

MODULE - II**15**

Risks and Challenges in Infrastructure Project Planning: Challenges in privatization of Power sector – Case studies – Challenges in privatization of water supply in India – Case studies- Challenges in privatization of Road and Transportation Infrastructure in India – Case studies - Economic and demand risks: The case studies of Vadodhara- Halol Expressway- Political risks- Socio-economic risks- Cultural risks- Demand and market risks - Demand analysis techniques - infrastructure report card – infrastructure inspection - Legal and Contractual issues in infrastructure- Challenges in construction and maintenance of Infrastructure – risk management

MODULE - III**15**

Infrastructure Project Management: Introduction to asset management – design service life – built infrastructure issues – life cycle analysis techniques – cost account codes – labour cost records – equipment cost sheets – facility maintenance – accounting cycle – Dupont model – cash flow and fund flow concepts – cost accounting – marginal costing – cost volume profit analysis - Capacity Building and Improving the Government’s role in infrastructure implementation- An integrated framework for successful Infrastructure Planning and Management- Infrastructure Management Systems and Future Directions

TOTAL : 45**TEXT BOOK**

1. India Infrastructure Report. “Ensuring Value for Money”, Oxford University Press, New Delhi, 2008.

REFERENCE BOOKS

1. Kochnar, Sammer, and Phatak, Deepak B., “Infrastructure and Governance”, Academic foundation, Darya Ganj, New Delhi, 2006.
2. “An over view of Power Sector in India”, India Core Publishing, New Delhi, 2008
3. Raghuram, G., Rekha Jain, and Shina, Sidharth; “Infrastructure Development and Financing: Towards Public – Private partnership”, Macmillan India Limited, New Delhi, 2006.
4. Jotin Khisty, C. and Lall, B. Kent., “Transportation Engineering: An Introduction”, Third Edition, Prentice Hall, New Delhi, 2002.

COURSE OUTCOMES

On completion of the course the students will be able to

- CO1: Gain knowledge of planning, design, evaluation, Construction and financing of infrastructure projects.
- CO2: Understand Political, Socio-economic, Cultural, Demand and market risks with Challenges in construction and maintenance of Infrastructure
- CO3: Emphasis on the project planning techniques and Managements.

Mapping of COs with POs

| COs/POs | a | B | C | d | e | F | g | H | i | j | k | l | m |
|---------|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 3 | 3 | | 3 | | | | | | 3 | | 2 |
| CO2 | | | 3 | | 3 | 3 | | | | | 3 | | |
| CO3 | | | | 3 | 3 | | | | | | 3 | | |

1 – Slight, 2 – Moderate, 3 – Substantial

MODULE – I**15**

Introduction - Variational Formulation: General field problems in Engineering - Modelling - Discrete and Continuous models - Characteristics - Difficulties involved in solution - The relevance and place of the finite element method - Historical comments - Basic concept of FEM, Boundary and initial value problems - Functionals - Variational calculus- The method of weighted residuals - The Ritz method.

MODULE - II**15**

Finite Element Analysis of One Dimensional Problems: One dimensional second order equations - discretisation of domain into elements - Generalised coordinates approach - derivation of elements equations - assembly of elements equations - solution of equations - Cholesky method - Post processing.

MODULE- III**15**

Applications to Field Problems in Two Dimensionals: Equations of elasticity - plane elasticity problems – axi-symmetric problems in elasticity - Bending of elastic plates - Time dependent problems in elasticity - incompressible fluid flow - use of commercial software packages.

Lecture: 45, Tutorial 15, TOTAL : 60**TEXT BOOKS**

1. Chandrupatla, T.R., and Belegundu, A.D., “Introduction to Finite Element in Engineering”, Third Edition, Prentice Hall, India, New Delhi, 2003.
2. Rao, S.S., “The Finite Element Method in Engineering”, Elsevier Publications, New Delhi, 2006.

REFERENCE BOOKS

1. Reddy, J.N., “An Introduction to Finite Element Method”, McGraw-Hill, Intl. Student Edition, New York, 2004.
2. Zienkiewics, “The Finite Element Method, Basic Formulation and Linear Problems”, Elsevier Publications, New Delhi, 2005.
3. Huttan, D.V., “Fundamentals of Finite Element Analysis”, Tata McGraw-Hill, New Delhi, 2004.
4. Cook, R.D., “Finite Element Concepts in Engineering”, Wiley India Ltd, New Delhi, 2002.

COURSE OUTCOMES

On completion of the course the students will be able to

- CO1: Gain knowledge about the basic concepts of FEM
 CO2: Understand the Analysis of Finite Element in One Dimensional Problem
 CO3: Gain knowledge in applications to Field Problems in Two Dimensional

Mapping of COs with POs

| COs/POs | a | b | c | d | e | f | g | h | i | j | k | l | m |
|---------|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | | | | 3 | | | | 1 | 2 | 3 | | 1 |
| CO2 | 3 | | | | 3 | | | | 1 | 2 | 3 | | 1 |
| CO3 | 3 | | | | 3 | | | | 1 | 2 | 3 | | 1 |

1 – Slight, 2 – Moderate, 3 – Substantial

11GE701 TOTAL QUALITY MANAGEMENT
(Common to all Engineering and Technology branches)

3 0 0 3

MODULE – I

15

Quality Systems: Definition of Quality, Dimensions of Quality, Quality Planning, Quality costs, Basic concepts of Total Quality Management, Historical Review. Need for ISO 9000 and Other Quality Systems, ISO 9000:2008 Quality System – Elements, Implementation of Quality System, Documentation, Quality Auditing, Introduction to TS 16949, QS 9000, ISO 14000, ISO 18000, ISO 20000, ISO 22000.

MODULE – II

15

TQM Principles: Principles of TQM, Leadership – Concepts, Quality Council, Quality Statements, Strategic Planning, Deming Philosophy, Barriers to TQM Implementation. Customer satisfaction – Customer Perception of Quality, Customer Complaints, Customer Retention, Employee Involvement – Motivation, Empowerment, Teams, Recognition and Reward, Performance Appraisal, Benefits. Continuous Process Improvement – Juran Trilogy, PDSA Cycle, 5S, Kaizen, Supplier Partnership – Partnering, sourcing, Supplier Selection, Supplier Rating, Relationship Development, Performance Measures – Basic Concepts.

MODULE – III

15

TQM Tools: The seven tools of quality, Statistical Fundamentals – Measures of central Tendency and Dispersion, Population and Sample, Normal Curve, Control Charts for variables and attributes, Process capability, Concept of six sigma, New seven Management tools, Poka Yoke. Benchmarking – Reasons to Benchmark, Benchmarking Process, Quality Function Deployment (QFD) – House of Quality, QFD Process, Benefits, Taguchi Quality Loss Function, Total Productive Maintenance (TPM) – Concept, Improvement Needs, FMEA – Stages of FMEA.

TOTAL :45

TEXT BOOKS

1. Besterfield, Dale H. et al., “Total Quality Management”, Third Edition, Pearson Education, 2008
2. Subburaj Ramasamy, “Total Quality Management”, Tata McGraw Hill, New Delhi, 2007.

REFERENCE BOOKS

1. Feigenbaum. A.V, “Total Quality Management”, Tata McGraw Hill, New Delhi, 1999.
2. Suganthi, L and Samuel A Anand., “Total Quality Management”, PHI Learning, New Delhi.
3. Evans James R. and Lindsay William M., “The Management and Control of Quality”, Seventh Edition, South-Western (Thomson Learning), 2007.

COURSE OUTCOMES

On completion of the course the students will be able to

- CO1: illustrate the evolution and basic concepts of TQM
- CO2: interpret various ISO standards and their implementation procedures
- CO3: apply the principles of TQM and its elements in real time scenario
- CO4: adapt quality tools and techniques to implement TQM at the work place

Mapping of COs with POs

| COs/POs | a | b | c | d | e | f | g | h | i | j | k | l | m |
|---------|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | | | | | | 2 | 2 | 3 | 2 | 2 | 2 | 2 | |
| CO2 | | | | | | 3 | 3 | 3 | 3 | 2 | 2 | 2 | |
| CO3 | | | | | 2 | 3 | 2 | 3 | 3 | 3 | 2 | 2 | |
| CO4 | 3 | 2 | 2 | 2 | 2 | 1 | | 2 | 2 | 2 | 3 | 3 | |

3 – Substantial, 2 – Moderate, 1 – Slight