

Dr. Mahalingam College of Engineering and Technology

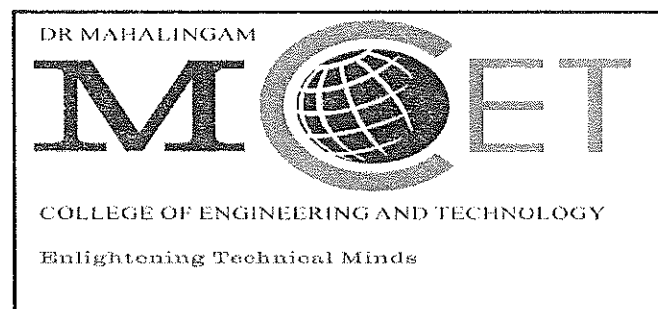
(An Autonomous Institution)

Pollachi - 642 003

**Curriculum and Syllabus
B.E. CIVIL ENGINEERING**

SEMESTER I to VIII

REGULATIONS 2016



DEPARTMENT OF CIVIL ENGINEERING

2016 REGULATION

Curriculum for B.E Civil Engineering from Semester I to VIII

SEMESTER I

| Course Code | Course Title | Hours/Week | | | Credits | Marks |
|------------------|----------------------------------|------------|----------|-----------|-----------|------------|
| | | L | T | P | | |
| THEORY | | | | | | |
| 16ENT11 | Communication Skills-I | 2 | 0 | 2 | 3 | 100 |
| 16MAT12 | Engineering Mathematics-I | 3 | 2 | 0 | 4 | 100 |
| 16PHT12 | Applied Physics | 3 | 0 | 0 | 3 | 100 |
| 16GET13 | C Programming | 3 | 0 | 2 | 4 | 100 |
| 16GET12 | Introduction to Engineering | 3 | 0 | 0 | 3 | 100 |
| PRACTICAL | | | | | | |
| 16EPL11 | Engineering Practices Laboratory | 0 | 0 | 4 | 2 | 100 |
| 16EGL12 | Engineering Graphics | 2 | 0 | 4 | 4 | 100 |
| 16PSL11 | Promotion of Students Wellness | 0 | 0 | 2 | 1 | 100 |
| TOTAL | | 16 | 2 | 14 | 24 | 800 |

SEMESTER II

| Course Code | Course Title | Hours/Week | | | Credits | Marks |
|------------------|--|------------|----------|-----------|-----------|------------|
| | | L | T | P | | |
| THEORY | | | | | | |
| 16ENT21 | Communication Skills-II | 2 | 0 | 2 | 3 | 100 |
| 16MAT22 | Engineering Mathematics-II | 3 | 2 | 0 | 4 | 100 |
| 16PHT22 | Materials Science | 3 | 0 | 0 | 3 | 100 |
| 16CYT21 | Engineering Chemistry | 3 | 0 | 0 | 3 | 100 |
| 16GET23 | Engineering Mechanics | 3 | 2 | 0 | 4 | 100 |
| PRACTICAL | | | | | | |
| 16PCL22 | Engineering Physics and Chemistry Laboratory | 0 | 0 | 4 | 2 | 100 |
| 16CDL22 | Computer Aided Building Drawing Laboratory | 0 | 0 | 4 | 2 | 100 |
| 16PSL21 | Sports for Wellness | 0 | 0 | 2 | 1 | 100 |
| TOTAL | | 14 | 4 | 12 | 22 | 800 |


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SEMESTER III

| Course Code | Course Title | Hours/Week | | | Credits | Marks |
|------------------|---|------------|----------|-----------|-----------|-------------|
| | | L | T | P | | |
| THEORY | | | | | | |
| 16MAT31 | Transforms and Partial Differential Equations | 3 | 2 | 0 | 4 | 100 |
| 16CET31 | Mechanics of Solids-I | 2 | 2 | 0 | 3 | 100 |
| 16CET32 | Fluid Mechanics | 2 | 2 | 0 | 3 | 100 |
| 16CET33 | Construction Materials | 3 | 0 | 0 | 3 | 100 |
| 16CET34 | Highway Engineering | 3 | 0 | 0 | 3 | 100 |
| 16CET35 | Surveying | 4 | 0 | 0 | 4 | 100 |
| PRACTICAL | | | | | | |
| 16CEL31 | Surveying Practice Laboratory | 0 | 0 | 4 | 2 | 100 |
| 16CEL32 | Construction Materials Laboratory | 0 | 0 | 4 | 2 | 100 |
| 16PSL31 | Personal Effectiveness | 0 | 0 | 2 | 1 | 100 |
| XXXX | One Credit Course | 0 | 0 | 2 | 1 | 100 |
| TOTAL | | 17 | 6 | 12 | 26 | 1000 |

SEMESTER-IV

| Course Code | Course Title | Hours/Week | | | Credits | Marks |
|------------------|--|------------|----------|-----------|-----------|-------------|
| | | L | T | P | | |
| THEORY | | | | | | |
| 16MAT46 | Numerical Methods | 4 | 0 | 0 | 4 | 100 |
| 16CET41 | Mechanics of Solids-II | 2 | 2 | 0 | 3 | 100 |
| 16CET42 | Environmental Engineering I | 3 | 0 | 0 | 3 | 100 |
| 16CET43 | Construction Techniques, Equipments and Practice | 3 | 0 | 0 | 3 | 100 |
| 16CET44 | Applied Hydraulic Engineering | 2 | 2 | 0 | 3 | 100 |
| 16CET45 | Water Resources and Irrigation Engineering | 3 | 0 | 0 | 3 | 100 |
| PRACTICAL | | | | | | |
| 16CEL41 | Hydraulic Engineering Laboratory | 0 | 0 | 4 | 2 | 100 |
| 16CEL42 | Strength of Materials Laboratory | 0 | 0 | 4 | 2 | 100 |
| 16PSL41 | Ethical and Moral Responsibility | 0 | 0 | 2 | 1 | 100 |
| XXXX | One Credit Course | 0 | 0 | 2 | 1 | 100 |
| TOTAL | | 17 | 4 | 12 | 25 | 1000 |

SEMESTER-V

| Course Code | Course Title | Hours/Week | | | Credits | Marks |
|------------------|-------------------------------------|------------|----------|-----------|-----------|-------------|
| | | L | T | P | | |
| THEORY | | | | | | |
| 16CET51 | Geotechnical Engineering I | 2 | 2 | 0 | 3 | 100 |
| 16CET52 | Structural AnalysisI | 2 | 2 | 0 | 3 | 100 |
| 16CET53 | Design of RC Elements | 4 | 0 | 0 | 4 | 100 |
| 16CET54 | Concrete Technology | 3 | 0 | 0 | 3 | 100 |
| 16CET55 | Environmental Engineering II | 3 | 0 | 0 | 3 | 100 |
| XXXX | Professional Elective-I | 3 | 0 | 0 | 3 | 100 |
| PRACTICAL | | | | | | |
| 16CEL51 | Concrete and Highway Laboratory | 0 | 0 | 4 | 2 | 100 |
| 16CEL52 | Geotechnical Engineering Laboratory | 0 | 0 | 4 | 2 | 100 |
| 16PSL51 | Teamness and Inter-Personal Skills | 0 | 0 | 2 | 1 | 100 |
| XXXX | One Credit Course | 0 | 0 | 2 | 1 | 100 |
| TOTAL | | 17 | 4 | 12 | 25 | 1000 |

SEMESTER-VI

| Course Code | Course Title | Hours/Week | | | Credits | Marks |
|------------------|--------------------------------------|------------|----------|-----------|-----------|------------|
| | | L | T | P | | |
| THEORY | | | | | | |
| 16CET61 | Geotechnical Engineering II | 3 | 0 | 0 | 3 | 100 |
| 16CET62 | Structural AnalysisII | 2 | 2 | 0 | 3 | 100 |
| 16CET63 | Design of RC Structures | 3 | 2 | 0 | 4 | 100 |
| 16CET64 | Design of Steel Structures | 2 | 2 | 0 | 3 | 100 |
| XXXX | Professional Elective-II | 3 | 0 | 0 | 3 | 100 |
| PRACTICAL | | | | | | |
| 16CEL61 | Building Drawing Laboratory | 0 | 0 | 4 | 2 | 100 |
| 16CEL62 | Environmental Engineering Laboratory | 0 | 0 | 4 | 2 | 100 |
| 16PSL61 | Campus to Corporate | 0 | 0 | 2 | 1 | 100 |
| XXXX | One Credit Course | 0 | 0 | 2 | 1 | 100 |
| Total | | 13 | 6 | 12 | 22 | 900 |

SEMESTER VII

| Course Code | Course Title | Hours/Week | | | Credits | Marks |
|------------------|--|------------|----------|-----------|-----------|------------|
| | | L | T | P | | |
| THEORY | | | | | | |
| 16CET71 | Construction Project Management | 3 | 0 | 0 | 3 | 100 |
| 16CET72 | Structural Dynamics and Earthquake Engineering | 3 | 2 | 0 | 4 | 100 |
| 16CET73 | Environmental Studies | 3 | 0 | 0 | 3 | 100 |
| XXXX | Professional Elective-III | 3 | 0 | 0 | 3 | 100 |
| XXXX | Open Elective- I | 3 | 0 | 0 | 3 | 100 |
| PRACTICAL | | | | | | |
| 16CEL71 | Computer Aided Design and Drafting Laboratory | 0 | 0 | 4 | 2 | 100 |
| 16CEL72 | Quantity Surveying and Estimation Laboratory | 0 | 0 | 4 | 2 | 100 |
| 16CEL73 | Project Phase I | 0 | 0 | 8 | 4 | 100 |
| TOTAL | | 15 | 2 | 16 | 24 | 800 |

SEMESTER -VIII

| Course Code | Course Title | Hours/Week | | | Credits | Marks |
|------------------|---------------------------|------------|----------|-----------|-----------|------------|
| | | L | T | P | | |
| THEORY | | | | | | |
| XXXX | Professional Elective-IV | 3 | 0 | 0 | 3 | 100 |
| XXXX | Professional Elective-V | 3 | 0 | 0 | 3 | 100 |
| XXXX | Professional Elective- VI | 3 | 0 | 0 | 3 | 100 |
| PRACTICAL | | | | | | |
| 16CEL81 | Project work phase II | 0 | 0 | 20 | 10 | 200 |
| TOTAL | | 9 | 0 | 20 | 19 | 500 |

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PROFESSIONAL ELECTIVES (PE)

| S. No. | Course code | Course title | L | T | P | C |
|--|-------------|--|---|---|---|---|
| Environmental Engineering Stream | | | | | | |
| 1 | 16CEE01 | Air Pollution Management | 3 | 0 | 0 | 3 |
| 2 | 16CEE02 | Ecological Engineering | 3 | 0 | 0 | 3 |
| 3 | 16CEE03 | Industrial Waste Management | 3 | 0 | 0 | 3 |
| 4 | 16CEE04 | Municipal Solid Waste Management | 3 | 0 | 0 | 3 |
| Structural Engineering Stream | | | | | | |
| 5 | 16CEE05 | Prestressed Concrete Structures | 3 | 0 | 0 | 3 |
| 6 | 16CEE06 | Bridge Structures | 3 | 0 | 0 | 3 |
| 7 | 16CEE07 | Computer Aided Design of Structures | 3 | 0 | 0 | 3 |
| 8 | 16CEE08 | Design of Plate And Shell Structures | 3 | 0 | 0 | 3 |
| 9 | 16CEE09 | Industrial Structures | 3 | 0 | 0 | 3 |
| 10 | 16CEE10 | Maintenance And Rehabilitation Of Structures | 3 | 0 | 0 | 3 |
| 11 | 16CEE11 | Prefabricated Structures | 3 | 0 | 0 | 3 |
| 12 | 16CEE12 | Storage Structures | 3 | 0 | 0 | 3 |
| 13 | 16CEE13 | Tall Buildings | 3 | 0 | 0 | 3 |
| Remote Sensing Stream | | | | | | |
| 14 | 16CEE14 | Electronic Surveying | 3 | 0 | 0 | 3 |
| 15 | 16CEE15 | Remote Sensing and GIS | 3 | 0 | 0 | 3 |
| 16 | 16CEE16 | Cartography | 3 | 0 | 0 | 3 |
| Transportation Engineering Stream | | | | | | |
| 17 | 16CEE17 | Railways, Airports and Harbour Engineering | 3 | 0 | 0 | 3 |
| 18 | 16CEE18 | Traffic Engineering and Management | 3 | 0 | 0 | 3 |
| 19 | 16CEE19 | Transportation Planning | 3 | 0 | 0 | 3 |
| Architectural Stream | | | | | | |
| 20 | 16CEE20 | Urban and Regional Planning | 3 | 0 | 0 | 3 |
| 21 | 16CEE21 | Architecture | 3 | 0 | 0 | 3 |
| Water Resources and Irrigation Stream | | | | | | |
| 22 | 16CEE22 | Design and Management of Irrigation Systems | 3 | 0 | 0 | 3 |
| 23 | 16CEE23 | Ground Water Engineering | 3 | 0 | 0 | 3 |
| 24 | 16CEE24 | Hydrology | 3 | 0 | 0 | 3 |
| Geotechnical Engineering Stream | | | | | | |
| 25 | 16CEE25 | Engineering Geology | 3 | 0 | 0 | 3 |
| 26 | 16CEE26 | Ground Improvement Techniques | 3 | 0 | 0 | 3 |
| 27 | 16CEE27 | Pavement Engineering | 3 | 0 | 0 | 3 |
| 28 | 16CEE28 | Soil Dynamics And Machine Foundations | 3 | 0 | 0 | 3 |
| Construction Management Stream | | | | | | |
| 29 | 16CEE29 | Advanced Construction Techniques | 3 | 0 | 0 | 3 |
| 30 | 16CEE30 | Building Services | 3 | 0 | 0 | 3 |
| 31 | 16CEE31 | Safety in Construction | 3 | 0 | 0 | 3 |
| 32 | 16CEE32 | Quality Control And Assurance | 3 | 0 | 0 | 3 |
| 33 | 16CEE33 | Smart Structures And Smart Materials | 3 | 0 | 0 | 3 |
| 34 | 16CEE34 | Infrastructure Engineering | 3 | 0 | 0 | 3 |
| 35 | 16CEE35 | Project Formulation And Appraisal | 3 | 0 | 0 | 3 |
| 36 | 16CEE36 | Contract Laws And Regulations | 3 | 0 | 0 | 3 |

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| General Electives | | | | | | |
|--------------------------|---------|--------------------------------------|---|---|---|---|
| 37 | 16CEE37 | Indian Constitution And Society | 3 | 0 | 0 | 3 |
| 38 | 16CEE38 | Intellectual Property Rights | 3 | 0 | 0 | 3 |
| 39 | 16CEE39 | Probability and Statistics | 3 | 0 | 0 | 3 |
| 40 | 16CEE40 | Professional Ethics and Human Values | 3 | 0 | 0 | 3 |
| Open Electives | | | | | | |
| 41 | 16OET08 | Safety Engineering | 3 | 0 | 0 | 3 |
| 42 | 16OET09 | Environmental Impact Assessment | 3 | 0 | 0 | 3 |

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|--------------------------|---|---------------|
| Course Code : 16ENT11 | Course title : COMMUNICATION SKILLS - I | |
| Core / Elective: General | L : T : P : C | 2 : 0 : 2 : 3 |
| Type : Theory | Total Contact hours: | 60 Hours |

COURSE OBJECTIVES

The course is intended to:

1. Listen and understand monologues and dialogues of a native speaker on par with A2 of CEFR level
2. Speak in simple sentences to convey their opinion and ideas on par with A2 of CEFR level
3. Read and infer a given text on par with A2 of CEFR level
4. Draft basic formal written communication on par with A2 of CEFR level
5. Speak and write with minimal grammatical mistakes on par with A2 of CEFR level

UNIT I - LISTENING

6+6

Short conversations/monologues - numbers and spelling (dates, prices, percentages, figures, etc.) - and locate specific information - longer monologue and guided note taking - gap filling - Understanding the gist and extracting the main idea.

UNIT II - SPEAKING

6+6

Answering questions about oneself, agreeing and disagreeing, expressing preferences - mini-presentation on a business theme (Oral) - Giving information and expressing opinions - discussion on business related topics – initiate a conversation and respond appropriately - business vocabulary - collocation.

UNIT III - READING

6+6

Read short texts and understand the main message (signs, messages, postcards, notes, emails, labels) - Read and find specific information - Interpreting visual information - Comprehend detailed factual information - gather gist – cloze test.

UNIT IV - WRITING

6+6

Internal written communication - short messages to colleagues - note, message, memo, email-External communication - letter, email, notice - set phrases for letters and e-mails-Discourse markers, sign post words.

UNIT V - GRAMMAR

6+6

Types of sentences – Declarative, interrogative, imperative and exclamatory – Usage of tenses (Simple and continuous forms) - Voices – Concord (Subject and verb) - Auxiliary - Infinitive and Gerunds – Article - Preposition - Comparative and superlative adjectives.

COURSE OUTCOMES

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

- CO.1 Listen to conversations, comprehend and answer questions equivalent to BEC preliminary listening exercises.
- CO.2 Answer questions about oneself and business-related themes on par with BEC preliminary speaking tests.
- CO.3 Read passages, infer and respond to the questions from BEC preliminary reading exercises.
- CO.4 Write appropriate business e mail, note, memo and letter on par with BEC preliminary writing tests.
- CO.5 Write simple and grammatically correct sentences.

TEXT BOOKS:

1. Whitby Norman, Business Benchmark Pre- intermediate to Intermediate Students' Book CUP Publications, 2nd Edition, 2014.
2. Wood Ian, Williams Anne, Cowper Anna, Pass Cambridge BEC Preliminary, Cengage Learning, 2nd edition, 2015.

REFERENCE BOOKS:

1. BEC-Preliminary-Cambridge Handbook for Language Teachers, 2nd Edition, CUP 2000.
2. Hewings Martin - Advanced Grammar in use - Upper-intermediate – Proficiency, CUP, Third Edition, 2013.

WEB REFERENCES:

1. www.cambridgeenglish.org/exams/business-certificates/business-preliminary/
2. http://www.pearsonlongman.com/intelligent_business/bec_tests/preliminary.html

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|--------------------------|--|---------------|
| Course Code : 16MAT12 | Course title : ENGINEERING MATHEMATICS - I | |
| Core / Elective: General | L: T : P : C | 3 : 2 : 0 : 4 |
| Type : Theory | Total Contact hours: | 75 Hours |

COURSE OBJECTIVES

The course is intended to:

1. Use Eigen values and Eigen vectors of a real matrix
2. Use the basic concepts of solid geometry
3. Compute the extremum for two variable functions.
4. Apply multiple integrals to find area of the plane curves and volume of solids.
5. Solve first order ordinary differential equations.

UNIT I - EIGENVALUES AND EIGENVECTORS

9+6

Solution of system of equations- Rank of a matrix-Eigen values and Eigen vectors of a real matrix - Characteristic equation - Properties of eigen values and eigen vectors – Cayley Hamilton Theorem - Diagonalization of matrices - Reduction of a quadratic form to canonical form by orthogonal transformation - Nature of quadratic forms.

UNIT II - SOLID GEOMETRY

9+6

Direction cosines- Direction ratios-The plane and the straight line – shortest distance between the plane and straight line - Sphere-Plane section of a sphere -Equation of a sphere through a circle-Tangent plane- Orthogonal spheres - Problems related to real life.

UNIT III - FUNCTIONS OF SEVERAL VARIABLES

9+6

Limits and continuity - Partial derivatives - Homogeneous functions and Euler's theorem - Total derivative - Change of variables - Jacobian and properties - Taylor's series for functions of two variables - Maxima and minima of functions of two variables - Lagrange's method of undetermined multipliers.

UNIT IV - MULTIPLE INTEGRALS

9+6

Double integrals in Cartesian and polar coordinates -Change of order of integration - Area enclosed by plane curves - Change of variables from Cartesian to polar, spherical and cylindrical coordinates - Triple integrals- Volume of Solids.

UNIT V - ORDINARY DIFFERENTIAL EQUATIONS OF FIRST ORDER

9+6

Formation of ordinary differential equation-Solution of differential equations of first order and first degree: homogeneous form, linear form and exact differential equations - Applications to engineering problems.

COURSE OUTCOMES

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

- CO.1 Use Eigen values and Eigenvectors of a real matrix to reduce quadratic form to canonical form.
- CO.2 Use the basic concepts of solid geometry which finds applications in various fields of engineering.
- CO.3 Compute the extremum for two variable functions.
- CO.4 Apply multiple integrals to find area of the plane curves and volume of solids.
- CO.5 Solve first order ordinary differential equations.

TEXT BOOKS:

1. Srimanta Pal &Subodh C Bhunia. Engineering Mathematics, First edition, 2015, Oxford University Press.
2. Ervin Kreyszig, Advanced Engineering Mathematics, 10th edition, 2015, Wiley India.


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REFERENCE BOOKS:

1. Grewal. B.S, "Higher Engineering Mathematics", 43rd Edition, Khanna Publications, Delhi, 2014.
2. Veerarajan.T, "Engineering Mathematics", Updated 2ndEdition, Tata McGraw Hill, New Delhi, 2010.

WEB REFERENCES:

1. <http://learnerstv.com/Free-Maths-video-lecture-courses.htm>
2. <http://nptel.ac.in/video.php?subjectId=122107036>

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|--------------------------|--------------------------------|---------------|
| Course Code : 16PHT12 | Course title : APPLIED PHYSICS | |
| Core / Elective: General | L : T : P : C | 3 : 0 : 0 : 3 |
| Type : Theory | Total Contact hours: | 45 Hours |

COURSE OBJECTIVES

The course is intended to:

1. Discuss principles of waves and oscillations
2. Explain the properties of acoustic and ultrasonic waves and their applications
3. Analyze the component of force and relate with motion
4. Calculate the work done and energies in 1D & 2D related problems
5. Describe and determine the elastic properties of materials

UNIT I - OSCILLATIONS AND WAVES

9

Periodic motion: Restoring force; Simple harmonic motion – displacement, velocity, acceleration, phase; Simple harmonic oscillator – forced, driven and damping oscillator (qualitative); resonance – examples; Introduction to waves – Longitudinal and transverse waves, speed of wave motion, reflection of waves, wave equation (no derivation); oscillations of a spring-restoring force and force constant. Seismic waves: P waves, S waves, Surface waves, Love waves, Raleigh waves – isolation of structures against seismic waves.

UNIT II - ACOUSTICS AND ULTRASONICS

9

Classification of sound – decibel – Weber-Fechner law – Sabine's formula (qualitative) – Physical significance of Sabine's formula – Correction to Eyring's reverberation formula - Absorption coefficient and its determination – factors affecting acoustics of buildings and their remedies.

Production of Ultrasonic waves by magnetostriction and piezoelectric methods – acoustic grating, Non Destructive Testing (NDT) – pulse echo system, through transmission and reflection modes – A, B and C scan displays, Impact echo method – detection of flaws in civil structures (P waves and S waves).

UNIT III - FORCES AND MOTION IN 2D

9

Concurrent forces and coplanar forces, Resolution of vector into two perpendicular components, resultant and equilibrant, parallelogram law of forces, Lami's theorem – statement and explanation. Motion in 2D; Components of motion, Kinematic equation for components of motion, vector addition and subtraction. Projectile motion: Horizontal, projections at arbitrary angles, relative velocity: 1D, 2D.

UNIT IV - ENERGY AND WORK

9

Work and energy, work and kinetic energy: Expression for work, work done by: gravitational force, spring force, Work – kinetic energy theorem with variable force. Potential energy - Elastic potential energy - Conservation of mechanical energy - reading a potential energy curve - work done on a system by an external force - conservation of energy.

UNIT V - PROPERTIES OF MATTER AND THERMAL PHYSICS

9

Elasticity-Hooke's law, Elastic moduli – Relationship between three moduli of elasticity (qualitative) – stress – strain diagram – Poisson's ratio – Factors affecting elasticity – Bending moment – Depression of a cantilever – Young's modulus by uniform bending – I shaped section.

Modes of heat transfer – thermal conductivity – Newton's law of cooling – Linear heat flow – Lee's disc method – Radial heat flow – Rubber tube method – conduction through compound media (series and parallel). Applications: heat insulation in civil structures – thermal comfort factor.

COURSE OUTCOMES

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

- CO.1 Discuss principles of waves and oscillations
- CO.2 Explain the properties of acoustic and ultrasonic waves and their applications
- CO.3 Analyze the component of force and relate with motion
- CO.4 Calculate the work done and energies in 1D & 2D related problems
- CO.5 Describe and determine the elastic properties of materials

TEXT BOOKS:

1. David Halliday, Robert Resnick and Jearl Walker, Fundamentals of Physics, 6thEd., John Wiley, 2011.
2. Jerry D. Wilson, Anthony J. Baffa and Bo Lou, College Physics, 6thEd., Pearson Prentice Hall, 2007.
3. BrijLal and N. Subramanian, Waves and Oscillations, Vikas Publishing House, New Delhi, 2009.

REFERENCE BOOKS:

1. A. Beiser, Concepts of Modern Physics, 5th Ed., McGraw Hill International, 2003.
2. Yakov Perelman, Physics for Entertainment, Create Space Independent Publishing Platform, 2010.

WEB REFERENCES:

1. <http://nptel.ac.in>
2. www.physicsclassroom.com
3. www.study.com
4. www.physics.org

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|---------------------------|------------------------------|---------------|
| Course Code : 16GET13 | Course title : C PROGRAMMING | |
| Core / Elective: General | L : T : P : C | 3 : 0 : 2 : 4 |
| Type : Theory & Practical | Total Contact hours: | 75 Hours |

COURSE OBJECTIVES

The course is intended to:

1. Explain about computer systems and problem solving techniques.
2. Write programs using appropriate programming constructs.
3. Write programs using Arrays and Functions.
4. Write programs using Pointers and Structures.
5. Write programs using Files and Pre-Processor Directives.

UNIT I - INTRODUCTION

9

Generation and Classification of Computers, Computer Systems, Basic Organization of a Computer, Computer languages, Software development life cycle, Need for logical analysis and thinking, Problem formulation, Problem Solving, Algorithm, Pseudo code, Flow Chart.

UNIT II - C PROGRAMMING BASICS

9

Introduction to C programming, Structure of a C program, Compilation and linking processes, Identifier, Keywords, Constants, Variables, Data Types, Operators and Expressions, Managing input and output operations, Decision making, Branching and Looping statements, Type casting.

UNIT III - ARRAYS, STRINGS AND FUNCTIONS

9

Arrays: Declaration, Initialization, One dimensional and Two dimensional arrays, Strings: String operations, Arrays of Strings, Applications: Linear search, Binary search, Bubble sort, Matrix operations: Addition, Multiplication, Transpose, Functions: Built in function, User defined function, Declaration and Definition of function, Pass by value, Pass by reference, Recursion.

UNIT IV - POINTERS AND STRUCTURES

9

Pointers: Definition, Initialization, Array of Pointers, Structure: Definition, Declaration, Accessing structure elements, Array of structures, Union: Accessing Union elements.

UNIT V - FILES

9

Introduction to Files, File access: Sequential access, Random access, File organization, File operations (open, close, read, write, name) Command line arguments, Pre-processor directives, Features, Macro expansion: File inclusion, Conditional compilation.

COURSE OUTCOMES

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

- CO.1 Explain about computer systems and problem solving techniques.
- CO.2 Write programs using appropriate programming constructs.
- CO.3 Write programs using Arrays and Functions.
- CO.4 Write programs using Pointers and Structures.
- CO.5 Write programs using Files and Pre-Processor Directives.

TEXT BOOKS:

1. Ajay Mittal, "Programming in C – A Practical Approach", Pearson Education, 2010.
2. PradipDey, ManasGhosh, "Computer Fundamentals and Programming in C", Second Edition, Oxford University Press, 2013
3. Yashavant. P. Kanetkar. "Let Us C", BPB Publications, 2011.


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REFERENCE BOOKS:

1. Ashok N. Kamthane, "Computer programming", Pearson Education, 2009.
2. Brian W. Kernighan, Dennis M. Ritchie, "The C Programming language", Second Edition, Pearson Education, 2006.
3. Byron S Gottfried, "Programming with C", Schaum's Outlines, Second Edition, Tata McGraw-Hill, 2006.
4. R.G. Dromey, "How to Solve it by Computer", Pearson Education, Fourth Reprint, 2007.

WEB REFERENCES:

1. <http://www.cprogramming.com/tutorial/c-tutorial.html>
2. <http://www.programiz.com/c-programming>
3. <http://www.w3schools.in/c/>

LAB COMPONENT

30

(Students have to take-up the following experiments. These lab components are given weightage of 12 marks out of 40 marks in the internal assessment)

LIST OF EXPERIMENTS:

1. Text formatting, Tables and Mathematical equations in MS Word
2. Calculation and Charting in MS Excel
3. Programs to evaluate an expression using various types of operators (Any 1)
 - a. To find the area of a rectangle/circle/square
 - b. To find the simple interest and compound interest
 - c. To find the roots of a quadratic equation
4. Programs using Decision Making and Branching statement (Any 1)
 - a. Calculation of electricity bill
 - b. To identify the grade of the student
 - c. To find the maximum number among 3 numbers
5. Programs using Loops (Any 2)
 - a. To display the total and average of N students
 - b. To display the floyd's triangle
 - c. To display the Fibonacci series
 - d. To display the sum of first N prime numbers
 - e. To calculate the following series $12 + 22 + 32 + \dots + N^2$
6. Program using Arrays (Any 2, 1 from 1D array and another from 2D array)
 - a. To sort N Numbers in ascending/descending order
 - b. To find the greatest number among N numbers
 - c. To search for a particular number among N Numbers
 - d. To compute the Matrix addition / multiplication / transpose
7. Program using Strings (Any 2)
 - a. To manipulate strings using string functions.
 - b. To calculate the length of the String without using builtin functions.
 - c. To check whether the string is Palindrome or not.
 - d. To sort a given set of strings in alphabetical order.
8. Programs using Functions (Any 1)
 - a. To find the square and cube of a number.
 - b. To find the factorial of a number.
 - c. To swap two numbers.
9. Programs using Pointers (Any 1)
 - a. To display the address of each element in an array
 - b. To perform arithmetic operations using pointers

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|-----------------------|--|---------------|
| Course Code : 16GET12 | Course title : INTRODUCTION TO ENGINEERING | |
| Core / Elective: Core | L: T : P : C | 3 : 0 : 0 : 3 |
| Type : Theory | Total Contact hours: | 45 Hours |

COURSE OBJECTIVES

The course is intended to:

1. Explain importance of infrastructural development and explain various fields of civil engineering.
2. Demonstrate the need of higher order thinking skills and learning methodologies.
3. Explain the different engineering disciplines used in the buildings.
4. Explain the various requirements of infrastructures and demonstrate the all the phases of a construction project.
5. List elements of a building and explain their functions and materials used.

UNIT I - ROLE OF ENGINEERING IN SOCIETY

9

Basic human needs – Maslow's hierarchy of needs, Benefits derived from engineering – Challenges for engineering, Historical development in civil engineering - Importance of infrastructural development – Scope and branches of Civil Engineering – Role of civil engineers — Government funding plans for construction. Opportunities for civil engineers.

UNIT II - ENGINEERING EDUCATION

9

Expectations and aspirations of engineering students, Graduate engineering attributes and employability, outcome based engineering curriculum, engineering skills –Technical and professional, courses and course map– Higher order thinking skills, Bloom's taxonomy, multiple intelligences, concepts and theories of learning, learning styles, Kolb's experiential learning style, learning methodologies.

UNIT III -MULTI-DISCIPLINARY ENGINEERING

9

Needs in day-today life, connection between needs and products, application of science and engineering principles – Manufacturing and construction methods, basics of mechanical equipment and systems used in the buildings, basics of electricity and electrical systems used for domestic and industrial purpose-AC Vs DC- Single Vs Three Phase – Resistors, capacitors, inductors, RLC circuit.

UNIT IV - CIVIL ENGINEERING PROCESS

9

Aspects considered in creating infrastructures – Types of Infrastructure - Client requirements-Functional, comfort & convenience, safety, strength, durability, maintenance, operations, comfort and convenience, economic/environment sustainability requirements. Construction process, construction project life cycle management and stages – Market demands, conceptual planning and feasibility studies, design and engineering, procurement and construction, start-up for occupancy, operation and maintenance, disposal of facility. Activities and deliverables in each construction stage. Roles and responsibilities of different engineering professionals.

UNIT V - ELEMENT OF BUILDINGS

9

Types of buildings – functions and performance of buildings, Planning considerations in buildings (light, climate, safety) - General principle of construction, construction methods, site analysis and setup, soil investigations, ground work and foundation, floors, columns, beams, walls-Damp proof course-stone masonry-brick masonry, bonding bricks, mortar – doors, windows, lintels, roofs and slabs, staircases, surface finish, water supply and sanitation (plumbing lines), electrical wiring, air condition ducts, making model of a house.

COURSE OUTCOMES

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

- CO.1 Explain importance of infrastructural development and explain various fields of civil

10. Programs using Structures (Any 1)

- a. To display the employee details using .(dot) operator
- b. To display the book details using ->(reference) operator
- c. To display the information of N Students

11. Programs using Files (Any 1)

- a. To write a string into a text file
- b. To read the contents of a text file
- c. To copy the contents from one file into another.

12. Mini Project using above concepts.

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| | | |
|--------------------------|---|---------------|
| Course Code : 16EPL11 | Course title : ENGINEERING PRACTICES LABORATORY | |
| Core / Elective: General | L: T : P : C | 0 : 0 : 4 : 2 |
| Type : Practical | Total Contact hours: | 60 Hours |

COURSE OBJECTIVES

The course is intended to:

1. Lay the joints in bricks and timber connections
2. Assemble a pipeline and a sanitary line for kitchen.
3. Make the electrical wiring connections.
4. Make two way connection for a lamp
5. Do the simple welding mechanism.

LIST OF EXERCISES:

1. Laying of the bricks for walls.
2. Making Lap, butt, Tee joints in timber frames
3. Making a wooden window frame to the required dimensions.
4. Assembling a pipeline from overhead tank to kitchen sink and dining wash basin.
5. Assembling of a sanitary line from kitchen sink to outlet.
6. Making of a domestic wiring circuit to connect a light, a fan with a regulator and a socket.
7. Making of internal wiring of tube light and checking connection.
8. Making of two way staircase wiring for lamp.
9. Making lap and butt joints using arc welding
10. Making a winnowing basket in a sheet metal to the required dimensions.

COURSE OUTCOMES

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

- CO.1 Lay the joints in bricks and timber connections
CO.2 Assemble a pipeline and a sanitary line for kitchen.
CO.3 Make the electrical wiring connections.
CO.4 Make two way connection for a lamp
CO.5 Do the simple welding mechanism.

REFERENCE BOOKS:

1. Jeyachandran.K, Natarajan.S. &Balasubramanian.S, "A Primer on Engineering Practices Laboratory", Anuradha Publications, 2007.
2. Rajendra Prasad. A &Sarma.P.M.M.S, "Workshop Practice", Sree Sai Publication, 2002.
3. Kannaiah.P &Narayana.K.L, "Manual on Workshop Practice", Scitech Publications, 1999.
4. Electrical practices laboratory manual for civil engineers - MCET.
5. B. C. Punmia, "Building Construction", 10th Edition, Laxmi Publication, 2008.

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engineering.

CO.2 Demonstrate the need of higher order thinking skills and learning methodologies.

CO.3 Explain the different engineering disciplines used in the buildings.

CO.4 Explain the various requirements of infrastructures and demonstrate the all the phases of a construction project.

CO.5 List elements of a building and explain their functions and materials used.

TEXT BOOKS:

1. David A. Kolb, "Experiential Learning: Experience as the Source of Learning and Development", Kindle Edition, Pearson FT Press; 2 edition, (2014).
2. Punmia B.C., Ashok Kumar Jain and Arun Kumar Jain, "Building Construction", 11th Edition, Laxmi Publications, New Delhi (2016).

REFERENCE BOOKS:

1. Arora S.P. and S.P. Bindra, "A Text book of Building Construction", DhanpatRai Publications pvt Ltd, New Delhi (2010).
2. Varghese, P.C, "Building Construction", 1st Edition, PHI Learning, New Delhi (2009).
3. Sushilkumar, "Building Construction", 20th Edition, Standard Publishers Distributors. New Delhi (2010).
4. Neelam Sharma, "Building Construction", S.K. Kataria & Sons, New Delhi, 2012.

WEB REFERENCES:

1. http://epitt.coe.uga.edu/index.php?title=Multiple_Intelligences_and_Learning_Styles (updated 27-Mar-2016)
2. Clark, D.R. (2012). "Bloom's Taxonomy of Learning Domains", Retrieved from http://nwlink.com/~donclark/design/design_models.html, (updated on 12-Jan-2015)
3. Robert M. Arens, Joseph P. Hanus and Edmond Saliklis, "Teaching Architects and Engineers: Up and Down Bloom's Taxonomy" retrieved from http://content-calpoly-edu.s3.amazonaws.com/architecture/1/documents/arens_1_0809.pdf
4. Peter Goodhew, "Teaching Engineering" retrieved from <http://teachingengineering.liv.ac.uk/book/> (2015).

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|--------------------------|-------------------------------------|---------------|
| Course Code : 16EGL12 | Course title : ENGINEERING GRAPHICS | |
| Core / Elective: General | L: T : P : C | 2 : 0 : 4 : 4 |
| Type : Practical | Total Contact hours: | 60 Hours |

COURSE OBJECTIVES

The course is intended to:

1. Sketch different engineering curves and explain its application.
2. Draw orthographic and isometric drawings of simple solids.
3. Draw the projections of solids when the axis is inclined to one reference plane
4. Sketch development of lateral surfaces of simple objects..
5. Draw perspective projections of regular solids.

UNIT I - CURVES USED IN ENGINEERING PRACTICES

6+6

Importance of graphics in engineering applications – BIS conventions and specifications – Size, layout and folding of drawing sheets – Lettering and dimensioning - Methods of Dimensioning. Conics – Construction of ellipse, Parabola and hyperbola by eccentricity method – Construction of cycloid and involutes of square and circle – Drawing of tangents and normal to the above curves. Mathematical representation of these curves and their applications.

UNIT II - ORTHOGRAPHIC AND ISOMETRIC PROJECTION

6+6

Representation of Three Dimensional objects – General principles of orthographic projection – Need for importance of multiple views and their placement – First angle projection – layout of views – Developing visualization skills through free hand sketching of multiple views from pictorial views of objects. Orthographic projection of solids – Practices on three view projection of solids. Isometric Projection of solids – practices on simple solids.

UNIT III -PROJECTION OF LINES AND PLANE SURFACES

6+6

Projection of straight lines located in the first quadrant and inclined to both the planes – Concept of true lengths and true inclinations – Projection of polygonal surface and circular lamina inclined to both reference planes.

UNIT IV - PROJECTION OF SOLIDS AND ITS SECTION

6+6

Projection of simple solids like prisms, pyramids, cylinder and cone when the axis is inclined to one reference plane. Need for sectioning of solids – Sectioning of simple solids like prisms, pyramids, cylinder and cone when the axis is inclined to one reference plane by cutting planes inclined to one reference plane and perpendicular to the other – Orthographic views of sections of simple solids.

UNIT V - DEVELOPMENT OF SURFACES AND PERSPECTIVE PROJECTIONS

6+6

Development of lateral surfaces of simple and truncated solids – Prisms, pyramids, cylinders and cones. Concepts of Perspective projection of prisms, pyramids and cylinders by visual ray method.

COURSE OUTCOMES

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

- CO.1 Sketch different engineering curves and explain its application.
- CO.2 Draw orthographic and isometric drawings of simple solids.
- CO.3 Draw the projections of solids when the axis is inclined to one reference plane
- CO.4 Sketch development of lateral surfaces of simple objects..
- CO.5 Draw perspective projections of regular solids.

TEXT BOOKS:

1. K.V.Natrajan, "A text book of Engineering Graphics", Dhanalakshmi Publishers, Chennai (2013).

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REFERENCE BOOKS:

1. Dhananjay A. Jolhe, "Engineering Drawing with an introduction to AutoCAD" Tata McGraw Hill Publishing Company Limited (2008).
2. Basant Agarwal and Agarwal C.M., "Engineering Drawing", Tata McGraw Hill Publishing Company Limited, New Delhi, (2008).
3. Cencil Jensen, Jay D. Helsel and Dennis R. Short Engineering Drawing and Design. Tata McGraw Hill Publishing Company Limited (2012).
4. John. K.C and Verghese. P.I "Machine Drawing", Jovast Publishers, Trissur, 2007.

PUBLICATIONS OF BUREAU OF INDIAN STANDARDS

1. IS 10711 – 2001: Technical products Documentation – Size and lay out of drawing sheets.
2. IS 9609 (Parts 0 & 1) – 2001: Technical products Documentation – Lettering.
3. IS 10714 (Part 20) – 2001 & SP 46 – 2003: Lines for technical drawings.
4. IS 11669 – 1986 & SP 46 – 2003: Dimensioning of Technical Drawings.
5. IS 15021 (Parts 1 to 4) – 2001: Technical drawings – Projection Methods. The mode of delivery is like practical.

WEB REFERENCES:

1. <http://www.engineeringdrawing.org>
2. <http://nptel.ac.in>
3. <http://iitd.ac.in>



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|---------------------------|---|---------------|
| Course Code : 16PSL11 | Course title : PROMOTION OF STUDENTS WELLNESS (Common to Auto, Mech, Civil, EEE & EIE) | |
| Core / Elective: General | L : T : P : C | 0 : 0 : 2 : 1 |
| Type : Theory & Practical | Total Contact hours: | 30 Hours |

COURSE OBJECTIVES

The course is intended to:

1. Sketch different engineering curves and explain its application.
2. Draw orthographic and isometric drawings of simple solids.
3. Draw the projections of solids when the axis is inclined to one reference plane
4. Sketch development of lateral surfaces of simple objects..
5. Draw perspective projections of regular solids.

UNIT I - PHYSICAL HEALTH

6

Physical structure and functions of human body – simplified physical exercises (hand exercises, Leg exercises, breathing exercises, eye exercises) – kapalapathi – Maharasanas 1-2 – Massages – Acupuncture – relaxation – importance and benefits. Suryanamaskar.

UNIT II - MENTAL HEALTH

6

Maintenance of youthfulness and life force – kayakalpa yoga – anti ageing process – benefits. Mind and its functions – mind wave frequency – meditation process – Agna, shanthy, thuriam – benefits.

UNIT III -PERSONALITY DEVELOPMENT – I

6

Purpose of life and analysis of thought – philosophy of life – introspection – practice. Moralization of desires and neutralization of anger – practices.

UNIT IV - PERSONALITY DEVELOPMENT – II

6

Eradication of worries and benefits of blessings – wave theory –practices. Genetic centre – purification – cause and effect theory.

UNIT V - SOCIAL HEALTH

6

Greatness of guru – cultural education – love and compassion – fivefold culture. Greatness of friendship and social welfare – individual, family and world peace.

COURSE OUTCOMES

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

- CO1 Maintain physical wellbeing - grooming, BMI, flexibility, muscle strength, body compositions (vatha, pitha, kapa)
- CO2 Maintain mental wellbeing - perceptions, attention/concentration, memory, gunas
- CO3 Maintain social wellbeing - etiquettes, emotional and psychological aspects, stress management, morality and values

TEXT BOOKS:

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

REFERENCE BOOKS:

1. Dr.R.Nagarathna, Dr.H.R.Nagendra, “Integrated approach of yoga therapy for positive health”, Swami Vivekananda Yoga Prakashana, Bangalore, 2008 Ed.
2. Dr.R.Nagarathna, Dr.H.R.Nagendra, “New perspectives in stress management”, Swami Vivekananda Yoga Prakashana, Bangalore, I Ed June 1986.

END OF SEMESTER I

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| | | |
|--------------------------|---|---------------|
| Course Code : 16ENT21 | Course title : COMMUNICATION SKILLS – II (Common to all B.E/B.Tech Programmes) | |
| Core / Elective: General | L : T : P : C | 2 : 0 : 2 : 3 |
| Type : Theory | Total Contact hours: | 60 Hours |

PREREQUISITES: 16ENT11 - Communication Skills - I

COURSE OBJECTIVES

The course is intended to:

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

UNIT I - LISTENING

6+6

Listening to monologues or dialogues and noting specific information - Listening to identify topic, context, and function -Listening for details and main ideas - Gap filling and matching job descriptions and titles.

UNIT II - SPEAKING

6+6

Giving personal information -Talking about present circumstances, past experiences and future plans, expressing opinions, speculating -mini-presentation on a business theme - Giving information and expressing and justifying opinions -discussion on a business-related topic -Expressing and justifying opinions, speculating, comparing and contrasting, agreeing and disagreeing, etc. – negotiating and persuading.

UNIT III -READING

6+6

Reading - skimming for gist and scanning for specific information(Newspaper and magazine articles, reports, advertisements, letters, messages, brochures, guides, manuals) -Reading and understanding text structure – Comprehension –Reading for vocabulary and structure - understanding sentence structure and finding errors.

UNIT IV - WRITING

6+6

Internal written communication - Writing a message, memo or an email: giving instructions, explaining development, asking for comments, requesting information, agreeing to requests -External Communication (e.g. explaining, apologizing, reassuring, complaining), reports (e.g. describing, summarizing) or proposals (e.g. describing, summarizing, recommending, persuading and negotiating).

UNIT V - GRAMMAR

6+6

Conditional sentences – Modals and their usage- common errors - Linkers and discourse markers – concord (pronoun and antecedent).

COURSE OUTCOMES

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

- CO1 Listen to monologues or dialogues, comprehend and answer questions equivalent to BEC vantage listening exam.
- CO2 Answer questions about oneself and business-related themes on par with BEC vantage speaking exam.
- CO3 Read business correspondence, infer and respond to the questions similar to BEC vantage reading exam.
- CO4 Write appropriate business e mail, memo, proposal, report and letter on par with BEC


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vantage writing exam.

CO5 Write complex sentences using appropriate discourse markers.

TEXT BOOKS:

1. Whitby Norman, Business Benchmark Upper Intermediate Students' Book CUP Publications, 2nd Edition, 2014.

REFERENCE BOOKS:

1. Cambridge BEC Vantage- Practice Tests, Self-study Edition, Cambridge University Press, 2002.
2. Hewings Martin - Advanced Grammar in use - Upper-intermediate – Proficiency, CUP, Third Edition, 2013.

WEB REFERENCES:

1. http://www.examenglish.com/BEC/BEC_Vantage.html
2. www.splendid-speaking.com/exams/bec_speaking.html



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| | | |
|--------------------------|---|--------------|
| Course Code : 16MAT22 | Course title : ENGINEERING MATHEMATICS-II | |
| Core / Elective: General | L: T : P : C | 3: 2 : 0 : 4 |
| Type : Theory | Total Contact hours: | 75 Hours |

PREREQUISITES: 16MAT12 - Engineering Mathematics I

COURSE OBJECTIVES

The course is intended to:

1. Solve the second and higher order ordinary differential equations.
2. Apply the concepts of gradient, divergence and curl to solve engineering problems.
3. Apply the Laplace transform techniques to solve differential equations.
4. Use the functions of a complex variable and construct analytic functions.
5. Apply the concept of complex integration to evaluate real integrals

UNIT I - DIFFERENTIAL EQUATIONS OF SECOND AND HIGHER ORDER 9+6

Second and higher order linear differential equations with constant coefficients - Solution by variation of parameters- First order simultaneous differential equations - Application problems related to civil engineering.

UNIT II - VECTOR CALCULUS 9+6

Gradient, divergence and curl - Directional derivative - Irrotational and solenoidal vector fields - Vector integration - Green's theorem in a plane, Gauss divergence theorem and Stokes' theorem(excluding proofs) -Evaluation of integrals using Green's, Gauss's and Stoke's theorem.

UNIT III -LAPLACE TRANSFORM 9+6

Laplace transform - Sufficient condition for existence - Transform of elementary functions – Basic properties - Transforms of derivatives - Transforms of unit step function and impulse functions - Transform of periodic functions - Inverse Laplace transforms -Statement of Convolution theorem -Solution of linear ODE of second order.

UNIT IV - COMPLEX DIFFERENTIATION 9+6

Functions of a complex variable - Analytic functions: Necessary conditions - Cauchy-Riemann equations and sufficient conditions (excluding proofs) -Properties of analytic functions - Harmonic conjugate - Construction of analytic functions – Conformal mapping.

UNIT V - COMPLEX INTEGRATION 9+6

Statement and applications of Cauchy's integral theorem and Cauchy's integral formula – Taylor's and Laurent's series expansions – Types of Singularities– Residues – Cauchy's residue theorem.

COURSE OUTCOMES

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

- CO.1 Solve the second and higher order ordinary differential equations.
- CO.2 Apply the concepts of gradient, divergence and curl to solve engineering problems.
- CO.3 Apply the Laplace transform techniques to solve differential equations.
- CO.4 Use the functions of a complex variable and construct analytic functions.
- CO.5 Apply the concept of complex integration to evaluate real integrals

TEXT BOOKS:

1. Srimanta Pal &Subodh C. Bhunia, "Engineering Mathematics", First edition Oxford University Press, New Delhi, 2015.
2. Erwin Kreyszig, "Advanced Engineering Mathematics", 10th edition, Wiley Publications, 2015.

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REFERENCE BOOKS:

1. Grewal. B.S, "Higher Engineering Mathematics", 43rd Edition, Khanna Publications, Delhi, 2014. -
2. Veerarajan.T, "Engineering Mathematics", Updated 2nd Edition, Tata McGraw Hill, New Delhi, 2010.

WEB REFERENCES:

1. <http://learnerstv.com/Free-Maths-video-lecture-courses.htm>
 2. <http://nptel.ac.in/video.php?subjectId=122107036>
-



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|---------------------------------|---|----------------------|
| Course Code : 16PHT22 | Course title : MATERIALS SCIENCE | |
| Core / Elective: General | L: T : P : C | 3 : 0 : 0 : 3 |
| Type : Theory | Total Contact hours: | 45 Hours |

PREREQUISITES: 16PHT12Applied Physics

COURSE OBJECTIVES

The course is intended to:

1. Calculate crystal structure and classify the type of the defect present in the crystal.
2. Explain the mechanical properties of materials
3. Choose the materials using different methods of testing.
4. Explain the principle of strengthening mechanisms of materials.
5. Identify the different composite materials.

UNIT I - CRYSTALLOGRAPHY

9+6

Crystalline and Non crystalline materials: Single crystals, polycrystalline materials, Anisotropy Crystal Parameters: Atomic radius, Number of atoms per unit cell, Coordination number, Atomic Packing factor for SC, BCC, FCC and HCP – Influence of grain structure on material behavior. Crystal planes: Miller indices, Bragg's law, Debye Scherrer method, Inter-planar distance – Polymorphism and allotropy. Crystal imperfections: Point, line, surface and volume defects and its role in mechanical properties.

UNIT II - MECHANICAL PROPERTIES

9+6

Elasticity and plasticity of bulk material, Ductility, malleability and brittleness, Stress and strain behavior, Hooke's law, Yield strength, Impact strength, Tensile strength, Resilience, Hardness, Failure of Metals: Fracture behavior, Ductile and Brittle fracture, Toughness, Fatigue, Endurance limit, SN curve, Creep, Stages of creep.

UNIT III - TESTING OF MATERIALS

9+6

Introduction, Tensile testing, compression testing, hardness tests – Vickers, Rockwell, Brinell, Poldi, Micro hardness test, impact testing, bend test - torsion test, fatigue testing, creep testing, Ductility test: Erichsen Cupping Test

UNIT IV - STEEL AND STRENGTHENING MECHANISM

9+6

Substitutional solid solution: Disordered and ordered, interstitial solid solution, cooling curves, solidification of metals and alloys – nucleation and crystal growth from the liquid phase, ingot structure, dendrite freezing. Iron – allotropy, polymorphism. Classification of steels, micro-constitutions of iron and steel, effect of carbon and other alloying elements (Mn, Si, Cr, Va, Mo, Ti &W) on properties of steels. Strengthening Mechanism of steel: Solid solution hardening, precipitation hardening, dispersion hardening and work hardening.

UNIT V - COMPOSITES

9+6

Introduction, properties, functions of matrix and reinforcement in composites – Law of mixtures, Classification of composites: Particle-reinforced, Fiber-reinforced and Structural composites (Laminar and Sandwich) Types of composite materials: Polymer-matrix composites, Metal-matrix composites, Ceramic-matrix composites, Carbon-carbon composites and Hybrid composite – Applications

COURSE OUTCOMES

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

- CO.1 Calculate crystal parameters and analyze different crystal structures.
- CO.2 Explain the mechanical properties and failure in bulk materials.
- CO.3 Choose appropriate mechanical testing technique for analyzing materials.
- CO.4 Discuss the properties and strengthening mechanism of steel.
- CO.5 Identify the types of composite materials.


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TEXT BOOKS:

1. W.D. Callister, Materials Science and Engineering: An Introduction, 7th Edition, Wiley, 2006.
2. V. Raghavan, Materials Science and Engineering, 4th Edition, Prentice Hall, 1998.
3. O.P. Khanna, A Text Book of Materials Science and Metallurgy, Khanna Publishers, 2003.

REFERENCE BOOKS:

1. L.H. Van Vlack, Elements of Materials Science and Engineering, Pearson Education, 2008.
2. M.A.Wahab, Solid State Physics: Properties of Materials, Narosa Publishing House, 1999.
3. William F. Smith, Fundamentals of Materials Science and Engineering, McGraw Hill, 2003.
4. G.K. Narula, K.S. Narula and V.K. Gupta, Materials Science, Tata McGraw Hill, 2007.

WEB REFERENCES:

1. www.nptel.ac.in
2. www.ocw.mit.edu



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| | | |
|------------------------|------------------------------------|------------|
| Course Code:16CYT21 | Course Title:ENGINEERING CHEMISTRY | |
| Core/Elective: General | L: T: P: C | 3: 0: 0: 3 |
| Type: Theory | Total Contact Hours: | 45 |

COURSE OBJECTIVES

The course is intended to:

1. Explain the chemistry of water and water conditioning methods
2. Determine the rate of corrosion of materials and methods for corrosion prevention and protection of materials.
3. Explain the basic concepts of thermodynamics and surface chemistry
4. Describe the preparation, properties and applications of engineering plastics
5. Explain the basics of chemistry of cement

Unit I - WATER TECHNOLOGY

9

Water quality parameters – Physical, Chemical and Biological characteristics of potable water – Water Quality Standards (BIS, WHO) – Hardness of water – types, expression – determination by EDTA method – Boiler feed water – boiler troubles. Water conditioning methods – Internal conditioning- Carbonate, Phosphate and Calgon Conditioning. External conditioning – Demineralization, Reverse osmosis.

Unit II - CORROSION AND ITS CONTROL

9

Corrosion – Dry and Wet corrosion, mechanism of electrochemical corrosion– Galvanic corrosion and concentration cell corrosion - Factors influencing corrosion (metallic and environmental factors).

Corrosion Control methods – Cathodic protection method – Sacrificial anodic protection and impressed current cathodic protection method – Corrosion inhibitors- Inorganic coating- Metallic coating – Galvanizing –Tinning- Organic coating.

Unit III - CHEMICAL THERMODYNAMICS & SURFACE CHEMISTRY

9

Thermodynamic processes - Isothermal, Isobaric, Isochoric, Adiabatic, Reversible and Irreversible process – Mathematical derivation of First & Second law of thermodynamics –Enthalpy, Entropy, Spontaneity, Free energy, Internal energy and work functions – ΔS of phase transitions.

Adsorption – Classification, Adsorption Isotherm – Freundlich Adsorption Isotherm and Langmuir Adsorption Isotherm – Derivation and Limitations – Applications of Activated carbon in waste water treatment.

Unit IV - POLYMER, PLASTICS AND COMPOSITES

9

Polymers- Classification – Terminology - Polymerization - Addition and condensation polymerization – Free radical mechanism –Plastics – Classification – Engineering plastics - Preparation, properties and uses of Nylon 6,6. Commodity plastics- Preparation, properties and uses of PVC. Compounding of plastics –Moulding technique - blow and extrusion. Polymer composites – FRP & Ceramic matrix composites.

Unit V - CHEMISTRY OF BUILDING MATERIALS

9

Chemistry of Lime & Gypsum - Cement – Chemical composition - Classification - Manufacture by wet and dry process– Setting and Hardening of cement –Chemical reactions during the hydration of cement – Hydration products of cement –Physical and chemical properties –Chemistry and applications of Ceramics, Fly ash and Glass in construction.


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COURSE OUTCOMES

1. Explain the chemistry of water and specify the water conditioning processes.
2. Determine the rate of corrosion of a given metal in a given environment and identify appropriate control techniques to avoid corrosion.
3. Comprehend the role of adsorption in waste water treatment.
4. Explain the theory associated with chemical engineering thermodynamics.
5. Identify a suitable plastic for a specific engineering application.
6. Describe the chemistry of cement in modern construction

TEXT BOOK:

1. P. C. Jain and Monica Jain, "Engineering Chemistry", 16th Ed., DhanpatRai Pub, Co., New Delhi (2004).
2. Wiley Engineering Chemistry, Second Edition, Wiley India Pvt. Ltd. New Delhi (2011)

REFERENCE BOOKS:

1. L. Brown and T. Holme, Chemistry for Engineering Students, 3rd Edition, Cengage Learning (2010).
2. P.W. Atkins and de Paula Julio, "Physical Chemistry", Oxford University Press, 9th Ed. (Indian Student Edition) (2011).
3. V.R.Gowariker, N.V.Viswanathan and JayadevSreedhar, "Polymer Science", New Age International P (Ltd.), Chennai (2006).
4. S. S. Dara "A text book of Engineering Chemistry" S. Chand & Co. Ltd., New Delhi (2006).

WEB REFERENCES:

1. <http://nptel.ac.in/syllabus/syllabus.php?subjectId=104101001>
2. <http://nptel.ac.in/courses/104105039/>
3. <http://nptel.ac.in/courses/122101001/>



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| | | |
|---------------------|------------------------------------|------------|
| Course Code:16GET23 | Course Title:ENGINEERING MECHANICS | |
| Core/Elective: Core | L: T: P: C | 3: 2: 0: 4 |
| Type: Theory | Total Contact Hours: | 75 hours |

COURSE OBJECTIVES

The course is intended to:

- CO1 Analyze the forces in concurrent system
- CO2 Calculate the resultant in non-concurrent system of forces.
- CO3 Calculate geometric properties like centre of gravity, moment of Inertia and mass moment of inertia for various sections.
- CO4 Apply equilibrium equations to find reactions in beams and member forces in trusses and explain the effect of dry friction in contact surfaces.
- CO5 Apply the law of dynamics on particles.

Unit I - BASICS AND STATICS OF PARTICLES

9+6

Introduction – Units and Dimensions – Laws of Mechanics – Lamé's theorem, Parallelogram and triangular Law of forces — Vectorial representation of forces – Vector operations of forces - additions, subtraction, dot product, cross product – Coplanar Forces – rectangular components – Equilibrium of a particle – Forces in space – Equilibrium of a particle in space – Equivalent systems of forces – Principle of transmissibility.

Unit II - EQUILIBRIUM OF RIGID BODIES

9+6

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

Unit III - PROPERTIES OF SURFACES AND SOLIDS

9+6

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

Unit IV - APPLICATION OF EQUILIBRIUM

9+6

Types of supports and their reactions – Equilibrium of Rigid bodies in two dimensions and three dimensions – Static Indeterminacy of beams and trusses – Types of beams and its reactions from supports – Types of trusses – Analysis for member forces by method of joints and method of sections, Frictional force – Laws of Coulomb friction – Coplanar systems with friction (Ladder, Wedges).

Unit V - DYNAMICS

9+6

Kinematics of particles – Displacements, Velocity and acceleration, their relationship – Rectilinear and curvilinear motion with uniform and non-uniform accelerations – Relative motion – Kinetics of rigid bodies – Newton's law – D'Alembert's principle – Work, Energy equation of particles – Impulse and Momentum – Impact of elastic bodies.

COURSE OUTCOMES

- CO1 Analyze the forces in concurrent system by applying laws of mechanics for rigid bodies.
- CO2 Calculate the resultant in non-concurrent system of forces.
- CO3 Calculate geometric properties like centre of gravity, moment of Inertia and mass moment of inertia for various sections.
- CO4 Apply equilibrium equations to find reactions in beams and member forces in trusses and explain the effect of dry friction in contact surfaces.
- CO5 Apply the law of dynamics on particles.

TEXT BOOK:

1. Beer, F.P and Johnston Jr. E.R., "Vector Mechanics for Engineers (In SI Units): Statics and Dynamics", 8th Edition, Tata McGraw-Hill Publishing company, New Delhi (2005).
2. Vela Murali, "Engineering Mechanics", Oxford University Press (2010)

REFERENCE BOOKS:

1. Hibbeler, R.C and Ashok Gupta, "Engineering Mechanics: Statics and Dynamics", 11th Edition, Pearson Education 2010.
2. Irving H. Shames and Krishna MohanaRao. G., "Engineering Mechanics – Statics and Dynamics", 4th Edition, Pearson Education 2006.
3. Meriam J.L. and Kraige L.G., "Engineering Mechanics- Statics - Volume 1, Dynamics-Volume 2", Third Edition, John Wiley & Sons, 1993.
4. Rajasekaran S and Sankarasubramanian G., "Engineering Mechanics Statics and Dynamics", 3rd Edition, Vikas Publishing House Pvt. Ltd., 2005.
5. Bhavikatti, S.S and Rajashekarappa, K.G., "Engineering Mechanics", New Age International (P) Limited Publishers, 1998.
6. Kumar, K.L., "Engineering Mechanics", 3rd Revised Edition, Tata McGraw-Hill Publishing company, New Delhi 2008.

WEB REFERENCES:

1. <http://nptel.ac.in/courses/112103109/>(updated 01-Mar-2016)
2. <http://www.iitg.ac.in/ssg/me101.html>(updated 31-Jan-2015)
3. <https://www.coursera.org/learn/engineering-mechanics-statics>(updated 30-May-2015)
4. http://www.vssut.ac.in/lecture_notes/lecture1423904717.pdf (updated 01-Aug-2014)

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|------------------------|---|
| Course Code:16PCL22 | Course Title:ENGINEERING PHYSICS AND CHEMISTRY LABORATORY |
| Core/Elective: General | L: T: P: C 0: 0: 4: 2 |
| Type: Practical | Total Contact Hours: 60 hours |

COURSE OBJECTIVES

The course is intended to:

1. Measure velocity of ultrasound of a liquid.
2. Determination of Young's Modulus.
3. Estimate the total hardness of water.
4. Measure corrosion rate of a mild metal.
5. Determine concentration of a solution through electrical method.

Course Content - Physics Laboratory

1. Ultrasonic Interferometer – Determination of Velocity of ultrasound in a Liquid and Compressibility of Liquid.
2. Viscosity of Less & High Viscous Liquid.
3. Experimental verification of Lami's theorem.
4. Cantilever Bending – Determination of Young's Modulus.
5. Torsional Pendulum – Determination of Rigidity Modulus.
6. Lee's Disc Method – Determination of Thermal Conductivity of a Bad Conductor.

Course Content - Chemistry Laboratory

1. Estimation of Hardness of water by EDTA Method.
2. Determination of corrosion rate of mild steel by weight loss method.
3. Estimation of iron in water by spectrophotometry.
4. Determination of Molecular weight of polymer by viscometric method.
5. Construction of a pH titration curve and estimation of strength of an acid by pH metry.
6. Determination of percentage of calcium oxide in the cement solution by titrimetric method.

COURSE OUTCOMES

- CO.1 Measure velocity of ultrasound of a liquid.
 CO.2 Determination of Young's Modulus.
 CO.3 Estimate the total hardness of water.
 CO.4 Measure corrosion rate of a mild metal.
 CO.5 Determine concentration of a solution through electrical method.

TEXT BOOK:

1. Engineering Physics Laboratory Manual, Dr.R.Jayaraman, V.Umadevi, S. Maruthamuthu and B. Saravanakumar, Pearson Publication, New Delhi.
2. Engineering Chemistry Laboratory Manual by Faculty, Chemistry Department, MCET

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|---------------------|--|------------|----------|
| Course Code:16CDL22 | Course Title:COMPUTER AIDED BUILDING DRAWING | | |
| Core/Elective: Core | L: T: P: C | 0: 0: 4: 2 | |
| Type: Practical | Total Contact Hours: | | 60 hours |

COURSE OBJECTIVES

The course is intended to:

1. Use various commands in CAD Software to draw building drawings.
2. Draw the components of buildings
3. Draw the king post and north light roof trusses.
4. Draw plan, elevation and sectional view of various types of residential and commercial buildings with proper orientation.
5. Draw the perspective view of buildings.

LIST OF EXPERIMENTS:

1. Introduction to CAD commands – A Study.
2. Components of buildings, types of buildings and its orientation – A Study.
3. Introduction to Foundation and its Types - drawing of various types of foundations.
4. Drawing of Doors and windows.
5. Introduction to Roofing elements and its types – drawing of north light and king post trusses.
6. Drawing of Simple buildings – load bearing structure
7. Drawing of Simple buildings – framed structure
8. Planning & drawing of One BHK – Single storey
9. Planning & drawing of One BHK – Double storeyed
10. Planning & drawing of Two BHK– Double storeyed
11. Drawing of Commercial buildings
12. Perspective view of buildings - Hand drawing

COURSE OUTCOMES

- CO.1 Use various commands in CAD Software to draw building drawings.
CO.2 Draw the components of buildings
CO.3 Draw the king post and north light roof trusses.
CO.4 Draw plan, elevation and sectional view of various types of residential and
CO.5 Draw the perspective view of buildings.

TEXT BOOK:

1. Civil Engineering Drawing & House Planning – Varma B.P., Khanna publishers, Delhi, 2010.
2. Building planning & Drawing – Kumaraswamy N., KameswaraRao A., Charotar Publishing, 7th Revised & Enlarged Edition : 2013.

REFERENCES:

1. Building drawing – Shah. M.G., Tata McGraw-Hill, 5th Edition, 2013.


BoS Chairman

| | | |
|---------------------------|----------------------------------|------------|
| Course Code:16PSL21 | Course Title:SPORTS FOR WELLNESS | |
| Core/Elective: General | L: T: P: C | 0: 0: 2: 1 |
| Type: Lecture & Practical | Total Contact Hours: | 30 hours |

COURSE OBJECTIVES

The course is intended to:

1. Explain the significance of physical fitness.
2. Maintain physical fitness.
3. Exhibit mental agility.

Unit I - HEALTH

6

Meaning of health - Components of health - physical, mental, social, emotional, spiritual -importance of health - Personal hygiene - Heredity and environment – Adopting healthy habits.

Unit II - FITNESS&WELLNESS

6

Fitness and wellness – what is physical fitness - categories - components of health related physical fitness- components of skill related physical fitness-values of physical fitness – Physical fitness development. What is wellness - importance of wellness for engineers –factors promoting wellness – Physiology and health: cardio-respiratory, muscular and nervous systems – ageing.

Unit III - FOOD & HEALTH

6

Energy balance and body composition – nutrients- problems of surplus and deficiency- balanced diet - good food habits for better health – hazards of junk food - food and the gunas.

Unit IV - FITNESS & DEVELOPMENT I

6

Exercises related ailment and injuries - safety and precautions - first aid. Muscular strength – exercises (calisthenics): pull-up, sit-up, push-up and weight training. Explosive power – exercises: vertical jump, long jump, Cardio respiratory endurance– exercises: walking, jogging, treadmill, stair climbing, bicycling, skipping. Flexibility – exercises: stretching.

Unit V - FITNESS & DEVELOPMENT II

6

Speed, agility, balance and coordination – exercises: sprint, cone drill, ladder drill, hurdle drill, ball throw - mental agility tests. Dexterity - 12 minutes cooper test – long run – adventure games, Team games.

COURSE OUTCOMES

- CO.1 Explain the significance of physical fitness.
CO.2 Maintain physical fitness.
CO.3 Exhibit mental agility.

REFERENCE BOOKS:

1. Tony Buzan, Harper Collins, The Power of Physical Intelligence (English)
2. Padmakshan Padmanabhan, Handbook of Health & Fitness, Indus Source Books, First Edition, 2014.

END OF SEMESTER II


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SEMESTER III

| | | |
|-----------------------|--|---------------|
| Course Code : 16MAT31 | Course title : TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS | |
| Core / Elective: Core | L : T : P : C | 3 : 2 : 0 : 4 |
| Type : Theory | Total Contact hours: | 75 Hours |

PREREQUISITES: 16MAT12 Engineering Mathematics–I
16MAT22 Engineering Mathematics–II

COURSE OBJECTIVES

The course is intended to:

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

UNIT I - PARTIAL DIFFERENTIAL EQUATIONS

9+6

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

UNIT II - FOURIER SERIES

9+6

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

UNIT III - SOLUTION OF ONE DIMENSIONAL WAVE EQUATION

9+6

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

UNIT IV - SOLUTION OF ONE AND TWO DIMENSIONAL HEAT FLOW EQUATION

9+6

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

UNIT V - FOURIER TRANSFORMS

9+6

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

COURSE OUTCOMES

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

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



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TEXT BOOKS:

1. Srimanta Pal and Subodh C. Bhunia, "Engineering Mathematics", First Edition, Oxford University Press, New Delhi, 2015
2. Veerarajan T., "Transforms and Partial Differential Equations", Tata McGraw Hill Education Pvt. Ltd., New Delhi, Second reprint, 2012.
3. Erwin Kreyszig, "Advanced Engineering Mathematics", 10th Edition, Wiley Publications, 2015

REFERENCE BOOKS:

1. Grewal B.S., "Higher Engineering Mathematics", 42nd Edition, Khanna Publishers, Delhi, 2012
2. Bali.N.P and Manish Goyal, "A Textbook of Engineering Mathematics", 8th Edition, Laxmi Publications Pvt Ltd, 2011.
3. Ramana. B.V., "Higher Engineering Mathematics", Tata McGraw Hill Publishing Company Limited, New Delhi, 2008.

WEB REFERENCES:

1. <http://nptel.ac.in/courses/122107037/19>
2. <http://nptel.ac.in/video.php?subjectId=108106075>

| | | |
|-----------------------|--|-----------------|
| Course Code : 16CET31 | Course title : MECHANICS OF SOLIDS – I | |
| Core / Elective: Core | L: T : P : C | 2 : 2 : 0 : 3 _ |
| Type : Theory | Total Contact hours: | 60 Hours |

PREREQUISITES: 16GET23 Engineering Mechanics

COURSE OBJECTIVES

The course is intended to:

1. Determine stresses and strains in compound bars, bars of varying section
2. Determine the principle stresses, normal and tangential stresses in oblique planes
3. Draw shear forces and bending moment diagram for determinate beams and determine the shear stress, bending stress distribution in them
4. Determine deflection in determinate beams
5. Design shafts to transmit required power

UNIT I STRESS-STRAIN AND DEFORMATION OF SOLIDS, STATES OF STRESS 6+6

Rigid bodies and deformable solids – Stability, strength, stiffness – Tension, compression and shear stresses – strain, Hooke's law, ultimate strength, yield stress , factor of safety, stress-strain curve for mild steel, TMT bars and concrete, poisson's ratio, lateral strain , temperature stresses. Deformation of simple bars- Compound bars and bars of varying section – Shear modulus, bulk modulus, relationship between elastic constants.

UNIT II - ANALYSIS OF THIN CYLINDERS AND PRINCIPAL STRESSES 6+6

Thin cylinders - Circumferential stress, longitudinal stress, volumetric strain under internal pressure, – Stresses in thin compound cylinders – Shrink fit. Biaxial state of stress – Stress at a point – Stress on inclined plane – Principal stresses and principal planes – Mohr's circle of stresses.

UNIT III - SHEAR AND BENDING IN BEAMS 6+6

Beams – Types of supports – Simple and fixed, types of load – Concentrated, uniformly distributed, –Bending moment and shear force diagram for simply supported, cantilever and overhanging beams– Relationship between load, bending moment and shear force. Theory of simple bending, Analysis of Beams for Stresses – Stress Distribution at a cross Section due to bending moment and shear force for Cantilever, simply supported and overhanging beams with different loading conditions - Flitched Beams.

UNIT IV - DEFLECTION 6+6

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

UNIT V - TORSION OF SHAFTS AND SPRINGS 6+6

Elastic theory of torsion -Stresses and deformation in circular solid and hollow shafts - Combined bending moment and torsion of shafts - Strain energy due to torsion - Modulus of Rupture – Power transmitted to shaft – Shaft in series and parallel - Design of shafts - Closed coiled and open coiled helical springs subjected to axial load, leaf springs, deflection of springs.

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COURSE OUTCOMES

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

- CO.1 Determine stresses and strains in compound bars, bars of varying section and determine the relation between elastic constants.
- CO.2 Determine the principle stresses, normal and tangential stresses in oblique planes in an element subjected to two dimensional stress systems.
- CO.3 Draw shear forces and bending moment diagram for determinate beams and determine the shear stress, bending stress distribution in them
- CO.4 Determine deflection in determinate beams
- CO.5 Design shafts to transmit required power.

TEXT BOOKS:

- 1. Bansal R.K., A text book of Strength of materials, Fourth Edition, Laxmi Publications (P) Ltd, New Delhi, 2007.
- 2. Egor P Popov, Engineering Mechanics of Solids, Second Edition, Prentice Hall of India, New Delhi, 2005.
- 3. Rajput.R.K., Strength of Materials, Fifth edition, Eurasia Publishing House, Ram Nagar, New Delhi.

REFERENCE BOOKS:

- 1. Timoshenko S.P. and Young D.H., Elements of Strength of Materials, East West Press Private Limited, New Delhi, 1978.
- 2. Hibbeler R.C., Mechanics of materials, Sixth Edition, Pearson-Prentice Hall, New Delhi, 2007.
- 3. Subramanian R., Strength of materials, Second Edition, Oxford university press, New Delhi, 2010.
- 4. William A. Nash, Theory and Problems of Strength of Materials, Schaum's Outline Series, Fourth Edition, Tata McGraw-Hill publishing co., New Delhi, 2007

WEB REFERENCES:

- 1. <http://nptel.ac.in/courses/105106116/>
- 2. <http://web.mit.edu/emech/dontindex-build/>
- 3. <http://www.aboutcivil.org/solid-mechanics.html>
- 4. <http://web.aeromech.usyd.edu.au/AMME2301/Documents/>

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|-----------------------|--------------------------------|---------------|
| Course Code : 16CET32 | Course title : FLUID MECHANICS | |
| Core / Elective: Core | L: T : P : C | 2 : 2 : 0 : 3 |
| Type : Theory | Total Contact hours: | 60 Hours |

COURSE OBJECTIVES

The course is intended to:

1. Determine the static pressure, buoyant force and meta centric height.
2. Explain the flow properties through velocity potential function and stream function
3. Apply the Bernoulli's theorem in pipe flow
4. Determine the discharge and loss of head in flow through pipes
5. Describe the dimensionless analysis, model analysis, and predict effects on the prototype.

UNIT I - FLUID PROPERTIES AND FLUID STATICS

6+6

Fluid - Definition, distinction between solid and fluid - Units and dimensions - Properties of fluids - Density, specific weight, specific volume, specific gravity, temperature, viscosity, compressibility, vapour pressure, capillarity and surface tension - Fluid statics Concept of fluid static pressure, absolute and gauge pressures - Pressure measurements by manometers and pressure gauges - Forces on planes - Centre of pressure - Buoyancy - Meta centric height- Flootation

UNIT II - FLUID KINEMATICS

6+6

Fluid Kinematics - Flow visualization - Lines of flow - Types of flow - Velocity field and acceleration - Velocity measurement- Continuity equation (one and three dimensional differential forms) - Equation of streamline - Stream function - Velocity potential function - circulation - Vortex flow - Flow net.

UNIT III - FLUID DYNAMICS

6+6

Equations of motion - Euler's equation along a streamline - Bernoulli's equation - Applications- Venturimeter, Orifice meter and Pitot tube. Linear momentum equation and its application-Boundary layer - Definition - Boundary layer on a flat plate - Thickness and classification - Displacement, energy and momentum thickness.

UNIT IV - FLOW THROUGH PIPES

6+6

Viscous flow - Shear stress, pressure gradient relationship - Laminar flow between parallel plates- Laminar flow through circular tubes (Hagen poiseulle's) - Hydraulic and energy gradient - flow through pipes - Darcy - Weisbach's equation - pipe roughness - Friction factor- Moody's diagram - Major and minor losses of flow in pipes - Pipes in series and in parallel.

UNIT V - DIMENSIONAL ANALYSIS AND MODEL STUDIES

6+6

Fundamental dimensions - Dimensional homogeneity - Rayleigh's method and Buckingham Pi -Theorem - Dimensionless parameters - Similitude and model studies - Distorted Models.

COURSE OUTCOMES

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

- CO.1 Determine the static pressure, buoyant force and meta centric height.
- CO.2 Explain the flow properties through velocity potential function and stream function
- CO.3 Apply the Bernoulli's theorem in pipe flow
- CO.4 Determine the discharge and loss of head in flow through pipes
- CO.5 Describe the dimensionless analysis, model analysis, and predict effects on the prototype.

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TEXT BOOKS:

1. Bansal R.K., "Fluid Mechanics And Hydraulic Machines", Laxmi Publications, New Delhi (2010)
2. Som S., BiswasGowdham and Chakraborty S., "Introduction to Fluid Mechanics & Fluid Machines" Tata McGraw Hill Education Private Ltd, New Delhi, (2011).

REFERENCE BOOKS:

1. Modi P.N. and Seth S.M., "Hydraulics and Fluid Mechanics", Standard Book House, New Delhi, (2000).
2. Frank M White, "Fluid Mechanics", Tata McGraw Hill Publications, New Delhi, (2008).
3. James A Fay, "Introduction to Fluid Mechanics", Prentice Hall of India Private Limited, New Delhi, (2007).
4. John F. Douglas, Janusz M. Gasiorek and John A. Swaffield, "Fluid Mechanics", Fourth Edition, Pearson Education Ltd, New Delhi, (2001).

WEB REFERENCES:

1. <http://nptel.ac.in/courses/105103095/>
2. <http://www.et.byu.edu/~dol4/che374/lectureNotes/lectureNotes.html>
3. <http://ocw.mit.edu/courses/aeronautics-and-astronautics/16-01-unified-engineering-i-ii-iii-iv-fall-2005-spring-2006/fluid-mechanics/>
4. https://www.vidyarthiplus.com/vp/Thread-ME2204-Fluid-Mechanics-and-Machinery-Lecture-Notes-2013-Edition#.VxG4X_I97IU

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|-----------------------|---------------------------------------|---------------|
| Course Code : 16CET33 | Course Title : CONSTRUCTION MATERIALS | |
| Core/Elective: Core | L: T : P : C | 3 : 0 : 0 : 3 |
| Type : Lecture | Total Contact hours: | 45 Hours |

COURSE OBJECTIVES

The course is intended to:

1. Explain the importance of most common building materials
2. Explain the characteristics of lime, cement, aggregates and mortar
3. Apply the knowledge of metal characteristics and their structural form
4. Describe the importance of timber and other materials properties
5. Illustrate the modern materials applications in construction

UNIT I - STONES – BRICKS – BLOCK

9

Stone as building material – Criteria for selection – Tests on stones – Deterioration and Preservation of stone work – Bricks – Classification – Manufacturing of clay bricks – Fly ash bricks - Tests on bricks – Bricks for special use – Refractory bricks – Cement, Concrete blocks – Dimensions and Tolerances – Types- Autoclaved aerated concrete blocks – Joist and Filler blocks - Considerations for use of hollow concrete blocks.

UNIT II - LIME – CEMENT – AGGREGATES – MORTAR

9

Lime – Types – Properties and Uses – Cement: Manufacture of cement – Types of cement – Characteristics – Tests for cement - Hydration – Properties – Industrial byproducts – Fly ash. Aggregates - Characteristics - Types of aggregates – Testing of aggregates - Water – Qualities of water for construction - Mortar: Classification of mortar - Preparation - Selection of mortar - Tests for mortars.

UNIT III - METALS

9

Types of Steels – Manufacturing process of steel – Structural steel – Rebar - Rusting and corrosion - Tensile testing of steel - Advantages of new alloy steels – Aluminium – Properties Aluminium composite panel – Applications in construction and its products – Types of Coatings & Coatings to reinforcement – Applications of Coatings.

UNIT IV - TIMBER AND OTHER MATERIALS

9

Timber – Types of timber –Characteristics - Seasoning of timber - Defects in timber - Timber products – Market forms – Industrial timber– Plywood – Veneer – Thermacole – Panels of laminates – Paints – Types of paints - Varnishes – Distempers – Bitumen – Properties and applications.

UNIT V - MODERN MATERIALS

9

Glass – Types – Selection of glass for various applications – Engineering properties of glass – Ceramics – Sealants for joints – Fibre glass reinforced plastic – Clay products – Refractories – Composite materials – Types – Applications of laminar composites – Fibre textiles – Geosynthetics – properties and applications

COURSE OUTCOMES

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

- CO.1 Explain the importance of most common building materials like stones, bricks and blocks
- CO.2 Explain the characteristics of lime, cement, aggregates and mortar and the potential applications of these materials

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- CO.3 Apply the knowledge of metal characteristics and their structural form used for construction
- CO.4 Describe the importance of timber and other materials properties and application
- CO.5 Illustrate the modern materials applications in construction

TEXT BOOKS:

1. Varghese. P.C, "Building Materials", 2nd Revised edition (2015) PHI Learning Pvt. Ltd, New Delhi.
2. Rajput. R.K., "Engineering Materials", S. Chand and Company Ltd., 2008.
3. Shetty. M.S., "Concrete Technology (Theory and Practice)", S. Chand and Company Ltd., 2008.
4. Gambhir. M. L., "Concrete Technology", 5th Edition, Tata McGraw Hill Education, 2013
5. Duggal. S. K., "Building Materials", 4th Edition, New Age International, 2012.

REFERENCE BOOKS:

1. Jagadish. K.S, "Alternative Building Materials Technology", New Age International, 2007.
2. Gambhir. M.L., & NehaJamwal., "Building Materials, products; properties and systems", Tata McGraw Hill Educations Pvt. Ltd, New Delhi, 2012.
3. Rangwala, "Engineering Materials (Material Science)", Charotar Publishing House Private Limited, Gujarat, Thirty Eighth Edition, 2011.
4. IS383–1970: Indian Standard specification for coarse and fine aggregate from natural Sources for concrete, 2011.
5. IS1542–1992: Indian standard specification for sand for plaster, 2009.

WEB REFERENCES:

1. www.understandconstruction.com
2. www.engineeringcivil.com
3. www.aboutcivil.com
4. www.lmtpc.org

| | | |
|------------------------|------------------------------------|---------------|
| Course Code : 16CET34 | Course title : HIGHWAY ENGINEERING | |
| Core / Elective : Core | L: T : P : C | 3 : 0 : 0 : 3 |
| Type : Theory | Total Contact hours: | 45 Hours |

COURSE OBJECTIVES

The course is intended to:

1. Explain the basic concepts of highway planning and development.
2. Explain the geometric design concepts
3. Explain the design concepts for different types of Pavements as per IRC Codal Provisions.
4. Describe the materials, construction practices and maintenance
5. Explain the concepts of economics and finance involved in highway projects.

UNIT I - HIGHWAY PLANNING AND ALIGNMENT

8

History of road development in India – Classification of highways – Institutions for Highway planning, design and construction at different levels – factors influencing highway alignment – Road ecology - Engineering surveys for alignment, objectives, conventional and modern methods.

UNIT II - GEOMETRIC DESIGN OF HIGHWAYS

10

Typical cross sections of Urban and Rural roads — Cross sectional elements – Horizontal curves, super elevation, transition curves, widening of curves – Sight distances – Vertical curves, gradients, hairpin bends – Lateral and vertical clearance at underpasses – IRC standards-Road signs and safety.

UNIT III - DESIGN OF FLEXIBLE AND RIGID PAVEMENTS

9

Design principles – pavement components and their role - Design practice for flexible and rigid pavements (IRC methods only).

UNIT IV - HIGHWAY CONSTRUCTION AND MAINTENANCE

10

Highway construction materials, properties, testing methods – Construction practice including modern materials and methods of concrete and flexible pavements, Highway drainage – Special considerations for hilly roads; Evaluation and Maintenance of pavements.

UNIT V - HIGHWAY ECONOMICS AND FINANCE

8

Introduction, Highway User Benefits, Highway Costs, Vehicle Operation Costs, Economic analysis, Highway projects under Public-Private Sector Participation, Bidding process, Highway finance.

COURSE OUTCOMES:

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

- CO.1 Explain the basic concepts of highway planning and development.
- CO.2 Design the elements of highway.
- CO.3 Design Flexible and Rigid Pavements as per IRC Codal Provisions.
- CO.4 Describe about the materials, construction practices and maintenance used in Highway Engineering.
- CO.5 Describe the economics and finance involved in highway projects.

TEXT BOOKS:

1. Subramanian K.P., Highways, Railways, Airport and Harbour Engineering, Scitech Publications (India), Chennai, 2010
2. Veeraragavan. A, Khanna.K and Justo.C.E.G. Highway Engineering, Nem Chand & Bros Publishers, 2014
3. Subhash C Saxena, Textbook of Highway and Traffic Engineering., CBS Publishers, 2014

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REFERENCE BOOKS:

- 1. ParthaChakroborty and Animesh Das Principles of Transportation Engineering, PHI Learning Pvt. Ltd., 2005
2. Kadiyali. L. R. Principles and Practice of Highway Engineering, Khanna Technical Publications, Delhi, 1997.
3. Indian Road Congress (IRC), Guidelines and Special Publications on Planning and Design of Highways.
4. C.Venkatramaiah., Transportation Engineering-Highway Engineering, Universities Press (India) Private Limited, Hyderabad, 2015
5. R.Srinivasa Kumar., Textbook of Highway Engineering Universities Press (India) Private Limited, Hyderabad, 2011
6. Sharma.S.K Principles , Practices and Design of Highway Engineering, S.Chand and Company Ltd.1995
7. Clarkson.H Oglesby and R.Gary Hicks, Highway Engineering, John Wileysons, 1992.
8. O"Flaherty.C.A Highways, Butterworth – Heinemann, Oxford,2006

WEB REFERENCES:

1. <https://www.vidyarthiplus.com/vp/attachment.php?aid=10395>
2. <https://www.scribd.com/doc/119865487/Pavement-Engineering-Notes-2012>

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|------------------------------|---------------------------------|----------------------|
| Course Code : 16CET35 | Course title : SURVEYING | |
| Core / Elective: Core | L : T : P : C | 4 : 0 : 0 : 4 |
| Type : Theory | Total Contact hours: | 60 Hours |

COURSE OBJECTIVES

The course is intended to:

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

UNIT I - BASICS OF SURVEYING

12

Definition - Principles – Classification. Introduction to Chain – Errors and corrections, Compass – bearing, meridian – Open and closed traverse – Closing errors and Introduction to Plane table instruments and accessories - Merits and demerits - Methods - Radiation - Intersection - Resection - Traversing.

UNIT II - LEVELLING

12

Principles and theory of levelling - Datum, bench mark and reduced level - Level surface and horizontal plane - Mean sea level - Types of levels, levelling staff and their types - Effect of curvature and refraction - Balancing back sight and foresight distance - Longitudinal, cross-sectional and reciprocal levelling - Reducing levels by rise and fall and height of collimation methods and check.

UNIT III - THEODOLITE SURVEYING

12

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

UNIT IV - TACHEOMETRIC SURVEYING

12

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

UNIT V - CONTOURING, CURVES AND MODERN SURVEYING

12

Definition - Contour interval and horizontal equivalent - Characteristics - Uses of contour maps - Drawing of contours using computers. Computation of area and volume of earthwork or reservoir capacity from contour map. Elements of simple curve - Location of tangent points - Setting out of simple curve by offset and Rankine's methods. Vertical curves – Types – grades. Total Station – Electronic Theodolite – Laser alignment instrument – Global Positioning System.

COURSE OUTCOMES

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

- CO.1 Calculate areas and included angles by Chain, Compass and Plane table surveying.

Pooe
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- CO.2 Apply methods of levelling in determination of reduced levels.
CO.3 Establish the position of different objects in space using Theodolite and Tacheometer.
CO.4 Calculate the areas and volume of the given terrain by contours
CO.5 Compute the elements of curves to set out for road and bridge construction.

TEXT BOOKS:

1. Punmia B C, "Surveying" - vol. 1, vol. 2 and vol 3, Laxmi Publications (P) Ltd., New Delhi, 2016.
2. Agor. R, "A Text Book of Surveying and Levelling", Khanna Publishers, 2009.
3. Duggal R K, "Surveying", Vol I & II, Tata McGraw Hill Publishing Company Ltd., New Delhi, 2013.

REFERENCE BOOKS:

1. Kanetkar T P, "Surveying and Levelling", Part I and II, Pune VidyarthiGrihaPrakashan, 2006.
2. Bannister A and Raymond S, "Surveying", 7th Edition, Addison Wesley Longman Ltd, England, 1998.
3. Gopi. S, Sathikumar. R, Madhu. N, "Advanced Surveying", Dorling Kindersley (India) Pvt. Ltd., 2008.
4. Chandra. A.M., "Surveying", New Age International Private Ltd Publishers, 2015.

WEB REFERENCES:

1. <http://www.aboutcivil.org/surveying-levelling%20II.html>
2. <http://civil.engineering.webservices.utoronto.ca/Assets/Civil+Engineering+Digital+Assets/programs/courses/Survey+Camp+Class+Notes.pdf?method=1>
3. <http://www.nptel.ac.in/courses/105107122/>
4. http://www.vssut.ac.in/lecture_notes/lecture1428642587.pdf
5. www.scribd.com/doc/63716977/Surveying-1-Lecture-Notes



BoS Chairman

| | | |
|-----------------------|--|---------------|
| Course Code : 16CEL31 | Course title : SURVEYING PRACTICE LABORATORY | |
| Core / Elective: Core | L: T : P : C | 0 : 0 : 4 : 2 |
| Type : Practical | Total Contact hours: | 60 Hours |

COURSE OBJECTIVES

The course is intended to:

- CO.1 Draw and Compute the distances and areas
- CO.2 Determine the reduced levels of various points on the given field
- CO.3 Determine the elevation and gradients of any objects with the concepts of trigonometric levelling.
- CO.4 Set out simple curves
- CO.5 Set out foundation layout for a given building.

LIST OF EXPERIMENTS:

1. Study of Instruments – chains, compass, plane table and dumpy levels.
2. Determination of the area of a closed traverse after eliminating the closing error using Compass Surveying
3. Determination of RL of different points on the earth surface using dumpy level
4. Verifying the accuracy of levelling using method of Check Levelling
5. Plot the LS & CS of a given length of road using Profile levelling.
6. Determination of horizontal angles by Method of repetition and reiteration.
7. Determination of elevation of an object whose base is inaccessible by Single Plane method
8. Determination of elevation of an object whose base is inaccessible by Double Plane method
9. Determination of gradients between given points by stadia method
10. Set out a simple circular curve by Rankine's method
11. Set out a given foundation layout with standard markings
12. Study and demonstration of total station

COURSE OUTCOMES

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

- CO.1 Draw and Compute the distances and areas by operating chain, compass and its accessories.
- CO.2 Determine the reduced levels of various points on the given field using levelling instruments.
- CO.3 Determine the elevation and gradients of any objects with the concepts of trigonometric levelling using tacheometric principles.
- CO.4 Set out simple curves using deflection angle method
- CO.5 Set out foundation layout for a given building.

REFERENCES:

1. Surveying Practice Laboratory manual of Civil Engineering Department, MCET, Pollachi.


 BoS Chairman

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|-----------------------|--|---------------|
| Course Code : 16CEL32 | Course Title : CONSTRUCTION MATERIALS LABORATORY | |
| Core/Elective: Core | L : T : P : C | 0 : 0 : 4 : 2 |
| Type : Practical | Total Contact hours: | 60 Hours |

COURSE OBJECTIVES

The course is intended to:

1. Determine the properties of bricks.
2. Determine the properties of concrete blocks.
3. Verify the tests of properties of cement.
4. Determine the fine aggregate properties.
5. Determine the coarse aggregate properties

LIST OF EXPERIMENTS

1. Determination of Compressive Strength, Water Absorption and Efflorescence of Bricks
2. Determination of Compressive Strength and Water Absorption of Concrete Blocks
3. Determination of Fineness, Consistency and Soundness of Cement
4. Determination of Initial and Final Setting time of Cement
5. Determination of Compressive Strength of Cement
6. Sieve Analysis of Fine Aggregate
7. Determination of Specific Gravity and Bulking of Sand
8. Sieve Analysis of Coarse Aggregate
9. Determination of Flakiness and Elongation Indices
10. Determination of Specific Gravity and Water Absorption of Coarse Aggregate
11. Determination of Aggregate Impact and Crushing Values
12. Determination of Aggregate Abrasive Value

COURSE OUTCOMES

At the end of the course, the students will be able to

- CO.1 Conduct various tests to determine the properties of bricks
- CO.2 Perform the tests to determine the properties of concrete blocks
- CO.3 Verify the properties of cement as per IS codes of practice
- CO.4 Determine the properties of fine aggregates such as fineness modulus, specific gravity and bulking of sand.
- CO.5 Determine the properties of coarse aggregates and decide the suitability of coarse aggregate for various civil works.

REFERENCE

1. Construction Materials Laboratory manual of Civil Engineering Department, MCET, Pollachi, 2017.


 BoS Chairman

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|----------------------|---------------------------------------|---------------|
| Course Code :16PSL31 | Course title : PERSONAL EFFECTIVENESS | |
| Core / Elective: PS | L: T : P : C | 0 : 0 : 2 : 1 |
| Type : Practical | Total Contact hours: | 30 Hours |

COURSE OBJECTIVES

The course is intended to:

1. Identify the strengths, weaknesses and opportunities
2. Set goals for academics, career, and personal aspirations
3. Establish the road map for goals
4. Apply time management techniques
5. Create time and pursue activities of self-interest

UNIT I THE IMPORTANCE OF ENVISIONING

6

Importance of positive self-perception – Principle of dual creation (Everything gets created twice – Envisioning) - Understanding vision and mission statements - Writing personal mission statements – ‘Focus’ as a way of life of most successful people – Importance of goal setting –Importance of planning and working to time

UNIT II FUNDAMENTAL PRINCIPLES OF GOAL SETTING AND WORKING TO TIME

6

Clarifying personal values, interests and orientations – Awareness of opportunities ahead – Personal SWOT analysis - Principles driving goal setting: Principle of response and stimuli, Circle of influence and circle of concern, What you see depends on the role you assume

UNIT III GOAL SETTING AND ACTION ORIENTATION

6

Potential obstacles to setting and reaching your goals - Five steps to goals setting: SMART goals, Inclusive goals, Positive stretch, Pain vs gain, Gun-point commitment – Importance of action orientation - Converting goals to actionable tasks – Establishing road map – Using Gantt chart for planning and progress

UNIT IV TIME MANAGEMENT - TOOLS AND TECHNIQUES

6

Pareto 80-20 principle of prioritization – Time quadrants as a way to prioritize weekly tasks – The glass jar principle - Handling time wasters – Assertiveness, the art of saying ‘NO’ – Managing procrastination

UNIT V PUTTING INTO PRACTICE

6

Practicals using the weekly journal – Executing and achieving short term goals – Periodic reviews

COURSE OUTCOMES

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

- CO.1 Identify the strengths, weaknesses and opportunities
- CO.2 Set well-articulated goals for academics, career, and personal aspirations
- CO.3 Establish the road map to realize the goals
- CO.4 Apply time management techniques to complete planned tasks on time
- CO.5 Create time and pursue activities of self-interest that add value

Course handouts (compiled by PS team, MCET)

1. Learner’s workbook
2. Personal efficiency Journal
3. Reading material for Personal Effectiveness

Further Reading:

1. Stephen R Covey, “First things first”, Simon & Schuster Uk, Aug 1997.
2. Sean Covey, “Seven habits of highly effective teenagers”, Simon & Schuster Uk, 2004.
3. College student's guide to time management (e-book)

SEMESTER IV

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|-----------------------|----------------------------------|---------------|
| Course Code : 16MAT46 | Course title : NUMERICAL METHODS | |
| Core/Elective: Core | L : T : P : C | 4 : 0 : 0 : 4 |
| Type : Theory | Total Contact hours: | 60 |

PREREQUISITE:

- 16MAT12 Engineering Mathematics I
- 16MAT22 Engineering Mathematics II
- 16MAT31 Transforms and Partial Differential Equations.

COURSE OBJECTIVES

The course is intended to:

1. Solve the non-linear equations and system of linear equations and calculate the dominant Eigenvalue.
2. Predict the unknown values for the given set of data.
3. Apply numerical techniques to find derivatives and to evaluate integrals.
4. Solve first order differential equation using numerical techniques
5. Solve partial differential equations using numerical techniques.

UNIT I - SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS 12

Solution of algebraic and transcendental equations – RegulaFalsi method – Newton Raphson method- Solution of linear system of equations - Gauss elimination method - Gauss Jordan method – Iterative methods of Gauss Jacobi and Gauss Seidel - Dominant Eigen values of a matrix by Power method.

UNIT II - INTERPOLATION AND APPROXIMATION 12

Interpolation with unequal intervals - Lagrange's interpolation – Newton's divided difference interpolation – Cubic Splines - Interpolation with equal intervals - Newton's forward and backward difference formulae.

UNIT III - NUMERICAL DIFFERENTIATION AND INTEGRATION 12

Approximation of derivatives using interpolation polynomials - Numerical integration using Trapezoidal, Simpson's 1/3 rule –Simpson's 3/8 rule- Two point and three point Gaussian quadrature formulae – Evaluation of double integrals by Trapezoidal rule.

UNIT IV - INITIAL VALUE PROBLEMS FOR ORDINARY DIFFERENTIAL EQUATIONS 12

Single Step methods - Taylor's series method - Euler's method - Modified Euler's method - Fourth order Runge-Kutta method for solving first order equations - Multi step methods - Milne's and Adams-Bashforth predictor corrector methods for solving first order equations.

UNIT V - BOUNDARY VALUE PROBLEMS IN ORDINARY AND PARTIAL DIFFERENTIAL EQUATIONS 12

Finite difference methods for solving two-point linear boundary value problems - Finite difference techniques for the solution of two dimensional Laplace's and Poisson's equations on rectangular domain – One dimensional heat flow equation by explicit and implicit (Crank Nicholson) methods – One dimensional wave equation by explicit method.

COURSE OUTCOMES

At the end of this course, students will be able to:

- CO.1 Solve the non-linear equations and system of linear equations and calculate the dominant Eigenvalue.
- CO.2 Predict the unknown values for the given set of data.
- CO.3 Apply numerical techniques to find derivatives and to evaluate integrals.

CO.4 Solve first order differential equation using numerical techniques
CO.5 Solve partial differential equations using numerical techniques.

TEXT BOOKS:

1. Srimanta Pal and Subodh C. Bhunia, "Engineering Mathematics", First Edition, Oxford University Press, New Delhi, 2015
2. Grewal, B.S. and Grewal, J. S., "Numerical methods in Engineering and Science", 9th Edition, Khanna Publishers, New Delhi, 2007
3. Erwin Kreyszig, "Advanced Engineering Mathematics", 10th Edition, Wiley Publications, 2015.

REFERENCE BOOKS:

1. Chapra. S.C., and Canale. R.P., "Numerical Methods for Engineers", Tata McGraw Hill, 5th Edition, New Delhi, 2007.
2. Brian Bradie. "A friendly introduction to Numerical analysis", Pearson Education, Asia, New Delhi, 2007.
3. SankaraRao. K., "Numerical methods for Scientists and Engineers", Prentice Hall of India Private, 3rd Edition, New Delhi, 2007.

WEB REFERENCES:

1. <http://nptel.ac.in/syllabus/syllabus.php?subjectId=103101009>
2. <http://nptel.ac.in/courses/122107037/19>
3. <http://nptel.ac.in/video.php?subjectId=108106075>

| | | |
|-----------------------|---------------------------------------|---------------|
| Course Code : 16CET41 | Course title : MECHANICS OF SOLIDS-II | |
| Core/Elective: Core | L : T : P : C | 2 : 2 : 0 : 3 |
| Type : Theory | Total Contact hours: | 60 |

PREREQUISITE:

16GET23ENGINEERING MECHANICS

16CET31 MECHANICS OF SOLIDS-I

COURSE OBJECTIVES

The course is intended to:

1. Apply Energy theorem for computing deflection.
2. Determine the bending moment and shear force in propped, fixed and continuous beams.
3. Examine the behavior of columns at critical load condition.
4. Demonstrate the various theories of failure.
5. Determine the bending stresses, shear stresses and deflection due to unsymmetrical bending and to locate the shear centre.

UNIT I - ENERGY PRINCIPLES

6+6

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

UNIT II - STATICALLY INDETERMINATE BEAMS

6+6

Static and Kinematic indeterminacy. Fixed end moments, reactions, BM and S.F. diagrams for propped and fixed beams for point loads, UDL, UVL - Theorem of three Moments - Analysis of continuous beam (up to two span)-Shear force and B.M diagrams for continuous beams.

UNIT III - COLUMNS AND CYLINDERS

6+6

Type of columns, eccentrically loaded short columns, combined bending and direct stresses, crushing load, - middle third rule - Euler's theory of long columns - Limitations of Euler's theory - critical loads for prismatic columns with different end conditions; Rankine formula - Thick Cylinders-Compound Cylinders.

UNIT IV - STATE OF STRESS IN THREE DIMENSIONS

6+6

Determination of Principal stresses and Principal planes - Volumetric strains - Dilatation and Distortion. Theories of failure - Maximum Principal Stress theory - Maximum shear stress theory - Strain energy theory - Distortion energy theory - Principal strain energy theory - Application of above theories in determining load carrying capacity - Design of members.

UNIT V - ADVANCED TOPICS IN BENDING OF BEAMS

6+6

Properties of beam cross section - Unsymmetrical bending of beams of symmetrical and unsymmetrical sections - Determination of shear centre for I and channel sections - Bending of curved beams, Winkler Bach formula - Position of neutral axis for rectangular and trapezoidal sections- Stress concentration - fatigue.

COURSE OUTCOMES

At the end of this course, students will be able to:

CO.1 Apply Energy theorem for computing deflection.

CO.2 Determine the bending moment and shear force in propped, fixed and continuous

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beams.

CO.3 Examine the behavior of columns at critical load condition.

CO.4 Demonstrate the various theories of failure.

CO.5 Determine the bending stresses, shear stresses and deflection due to unsymmetrical bending and to locate the shear centre.

TEXT BOOKS:

1. Bansal R.K. "A text book of Strength of materials", Fourth Edition, Laxmi Publications (P) Ltd, New Delhi, 2007.
2. Punmia B.C. "Theory of Structures (SMTS)" Vol 1, Laxmi publishing Pvt Ltd, New Delhi, 2004.
3. Rajput, R.K. "Strength of Materials", Fifth edition, Eurasia Publishing House, Ram Nagar, New Delhi.

REFERENCE BOOKS:

1. Subramanian R., "Strength of materials", Second Edition, Oxford university press, New Delhi, 2010.
2. William A. Nash, "Theory and Problems of Strength of Materials", Schaum's Outline Series, Fourth Edition, Tata McGraw-Hill publishing co., New Delhi, 2007.
3. Lehri. R. S. and Lehri. A. S., "Strength of materials", S.K. Kataria & Sons, New Delhi, 2010.
4. Egor P Popov, "Engineering Mechanics of Solids", Second Edition, Prentice Hall of India, New Delhi, 2005.

WEB REFERENCES:

1. http://nptel.ac.in/courses/112106141/Pdfs/2_1.pdf
2. http://physics.fe.uni-lj.si/students/literatura/20131029085254762_1.pdf/
3. <http://www2.hcmuaf.edu.vn/data/phamducdung/thamkhao/MachineryHandbook/MH26/yc.pdf>

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|-----------------------|--|---------------|
| Course Code : 16CET42 | Course title : ENVIRONMENTAL ENGINEERING I | |
| Core/Elective: Core | L : T : P : C | 3 : 0 : 0 : 3 |
| Type : Theory | Total Contact hours: | 45 |

COURSE OBJECTIVES

The course is intended to:

1. Explain the sources of drinking water supply systems and its quality
2. Describe the conveyance systems for the water supply
3. Describe the primary methods for water treatment
4. Outline the advanced methods involved in the treatment of water.
5. Design the water distribution networks for buildings

UNIT I - PLANNING FOR WATER SUPPLY SYSTEM

9

Public water supply system -Planning - Objectives -Design period - Population forecasting -Water demand -Sources of water and their characteristics -Surface and Groundwater- Impounding. Reservoir Well hydraulics -Development and selection of source - Water quality – Characterization and standards- Impact of climate change.

UNIT II - CONVEYANCE SYSTEM

9

Water supply -intake structures -Functions and drawings -Pipes and conduits for water- Pipe materials - Hydraulics of flow in pipes -Transmission main design -Laying, jointing and testing of pipes - Drawings appurtenances - Types and capacity of pumps - Selection of pumps and pipe materials.

UNIT III - WATER TREATMENT

9

Objectives - Unit operations and processes - Principles, functions design and drawing of Chemical feeding, Flash mixers, flocculators, sedimentation tanks and sand filters - Disinfection- Residue Management - Construction and Operation & Maintenance aspects of Water Treatment Plants.

UNIT IV - ADVANCED WATER TREATMENT

9

Principles and functions of Aeration - Iron and manganese removal, Defluoridation and demineralization -Water softening - Desalination - Membrane Systems - Recent advances.

UNIT V - WATER DISTRIBUTION AND SUPPLY TO BUILDINGS

9

Requirements of water distribution -Components -Service reservoirs -Functions and drawings - Network design -Economics -Computer applications -Analysis of distribution networks - Appurtenances -operation and maintenance -Leak detection, Methods. Principles of design of water supply in buildings -House service connection -Fixtures and fittings -Systems of plumbing and drawings of types of plumbing.

COURSE OUTCOMES

At the end of this course, students will be able to:

- CO.1 Explain the sources of drinking water supply systems and its quality
- CO.2 Describe the conveyance systems for the water supply
- CO.3 Describe the primary methods for water treatment
- CO.4 Outline the advanced methods involved in the treatment of water.
- CO.5 Design the water distribution networks for buildings


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TEXT BOOKS:

1. Garg, S.K., "Environmental Engineering", Vol.1 Khanna Publishers, New Delhi, 2005.
2. Modi. P.N, "Water Supply Engineering", Vol. I Standard Book House, New Delhi, 2005.

REFERENCE BOOKS:

1. Punmia, B.C., Jain, A.K., Jain, A.K., "Water Supply Engineering", Laxmi publications Pvt.Ltd., New Delhi, 2005
2. Government of India, "Manual on Water Supply and Treatment", CPHEEO, Ministry of Urban Development, New Delhi, 2003
3. Syed,R.Q., Motley, E.M., Zhu, G., "Water Works Engineering Planning", Design and Operation, Prentice Hall of India Private Limited, New Delhi, 2006.

WEB REFERENCES:

1. <http://nptel.ac.in/courses/105104102/>
2. https://books.google.co.in/books?id=74HYY31zwhQC&printsec=frontcover&source=gb_s_ge_summary_r&cad=0#v=onepage&q&f=false


BoS Chairman

| | | |
|-----------------------|---|---------------|
| Course Code : 16CET43 | Course title : CONSTRUCTION TECHNIQUES, EQUIPMENTS AND PRACTICE | |
| Core/Elective: Core | L : T : P : C | 3 : 0 : 0 : 3 |
| Type : Theory | Total Contact hours: | 45 |

PREREQUISITE: 16CET33 Construction Materials

COURSE OBJECTIVES

The course is intended to:

1. Describe the constructions practices for different types of masonry.
2. Explain the construction practices of various building components.
3. Illustrate the various service requirements for buildings.
4. Elucidate the various repair and rehabilitation works with case studies.
5. Describe the various construction equipments used in building constructions.

UNIT I - SUB STRUCTURE CONSTRUCTION PRACTICES

9

Specifications, details and sequence of activities and construction co-ordination - Site Clearance - Marking - Earthwork - Shoring - Strutting - Dewatering - Excavation in hard rocks - Diaphragm wall - Underpinning - Masonry - Stone masonry - Brick masonry - Block masonry - Pointing.

UNIT II - SUPER STRUCTURE CONSTRUCTION PRACTICES

10

Formwork - Elements of formwork - Centering - Shuttering - Scaffolding - Slip and moving forms - Joints in Concrete - contraction / construction / expansion joints - Plastering - Roofs and roof covering - Flooring - types of flooring - Cladding - types of cladding - false ceiling.

UNIT III - SERVICE REQUIREMENTS

8

Painting, Distempering and white washing - Fire Protection - Thermal insulation - Ventilation and air conditioning - Acoustics and Sound insulation - Damp proofing - Termite proofing - Weather and water proofing.

UNIT IV - REPAIR AND REHABILITATION WORKS

8

Causes of damage and deterioration in masonry and concrete structures - Symptoms and Diagnosis – Common types of repairs - Grouting - Case studies on Repair and Rehabilitation works of Buildings and Bridges- special materials for repair work.

UNIT V - CONSTRUCTION EQUIPMENT

10

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

COURSE OUTCOMES

At the end of this course, students will be able to:

- CO.1 Describe the constructions practices for different types of masonry.
- CO.2 Explain the construction practices of various building components.
- CO.3 Illustrate the various service requirements for buildings.
- CO.4 Elucidate the various repair and rehabilitation works with case studies.
- CO.5 Describe the various construction equipments used in building constructions.


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TEXT BOOKS:

1. Varghese.P.C., Building Constructions, PHI Learning Private Limited, Second Edition, 2016.
2. Punmia, B.C., Building Construction, Laxmi Publications (P) Ltd., 1993
3. Arora, S.P. and Bindra, S.P., Building Construction, DhanpatRai and Sons, 2013
4. Santhakumar.A.R., Concrete Technology, Oxford University Press ,India, 2006.

REFERENCE BOOKS:

1. Shetty.M.S., Concrete Technology(Theory and Practice), S.Chand& Company Ltd., 2014. -
2. Peurifoy, R.L., Form work for Concrete Structures, McGraw Hill Book Co., 1999.
3. Peurifoy, R.L, Schexnayder,C.J., Shapira,A., Schmitt. R., Construction Planning, Equipment and Methods, Tata McGraw-Hill, 2010.
4. Sankar, S.K. and Saraswati, S., Construction Technology, Oxford University Press, New Delhi, 2008.

WEB REFERENCES:

1. <http://www.civilenggforall.com/2015/09/concrete-technology-theory-and-practice-by-ms-shetty-free-download-pdf-civilenggforall.html>
2. <https://www.studynama.com/community/threads/176-Construction-Techniques-Equipment-Practices-ebook-notes-pdf-download>
3. <http://www.nprcet.org/civil/document/CE2203%20CONSTRUCTION%20TECHNIQUE%20EQUIPMENTS%20AND%20PRACTICES.pdf>
4. <http://nptel.ac.in/courses/105102088/>



BoS Chairman

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|-----------------------|--|---------------|
| Course Code : 16CET44 | Course title : APPLIED HYDRAULIC ENGINEERING | |
| Core/Elective: Core | L : T : P : C | 2 : 2 : 0 : 3 |
| Type : Theory | Total Contact hours: | 60 |

PREREQUISITE:

16CET32 Fluid Mechanics

COURSE OBJECTIVES

The course is intended to:

1. Compute the critical flow and alternate depth of the channel flow.
2. Design the efficient section of channel with uniform flow.
3. Explain gradually varied flow and its computations by various methods.
4. Describe the behavior of hydraulic jump and its use in energy dissipation structures.
5. Describe the components, function, and use of different types of pumps and turbines.

UNIT I - OPEN CHANNEL FLOW & CRITICAL FLOW

6+6

Open channel flow – Types - Difference between open channel and pipe flow – Properties of Open channel-Types of channel -Fundamental equations, conservation of mass, conservation of energy and conservation of momentum-Velocity distribution in open channel flow –Mean velocity - Specific energy – Specific energy equation-Critical flow and its computation – Critical depth and Alternate depths.

UNIT II - UNIFORM FLOW

6+6

Uniform flow – Manning's and Chezy's formula –Equivalent roughness-Determination of normal depth and velocity - Efficient hydraulic sections for open channel- Rectangular, trapezoidal and circular sections-Derivation – Applications- channel transition- Measurement of flow- Measurement using area of flow and Mean velocity of flow-Notches and weirs

UNIT III - GRADUALLY VARIED FLOW

6+6

Dynamic equation of gradually varied flow – Assumptions – Characteristics of flow profiles - Water surface flow profile classifications - Profile determination by direct step method, standard step method and graphical method – Drawdown and backwater curves – Profile determination

UNIT IV - RAPIDLY VARIED FLOW

6+6

Hydraulic jump – Types of hydraulic jump –Expression of depth of Hydraulic jump- Expression for loss of energy due to hydraulic jump- Length of hydraulic jump- Energy dissipation - Surges and surge through channel transitions.

UNIT V - PUMPS & TURBINES

6+6

Centrifugal pump –Components-Working principle- Priming of centrifugal pump- Reciprocating pump – Components-working principle- Single and Double acting reciprocating pump- Discharge through a pump- Work done-Pump efficiency- Negative slip - Turbines - Classification – Impulse and Reaction turbines - Head and Efficiencies of Hydraulic turbines -Components and functions of Pelton Wheel turbine, Francis turbine and Kaplan turbine- Physical and Technical basics of hydropower.

COURSE OUTCOMES

At the end of this course, students will be able to:

- CO.1. Compute the critical flow and alternate depth of the channel flow.
- CO.2. Design the efficient section of channel with uniform flow.
- CO.3. Explain gradually varied flow and its computations by various methods.
- CO.4. Describe the behavior of hydraulic jump and its use in energy dissipation structures.

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CO.5. Describe the components, function, and use of different types of pumps and turbines.

TEXT BOOKS:

1. Subramanya. K, "Flow in Open Channels", Tata McGraw Hill Publishing Company Ltd, New Delhi (2009).
2. Bansal. R.K, "Fluid Mechanics and Hydraulic Machines", Laxmi Publishing Pvt Ltd, New Delhi, (2007).

REFERENCE BOOKS:

1. Chow VenTe, "Open Channel. Hydraulics", Tata McGraw Hill Book Company Ltd, New Delhi (1996).
2. Modi, P.N. and Seth, S.M., "Hydraulic and Fluid Mechanics", Standard Book House, New Delhi (2000).
3. Srivastava. R., "Flow through open channels", Oxford University Press, New Delhi, (2008).

WEB REFERENCES:

1. <http://www.annaunivupdates.com/2015/01/ce6403-applied-hydraulic-engineering-ahe-lecture-notes-question-bank-2-mark-with-answers.html>
2. <http://nptel.ac.in/courses/105106114/>
3. http://web.itu.edu.tr/~bulu/hydraulics_files/lecture_notes_05.pdf


BoS Chairman

| | | |
|-----------------------|---|---------------|
| Course Code : 16CET45 | Course title : WATER RESOURCES AND IRRIGATION ENGINEERING | |
| Core/Elective: Core | L : T : P : C | 3 : 0 : 0 : 3 |
| Type : Theory | Total Contact hours: | 45 |

COURSE OBJECTIVES

The course is intended to:

1. Explain fundamentals of water resources engineering.
2. Estimate and measure the processes involved in the Hydrological cycle.
3. Analyze the steady and unsteady ground water flow problems.
4. Adopt the suitable Irrigation methods for managing the irrigation water .
5. Design the different structures involved in irrigation.

UNIT I - WATER RESOURCES ENGINEERING AND MANAGEMENT

9

Water resource potential - Majors rivers in India - Classification of river basins, Water requirements and Water demands for irrigation , Domestic purpose hydro power generation ,Navigation and recreation, Optimum utilization of water resources in irrigation - Social economic aspects & scope of water resource engineering- Water resources survey- Description of water resources planning - National Water Policy- Conjunctive use of surface and ground water – Consumptive and non- consumptive water use

UNIT II - SURFACE WATER HYDROLOGY

9

Hydrologic cycle – Climate – Weather – Layers in atmosphere – Types and forms of precipitation – Hydro meteorological measurements – Cyclones – Fronts – Winds – Monsoon – Clouds – Requirements for Precipitation- Rainfall – Rain gauges – Adequacy of network –Frequency and Intensity/duration analysis – Consistency - Missing data – Abstractions – Infiltration – Evaporation – Interception – Process, Estimation and Measurement – Depression and detention storages - Detailed study of runoff process. Hydrograph analysis- Unit Hydrographs

UNIT III - GROUND WATER HYDROLOGY

9

Occurrence, distribution & movement of ground water supply- Geologic formation of ground water - Assessment of ground water potential supply - Aquifer properties - Hydrologic properties of aquifer- Flow through aquifers properties-Properties of water in relation to flow- Storage equations, steady and unsteady flow in confined, unconfined & semi confined aquifer-Seepage from canal, stream aquifer- Ground water modeling - Ground water balances - Ground water recharge.

UNIT IV - IRRIGATION ENGINEERING AND MANAGEMENT

9

Irrigation – Need, mode and Influence of irrigation – Crop and crop seasons – Consumptive use of water – Duty- Factors affecting duty - Relationship between Duty, Delta, Base period- Irrigation efficiencies - Irrigation scheduling – Planning and Development of irrigation projects. Canal irrigation – Lift irrigation – Tank irrigation – Flooding methods – Irrigation methods-Surface and Sub-Surface - Micro Irrigation – Drip and Sprinkler Irrigation - Merits and demerits

UNIT V - IRRIGATION STRUCTURES

9

Diversion and impounding Structures - Types of impounding structures - Tanks, Sluices and Weirs – Gravity dams – Earth dams – Arch dams – Spillways – Factors affecting location and type of dams – Forces on a dam – Hydraulic design of dams. 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.

BoS

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COURSE OUTCOMES

At the end of this course, students will be able to:

- CO.1 Explain fundamentals of water resources engineering.
- CO.2 Estimate and measure the processes involved in the Hydrological cycle.
- CO.3 Analyze the steady and unsteady ground water flow problems.
- CO.4 Adopt the suitable Irrigation methods for managing the irrigation water .
- CO.5 Design the different structures involved in irrigation.

TEXT BOOKS:

- 1. Asawa. G.L, "Irrigation Engineering", New Age International Publishers.1st Edition, reprint 2012.
- 2. Sharma. R.K, and Sharma T.K., "Irrigation Engineering", S. Chand and company, New Delhi, 2008
- 3. Gupta, B.L, & Amir Gupta, "Irrigation Engineering", SatyaPraheshan, New Delhi
- 4. Subramanya. K., "Hydrology", Tata McGraw Hill Co., New Delhi, 1994.
- 5. Dilip Kumar Majumdar, "Irrigation Water Management – Principles and Practice", Prentice Hall of India Pvt. Ltd., New Delhi, 2000

REFERENCE BOOKS:

- 1. Basak, N.N, "Irrigation Engineering", Tata McGraw-Hill Publishing Co, Edition:2011-2012
- 2. Garg, S.K., "Irrigation Engineering", Khanna Publishers, 2006
- 3. H.M., Ragunath, "Irrigation Engineering", Wiley India Pvt Ltd., 2011
- 4. Garg. S. K, "Hydrology And Water Resources Engineering", KhannaPublishsers-Delhi, 2010

WEB REFERENCES:

- 1. <http://nptel.ac.in/downloads/105105110/>
- 2. <http://www.civilenggforall.com/2015/09/irrigation-and-water-resources-engineering-gl-asawa-free-download-pdf-civilenggforall.html>
- 3. <https://ocw.mit.edu/courses/civil-and-environmental-engineering/1-731-water-resource-systems-fall-2006/lecture-notes/>



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| | | |
|-----------------------|---|---------------|
| Course Code : 16CEL41 | Course Title : HYDRAULIC ENGINEERING LABORATORY | |
| Core/Elective: Core | L : T : P : C | 0 : 0 : 4 : 2 |
| Type : Practical | Total Contact hours: | 60 |

PREREQUISITE:

16CET32 Fluid Mechanics

COURSE OBJECTIVES

The course is intended to:

1. Identify the laminar and turbulent flow using Reynolds apparatus.
2. Verify the Bernoulli's Theorem
3. Use the venturimeter, orifice meter and notch to measure the discharge
4. Determine the losses for different pipes and fittings
5. Demonstrate optimum operating condition of turbines and pumps

LIST OF EXPERIMENTS

FLOW EXPERIMENTS

1. To determine Meta centric height of a floating body
2. Fluid flow analogy using Reynolds apparatus
3. Verification of Bernoulli's Theorem.
4. Measurement of Flow using Venturimeter and orifice meter
5. Measurement of Flow through Orifice/ Mouthpiece
6. Determination of Friction Factor of the Pipe Materials.
7. To determine the losses for different pipe fittings (including friction loss)
8. Measurement of Flow through Notch.

FLUID MACHINERY EXPERIMENTS

9. Performance Test on Centrifugal Pump.
10. Performance Test on Reciprocating Pump.
11. Performance Test on Pelton Wheel.
12. Performance Test on Kaplan turbine

COURSE OUTCOMES

At the end of the course, the students will be able to

- CO.1 Identify the laminar and turbulent flow using Reynolds apparatus.
CO.2 Verify the Bernoulli's Theorem
CO.3 Use the venturimeter, orifice meter and notch to measure the discharge
CO.4 Determine the losses for different pipes and fittings
CO.5 Demonstrate optimum operating condition of turbines and pumps

REFERENCE

1. "Hydraulic Engineering Laboratory manual of civil engineering department", MCET, Pollachi.

BoS

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| | | |
|-----------------------|---|---------------|
| Course Code : 16CEL42 | Course Title : STRENGTH OF MATERIALS LABORATORY | |
| Core/Elective: Core | L : T : P : C | 0 : 0 : 4 : 2 |
| Type : Practical | Total Contact hours: | 60 |

COURSE OBJECTIVES

The course is intended to:

1. Conduct the test to determine strength and moduli of steel and concrete.
2. Determine Impact Strength of mild steel by various metals.
3. Determine hardness of ferrous and non ferrous metal using hardness test.
4. Conduct Test to find out flexural rigidity of a given model beam.
5. Verify various theorems applicable for beams and columns by conducting test and validate theorems.

LIST OF EXPERIMENTS

1. Determination of strength and modulus of elasticity of mild steel and study stress strain curve for mild steel and TMT bars using both tension and compression test.
2. Determination of strength and modulus of elasticity of concrete and study stress-strain curve using compression test.
3. Determination of Torsional strength and modulus of rigidity of mild steel.
4. Determination of impact strength of mild steel by a) Izod test b) Charpy test and c) Impact tension test.
5. Determination of hardness of metals using Brinell, Vicker's and Rockwell hardness tests.
6. Determination of the flexural rigidity (EI) of a given beam.
7. Determination of Buckling load & Effective length of Columns.
8. Verify moment area theorems for slope and deflections of a beam.
9. Determination of strain in the cantilever beam using strain gauge.
10. Determination of shear strength of metals (Double shear test).
11. Determination of stiffness of the helical spring.
12. Determination of shear centre for D, Angle and Channel sections.

COURSE OUTCOMES

At the end of the course, the students will be able to

- CO.1 Conduct the test to determine strength and moduli of steel and concrete.
 CO.2 Determine Impact Strength of mild steel by various metals.
 CO.3 Determine hardness of ferrous and non ferrous metal using hardness test.
 CO.4 Conduct Test to find out flexural rigidity of a given model beam.
 CO.5 Verify various theorems applicable for beams and columns by conducting test and validate theorems.

REFERENCE

1. Strength of materials Laboratory Manual of Civil Engineering department, MCET, Pollachi.
2. Kukreja C.B. and V.V. Shastry, "Experimental methods in structural mechanics", Standard Publishers Distributors, New Delhi, 2009.


 BoS Chairman

| | | |
|-----------------------|---|---------------|
| Course Code : 16PSL41 | Course title : ETHICAL AND MORAL RESPONSIBILITY | |
| Core/Elective: Core | L: T : P : C | 0 : 0 : 2 : 1 |
| Type : PS | Total Contact hours: | 30 |

COURSE OBJECTIVES

The course is intended to:

1. Articulate the importance of ethical and moral responsibilities
2. Explain the fundamental aspects of ethical practices
3. Validate one's appropriate and inappropriate behaviors in various roles
4. Elaborate code of conduct of professional bodies
5. Explain the importance of professional practices as a future employee/entrepreneur

UNIT I -Ethical Practices – Importance

8*

Why ethical practices; The current day scenario of ethical practices – parents, society, politics & business; Awareness of skewedness of information – news, advertisements and other media; The need for ethical and moral responsibility on a personal level; Handling oneself amidst peer pressure and societal pressure;

UNIT II - ETHICAL PRACTICES – FUNDAMENTALS

6*

Morality & Ethics; Moral issues, inquiry, moral dilemmas; Moral autonomy – Kohlberg's theory and Gilligan's refinement; Theories on "right action" – virtue ethics, utilitarianism, duty ethics, rights ethics – resolving moral dilemmas; justifying moral obligations;

UNIT III - CODES OF CONDUCT

8*

Importance of code of conduct and its role; Evolving draft Code of conduct for different roles – son/daughter, student, future employee & citizen; Reflection on real time incidences at the college.

Engineers as responsible experimenters; Faith of the Engineer (ABET); Pledge and Code of ethics as per National Society of Professional Engineers (NSPE); Code of Ethics of Institution of Engineers (India); Case studies and discussions in professional context

UNIT IV -PROFESSIONAL PRACTICES AT WORK

8*

Transition from a student to a professional; Importance of professional practices at work; Integrity as the topmost virtue of a professional; Self-awareness: Where competence ends and professionalism takes over; Professional qualities;

Need to align oneself to culture & values of organizations; Need to embrace diversity in organizations

*- Includes review sessions

Course handouts (compiled by PS team, MCET)

1. Instructor's Manual (for the faculty)
2. Learner's workbook (for the student)

References:

1. Mike W Martin & Roland Schinzenger, Ethics in Engineering, Latest Edition, Tata McGraw-Hill
2. Code of conduct document, MCET student handbook
3. Gail D Baura, Engineering Ethics - an industrial perspective, Academic Press, Elsevier,
4. Subrato Bagchi, The professional - Defining the new standard of Excellence at work, Penguin Books India


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Assessments:

| Assessment | Details | Wt: | Administration | When |
|----------------------------|--|-----|--------------------------------|---------------|
| Class room participation | Group assignments presentation; Case discussions participation | 70% | Continuous assessment in class | During class |
| Knowledge test | Multiple choice questions | 10% | Pen and Paper | End of course |
| Scenario based assessments | Multiple choice questions | 20% | Pen and Paper | End of course |

No. of hours & credits:

| | | |
|---|---|---------------------|
| Enablement through class room lecture, case discussions and group presentations | Conducted by trained internal faculty | 30 hours – 1 credit |
| At least two guest lectures | Delivered by senior people from Industries/Government organizations | |

COURSE OUTCOMES

At the end of this course, students will be able to:

- CO.1 Articulate the importance of ethical and moral responsibilities
- CO.2 Explain the fundamental aspects of ethical practices
- CO.3 Validate one's appropriate and inappropriate behaviors in various roles
- CO.4 Elaborate code of conduct of professional bodies
- CO.5 Explain the importance of professional practices as a future employee/entrepreneur

END OF SEMESTER IV



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SEMESTER V

| | | |
|-----------------------|---|---------------|
| Course Code : 16CET51 | Course title : GEOTECHNICAL ENGINEERING I | |
| Core/Elective: Core | L: T : P : C | 2 : 2 : 0 : 3 |
| Type : Theory | Total Contact hours: | 60 |

COURSE OBJECTIVES

The course is intended to:

1. Calculate the Engineering properties, identification and classification of soil mass with reference to their characteristics.
2. Describe the behaviour and effect of water in the soil mass.
3. Explain the principles of settlement and stress distribution in soil mass.
4. Calculate and plot the soil strength parameters.
5. Analyze the stability of slopes.

UNIT I - INDEX PROPERTIES

6+6

Formation of soil – Types of soil – Civil Engineering problems with soil – Three phase system – Index properties of soils – Specific Gravity, Field Density, Grain size analysis – Atterberg's limits - Classification of soils for engineering purposes - BIS classification system – Soil compaction - Factors affecting compaction – Field compaction methods and monitoring.

UNIT II - SOIL WATER, PERMEABILITY AND SEEPAGE

6+6

Soil water – Various forms – Capillary rise – Effective stress concepts in soil – Total, neutral and effective stress distribution in soil - Permeability – Darcy's Law- Permeability measurement in the laboratory – Liquefaction - Seepage – Laplace Equation - Introduction to flow nets –properties and uses - Application to simple problems.

UNIT III - STRESS DISTRIBUTION AND SETTLEMENT BEHAVIOUR OF SOIL

6+6

Stress distribution in soil media – Boussinesq's theory – Approximate methods - Use of Newmark influence charts – Westergaard's equation for point load - Terzaghi's one dimensional consolidation theory – Laboratory consolidation test – Field consolidation curve for NC and OC clays - Components of settlement - Immediate and consolidation settlement - problems on final and time rate of consolidation.

UNIT IV - SHEAR STRENGTH BEHAVIOUR OF SOIL

6+6

Shear strength of cohesive and cohesion less soils - Mohr-Coulomb failure theory – shear strength parameters and their measurements - Direct shear, Triaxial compression, Unconfined Compression and Vane shear tests – Types of shear tests based on drainage and their applicability – Factors influencing shear strength behaviour of clay and sand – pore pressure parameters.

UNIT V - SLOPE STABILITY

6+6

Slope failure – types, causes and mechanisms - Modes - Infinite slopes - Finite slopes – Total and effective stress analysis - stability analysis for purely cohesive and $c-\phi$ soils - Method of slices – Friction circle method - Stability number – Slope protection measures.

COURSE OUTCOMES

At the end of this course, students will be able to:

- CO.1 Calculate the Engineering properties, identification and classification of soil mass with reference to their characteristics.
- CO.2 Describe the behaviour and effect of water in the soil mass.
- CO.3 Explain the principles of settlement and stress distribution in soil mass.

- CO.4 Calculate and plot the soil strength parameters.
CO.5 Analyze the stability of slopes.

TEXT BOOKS:

1. Murthy V.N.S., "Geotechnical Engineering: Principles and Practices of Soil Mechanics and Foundation Engineering", Marcel Dekker, Inc., New York, 2009.
2. Venkatramaiah, C. "Geotechnical Engineering", New Age International Publishers, New Delhi, 2012.
3. Arora.K.R "Soil Mechanics and Foundation Engineering", Standard Publishers Distributors, 2010.

REFERENCE BOOKS:

1. Coduto, D.P., "Geotechnical Engineering Principles and Practices", 2nd edition, Prentice Hall of India Private Limited, New Delhi, 2010.
2. GopalRanjan and Rao A.S.R., "Basic and Applied soil mechanics", New Age International Publishers, New Delhi, 2007.
3. Varghese P.C., "Foundation Engineering", PHI Learning Private Limited, New Delhi, 2005.

WEB REFERENCES:

1. <http://nptel.ac.in/courses/105103097/>
2. <http://home.iitk.ac.in/~pkbd/A%20Preview%20of%20Soil%20Behavior.pdf>
3. <http://ocw.mit.edu/courses/civil-and-environmental-engineering/1-361-advanced-soil-mechanics-fall-2004/lecture-notes/>
4. <http://www.aboutcivil.org/soil-mechanics.html>

| | | |
|----------------------|--------------------------------------|---------------|
| Course Code :16CET52 | Course title : STRUCTURAL ANALYSIS I | |
| Core/ Elective: Core | L : T : P : C | 2 : 2 : 0 : 3 |
| Type : Theory | Total Contact hours: | 60 Hours |

COURSE OBJECTIVES

The course is intended to:

1. Determine the deflection in trusses, beams and frames using virtual work method.
2. Calculate the bending moment and shear force using slope-deflection method.
3. Calculate the bending moment and shear force using moment distribution method.
4. Calculate the bending moment and shear force using matrix flexibility method.
5. Calculate the bending moment and shear force using matrix stiffness method.

UNIT I - DEFLECTION OF DETERMINATE STRUCTURES

6+6

Principle of superposition - Principle of Virtual Work - Derivation of virtual work equation for deflection - Determination of deflections of determinate plane trusses, beams and rigid plane frames using Virtual Work method.

UNIT II - SLOPE DEFLECTION METHOD

6+6

Introduction to Displacement methods - Assumptions in slope deflection method - Fixed end moments - Sign conventions- Slope deflection equations- Analysis of continuous beams, simple frames and portal frames (with and without sway) - Support settlements.

UNIT III - MOMENT DISTRIBUTION METHOD

6+6

Absolute stiffness- Relative stiffness - Distribution factor- Carry over moments- Carry over factors - Application of Moment distribution method to continuous beams, simple frames and portal frames (with and without sway) - Support settlements - Simplification for Symmetry and antisymmetry - Naylor's method.

UNIT IV - MATRIX FLEXIBILITY METHOD

6+6

Flexibility coefficients - Flexibility matrix for truss, beam and frame elements - Flexibility matrix for determinate structures - Static indeterminacy - Primary structure - Transformation matrix - Flexibility matrix for indeterminate structures - Analysis of pin jointed plane frames, continuous beams and rigid jointed plane frames.

UNIT V - MATRIX STIFFNESS METHOD

6+6

Stiffness coefficients - Stiffness matrix for truss, beam and frame elements - Element and global stiffness matrix - Generating stiffness matrices directly - Kinematic indeterminacy - Transformation matrix - Analysis of pin jointed plane frames, continuous beams and rigid jointed plane frames.

COURSE OUTCOMES

At the end of this course, students will be able to:

- CO.1 Determine the deflection in trusses, beams and frames using virtual work method.
- CO.2 Calculate the bending moment and shear force using slope-deflection method.
- CO.3 Calculate the bending moment and shear force using moment distribution method.
- CO.4 Calculate the bending moment and shear force using matrix flexibility method.
- CO.5 Calculate the bending moment and shear force using matrix stiffness method.


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TEXT BOOKS:

1. Vaidyanathan, R. and Perumal, P., "Structural Analysis Vol. I (4th Edition) and Vol. II (3rd Edition)", Laxmi Publications, New Delhi, 2016 & 2017.
2. Punmia, B.C., Ashok Kumar Jain and Arun Kumar Jain, "Theory of structures", Laxmi Publications, New Delhi, 2017.
3. Negi, L.S. and R.S. Jangid, "Structural Analysis", Tata McGraw-Hill Publications, New Delhi, 2003.

REFERENCE BOOKS:

1. Rajasekaran S and Sankarasubramanian G, "Computational Structural Mechanics", Prentice Hall of India Pvt. Ltd, New Delhi, 2001
2. Jain A.K. and Arya A.S., "Structural Analysis, Vol.II", Nemchand Publishers, Roorkee, 1996.
3. Ashok K. Jain, "Advanced Structural Analysis", Nem Chand & Bros, Roorkee, 2015.
4. Reddy C.S., "Basic Structural Analysis". Tata McGraw Hill Publishing Co. Ltd., New Delhi, 2010.
5. Pandit G.S. and Gupta S.P., "Structural Analysis – A Matrix Approach", 2nd Edition, Tata McGraw Hill Publishing Company Ltd., New Delhi, 2008.
6. Harry H West., "Fundamentals of Structural Analysis" John Wiley & sons Inc, 2011.
7. Timoshenko S.P., "Theory of Structures", McGraw Hill Publishing Intl Ltd, 1965.

WEB REFERENCES:

1. https://ecourses.ou.edu/cgi-bin/ebook.cgi?doc=&topic=me&chap_sec=03.3&page=theory
2. https://www.civil.iitb.ac.in/800-dir/Kalani_Book.pdf
3. <http://www.faadooengineers.com/threads/18572-Structural-Analysis-Full-Book-in-pdf-All-units-of-structure-I-II-III>
4. <http://ocw.mit.edu/courses/civil-and-environmental-engineering/1-571-structural-analysis-and-control-spring-2004/lecture-notes/>
5. <http://profkodali.blogspot.in/>
6. <http://www.learnerstv.com/Free-engineering-Video-lectures-ltv085-Page1.htm>

| | | |
|-----------------------|--------------------------------------|---------------|
| Course Code : 16CET53 | Course title : DESIGN OF RC ELEMENTS | |
| Core/ Elective: Core | L : T : P : C | 4 : 0 : 0 : 4 |
| Type : Theory | Total Contact hours: | 60 Hours |

COURSE OBJECTIVES

The course is intended to:

1. Illustrate the design concepts of reinforced concrete and to use design aids.
2. Design the reinforced concrete beams.
3. Design the reinforced concrete slabs.
4. Design RC columns subjected to axial load, uniaxial and biaxial bending
5. Design various types of RC footings.

UNIT I - REINFORCED CONCRETE DESIGN CONCEPTS

12

Concept of reinforced concrete – stress strain characteristics of concrete and steel reinforcement – concept of elastic method – shear and bond stresses – singly reinforced, balanced section, under reinforced section, over reinforced section, working stress, ultimate load and limit state methods – Advantages of Limit State Method over other methods – Limit state philosophy – Characteristic strength – Characteristic loads – Design Values – Partial Safety factors – Limit state of collapse – limit state of serviceability – Deflection, cracking – other limits.

UNIT II - DESIGN OF BEAMS

12

Design of singly and doubly reinforced rectangular and flanged beams – use of design aids for flexure – Behaviour of R.C. beams in shear, bond anchorage and torsion – Shear and torsional reinforcement – Limit State design of R.C. members for combined bending, shear and torsion. Design requirement for bond and anchorage as per IS code.

UNIT III - DESIGN OF SLABS

12

Behaviour of one way and two way slabs – Analysis and design of one way and two way rectangular slab subjected to uniformly distributed load for various boundary conditions and corner effects, Types of staircases, design of dog-legged staircase. Application of virtual work method to square, rectangular, circular and triangular slabs.

UNIT IV - DESIGN OF COLUMNS

12

Assumptions, minimum eccentricity, Types of columns – Braced and unbraced columns – Short and Long Columns - Design of short and long columns for axial, uniaxial and biaxial bending.

UNIT V - DESIGN OF FOOTING

12

Design of wall footing – Design of axially and eccentrically loaded square, rectangular and circular footings – Design of combined rectangular and trapezoidal footing – Design of Strap footing – Raft foundation.

COURSE OUTCOMES

At the end of this course, students will be able to:

- CO.1 Illustrate the design concepts of reinforced concrete and to use design aids.
- CO.2 Design the reinforced concrete beams.
- CO.3 D Design the reinforced concrete slabs.
- CO.4 Design RC columns subjected to axial load, uniaxial and biaxial bending
- CO.5 Design various types of RC footings.

TEXT BOOKS:

1. Varghese, P.C., "Limit State Design of Reinforced Concrete", Prentice Hall of India Pvt. Ltd., 2nd Edition, New Delhi, 2008.
2. Unnikrishna Pillai S and Devdas Menon, "Reinforced Concrete Design", Tata McGraw Hill Publishing Company Ltd., 3rd Edition, New Delhi, 2009.
3. Krishna Raju, N., "Design of Reinforced Concrete Structures", 4th Edition, CBS Publishers & Distributors, New Delhi, 2016.

REFERENCE BOOKS:

1. Purushothaman, P. "Reinforced Concrete Structural Elements", Tata McGraw Hill Publishing Co. Ltd., New Delhi, 1992.
2. Jain, A.K., A.K. Jain and B.C. Punmia, "Limit State Design of RC Structures", Laxmi Publications, New Delhi, 2016.
3. Sinha, S.N., "Reinforced Concrete Design", 3rd Edition, Tata McGraw-Hill Publishing Company Ltd., New Delhi, 2017.

Code Books: IS 456-2000 & SP 16-1980

WEB REFERENCES:

1. <http://nptel.ac.in/courses/105105105/6>
2. <http://nptel.ac.in/courses/105105104/pdf/m13i35.pdf>


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|-----------------------|------------------------------------|---------------|
| Course Code : 16CET54 | Course title : CONCRETE TECHNOLOGY | |
| Core / Elective: Core | L: T : P : C | 3 : 0 : 0 : 3 |
| Type : Theory | Total Contact hours: | 45 Hours |

COURSE OBJECTIVES

The course is intended to:

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

UNIT I - CONCRETE CONSTITUENTS

9

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

UNIT II - ADMIXTURES

9

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

UNIT III - CONCRETE MIX PROPORTIONING

9

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

UNIT IV - PROPERTIES OF CONCRETE

9

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

UNIT V - SPECIAL CONCRETES

9

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

COURSE OUTCOMES

At the end of this course, students will be able to:

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

TEXT BOOKS:

1. Shetty. M.S, "Concrete Technology", S. Chand and Company Ltd., New Delhi, 2010.
2. Gambhir. M.L, "Concrete Technology", Tata Mc-Graw Hill Company, New Delhi, 2013.


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REFERENCE BOOKS:

1. Santhakumar.A.R, "Concrete Technology", Oxford university press, New Delhi, 2007.
2. Neville A.M "Properties of Concrete", Pearson Education Asia Pvt Ltd., New Delhi, 2012. -
3. Povindar K. Mehta, Paulo J. M. Monteiro, "Concrete: Microstructure, Properties, and Materials", Mc-Graw Hill Company, 2011.

WEB REFERENCES:

1. <http://nptel.ac.in/courses/105102012/>
 2. <http://freevideolectures.com/Course/3357/Concrete-Technology/1>
-

| | | |
|-----------------------|--|---------------|
| Course Code : 16CET55 | Course title: ENVIRONMENTAL ENGINEERING II | |
| Core/Elective: Core | L: T : P : C | 3 : 0 : 0 : 3 |
| Type : Theory | Total Contact hours: | 45 |

COURSE OBJECTIVES

The course is intended to:

1. Estimate the sewage generation and storm runoff
2. Design the sewer system including sewage pumping stations
3. Design the unit operations and processes in primary sewage treatment
4. Design the processes involved in secondary sewage treatment
5. Describe the sludge management process

UNIT I - PLANNING FOR SEWERAGE SYSTEMS

9

Sources of wastewater generation – Effects – Estimation of sanitary sewage flow – Estimation of storm runoff – Factors affecting Characteristics and composition of sewage and their significance – Effluent standards – Legislation requirements. Introduction to industrial waste water treatment.

UNIT II - SEWER DESIGN

9

Sewerage – Hydraulics of flow in sewers – Objectives – Design period - Design of sanitary and storm sewers – Small bore systems - Computer applications – Laying, joining & testing of sewers – appurtenances – Pumps – selection of pumps and pipe Drainage -. Plumbing System for Buildings – One pipe and two pipe system.

UNIT III - PRIMARY TREATMENT OF SEWAGE

9

Objective – Selection of treatment processes – Principles, Functions, Design and Drawing of Units- Onsite sanitation - Septic tank with dispersion - Grey water harvesting – Primary treatment – Principles, functions design and drawing of screen, grit chambers and primary sedimentation tanks – Construction, operation and Maintenance aspects.

UNIT IV - SECONDARY TREATMENT OF SEWAGE

9

Objective – Selection of Treatment Methods – Principles, Functions, Design and Drawing of Units - Activated Sludge Process and Trickling filter – Oxidation ditches, UASB – Waste Stabilization Ponds – Reclamation and Reuse of sewage - sewage recycle in residential complex – Recent Advances in Sewage Treatment – Construction and Operation & Maintenance of Sewage Treatment Plants.

UNIT V - DISPOSAL OF SEWAGE AND SLUDGE MANAGEMENT

9

Standards for Disposal - Methods – dilution – Self-purification of surface water bodies – Oxygen sag curve – Land disposal – Sludge characterization – Thickening – Sludge digestion – Biogas recovery – Sludge Conditioning and Dewatering – disposal – Advances in Sludge Treatment and disposal.

COURSE OUTCOMES

At the end of this course, students will be able to:

- CO.1 Estimate the sewage generation and storm runoff
- CO.2 Design the sewer system including sewage pumping stations
- CO.3 Design the unit operations and processes in primary sewage treatment
- CO.4 Design the processes involved in secondary sewage treatment
- CO.5 Describe the sludge management process

TEXT BOOKS:

1. Garg, S.K., "Environmental Engineering" Vol. II, Khanna Publishers, New Delhi, 2003.
2. Punmia, B.C., Jain, A.K., and Jain. A.K., "Environmental Engineering", Vol.H, Lakshmi Publications.

REFERENCE BOOKS:

1. Government of India, "Manual on Sewerage and Sewage Treatment", CPHEEO, Ministry of Urban Development, New Delhi, 1997.
2. Metcalf & Eddy, "Wastewater Engineering – Treatment and Reuse", Tata McGraw Hill Company, New Delhi, 2003.
3. Karia, G. L., Christian, R. A., "Wastewater Treatment", Prentice Hall of India, New Delhi, 2013.

WEB REFERENCES:

1. <http://nptel.ac.in/downloads/105105110/>
2. <http://www.civilenggforall.com/2015/09/irrigation-and-water-resources-engineering-gl-asawa-free-download-pdf-civilenggforall.html>
3. <https://ocw.mit.edu/courses/civil-and-environmental-engineering/1-731-water-resource-systems-fall-2006/lecture-notes/>

| | | |
|-----------------------|--|---------------|
| Course Code : 16CEL51 | Course Title : CONCRETE AND HIGHWAY LABORATORY | |
| Core/Elective: Core | L: T : P : C | 0 : 0 : 4 : 2 |
| Type : Practical | Total Contact hours: | 60 Hours |

COURSE OBJECTIVES

The course is intended to:

- CO.1 Prepare concrete mix design and determine the fresh and hardened properties of concrete as per IS codes of practice.
- CO.2 Determine the quality of hardened concrete using Non Destructive Testing.
- CO.3 Perform workability tests on Self Compacting Concrete.
- CO.4 Determine the ductile and elastic properties of bitumen
- CO.5 Determine the optimum content of bitumen for bituminous mix.

LIST OF EXPERIMENTS

Tests on Fresh and Hardened concrete:

1. Preparation of concrete mix design using IS code of practice.
2. Determination of workability of concrete.
3. Determination of compressive strength and split tensile strength of hardened concrete.
4. Determination of flexural strength of hardened concrete.
5. Determination of strength & quality of concrete using NDT.
6. Determination of workability of Self Compacting Concrete.

Tests on Bitumen:

1. Determination of specific gravity of bitumen.
2. Determination of softening point of bitumen.
3. Determination of ductility of bitumen.
4. Determination of flash and fire point of bitumen.
5. Determination of binder content of flexible pavement using binder recovery extraction test.
6. Determination of optimum bitumen content using Marshall Stability test.

COURSE OUTCOMES

At the end of the course, the students will be able to

- CO.1 Prepare concrete mix design and determine the fresh and hardened properties of concrete as per IS codes of practice.
- CO.2 Determine the quality of hardened concrete using Non Destructive Testing.
- CO.3 Perform workability tests on Self Compacting Concrete.
- CO.4 Determine the ductile and elastic properties on bitumen
- CO.5 Determine the optimum content of bitumen for bituminous mix.

REFERENCE

1. Concrete and Highway laboratory manual of Civil Engineering Department, MCET, Pollachi, 2018.


 BoS Chairman

| | | |
|-----------------------|---|---------------|
| Course Code : 16CEL52 | Course Title : GEOTECHNICAL ENGINEERING LABORATORY | |
| Core/Elective: Core | L : T : P : C | 0 : 0 : 4 : 2 |
| Type : Practical | Total Contact hours: | 60 Hours |

COURSE OBJECTIVES

The course is intended to:

1. Determine index properties of soils
2. Perform the grain size distribution of soils.
3. Demonstrate the relationship between moisture and density by compaction tests.
4. Determine the engineering properties of the soil samples
5. Perform and interpret shear tests and estimate the shear strength parameters.

LIST OF EXPERIMENTS

1. Determination of Water content by Oven drying method and Specific gravity of soil grains by Pycnometer method and Density bottle method
2. Determination of Relative density of sands and Grain size distribution of coarse grained soils by Sieve analysis
3. Determination of grain size distribution of fine grained soils by Hydrometer Analysis
4. Determination of Field density by core cutter method and sand replacement method
5. Determination of Liquid limit and plastic limit (Casagrande's Method)
6. Determination of Shrinkage limit of soil
7. Determination of moisture - density relationship by Standard Proctor compaction test
8. Determination of Soil Permeability by constant head and falling head methods
9. Determination of coefficient of consolidation of clays by One dimensional consolidation test
10. Determination of shear strength parameters of cohesion less soils by Direct shear test
11. Determination of shear strength parameters by Unconfined compression test on cohesive soil
12. Determination of shear strength parameters of soils by Triaxial compression test

COURSE OUTCOMES

At the end of the course, the students will be able to

- CO.1 Determine index properties of soils – water content, specific gravity, liquid limit, plastic limit, shrinkage limit, relative density and field density of soils
- CO.2 Perform grain size distribution in order to classify the soils
- CO.3 Develop the relationship between moisture and density and demonstrate the importance of optimum moisture content and dry density determination
- CO.4 Determine the engineering properties of the soil samples such as permeability and coefficient of consolidation
- CO.5 Determine the shear strength parameters of cohesion less and cohesive soil with appropriate tests.

REFERENCE

1. Geotechnical Engineering Laboratory Manual of Civil Engineering Department, MCET, Pollachi, 2017
2. Soil Mechanics Laboratory Manual, Braja M. Das, 8th Edition, Oxford University Press 2016.
3. Soil Mechanics Laboratory Manual, Micheal E Kalinski, 2nd Edition, 2011
4. "I.S.Code of Practice (2720) Relevant Parts"



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|-----------------------|---|---------------|
| Course Code : 16PSL51 | Course title : TEAMNESS AND INTER-PERSONAL SKILLS | |
| Core | L : T : P : C | 0 : 0 : 2 : 1 |
| Type : PS | Total Contact hours: | 30 |

COURSE OBJECTIVES

The course is intended to:

- CO.1 Be aware of attitudinal, behavioral and emotional aspects of self
- CO.2 Prefer to learn continuously about self and be in harmony with self
- CO.3 Understand others' preferences, values, roles & contexts and be in harmony with others
- CO.4 Identify barriers to harmonious relationships and derive ways to handle them
- CO.5 Work collaboratively as a team to deliver expected outcomes.

UNIT I - HARMONY WITH SELF

Importance of learning about self continuously; Approaches to learn about self: introspection, being open to feedback, critical incidences as opportunities; Understanding life stages and challenges associated with them; Healthy ways of handling self in response to life's challenges;

Instruments/inventories to understand self and others: A) Know your temperament, B) Interpersonal Needs Inventory (tentative).

UNIT II - HARMONY WITH OTHERS

Importance of living in harmony with others; What it takes to live in harmony with others; Understanding preferences, values, roles and contexts of others; Approaches to navigating through differences between self and others;

Barriers to harmonious relationships - Perceptions, Judgments, and Emotional instability; Ways to handle each of the barriers; Importance of reaching-out to others

UNIT III - GROUP DYNAMICS AND CONFLICTS RESOLUTION

Group dynamics: overt and covert processes at micro and macro levels; Understanding the basis of conflicts; Understanding one's own conflict handling style; Methods to handling conflicts effectively.

UNIT IV - WORKING IN TEAMS

Effectiveness in communication; Forming – storming – norming and performing model; Competition vs collaboration – impact of both on team tasks; TEAM Questionnaire – components of a healthy team and approaches to improving them

Mode of delivery:

1. A 2-day learning workshop

1. Activities (experiential learning)
2. Audio visuals (affective learning)
3. Case discussions (cognitive learning)
4. Instruments/questionnaires (reflective learning)

Guided by Learner's workbook.

2. Continuous learning guided by learning journal, and reviews by faculty

3. Half-day reinforcement session towards the end of the semester

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Assessments and Evaluation:

| Assessment | Details | Weightage | Administration | By Whom | When |
|------------------------------------|--------------------------------|-----------|---------------------------------|--------------------------|--|
| Continuous Assessment | | | | | |
| Initial Knowledge Test | Multiple choice questions (20) | 10% | Pen and paper | Internal team | Immediately after the initial workshop. |
| Review of student journal | Student held journal book. | 50% | Student journals to be reviewed | Trained Internal faculty | Once in a week. |
| Semester End Examination: | | | | | |
| Final comprehensive Knowledge test | Multiple choice questions (40) | 10% | Pen and paper | Internal team | End of semester after the reinforcement program. |
| Viva-Voce | Scenario based questions | 30% | | Internal team | |

Continuous Assessment = 60%

Semester end examination = 40%

An overall mark of 50 is to be scored for a pass in the course

COURSE OUTCOMES

At the end of this course, students will be able to:

- CO.1 Be aware of attitudinal, behavioral and emotional aspects of self
- CO.2 Prefer to learn continuously about self and be in harmony with self
- CO.3 Understand others' preferences, values, roles & contexts and be in harmony with others
- CO.4 Identify barriers to harmonious relationships and derive ways to handle them
- CO.5 Work collaboratively as a team to deliver expected outcomes.

END OF SEMESTER V


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SEMESTER VI

| | | |
|-----------------------|--|---------------|
| Course Code : 16CET61 | Course title : GEOTECHNICAL ENGINEERING II | |
| Core/Elective: Core | L: T : P : C | 3 : 0 : 0 : 3 |
| Type : Theory | Total Contact hours: | 45 Hours |

COURSE OBJECTIVES

The course is intended to:

1. Describe the stages in site investigation to select the suitable foundation types based on soil conditions
2. Explain the methods available in determining bearing capacity of shallow foundations and their settlements
3. Design of shallow foundations and rafts
4. Design of pile foundation and computing carrying capacity of pile groups and its settlement
5. Apply the knowledge of earth pressure theory and able to analysis retaining walls

UNIT I - SITE INVESTIGATION AND SELECTION OF FOUNDATION

9

Scope and objectives – Methods of exploration – Boring – Depth of boring – Spacing of bore hole - Sampling – Types of samples – Sampling techniques – In-situ penetration tests (SPT and SCPT) - Bore log report, interpretation of test results —Subsurface profile – Types of foundation - Selection of foundation based on soil condition

UNIT II - BEARING CAPACITY AND SETTLEMENT OF SHALLOW FOUNDATIONS

9

Location and depth of foundation – codal provisions – bearing capacity of shallow foundation on homogeneous deposits – Terzaghi's formula and BIS formula (only) – factors affecting bearing capacity – problems - Bearing Capacity from insitu tests (SPT, SCPT and Plate load) – Allowable bearing pressure - Components of settlement – Settlement of foundations on granular and clay deposits – Allowable and differential settlements – codal provisions, Methods of minimising settlement

UNIT III - FOOTINGS AND RAFT FOUNDATIONS

9

Contact pressure distribution below footings & raft – Design (no structural design) of Isolated, combined footings (rectangular and trapezoidal), strap footings and mat foundation – types – importance of proportioning– floating foundation - Identification of expansive soil – design (no structural design) of foundations on expansive soil – under reamed piles

UNIT IV - PILE FOUNDATIONS

9

Types of piles and their function – Factors influencing the selection of pile – Carrying capacity of single pile in granular and cohesive soil - Static formula - Dynamic formulae (Engineering news and Hiley's) – Capacity from in-situ tests (SPT and SCPT) – Pile load test - Negative skin friction – uplift capacity – Group capacity (Individual pile method and Block failure criterion) – Pile group efficiency by Feld's rule, Converse Labarra formula - Settlement of pile groups

UNIT V - EARTH PRESSURE AND RETAINING WALLS

9

Plastic equilibrium in soils – active and passive states – Rankine's theory – cohesionless and cohesive soil - Coloumb's wedge theory – Types of retaining walls - Earth pressure on retaining walls of simple configurations – Graphical methods (Culmann's method only) – Stability (no structural design) of retaining walls


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COURSE OUTCOMES

At the end of this course, students will be able to:

- CO.1 Describe the stages in site investigation, methods of explorations, techniques followed in sampling and to select the suitable foundation types based on soil conditions
- CO.2 Explain the methods available in determining bearing capacity of shallow foundations and their settlements
- CO.3 Design of shallow foundations and rafts and explain about expansive soils
- CO.4 Design of pile foundation and computing carrying capacity of pile groups and its settlement
- CO.5 Apply the knowledge of earth pressure theory and able to analysis retaining walls

TEXT BOOKS:

1. Venkatramaiah, C. "Geotechnical Engineering", New Age International Publishers, New Delhi, 2017
2. Murthy, V.N.S, Text book of "Soil Mechanics and Foundation Engineering", CBS Publishers Distribution Ltd, New Delhi, 2015.
3. Arora.K.R,"Soil Mechanics and Foundation Engineering", Standard Publishers and Distributors, Pvt. Ltd., New Delhi, 2011.
4. Punmia B.C., "Soil Mechanics and Foundations", Laxmi Publications Pvt. Ltd., New Delhi, 2005.

REFERENCE BOOKS:

1. Coduto, D.P., "Geotechnical Engineering Principles and Practices", 2nd edition, Prentice Hall of India Private Limited, New Delhi, 2010.
2. GopalRanjan and Rao A.S.R., "Basic and Applied soil mechanics", New Age International Publishers, New Delhi, 2016.
3. Varghese P.C., "Foundation Engineering", PHI Learning Private Limited, New Delhi, 2012.
4. Das, B.M. "Principles of Foundation Engineering (Eighth edition), Thomson Books /COLE, 2014.
5. Bowles J.E, "Foundation analysis and design", McGraw-Hill, 1994.
6. Purushothma Raj P "Soil Mechanics and Foundation Engineering" 2nd Edition, Pearson Education, 2013.

WEB REFERENCES:

1. <http://nptel.ac.in/courses/105103097/>
2. <http://home.iitk.ac.in/~pkbd/A%20Preview%20of%20Soil%20Behavior.pdf>
3. <http://ocw.mit.edu/courses/civil-and-environmental-engineering/1-361-advanced-soil-mechanics-fall-2004/lecture-notes/>
4. <http://www.aboutcivil.org/soil-mechanics.html>


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|-----------------------|---------------------------------------|---------------|
| Course Code : 16CET62 | Course title : STRUCTURAL ANALYSIS II | |
| Core/Elective: Core | L: T : P : C | 2 : 2 : 0 : 3 |
| Type : Theory | Total Contact hours: | 60 |

COURSE OBJECTIVES

The course is intended to:

1. Calculate the stress resultants in space trusses and beams curved in plan.
2. Calculate the bending moment, radial shear and normal thrust in two and three hinged arches.
3. Determine the stress resultants in determinate structures using influence lines.
4. Determine the stress resultants in indeterminate structures using influence lines.
5. Calculate the plastic moment of resistance and collapse load using plastic analysis.

UNIT I - SPACE STRUCTURES

6+6

Basic forms of space trusses - Tension coefficients - Determination of member forces in space trusses using tension coefficient method - Curved beams - Application of Castigliano's theorems - Determination of shear force, bending moment and twisting moment in beams curved in plan.

UNIT II - ARCHES

6+6

Arches - Structural forms - Types of arches - Linear arch - Arch action - Horizontal thrust - Eddy's theorem for bending moment - Determination of normal thrust, shear force and bending moment in three hinged and two hinged, parabolic and circular arches - Settlement and temperature effects.

UNIT III - INFLUENCE LINES FOR DETERMINATE STRUCTURES

6+6

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

UNIT IV - INFLUENCE LINES FOR INDETERMINATE STRUCTURES

6+6

Muller Breslau principle - Influence lines for propped cantilever and continuous beams (beams with one degree of indeterminacy only) - Influence lines for two hinged arches.

UNIT V - PLASTIC ANALYSIS

6+6

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

COURSE OUTCOMES

At the end of this course, students will be able to:

- CO.1 Calculate the stress resultants in space trusses and beams curved in plan.
- CO.2 Calculate the bending moment, radial shear and normal thrust in two and three hinged arches.
- CO.3 Determine the stress resultants in determinate structures using influence lines.
- CO.4 Determine the stress resultants in indeterminate structures using influence lines.
- CO.5 Calculate the plastic moment of resistance and collapse load using plastic analysis.


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TEXT BOOKS:

1. Vaidyanathan, R. and Perumal, P., "Structural Analysis Vol. I (4thEdition) and Vol. II (3rd Edition)", Laxmi Publications, New Delhi, 2016& 2017.
2. Punmia, B.C., Ashok Kumar Jain and Arun Kumar Jain, "Theory of structures" 12th Edition, Laxmi Publications, New Delhi, 2017.
3. Negi, L.S. and R.S. Jangid, "Structural Analysis", Tata McGraw-Hill Publications, New Delhi, 2003

REFERENCE BOOKS:

1. Rajasekaran S and Sankarasubramanian G, "Computational Structural Mechanics", Prentice Hall of India Pvt. Ltd, New Delhi, 2001
2. William Weaver, Jr& James M.Gere, "Matrix analysis of framed structures", 2nd Edition, CBS Publishers & Distributors, Delhi, 2004.
3. Ashok K.Jain, "Advanced Structural Analysis", 2nd Edition, Nem Chand & Sons, Roorkee, 2015.
4. Reddy C.S., "Basic Structural Analysis". Tata McGraw Hill Publishing Co. Ltd., New Delhi, 2010.

WEB REFERENCES:

1. https://ecourses.ou.edu/cgi-bin/ebook.cgi?doc=&topic=me&chap_sec=03.3&page=theory
2. <http://www.nptel.ac.in/downloads/105101085/>
3. <http://www.learnerstv.com/Free-engineering-Video-lectures-Itv085-Page1.htm>
4. <http://www.faadooengineers.com/threads/18572-Structural-Analysis-Full-Book-in-pdf-All-units-of-structure-I-II-III>
5. <http://ocw.mit.edu/courses/civil-and-environmental-engineering/1-571-structural-analysis-and-control-spring-2004/lecture-notes/>

| | | |
|-----------------------|--|---------------|
| Course Code : 16CET63 | Course title : DESIGN OF RC STRUCTURES | |
| Core/ Elective: Core | L : T : P : C | 3 : 2 : 0 : 4 |
| Type : Theory | Total Contact hours: | 75 Hours |

COURSE OBJECTIVES

The course is intended to:

1. Design retaining walls.
2. Design circular and rectangular water tanks.
3. Design flat slabs, RC walls and foundation.
4. Design simple type of bridges.
5. Determine losses and deflections in prestressed concrete beams.

UNIT I RETAINING WALLS

9+6

Design and detailing of cantilever and counterfort RC retaining walls.

UNIT II WATER TANKS

9+6

Design of underground circular and rectangular tanks – Domes– Overhead circular and rectangular tanks–Design of staging and foundations.

UNIT III Flat Slab and Foundation

9+6

Design of flat slabs (Interior Panel and Exterior Panel) – Design of Reinforced concrete walls – Mat foundation – Pile cap.

UNIT IV RCC BRIDGES

9+6

Introduction, Classification of bridges – IRC Loadings – Effective width of load dispersion – Design of solid slab Bridge – Box culverts.

UNIT V Introduction to prestressed concrete

9+6

Introduction– Principles of prestressing – types and methods of prestressing– Need for high strength materials – Losses in prestress – Long term and short term deflection – Anchorage zone.

COURSE OUTCOMES

At the end of this course, students will be able to:

- CO.1 Design retaining walls.
- CO.2 Design circular and rectangular water tanks.
- CO.3 Design flat slabs, RC walls and foundation.
- CO.4 Design simple type of bridges.
- CO.5 Determine losses and deflections in prestressed concrete beams.

TEXT BOOKS:

1. Gambhir, M.L., "Reinforced Concrete Structures", PHI Learning Private Ltd., New Delhi, 2008.
2. Varghese, P. C., Limit State Design of Reinforced Concrete, 2nd Edition, PHI Learning Private Ltd., New Delhi, 2008.
3. Krishna Raju. N., "Prestressed Concrete", Tata McGraw Hill Publishing Co., 5th Edition, New Delhi, 2012.

REFERENCE BOOKS:

1. Unnikrishna Pillai S. and Devdas Menon, "Reinforced Concrete Design", Tata McGraw


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- Hill Publishing Company Ltd., 3rd Edition, New Delhi, 2009.
2. Punmia, B.C., Ashok. K. Jain and Arun. K. Jain, "Reinforced Concrete Structures" Vol. II, Laxmi Publications, 5th Edition New Delhi, 2015.
 3. Syal, I.C. and Goel, A. K., "Reinforced Concrete Structures", S. Chand Publications, 5th Revised Edition, 2012.

Code Books: IS 456-2000, IS3370 (Part-II)-2009, IS 3370(Part-IV)-1967, IRC 6-2014, IRC 21-2000 & IS 1343-2012

WEB REFERENCES:

1. <http://nptel.ac.in/downloads/105105104/>
2. <http://www.ce.memphis.edu/4135/PDF/Notes/Chapter1-0%20.pdf>
3. <http://arch.usc.edu/sites/default/files/mbs/papers/kang-kyu%20choi.pdf>

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|------------------------------|--|----------------------|
| Course Code : 16CET64 | Course title : DESIGN OF STEEL STRUCTURES | |
| Core/Elective: Core | L : T : P : C | 2 : 2 : 0 : 3 |
| Type : Theory | Total Contact hours: | 60 Hours |

COURSE OBJECTIVES

The course is intended to:

1. Describe the properties of steel sections and design bolted and welded joints
2. Design steel members subjected to tension and compression
3. Design of beams, built up beams and plate girder
4. Design of elements of roof truss, joints
5. Design beam connections

UNIT I – INTRODUCTION AND CONNECTIONS

6+6

Steel Structures types, Indian standard rolled steel sections - maintenance of steel structures - loads on structures and load combination - Limit State Design Concepts - Bolted and welded connections - friction grip bolts - failure of joints - strength of fillet and butt welded joints – Review of bolted and welded connections for members subjected to axial forces - design of bolted and welded eccentric connections.

UNIT II - TENSION AND COMPRESSION MEMBERS

6+6

Net area, Net effective section for angles and Tees in tension - Design of simple and built up members subjected to tension - tension splices – Use of lug angles – concept of shear lag - compression members - effective lengths – slenderness ratio - design of axially loaded simple and built up compression members with lacing and battens - design of column bases - gusseted base.

UNIT III - BEAMS

6+6

Bending, bearing and shear stresses in beams – Design of laterally unsupported beams - design of built-up beams – design of plate girders - curtailment of flange plates - connection of flange plates and beams – intermediate and bearing stiffeners – flange and web splices.

UNIT IV - ROOF TRUSSES

6+6

Framing plan – metal roof sheets - Types of roof trusses – components of roof truss - Estimation of dead, live and wind loads - Design of roof purlins –need for bracing – design of bracing

UNIT V - BEAM CONNECTIONS

6+6

Types – framed beam connections – stiffened and unstiffened seated connections – moment connection - welded plate attachment to column flange – bolted attachment – end plate connection –beam to beam connection

COURSE OUTCOMES

- CO.1 Describe the properties of steel sections and design bolted and welded joints
- CO.2 Design steel members subjected to tension and compression
- CO.3 Design of beams, built up beams and plate girder
- CO.4 Design of elements of roof truss, joints
- CO.5 Design beam connections

TEXT BOOKS:

1. Subramanian. N, "Design of Steel Structures", Oxford University Press, New Delhi, 1stEdition, 2014.
2. Punmia B.C, Ashok Kumar Jain, Arun Kumar Jain., "Design of steel Structures", Laxmi


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- publications ltd, 2nd Edition, 2012
3. Duggal. S.K, "Limit State Design of Steel Structures", Tata McGraw Hill Publishing Company, New Delhi, 2nd Edition, 2011.

REFERENCE BOOKS:

1. Jayagopal L S, Tensing D., "Design of Steel Structures", Vikas Publishing, 1st Edition, 2015
2. Ramchandra S., "Design of Steel of Structures", Vol 1&2. Scientific publishers, Delhi, 11th Edition, 2005
3. Dayarathnam P., "Design of Steel Structures", S.Chand Publishing Co. Ltd., 2nd Edition, 2008
4. Bhavikatti S S., "Design of Steel Structures", I.K. International Publishing Pvt Ltd, 3rd Edition, 2012

WEB REFERENCES:

1. <http://nptel.ac.in/courses/105106112/>
2. <http://nptel.ac.in/courses/105106113/>
3. http://www.steel-insdag.org/TM_Content.asp
4. <https://www.sefindia.org/forum/index.php>

CODAL PROVISIONS:

1. IS 800: 2007 General Construction in Steel - Code of Practice
2. SP 6 (1) – 1964 Handbook for Structural Engineers - Structural Steel Sections
3. IS 875: 1987 Code of Practice for Design loads: Part-I Dead load, Part-II Imposed load & Part-III Wind load.


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|-----------------------|--|---------------|
| Course Code : 16CEL61 | Course Title : BUILDING DRAWING LABORATORY | |
| Core/Elective: Core | L : T : P : C | 0 : 0 : 4 : 2 |
| Type : Practical | Total Contact hours: | 60 |

COURSE OBJECTIVES

The course is intended to:

1. Draft the different types of foundations for a residential building
2. Draft the details of reinforcement of a roof slab and a beam for load bearing and framed structures.
3. Draft the details of different types of staircases
4. Draft the details of components of a septic tank, and rainwater harvesting structures
5. Draft the plan, elevation and sectional view of an residential building

LIST OF EXPERIMENTS

1. Explain the requirements of a building along with minimum dimension as per NBC, requirements
2. Draft the section for foundation of load bearing structure
3. Draft the section for foundation and column of framed structure
4. Draft the Cross Section and Longitudinal Section of RCC roof slab, and beam (one way)
5. Draft the Cross Section and Longitudinal Section of RCC roof slab, and beam (two way)
6. Preparation of Cross Section and Longitudinal Section for Beam - column joints
7. Draft the Plan, Section, and elevation of dog legged staircase,
8. Draft the Plan, Section, and elevation of bifurcated staircase,
9. Draft the Plan, Section, and elevation of septic tank,
10. Draft the Plan, Section, and elevation Rainwater Harvesting Structure.
11. Prepare a scheme layout of a residential building section (G+1) for a load bearing structure
12. Prepare a scheme layout of a residential building section (G+1) for a framed structure.

COURSE OUTCOMES

At the end of the course, the students will be able to

CO.1 Draft the different types of foundations for a residential building

CO.2 Draft the details of reinforcement of a roof slab and a beam for load bearing and framed structures.

CO.3 Draft the details of different types of staircases

CO.4 Draft the details of components of a septic tank, and rainwater harvesting structures

CO.5 Draft the plan, elevation and sectional view of an residential building

REFERENCES

1. Computer Aided Building Drawing Manual, 2017, Department of Civil Engineering, MCET, Pollachi
2. Civil Engineering Drawing and House Planning, B. P. Verma, Khanna Publishers, New Delhi, 2010.

Page

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|-----------------------|---|---------------|
| Course Code : 16CEL62 | Course Title : ENVIRONMENTAL ENGINEERING LABORATORY | |
| Core/Elective: Core | L: T : P : C | 0 : 0 : 4 : 2 |
| Type : Practical | Total Contact hours: | 60 |

PREREQUISITE:

COURSE OBJECTIVES

The course is intended to:

1. Determine the physical properties of the given water sample.
2. Determine the chemical properties of the given water sample.
3. Conduct tests to determine the amount of oxygen in the water.
4. Determine the amount of hardness in the given water sample.
5. Calculate the dosing of different chemicals required for the water treatment.

LIST OF EXPERIMENTS

1. Determination of p^H and Electrical Conductivity
2. Determination of Dissolved solids, Suspended Solids, Volatile Solids(VS), and Turbidity
3. Determination of Sulphates
4. Determination of Chlorides
5. Determination of Dissolved Oxygen (DO)
6. Determination of Acidity
7. Determination of Alkalinity
8. Determination of Total Hardness
9. Determination of Calcium Hardness
10. Determination of Available chlorine in Bleaching powder
11. Determination of Residual Chlorine, Chloride and Fluoride
12. Determination of Optimum amount of Coagulant

COURSE OUTCOMES

At the end of the course, the students will be able to

- CO.1 Determine the physical properties of the given water sample.
- CO.2 Determine the chemical properties of the given water sample.
- CO.3 Conduct tests to determine the amount of oxygen in the water.
- CO.4 Determine the amount of hardness in the given water sample.
- CO.5 Calculate the dosing of different chemicals required for the water treatment.

REFERENCES

1. Environmental engineering Laboratory manual of Civil Engineering Department, MCET, Pollachi, 2018.


BoS Chairman

| | | |
|-----------------------|------------------------------------|---------------|
| Course Code : 16PSL61 | Course title : CAMPUS TO CORPORATE | |
| Core | L: T : P : C | 0 : 0 : 2 : 1 |
| Type : PS | Total Contact hours: | 30 |

COURSE OBJECTIVES

The course is intended to:

- CO.1 Display gratitude and social responsibility
- CO.2 Understand various business environments
- CO.3 Explain the Transition from a campus mindset to corporate mindset
- CO.4 Be prepared to the work culture
- CO.5 Choose to be presentable and agile

UNIT I - GRATITUDE AND SOCIAL RESPONSIBILITY

Importance of gratitude; Finding opportunities to give back to society; Responsible behaviour in public places; Volunteerism during calamities; Social relevancy during engineering design and manufacturing – how social issues could be tackled by engineering solutions;

UNIT II - THE WORLD OF BUSINESS

World of business - Perceptions vs reality; Various business types - B2B, B2C, & other business models; Various industry verticals – fundamentals, dynamics & nuances; Nature of work as per various functions – Sales & Marketing, Service, Research & Development, Production etc; Self-reflective questionnaire to identified the fitment to a particular field/function

UNIT III - TRANSITION FROM A CAMPUS MINDSET TO CORPORATE MINDSET

ROCK as an acronym (Responsibility, Ownership, Contribution, Knowledgeable (continuous learning)); Responsibility – ways in which responsibility should be demonstrated; Ownership – owning one's career, owning mistakes, desisting from complaining; Contribution – focus on creating value, giving more than receiving (salary & perks); Knowledgeable (continuous learning) – learning just begins after campus, aspects of learning mindset, various opportunities to learn and how they can be utilised at work

UNIT IV - PREPAREDNESS TO ADAPT TO WORK CULTURE

Skills to get through selection process – Interview conversations, resume writing, group discussion, & presentation;
Handling Cultural differences; Handling Gender dynamics; Alignment to Ethics and values; Handling multiple (often conflicting) demands; Handling peer influence; Conducting sensitively with subordinates, peers & boss; Managing personal finance; Maintaining work-life balance – work & social life, hobbies etc;

UNIT V - PRESENTABLE AND AGILE

Dressing & grooming – Reasons for good dressing & grooming; Professional etiquette – what is etiquette, professional etiquette vs social etiquette, Aspects of professional etiquette; Wellness – Healthy eating habits, Importance of sleep, Importance of fitness; Importance of cleanliness of surroundings – desk, work area, place of stay (5S);

Mode of delivery:

1. A 2-day learning workshop Guided by Learner's workbook.

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2. Continuous learning guided by learning journal, and reviews by faculty

Assessments and Evaluation:

| Assessment | Details | Weightage | Administration | By Whom | When |
|--|---|-----------|--|-------------------------|---|
| Workbook record assessment | Assess the necessary elements to be entered in the workbook | 20% | Individual workbooks reviewed by the faculty | | Immediately after the learning workshop |
| Initial Knowledge Test and Scenario based knowledge test | Multiple choice questions (20) | 25% | Pen and paper, | Internal team | Immediately after the learning workshop |
| Review of student journal | Student held journal with enough pages for the whole semester | 30% | Individual journals reviewed by the faculty | Trained faculty members | Once in a week. |
| Final Knowledge test and Scenario based knowledge test | Multiple choice questions (40) | 10% | | Internal team | End of semester |
| Review of student journal by external expert | | 15% | Student journal comprehensive review | Trained faculty members | |

COURSE OUTCOMES

At the end of this course, students will be able to:

- CO.1 Display gratitude and social responsibility
- CO.2 Understand various business environments
- CO.3 Explain the Transition from a campus mindset to corporate mindset
- CO.4 Be prepared to the work culture
- CO.5 Choose to be presentable and agile

END OF SEMESTER VI

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SEMESTER VII

| | | |
|-----------------------|--|---------------|
| Course Code : 16CET71 | Course title : CONSTRUCTION PROJECT MANAGEMENT | |
| Core/Elective: Core | L : T : P : C | 3 : 0 : 0 : 3 |
| Type : Theory | Total Contact hours: | 45 |

COURSE OBJECTIVES

The course is intended to:

1. Describe the concepts of projects formulation.
2. Elucidate the planning concepts of a construction project.
3. Explain the scheduling procedures and techniques for a construction project.
4. Describe the project control techniques of a construction project.
5. Explain the organization and use of project information.

UNIT I - CONSTRUCTION PROJECT FORMULATION

9

Construction participants - Roles and responsibilities of client, construction management consultants, architect- Engineering associates and contractors - Different types of construction projects -Project life cycle- Phases in project life cycle- Pre-feasibility report and clearance- Techno economic feasibility report - Detailed project report- Types of contract – Contract procedures - Contract agreement - Principal clauses and conditions.

UNIT II - CONSTRUCTION PLANNING

9

Basic concepts in the development of construction plans - Choice of technology and construction method- Importance of planning in construction project – Different periods of planning – Pretender data collection, analysis and report- Charts for labour, staff, material and plant requirements - BOQ and cost estimates - Pre contract and Contract planning.

UNIT III - SCHEDULING PROCEDURES AND TECHNIQUES

9

Construction schedules- CPM/ PERT Network - Activities, their duration and interdependence; Construction of network diagram; activity start and finish time both early and late; forward and backward pass; critical path; float- PERT - three time aspects and their identification based on statistical data and Beta distribution - Probability of achieving desired time targets for projects.

UNIT IV - CONSTRUCTION PROJECT CONTROL

9

Inventory control- Types and tools- EOQ model- Direct cost and indirect cost and their relation to project duration- Normal and crash duration of activities and their corresponding cost - Crashing of network to optimize cost and duration of projects-Quality and safety concerns in construction-Total quality control-Quality control by statistical methods-Sampling by attributes-Sampling and variables.

UNIT V - ORGANIZATION AND USE OF PROJECT INFORMATION

9

Types of project information - Accuracy and use of information – Computerized organization and use of information - Organizing information in databases – Relational model of databases - Centralized database management systems - Databases and applications programs - Information transfer and flow.

COURSE OUTCOMES

At the end of this course, students will be able to:

CO.1 Describe the concepts of projects formulation.


BoS Chairman

- CO.2 Elucidate the planning concepts of a construction project.
- CO.3 Explain the scheduling procedures and techniques for a construction project.
- CO.4 Describe the project control techniques of a construction project.
- CO.5 Explain the organization and use of project information.

TEXT BOOKS:

- 1. Chris Hendrickson and Tung Au, Project Management for Construction – “Fundamental Concepts for Owners, Engineers, Architects and Builders”, Prentice Hall, Pittsburgh, 2000.
- 2. Chitkara. K.K, “Construction Project Management: planning, Scheduling and control”, Tata McGraw Hill Publishing Company, New Delhi, Reprint 2009

REFERENCE BOOKS:

- 1. Kumar NeerajJha, “Construction Project Management: Theory and Practice”, second edition, Pearson Education India, 2015
- 2. Seetharaman. S., “Construction Engineering and Management”, Umesh Publications, New Delhi, Reprint 2010
- 3. Willis, E. M., Scheduling Construction Projects, John Wiley & Sons, 1986.
- 4. Halpin, D. W., Financial and Cost Concepts for Construction Management, John Wiley & Sons, New York, 1985.
- 5. George J.Ritz , Total Construction Project Management - McGraw-Hill Inc, second edition, 2013

WEB REFERENCES:

- 1. <http://nptel.ac.in/courses/105103093/>
- 2. <https://www.vidyarthiplus.com/vp/attachment.php?aid=5816>
- 3. <https://www.vidyarthiplus.com/vp/thread-18563.html#.WF5t7dJ97cs>



BoS Chairman

| | | |
|-----------------------|---|---------------|
| Course Code : 16CET72 | Course title : STRUCTURAL DYNAMICS AND EARTHQUAKE ENGINEERING | |
| Core/Elective: Core | L : T : P : C | 3 : 2 : 0 : 4 |
| Type : Theory | Total Contact hours: | 75 hours |

PREREQUISITE: 16CET53 Design of RC Elements
16CET63 Design of RC Structures

COURSE OBJECTIVES

The course is intended to:

1. Formulate equation of motion of SDOF systems and obtain their response.
2. Explain the response of MDOF systems when subjected to dynamic loads
3. Describe the elements of seismology and measurement of the earthquake parameters
4. Explain the effects of structures under seismic loading based on IS Codal provisions for evaluating earthquake forces
5. Design and detailing the earthquake resistant structures using IS guidelines.

UNIT I - THEORY OF VIBRATIONS

9+6

Difference between static loading and dynamic loading – Degree of freedom – idealisation of structure as single degree of freedom system – Formulation of Equations of motion of SDOF system – D'Alemberts principles – effect of damping – free and forced vibration of damped and undamped structures – Natural frequency - Response to harmonic and periodic forces.

UNIT II - MULTIPLE DEGREE OF FREEDOM SYSTEM

9+6

Two degree of freedom system – modes of vibrations – formulation of equations of motion of multi-degree of freedom (MDOF) system - Eigen values and Eigen vectors – Response to free and forced vibrations - damped and undamped MDOF system – Modal superposition methods.

UNIT III - ELEMENTS OF SEISMOLOGY

9+6

Elements of Engineering Seismology - Causes of Earthquake – Plate Tectonic theory – Elastic rebound Theory – Characteristic of earthquake – Measurement of earthquake parameters - Magnitude and intensity of earthquakes – Spectral Acceleration - learning from past earthquake history.

UNIT IV - RESPONSE OF STRUCTURES TO EARTHQUAKE

9+6

Effect of earthquake on different type of structures – Behaviour of Reinforced Cement Concrete, Steel and Prestressed Concrete Structure under earthquake loading – Pinching effect – Bouchinger Effects – Evaluation of earthquake forces as per IS:1893 – 2016 - Response Spectra - lessons from failures of structures

UNIT V - DESIGN METHODOLOGY

9+6

Causes of damage – Planning considerations / Architectural concepts as per IS:4326 – 2013 – Guidelines for Earthquake resistant design – Earthquake resistant design for masonry and Reinforced Cement Concrete buildings –detailing as per IS:13920 – 2016.

COURSE OUTCOMES

At the end of this course, students will be able to:

- CO.1 Formulate equation of motion of SDOF systems and obtain their response.
- CO.2 Explain the response of MDOF systems when subjected to dynamic loads
- CO.3 Describe the elements of seismology and measurement of the earthquake parameters
- CO.4 Explain the effects of structures under seismic loading based on IS Codal provisions for evaluating earthquake forces


BoS Chairman

CO.5 Design and detailing the earthquake resistant structures using IS guidelines.

TEXT BOOKS:

1. Chopra A.K., "Dynamics of Structures (Theory and Applications to Earthquake Engineering)", 4th Edition, Prentice Hall of India Private Limited. New Delhi, 2012
2. Agarwal. P and Shrikhande. M., "Earthquake Resistant Design of Structures", Prentice Hall of India Pvt. Ltd. 2007
3. Duggal S.K., "Earthquake Resistant Design of Structures", 2nd Edition, Oxford University Press, New Delhi, 2013.
4. IS Codes: IS: 1893-1(2016), IS: 4326(1993) and IS:13920(2116), Bureau of Indian Standards, New Delhi.

REFERENCE BOOKS:

1. Damodarasamy, S. R., Kavitha.S, "Basics of structural dynamics and aseismic design", PHI Learning private limited, Delhi-2014.
2. Biggs, J.M., "Introduction to Structural Dynamics", McGraw Hill Book Co., New York, 1964
3. Dowrick, D.J., "Earthquake Resistant Design", John Wiley & Sons, London, 2009
4. Paz, M. and Leigh.W. "Structural Dynamics – Theory & Computation", 4th Edition, CBS Publishers & Distributors, Shahdara, Delhi, 2006
5. Jai Krishna, A.R. Chandrasekaran and Brijesh Chandra, "Elements of Earthquake Engineering", 2nd Edition, South Asian Publishers, Pvt. Ltd.
6. Stefen L Kramer, "Geotechnical Earthquake Engineering", Pearson Education Publications, 2003
7. Clough R.W & Penzien, "Dynamics of Structures", 4th Edition, McGraw Hill Book Co Ltd, 2008
8. Manickaselvam, V.K, "Elementary Structural Dynamics", Dhanpat Rai & Sons, 2001

WEB REFERENCES:

1. https://c.ymcdn.com/sites/www.nibs.org/resource/resmgr/BSSC/P-749_Chapter5.pdf
2. http://www.preventionweb.net/files/687_10092.pdf


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|-----------------------|--------------------------------------|---------------|
| Course Code : 16CET73 | Course title : ENVIRONMENTAL STUDIES | |
| Core/Elective: Core | L : T : P : C | 3 : 0 : 0 : 3 |
| Type : Theory | Total Contact hours: | 45 hours |

COURSE OBJECTIVES

The course is intended to:

1. Describe the multidisciplinary nature of environmental studies
2. Explain the importance of ecosystem and biodiversity
3. Identify the causes and propose suitable methods of control for various types of environmental pollution
4. Brief the importance of environmental protection in social and global context
5. Explain the relationship between environment and human beings

UNIT I - MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES

9

Definition, scope and importance; Need for public awareness; Natural resources and associated problems - Forest resources, Water resources, Mineral resources, Food resources, Energy resources, Land resources; Role of individual in conservation of natural resources; Equitable use of resources for sustainable lifestyles.

UNIT II - ECOSYSTEMS AND BIODIVERSITY

9

Concept of an ecosystem; Structure and function of an ecosystem; Producers, consumers and decomposers; Energy flow in the ecosystem; Ecological succession; Food chains, food webs and ecological pyramids; Introduction, types, characteristic features, structure and function of the following ecosystem - Forest, Grassland, Desert, Aquatic; Biodiversity and its conservation: Introduction; Biogeographical classification of India; Value of biodiversity; Biodiversity at global, national and local levels; India as a mega diversity nation; Threats to biodiversity; Endangered and endemic species of India; Conservation of biodiversity : In-situ and Ex-situ conservation.

UNIT III - ENVIRONMENTAL POLLUTION

9

Definition; Cause, effects and control measures of Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear pollution; Solid waste Management: Causes, effects and control measures of urban and industrial wastes; Role of an individual in prevention of pollution; Pollution case studies; Disaster management : floods, earthquake, cyclone and landslides

UNIT IV - SOCIAL ISSUES AND THE ENVIRONMENT

9

From Unsustainable to Sustainable development; Urban problems related to energy; Water conservation, rain water harvesting, watershed management; Environmental ethics : issues and possible solutions; Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Wasteland reclamation ; Consumerism and waste products; Environment Protection Act; Air Act; Water Act ; Wildlife Protection Act; Forest Conservation Act; Issues involved in enforcement of environmental legislation; Public awareness.

UNIT V - HUMAN POPULATION AND THE ENVIRONMENT

9

Population growth, 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; Field work – Visit to a local area to document environmental assets – river/forest/grassland/hill/mountain; Visit to a local polluted site – Urban/Rural/Industrial/Agriculture; Study of simple ecosystems – pond, river, hill, slopes, etc.


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COURSE OUTCOMES

At the end of this course, students will be able to:

- CO.1. Describe the multidisciplinary nature of environmental studies
- CO.2. Explain the importance of ecosystem and biodiversity
- CO.3. Identify the causes and propose suitable methods of control for various types of environmental pollution
- CO.4. Brief the importance of environmental protection in social and global context
- CO.5. Explain the relationship between environment and human beings

TEXT BOOKS:

- 1. Benny Joseph, "Environmental Studies", Tata McGraw Hill, New Delhi, 2006.
- 2. Mackenzie Davis and Susan Masten, "Principles of environmental engineering and science", Mc-Graw Hill, 3rd edition, 2014

REFERENCE BOOKS:

- 1. Trivedi R.K. "Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards", Vol. I and II, Enviro Media.
- 2. Cunningham, W.P.Cooper., T.H. Gorhani, "Environmental Encyclopedia", Jaico Publishing House, Mumbai, 2001.
- 3. Rajagopalan. R, "Environmental Studies - From Crisis to Cure", Oxford University Press, 2005.

WEB REFERENCES:

- 1. <http://nptel.ac.in/courses/122102006>
- 2. www.ugc.ac.in/oldpdf/modelcurriculum/env.pdf


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|-----------------------|--|---------------|
| Course Code : 16CEL71 | Course Title : COMPUTER AIDED DESIGN AND DRAFTING LABORATORY | |
| Core/Elective: Core | L: T : P : C | 0 : 0 : 4 : 2 |
| Type : Practical | Total Contact hours: | 60 |

COURSE OBJECTIVES

The course is intended to:

1. Impart thorough knowledge on the computer aided analysis and design of RCC structural components such as beams, columns, slabs & footings
2. Perform computer aided analysis, design and detailing of water tanks & earth retaining structure
3. Enhance the capability of the students to draw the plan, elevation and sectional view of various steel structural elements using softwares
4. Analyse & design plate and truss girder bridges used for both railways and highways.
5. Analyze and Design of RC slab, Tee beam deck slab bridges

LIST OF EXPERIMENTS

1. Analysis, Design & Detailing of different types of RCC Beams - Cantilever, simply supported, continuous beams with loading conditions.
2. Analysis, Design and detailing of short and long Columns
3. Analysis, Design & detailing of Floor slab system with T beam
4. Design and drawing the detailing of Isolated and combined rectangular footings
5. Analysis, Design and detailing of R.C.C. counter fort retaining walls
6. Analysis, Design and detailing of R.C.C rectangular ground level & elevated water tanks
7. Analysis, Design and detailing of R.C.C circular water tank with concrete domes.
8. Analysis and Design of steel battened column with gusseted base
9. Analysis and Design of Industrial Steel Plate girder
10. Analysis and Design of Industrial Steel gantry girder with moving loads
11. Analysis and Design of steel roof truss
12. Analysis, Design and detailing of R.C. Tee Beam Bridge deck

COURSE OUTCOMES

At the end of the course, the students will be able to

- CO.1 Analyse, design and detail the various RCC building components.
- CO.2 Analyse, design and detail the footings, rectangular water tanks & retaining walls
- CO.3 Analyse, Design and detail the different steel structural components such as columns, plate & gantry girders
- CO.4 Analyse and Design of steel roof trusses
- CO.5 Analyse and Design of RC slab, Tee beam deck slab bridges, plate and truss girder bridges used for both railways and highways.

TEXT BOOKS:

1. Krishnaraju, "Structural Design & Drawing" (Concrete & Steel – Volume II and III) – CBS Publishers, 2005.
2. S.K.Duggal, Limit state design of steel structures, McGraw hill education (India) private limited, new Delhi, 2014
3. B.C. Punmia, Ashok Kumar Jain & Arun Kumar Jain, "Comprehensive Design of Steel Structures" Laxmi Publications Pvt. Ltd., 2008.
4. P.C Varghese, "Limit State Design of Reinforced Concrete" Prentice Hall of India Pvt Ltd., 2008.


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REFERENCE

1. Computer Aided Design-and Drawing Laboratory Manual, MCET, Pollachi, 2014
2. Krishnamurthy, D., "Structural Design and Drawing Vol. II", CBS, Publishers & Distributors, Delhi, 2010
3. Krishnamurthy, D., "Structural Design and Drawing Vol.III (Steel Structures)", CBS, Publishers & Distributors, Delhi, 2010



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| | | |
|-----------------------|---|---------------|
| Course Code : 16CEL72 | Course Title : QUANTITY SURVEYING AND ESTIMATION LABORATORY | |
| Core/Elective: Core | L: T : P : C | 0 : 0 : 4 : 2 |
| Type : Practical | Total Contact hours: | 60 |

COURSE OBJECTIVES

The course is intended to:

1. Estimate the quantities for the given load bearing as well as framed structure.
2. Prepare the cost abstract for the quantities used in a given structure.
3. Estimate the quantities for irrigation and environmental structures.
4. Estimate the volume of earthwork for bituminous and concrete roads.
5. Determine the rent and depreciation value of a given building.

LIST OF EXPERIMENTS

1. Introduction to building components with detailed drawing.
2. Determine the rate for Damp proof course, RCC and plain concrete for various mix proportions with reference to the current schedule of rate.
3. Estimation of quantities for the given simple load bearing structures and give the cost abstract statement
4. Estimation of quantities for the given G+1 framed structures and give the cost abstract statement
5. Estimation of quantities for the given simple industrial building and give the cost abstract statement
6. Estimation of quantities for the given retaining wall.
7. Estimation of quantities for the given culvert
8. Estimation of quantities for the given septic tank and soak pit.
9. Estimation of quantities for bituminous and cement concrete roads
10. Estimate the quantities and calculate the rate for residential building with reference to the current schedule of rate.
11. Determination of rent for building.
12. Preparation of plan and costing using softwares for duplex residential building

COURSE OUTCOMES

At the end of the course, the students will be able to

- CO.1 Estimate the quantities for the given load bearing as well as framed structure.
- CO.2 Prepare the cost abstract for the quantities used in a given structure.
- CO.3 Estimate the quantities for irrigation and environmental structures.
- CO.4 Estimate the volume of earthwork for bituminous and concrete roads.
- CO.5 Determine the rent and depreciation value of a given building.

REFERENCES

1. Quantity Surveying and Estimation Lab Manual, Department of Civil Engineering, Dr. MCET, Pollachi.
2. Dutta, B.N., "Estimating and Costing in Civil Engineering", UBS Publishers & Distributors Pvt. Ltd., 28th Edition, 2016.
3. Kohli, D.D and Kohli, R.C., "A Text Book of Estimating and Costing (Civil)", S. Chand & Company Ltd, 2012
4. Chakraborti. M., "Estimating, Costing, Specification and Valuation in Civil Engineering", 24th edition 2012(Reprint 2013).
5. Schedule of Rate for the year 2018- 2019, Section I - Civil Engineering Section, Coimbatore Corporation
6. Schedule of Rate for the year 2018- 2019, Section II - Road Works, Coimbatore Corporation


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ENVIRONMENTAL ENGINEERING STREAM

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|-------------------------|---|---------------|
| Course Code : 16CEE01 | Course title : AIR POLLUTION MANAGEMENT | |
| Core/Elective: Elective | L : T : P : C | 3 : 0 : 0 : 3 |
| Type : Theory | Total Contact hours: | 45 |

COURSE OBJECTIVES

The course is intended to:

1. Brief the Classification, Sources and Effects of Air Pollutants
2. Illustrate the dispersion of air pollutants
3. Acquire the air pollution control techniques, strategy and equipments
4. Explain the standards, monitoring, and indices of air quality with case studies.
5. Explain the sources, characteristics, effects, assessment, control and prevention of noise pollution

UNIT I - CLASSIFICATION, SOURCES AND EFFECTS OF AIR POLLUTANTS 9

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.

UNIT II - DISPERSION OF POLLUTANTS 9

Elements of atmosphere – Meteorological factors – Wind roses – Lapse rate - Atmospheric stability and turbulence – Plume rise – Dispersion of pollutants – Dispersion models – Applications.

UNIT III - AIR POLLUTION CONTROL TECHNIQUES 9

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- Biological air pollution control technologies –Bioscrubers, Biofilters..

UNIT IV - AIR QUALITY MONITORING AND MANAGEMENT 9

Air quality standards – Air quality monitoring – Preventive measures - Air pollution control efforts – Zoning – Pollution control for specific major industries - Town planning regulation of new industries – Legislation and enforcement – Environmental Impact Assessment & Air quality.

UNIT V - NOISE POLLUTION 9

Sources of noise pollution – Definitions- Characteristics of noise and its measurement – Effects of noise – Assessment – Noise level Standards – Noise Abatement and Control methods – Prevention.

COURSE OUTCOMES

At the end of this course, students will be able to:

- CO.1 Brief the Classification, Sources and Effects of Air Pollutants
- CO.2 Illustrate the dispersion of air pollutants
- CO.3 Acquire the air pollution control techniques, strategy and equipments
- CO.4 Explain the standards, monitoring, and indices of air quality with case studies.
- CO.5 Explain the sources, characteristics, effects, assessment, control and prevention of noise pollution


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TEXT BOOKS:

1. Anjaneyulu. D., "Air Pollution and Control Technologies", Allied Publishers, Mumbai, 2002.
2. Rao. C.S. "Environmental Pollution Control Engineering", New Age International (P) Ltd., 2nd Edition, 2006.
3. Rao M.N. and Rao H. V. N., "Air Pollution Control", Tata McGraw-Hill, New Delhi, 1996

REFERENCE BOOKS:

1. W.L. Heumann, "Industrial Air Pollution Control Systems", Tata McGraw-Hill, New York, 1997
2. Mahajan S.P., "Pollution Control in Process Industries", Tata McGraw-Hill Publishing Company, New Delhi, 2009.
3. Peavy S.W., Rowe D.R. and Tchobanoglous G. "Environmental Engineering", Tata McGraw Hill, New Delhi, 1985.
4. Garg, S.K., "Environmental Engineering Vol. II", Khanna Publishers, New Delhi, 2010.

WEB REFERENCES:

1. <http://www.niehs.nih.gov/health/topics/agents/air-pollution/>
2. <http://newdelhi.usembassy.gov/airqualitydata.html>
3. <http://www.moef.nic.in/division/introduction-20>
4. <https://aqicn.org/links/>
5. <http://nptel.ac.in/courses/105104099/>


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|-------------------------|---------------------------------------|---------------|
| Course Code : 16CEE02 | Course title : ECOLOGICAL ENGINEERING | |
| Core/Elective: Elective | L : T : P : C | 3 : 0 : 0 : 3 |
| Type : Theory | Total Contact hours: | 45 |

COURSE OBJECTIVES

The course is intended to:

1. Explain the scope and applications of ecological principles.
2. Describe the ecosystem functions.
3. Apply the ecological principles in rehabilitation of ecosystems.
4. Estimate the various effects of industrialization on ecology.
5. Explain appropriate case studies of integrated ecological engineering systems.

UNIT I - PRINCIPLES AND CONCEPTS OF ECOSYSTEM

9

Scope and applications of Ecological Engineering - Development and evolution of ecosystems - principles and concepts pertaining to species, populations and community.

UNIT II - ECOSYSTEM FUNCTIONS

9

Energy flow and nutrient cycle - Food chain and food webs- biological magnification. Diversity and stability, immature and mature systems. Primary productivity- Biochemical cycling of nitrogen, phosphorous, sulphur and carbon dioxide: Habitat ecology- Terrestrial, fresh water, estuarine and marine habitats.

UNIT III - ECOLOGICAL ENGINEERING METHODS

9

Bio monitoring and its role in evaluation of aquatic ecosystem; Rehabilitation of ecosystems through ecological principles- step cropping, bio-wind screens, Wetlands, ponds, Root Zone Treatment for waste water, Reuse of treated waste water through ecological systems.

UNIT IV - ECOLOGICAL EFFECTS OF INDUSTRIALISATION

9

Ecological effects of exploration, production, extraction, processing, manufacture and transport.

UNIT V - CASE STUDIES

9

Case studies of integrated ecological engineering systems.

COURSE OUTCOMES

At the end of this course, students will be able to:

- CO.1 Explain the scope and applications of ecological principles.
- CO.2 Describe the ecosystem functions.
- CO.3 Apply the ecological principles in rehabilitation of ecosystems.
- CO.4 Estimate the various effects of industrialization on ecology.
- CO.5 Explain appropriate case studies of integrated ecological engineering systems.

TEXT BOOKS:

1. Odum, E.P., "Fundamentals of Ecology", W.B. Saunders, 1990.
2. Kormondy, E.J., "Concepts of Ecology", Prentice Hall, New Delhi, 1996.

REFERENCE BOOKS:

1. Patrick C Kangas., "Ecological Engineering Principles And Practices", Crc Press, 2005
2. Sven Erik, "Applications In Ecological Engineering", 2009.
3. Mitch, J.W., and Jorgensen, S.E., "Ecological Engineering - An Introduction to ecotechnology", John Willey & Sons, 1996.

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1. <http://ces.iisc.ernet.in/new/>
2. <http://www.environmentandecology.com/downloads>
3. <http://nptel.ac.in/courses/122102006/>


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|-------------------------|--|---------------|
| Course Code :16CEE03 | Course title : INDUSTRIAL WASTE MANAGEMENT | |
| Core/Elective: Elective | L: T : P : C | 3 : 0 : 0 : 3 |
| Type : Theory | Total Contact hours: | 45 |

PREREQUISITE: Environmental Science and Engineering

COURSE OBJECTIVES

The course is intended to:

1. Describe the generation of wastes and its minimization.
2. Explain the concept of waste audit and cleaner production.
3. Classify the major waste producing industries.
4. Illustrate the control techniques for recovery, reuse and disposal of wastes in Indian Industries.
5. Explain the hazardous waste management concept.

UNIT I - INTRODUCTION

9

Types of industries and industrial pollution – Characteristics of industrial wastes – Population equivalent – Bioassay studies – effects of industrial effluents on streams, sewer, land, sewage treatment plants and human health – Environmental legislations related to prevention and control of industrial effluents and hazardous wastes

UNIT II - CLEANER PRODUCTION

9

Waste management Approach – Waste Audit – Volume and strength reduction – Material and process modifications – Recycle, reuse and byproduct recovery – Applications.

UNIT III - POLLUTION FROM MAJOR INDUSTRIES

9

Sources, Characteristics, waste treatment flow sheets for selected industries such as Textiles, Tanneries, Pharmaceuticals, Electroplating industries, Dairy, Sugar, Paper, distilleries, Steel plants, Refineries, fertilizer, thermal power plants – Wastewater reclamation concepts

UNIT IV - TREATMENT TECHNOLOGIES

9

Equalization – Neutralization – Removal of suspended and dissolved organic solids - Chemical oxidation – Adsorption - Removal of dissolved inorganic – Combined treatment of industrial and municipal wastes – Residue management – Dewatering – Disposal

UNIT V - HAZARDOUS WASTE MANAGEMENT

9

Hazardous wastes - Physico chemical treatment –solidification – incineration – Dumping of solid waste; Secured land fill-site selection, design and operation of sanitary landfills– Leachate collection and treatment

COURSE OUTCOMES

At the end of this course, students will be able to:

- CO.1. Describe the generation of wastes and its minimization.
- CO.2. Explain the concept of waste audit and cleaner production.
- CO.3. Classify the major waste producing industries.
- CO.4 Illustrate the control techniques for recovery, reuse and disposal of wastes in Indian Industries.
- CO.5 Explain the hazardous waste management concept.


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TEXT BOOKS:

1. M.N. Rao & A.K. Dutta, "Wastewater Treatment", Oxford - IBH Publication, 1995.
2. W.W. Eckenfelder Jr., "Industrial Water Pollution Control", McGraw-Hill Book Company, New Delhi, 2000.
3. Mahajan, S.P., "Pollution Control in Process Industries", Tata McGraw Hill Publishing Company, New Delhi, 2009.

REFERENCE BOOKS:

1. T.T. Shen, "Industrial Pollution Prevention", Springer, 1999.
2. R.L. Stephenson and J.B. Blackburn, Jr., "Industrial Wastewater Systems Handbook", Lewis Publisher, New York, 1998
3. H.M. Freeman, "Industrial Pollution Prevention Hand Book", McGraw-Hill Inc., New Delhi, 1995
4. Bishop, P.L., "Pollution Prevention: Fundamental & Practice", McGraw-Hill, 2000

WEB REFERENCES:

1. <http://iwma.in/>
2. <https://www.epa.gov/sites/production/files>
3. <http://www.recyclenow.com/>



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| | | |
|-------------------------|---|---------------|
| Course Code : 16CEE04 | Course title : MUNICIPAL SOLID WASTE MANAGEMENT | |
| Core/Elective: Elective | L: T : P : C | 3 : 0 : 0 : 3 |
| Type : Theory | Total Contact hours: | 45 |

PREREQUISITE: Environmental Science and Engineering

COURSE OBJECTIVES

The course is intended to:

1. Explain the different types and sources of municipal solid waste.
2. Demonstrate the reduction of waste at source and storage methods for municipal solid waste.
3. Explain the different methods of collection and transport of municipal solid waste.
4. Describe the various methods for processing municipal solid waste.
5. Distinguish the different aspects of the disposal of municipal solid waste.

UNIT I - SOURCES AND TYPES

9

Sources and types of municipal solid wastes-Waste generation rates-factors affecting generation, characteristics-methods of sampling and characterization; Effects of improper disposal of solid wastes-Public health and environmental effects. Elements of solid waste management – Municipal solid waste (M&H) rules- Integrated management.- Social and Financial aspects; Public awareness; Role of NGO's.

UNIT II - SOURCE REDUCTION AND ON-SITE STORAGE

9

Source reduction of waste- Reduction, Reuse and Recycling - On-site storage methods- Effect of storage, materials used for containers- segregation of solid wastes – Public health and economic aspects of open storage – waste segregation and storage – case studies under Indian conditions –Critical Evaluation of Options.

UNIT III - COLLECTION AND TRANSFER

9

Methods of Residential and commercial waste collection – Collection vehicles – Manpower – Collection routes – Analysis of collection systems; Transfer stations – Selection of location, operation & maintenance; options under Indian conditions – Field problems – solving.

UNIT IV - PROCESSING OF WASTES

9

Objectives of waste processing – Physical Processing techniques and Equipments; Resource recovery from solid waste composting and biomethanation composting, Thermal processing options-incineration, Pyrolysis; case studies under Indian conditions.

UNIT V - DISPOSAL

9

Land disposal of solid waste; Sanitary landfills – site selection, design and operation of sanitary landfills –Landfill liners – Leachate collection & treatment-Management of leachate and landfill gas – Land fill bioreactor.-Dumpsite Rehabilitation.

COURSE OUTCOMES

At the end of this course, students will be able to:

- CO.1 Explain the different types and sources of municipal solid waste.
- CO.2 Demonstrate the reduction of waste at source and storage methods for municipal solid waste.
- CO.3 Explain the different methods of collection and transport of municipal solid waste.
- CO.4 Describe the various methods for processing municipal solid waste.
- CO.5 Distinguish the different aspects of the disposal of municipal solid waste.

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TEXT BOOKS:

1. George Tchobanoglous and Frank Kreith - (2002). Handbook of Solid waste Management, McGraw Hill, New York.
2. Paul T Williams (2000), Waste Treatment and Disposal, John Wiley and Sons

REFERENCE BOOKS:

1. Manual on Municipal Solid Waste Management, CPHEEO, Ministry of Urban Development, Government of India, New Delhi, 2000.
2. Bhide A.D. and Sundaresan, B.B. Solid Waste Management Collection, Processing and Disposal, 2001, ISBN 81-7525-282-0
3. Manser A.G.R and Keeling A.A (1996) , Practical Handbook of Processing and Recycling of Municipal solid Wastes, Lewis Publishers, CRC Press

WEB REFERENCES:

1. <http://nswaienviis.nic.in/>
2. <http://nptel.ac.in/courses/120108005/>
3. <http://www.moef.nic.in/legis/hsm/mswmhr.html>
4. http://moud.gov.in/advisory/swm_manual


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STRUCTURAL ENGINEERING STREAM

| | | |
|-------------------------|--|---------------|
| Course Code : 16CEE05 | Course title : PRESTRESSED CONCRETE STRUCTURES | |
| Core/Elective: Elective | L : T : P : C | 3 : 0 : 0 : 3 |
| Type : Theory | Total Contact hours: | 45 |

PREREQUISITE: Design of RC Elements
Concrete Technology

COURSE OBJECTIVES

The course is intended to:

1. Describe general principle in the principle of prestressing
2. Design the members for flexure and shear
3. Analyze and design of continuous beams
4. Design the tension and compression members
5. Analyze and Design the composite members

UNIT I - PRINCIPLES OF PRESTRESSING

9

Principles of Prestressing, Analysis of prestress – Concentric and eccentric tendons – resultant stresses - Types and systems of prestressing. Concepts of prestressing – stress, strength and load balancing. Need for High Strength materials, Losses, deflection (short-long term), camber, cable layouts.

UNIT II - DESIGN OF MEMBERS FOR FLEXURE AND SHEAR

9

Behaviour of flexural members, determination of ultimate flexural strength – Codal provisions - Design of flexural members, Design for shear, bond and torsion. Design of end blocks.

UNIT III - DESIGN OF CONTINUOUS BEAMS

9

Analysis and design of continuous beams - Methods of achieving continuity – concept of linear transformations, concordant cable profile and gap cables

UNIT IV - DESIGN OF TENSION AND COMPRESSION MEMBERS

9

Design of tension members - application in the design of prestressed pipes and prestressed concrete cylindrical water tanks - Design of compression members with and without flexure - its application in the design piles and flag masts.

UNIT V - DESIGN OF COMPOSITE MEMBERS

9

Composite beams - analysis and design, longitudinal shear transfer, ultimate strength - their applications. Partial prestressing - its advantages and applications.

COURSE OUTCOMES

At the end of this course, students will be able to:

- CO.1 Describe general principle in the principle of prestressing
- CO.2 Design the members for flexure and shear
- CO.3 Analyze and design of continuous beams
- CO.4 Design the tension and compression members
- CO.5 Analyze and Design the composite members

TEXT BOOKS:

1. Krishna Raju, Prestressed Concrete, Tata McGraw Hill Publishing Co, New Delhi, 2000.
2. Lin. T. Y. and Burns Ned. H., Design of Prestressed Concrete Structures, John Wiley and Sons, New York, 2009.


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REFERENCE BOOKS:

1. Nilson Arthur. H., Design of Prestressed Concrete, John Wiley and Sons, New York, 2004
2. Guyon. Y., Prestressed Concrete, Vols I and II, C. R. Books Ltd., London, 2008
3. Rajagopalan.N, Prestressed Concrete, Narosa Publications, New Delhi, 2008.
4. IS: 1343 – 1980, "IS Code of Practice for Concrete", BIS, New Delhi, 1980.

WEB REFERENCES:

1. <http://www.nptelvideos.in/2012/11/prestressed-concrete-structures.html>
2. <https://www.youtube.com/watch?v=4KYPItsNAWs>
3. <https://www.youtube.com/playlist?list=PLB50EF6A79D1F8C14>
4. <http://www.nptel.ac.in/courses/105106117/>



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|-------------------------|----------------------------------|---------------|
| Course Code : 16CEE06 | Course title : BRIDGE STRUCTURES | |
| Core/Elective: Elective | L : T : P : C | 3 : 0 : 0 : 3 |
| Type : Theory | Total Contact hours: | 45 |

PREREQUISITE: Design of RC Elements

COURSE OBJECTIVES

The course is intended to:

1. Explain the concepts of IRC loadings and design of various truss girder used as Highway bridges
2. Perform the design of various steel plate girder bridges used as railway bridge
3. Describe the IRC loading and design the various concrete bridges
4. Design the aqueducts, box culverts and composite bridges
5. Apply the Concepts of prestressed concrete bridges and design the prestressed concrete bridges

UNIT I - HIGHWAY STEEL BRIDGES

9

Design of through type steel highway bridges for IRC loading – Design of stringers, cross girders and main girders – Design of deck type steel highway bridges for IRC loading – Design of main girders – Design of pratt type truss girder highway bridges – Design of top chord, bottom chord, web members – Effect of repeated loading.

UNIT II - RAILWAY STEEL BRIDGES

9

Design of plate girder railway bridges for railway loading – Wind effects – Design of web and flange plates – Vertical and horizontal stiffeners – Web and flange splicing.

UNIT III - REINFORCED CONCRETE BRIDGES

9

Types of Bridges - Design of solid slab bridges for IRC loading - Design of kerb – Design of tee beam bridges – Design of panel and cantilever for IRC loading – Design of tee beams - Courbon's theory – Pigeaud's curves – Design of balanced cantilever bridges – Deck slab- Main girder – Design of cantilever – Design of articulation

UNIT IV - AQUEDUCTS, BOX CULVERTS AND COMPOSITE BRIDGES

9

Design of Aqueducts and Syphon Aqueducts – Design of Box Culverts – Design of composite bridges – composite action - shear connectors – design of concrete deck slab – design of composite section – design of steel plate girders

UNIT V - PRESTRESSED CONCRETE BRIDGES

9

Design of prestressed concrete bridges – Preliminary dimensions – Flexural and torsional parameters – Courbon's theory – Distribution coefficient by exact analysis – Design of girder section – Maximum and minimum prestressing forces – Eccentricity – Live load and dead load shear forces – Cable zone in girder – Check for stresses at various sections – Check for diagonal tension – Diaphragms – End block – Short term and long term deflections.

COURSE OUTCOMES

At the end of this course, students will be able to:

- CO.1 Explain the concepts of IRC loadings and design of various truss girder used as Highway bridges
- CO.2 Perform the design of various steel plate girder bridges used as railway bridge
- CO.3 Describe the IRC loading and design the various concrete bridges
- CO.4 Design the aqueducts, box culverts and composite bridges
- CO.5 Apply the Concepts of prestressed concrete bridges and design the


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prestressed concrete bridges

TEXT BOOKS:

1. Johnson Victor, D., Essentials of Bridge Engineering, Oxford and IBH Publishing Co., New Delhi 1995
2. Ponnuswamy S., Bridge Engineering, Tata McGraw Hill, New Delhi, 1996.
3. Phatak D.R., Bridge Engineering, SatyaPrakashan, New Delhi, 1990.

REFERENCE BOOKS:

1. Dr. Punmia B. C., Ashok Kumar, Jain and Arun Kumar Jain, R.C.C. Designs, Laxmi Publications 2000

WEB REFERENCES:

3. <http://ocw.mit.edu/courses/civil-and-environmental-engineering/1-051-structural-engineering-design-fall-2003/lecture-notes/>
4. http://nptel.ac.in/courses/105106113/9_bridges/1_introduction.pdf



BoS Chairman

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|-------------------------|--|---------------|
| Course Code : 16CEE07 | Course title : COMPUTER AIDED DESIGN OF STRUCTURES | |
| Core/Elective: Elective | L : T : P : C | 3 : 0 : 0 : 3 |
| Type : Theory | Total Contact hours: | 45 |

PREREQUISITE: Design of RC Elements
Computer Aided Design and Drafting Laboratory.

COURSE OBJECTIVES

The course is intended to:

1. Get them know about graphic primitives
2. Describe the knowledge about optimization and design principles
3. Explain finite element method and to apply for simple problems
4. Apply the use of standard software packages for analysis
5. Identifying the various structural analysis packages

UNIT I - INTRODUCTION

9

Fundamentals of CAD - Hardware and Software requirements - Design process - Application and benefits - drafting packages - Applications to layout of buildings and structures, use of AUTOCAD. Introduction of design softwares and their application

UNIT II - DESIGN & OPTIMIZATION

9

Principles of design of steel and RC structures - Applications to simple design problems - optimization techniques - user interactive format, input, output techniques - Display techniques - Sever control techniques and feedback systems- Design & optimization softwares introduction only.

UNIT III - INTRODUCTION TO FINITE ELEMENT ANALYSIS

9

Fundamentals of a Finite Element Analysis - Steps involved - Boundary value problems - Galerkin's approach - Variational principles - Isoparametric formulations - field application - Finite Element Division, Element matrix - assemblage, matrix and solution for deflection - Stresses & Strains - Simple problem using triangular elements.

UNIT IV - STRUCTURAL ENGINEERING PACKAGES

9

Introduction of various structural engineering packages - Analysis and design of structures by using softwares

UNIT V - ANALYSIS OF STRUCTURES BY FINITE ELEMENT METHOD

9

Analysis of plane truss, space truss, plane frames, space frames using FEM packages

COURSE OUTCOMES

At the end of this course, students will be able to:

- CO.1 Get them know about graphic primitives
- CO.2 Describe the knowledge about optimization and design principles
- CO.3 Explain finite element method and to apply for simple problems
- CO.4 Apply the use of standard software packages for analysis
- CO.5 Identifying the various structural analysis packages

TEXT BOOKS:

1. Krishnamoorthy C.S. and Rajeev .S, "Computer Aided Design", - Narosa Publishing House, New Delhi 1991
2. Rajasekaran S., "Finite Element Analysis", - A.H. Wheelers Publishing Co. Ltd., 1993


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3. S.S.Rao, "The Finite Element Method in Engineering", Fourth Edition, Elsevier,2006

REFERENCE BOOKS:

1. Grover M.P. and ZimmersE.W.Jr. CAD/CAM, "Computer Aided Design and Manufacturing", - Prentice Hall of India Ltd., 1996
2. Harrison H.B. "Structural Analysis and Design, Parts I and II"- Pergamon Press, Oxford, 1970
3. Rao, S.S. "Optimization Theory and Applications" - Wiley Eastern Ltd. New Delhi 1977
4. AUTOCAD Manual, 2000
5. Reddy, "Finite Element Methods", II Edition. - McGraw Hill Co., 1993

WEB REFERENCES:

1. <http://www.nptelvideos.in/2012/12/computer-aided-design.html>
2. http://web.iitd.ac.in/~hegde/cad/lecture/L01_Introduction.pdf
3. <http://nptel.ac.in/courses/105105041/>

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|-------------------------|---|---------------|
| Course Code : 16CEE08 | Course title : DESIGN OF PLATE AND SHELL STRUCTURES | |
| Core/Elective: Elective | L : T : P : C | 3 : 0 : 0 : 3 |
| Type : Theory | Total Contact hours: | 45 |

PREREQUISITE: Structural Analysis II

COURSE OBJECTIVES

The course is intended to:

1. Derive the governing equations for thin plates with small deflection
2. Compute the response of rectangular plates due to external loading
3. Explain thin shells and their behaviour
4. Analyze different types of shells for external loading
5. Design the domes, conical shells and cylindrical shells

UNIT I - THIN PLATES WITH SMALL DEFLECTION

9

Laterally loaded thin plates - Governing differential equation, various boundary conditions.

UNIT II - RECTANGULAR PLATES

9

Simply supported rectangular plates - Navier solution and Levy's method – Loading.

UNIT III - THIN SHELLS

9

Classification of shells - Types of shells - Structural action.

UNIT IV - ANALYSIS OF SHELLS

9

Shells of revolution – Spherical dome, Conical shell and ellipsoid of revolution – Shells of translation – Cylindrical shell and Hyperbolic paraboloid.

UNIT V - DESIGN OF SHELLS

9

Spherical dome, Conical shell and cylindrical shell.

COURSE OUTCOMES

At the end of this course, students will be able to:

- CO.1 Derive the governing equations for thin plates with small deflection
- CO.2 Compute the response of rectangular plates due to external loading
- CO.3 Explain thin shells and their behaviour
- CO.4 Analyze different types of shells for external loading
- CO.5 Design the domes, conical shells and cylindrical shells

TEXT BOOKS:

1. Timoshenko, S. and Krieger S.W., "Theory of Plates and Shells", McGraw Hill, 1993.
2. Ramasamy, G.S., "Design and Construction of Concrete Shells Roofs", CBS Publishers and Distributors, New Delhi, 1996.

REFERENCE BOOKS:

1. Billington D.P., "Thin Shell Concrete Structures", McGraw Hill, 1995
2. Chatterjee B.K., "Theory and design of Concrete Shells", Oxford and IBH Publishing Co., New Delhi, 1998
3. Szilard, R., "Theory and Analysis of Plates", Prentice Hall Inc., 1995

WEB REFERENCES:

1. <https://www.ethz.ch/content/specialinterest/baug/institute-ibk/structural-design-existing-structures/en/studium/vorlesungen/flaechentragwerke.html>
2. <http://nptel.ac.in/courses/105105041/m6l37.pdf>


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3. <https://ocw.mit.edu/courses/mechanical-engineering/2-081j-plates-and-shells-spring-2007/readings/lecturenote.pdf>
4. http://www.math.uci.edu/~fwan/pdf/65_theoryofthinelasticshellsnotes.pdf
5. [http://www.unipune.ac.in/Syllabi_PDF/revised_2013/engg/ME%20Civil%20\(Structures%20Engg.\).pdf](http://www.unipune.ac.in/Syllabi_PDF/revised_2013/engg/ME%20Civil%20(Structures%20Engg.).pdf)
6. <http://www.nptelvideos.in/2012/12/marine-construction-welding.html>

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|-------------------------|--------------------------------------|---------------|
| Course Code : 16CEE09 | Course title : INDUSTRIAL STRUCTURES | |
| Core/Elective: Elective | L: T : P : C | 3 : 0 : 0 : 3 |
| Type : Theory | Total Contact hours: | 45 |

PREREQUISITE: Design of Steel Structures
Design of RC Elements

COURSE OBJECTIVES

The course is intended to:

1. Plan and prepare the layout for an industrial structure
2. Decide the utility requirements for an industrial structure.
3. Design the various elements of an industrial steel structure.
4. Design the various elements of a RC industrial structure
5. Plan and outline the prefabrication process for various elements of an industrial structure.

UNIT I - PLANNING OF INDUSTRIES

9

Classification of Industries and Industrial structures - General requirements for industries like cement, chemical and steel plants – site layout - Planning of Industrial structures – steel plant, cement and refinery industries

UNIT II - UTILITY REQUIREMENTS

9

Lighting - Illumination levels – Characteristics of Good lighting – Principles of day lighting design – Artificial lighting Ventilation – Passive and active ventilation – principles of ventilation system - Fire safety and electrical installations - Guidelines from factories etc.

UNIT III - DESIGN OF STEEL STRUCTURES

9

Industrial roof structures – truss system - different components of steel roof trusses - design of structural roof components – gable frames - Design of steel gable frame with knee joint – steel bunkers and silos – design of steel bunker and silo – design of crane girder – design concept of mill buildings

UNIT IV - DESIGN OF RC STRUCTURES

9

General components of RC bunkers and silos - Design of silos and bunkers – Components of RC chimney – different stresses in RC chimney wall - Design of RC chimney – types of cooling tower – various parts – design of cooling tower

UNIT V - BASICS OF PREFABRICATION

9

Principles of Prefabrication - - advantages and limitations - functional requirements of precast concrete units - beams - columns - walls - roof trusses - footings - joints in prefabricated elements - erection of precast elements.

COURSE OUTCOMES

At the end of this course, students will be able to:

- CO.1 Plan and prepare the layout for an industrial structure
- CO.2 Decide the utility requirements for an industrial structure.
- CO.3 Design the various elements of an industrial steel structure.
- CO.4 Design the various elements of a RC industrial structure
- CO.5 Plan and outline the prefabrication process for various elements of an industrial structure.

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TEXT BOOKS:

1. Dayaratnam. P, "Design of Concrete Structure", S. Chand and Co., New Delhi, 2004
2. Subramanian, N. "Design of Steel Structures", Oxford University Press, NewDelhi,2008
3. Krishna Raju, "Advanced Concrete Structures", McGraw Hill, New Delhi, 2005
4. Bhavikatti.S.S., "Design of Steel Structures", J.K. International Publishing House Pvt. Ltd., 2009

REFERENCE BOOKS:

1. Edwin H. Gaylord, Charles N. Gaylord. Japes R. Stallmeyer, "Steel Structures", McGraw Hill, NewDelhi, 1995
2. S.K. Duggal, "Design of Steel Structures", McGraw Hill, New Delhi, Second Edition, 1996
3. S. Arya and J.L. Ajmani, "Design of Steel Structures", New Chand and Bros, Roorkee
4. Lothers, Structural Design in Steel, Prentice Hall, 1986
5. Ramamrutham.S., "Design of Reinforced Concrete Structures", DhanpatRai Publishing Company, 2007.
6. Varghese.P.C., "Limit State Design of Reinforced Concrete", PHI, Eastern Economy Editions, 2nd Edition, 2003.
7. Handbook on "Functional Requirements of Industrial buildings", SP32–1986, Bureau of Indian Standards, 1990.

WEB REFERENCES:

1. <https://www.peri.in/projects/industrial-structures.html>
2. http://www.freyssinet.com/freyssinet/wfreyssinet_en.nsf/sb/repair.industrial-structures
3. http://authors.library.caltech.edu/26539/1/Tangshan/Volume4_Chapter_6.pdf
4. <http://nptel.ac.in/courses/105106113/3>
5. <http://nptel.ac.in/downloads/105106113/>
6. <http://www.nptelvideos.in/2012/11/advanced-structural-analysis.html>

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|-------------------------|---|---------------|
| Course Code : 16CEE10 | Course title : MAINTENANCE AND REHABILITATION OF STRUCTURES | |
| Core/Elective: Elective | L : T : P : C | 3 : 0 : 0 : 3 |
| Type : Theory | Total Contact hours: | 45 |

PREREQUISITE: Construction Materials and Methods II - Concrete Technology

COURSE OBJECTIVES

The course is intended to:

1. Explain the maintenance and repair strategies
2. Outline the serviceable and durable characterization of concretes under thermal and corrosive environment
3. Explain repair techniques for different materials
4. Apply the principles of repair, rehabilitation and retrofitting of structures
5. Describe the modern demolition methods used in fields

UNIT I - MAINTENANCE AND REPAIR STRATEGIES

9

Maintenance, repair and rehabilitation, Facets of Maintenance, importance of Maintenance various aspects of Inspection, Assessment procedure for evaluating a damaged structure, causes of deterioration.

UNIT II - SERVICEABILITY AND DURABILITY OF CONCRETE

9

Quality assurance for concrete construction concrete properties - strength, permeability, thermal properties and cracking. - Effects due to climate, temperature, chemicals, corrosion - design and construction errors - Effects of cover thickness and cracking

UNIT III - REPAIR MATERIALS AND TECHNIQUES

9

Special concretes and mortar, concrete chemicals, special elements for accelerated strength gain, Expansive cement, polymer concrete, sulphur infiltrated concrete, ferro cement, Fibre reinforced concrete. Rust eliminators and polymers coating for rebars during repair, foamed concrete, mortar and dry pack, vacuum concrete, Guniting and Shotcrete, Epoxy injection, Mortar repair for cracks

UNIT IV - REPAIRS, REHABILITATION AND RETROFITTING OF STRUCTURES

9

Strengthening of super structures, Sub structures – Increasing the load carrying capacity of footing - Repairs to overcome low member strength, Deflection, Cracking, Chemical disruption, weathering corrosion, wear, fire, leakage and marine exposure - shoring and underpinning. Methods of corrosion protection, corrosion inhibitors, corrosion resistant steels, coatings and cathodic protection.

UNIT V - DEMOLITION TECHNIQUES

9

Introduction – Planning, precautions and protective measures in demolition works – Sequences of operations – Demolition of structural elements - Engineered demolition techniques for dilapidated structures - case studies

COURSE OUTCOMES

At the end of this course, students will be able to:

- CO.1 Explain the maintenance and repair strategies
- CO.2 Outline the serviceable and durable characterization of concretes under thermal and corrosive environment

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- CO.3 Explain repair techniques for different materials
CO.4 Apply the principles of repair, rehabilitation and retrofitting of structures
CO.5 Describe the modern demolition methods used in fields

TEXT BOOKS:

1. Dayarathnam. P and Rao. R, "Maintenance and Durability of Concrete Structures", University Press, India 2015
2. Denison Campbell, and Allen and Harold Roper, "Concrete Structures, Materials, Maintenance and Repair", Longman Scientific and Technical UK, 2001
3. Allen R.T. and Edwards S.C., "Repair of Concrete Structures", Blakie and Sons, UK, second Edition, 2004
4. Vidivelli. B; Rehabilitation of Concrete Structures, Standard Publishers Distributors, New Delhi, 2009
5. Gupta B.L. and Amit Gupta, " Maintenance and Repair of Civil Structures", Standard Publishers Distributors, 2009

REFERENCE BOOKS:

1. Gambhir M.L., Concrete Technology - Theory and Practice, Tata McGraw Hill, New Delhi, Third Edition, 2013.
2. Santhakumar, A.R., Training Course notes on Damage Assessment and repair in Low Cost Housing , "RHDC-NBO" Anna University, July 1992.
3. Palaniappan. N, Estate Management, Anna Institute of Management, Chennai, 2002
4. CPWD and Indian Building Concepts, Hand Book on Seismic Retrofit of Buildings, Narosa Publishers, 2008.
5. Dodge Woodson. R "Concrete Structures – Protection, Repair and Rehabilitation", Elsevier, Butterworth – Heinmann, UIC 2009.

WEB REFERENCES:

1. http://fmcet.in/CIVIL/CE2071_uw.pdf
2. <https://theconstructor.org/concrete/repair-rehabilitation-concrete-structure-failure-damage/13870/>
3. <https://www.vidyarthiplus.com/vp/attachment.php?aid=22642>



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|-------------------------|---|---------------|
| Course Code : 16CEE11 | Course title : PREFABRICATED STRUCTURES | |
| Core/Elective: Elective | L : T : P : C | 3 : 0 : 0 : 3 |
| Type : Theory | Total Contact hours: | 45 |

**PREREQUISITE: Design of Steel Structures
Design of RC Elements**

COURSE OBJECTIVES

The course is intended to:

1. Illustrate the concept of prefabrication
2. Explain the components of prefabrication like roof, wall panel and column etc
3. Describe the design principles involves in the prefabrication
4. Explain the details and principles of the joints in the structural members
5. Design the different connections for abnormal loads

UNIT I - INTRODUCTION

9

Components with monolithic construction of prefabrication Need for prefabrication - Principles - Materials - Modular co-ordination – Standardization –Systems Production – Transportation –handling- Erection- Elimination of handling and erection stresses

UNIT II - PREFABRICATED COMPONENTS

9

Planning for components of prefabrication structures- Behaviour of structural components – Large panel constructions – Construction of roof and floor slabs Wall panels – Columns – Shear walls- Provisions for non-structural fastenings

UNIT III - DESIGN PRINCIPLES

9

Disuniting of structures – Design of cross section based on efficiency of material used - Problems in design because of joint flexibility – Allowance for joint deformation- Design of simple rectangular beams and I beams

UNIT IV - JOINTS IN STRUCTURAL MEMBERS

9

Joints for different structural connections – Dimensions and detailing – Design of expansion joints-Jointing Materials.

UNIT V - DESIGN FOR ABNORMAL LOADS

9

Progressive collapse – Codal provisions – Equivalent design loads for considering abnormal effects such as earthquakes, cyclones etc., - Importance of avoidance of progressive collapse.

COURSE OUTCOMES

At the end of this course, students will be able to:

- CO.1 Illustrate the concept of prefabrication
- CO.2 Explain the components of prefabrication like roof, wall panel and column etc
- CO.3 Describe the design principles involves in the prefabrication
- CO.4 Explain the details and principles of the joints in the structural members
- CO.5 Design the different connections for abnormal loads

TEXT BOOKS:

1. Gerostiza C.Z., Hendrikson C. and Rehat D.R., Knowledge Based Process Planning for Construction and Manufacturing, Academic Press Inc., 1989


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2. Koncz T., Manual of Precast Concrete Construction, Vols. I, II and III, Bauverlag, GMBH, 1971.
3. Structural Design Manual, Precast Concrete Connection Details, Society for the Studies in the Use of Precast Concrete, Netherland BetorVerlag, 1978.
4. ICI publication – pre fab book - refer

REFERENCE BOOKS:

1. Building Materials and Components, CBRI, , India, 1990.
2. Glover C.W, "Structural Precast Concrete", Asia Publishing House, 1965
3. M. Levitt, "Precast Concrete Material, Manufacture, Properties and Usage" Applied Science Publishers Ltd., 1982.
4. IS 15916

WEB REFERENCES:

1. <http://nptel.ac.in/courses/105108075/11>
2. <http://nptel.ac.in/courses/105108075/10>
3. http://nptel.ac.in/Clarify_doubts.php.subjectId=105108075&lectureId=10


BoS Chairman

| | | |
|-------------------------|-----------------------------------|---------------|
| Course Code : 16CEE12 | Course title : STORAGE STRUCTURES | |
| Core/Elective: Elective | L: T : P : C | 3 : 0 : 0 : 3 |
| Type : Theory | Total Contact hours: | 45 |

PREREQUISITE: Design of Steel Structures
Design of RC Elements

COURSE OBJECTIVES

The course is intended to:

1. Design the Steel Water tanks including pressed steel tanks.
2. Design and Detailing of circular and rectangular water tanks.
3. Analyze and Design the steel bunkers and silos.
4. Analyze and Design of Concrete bunkers and silos
5. Explain principles of prestressing and apply design concepts on prestressed concrete structures

UNIT I - STEEL WATER TANKS

9

Design of rectangular steel water tank – Tee covers – Plates – Stays – Longitudinal and transverse beams – Design of Staging – Base plates – Foundation and anchor bolts – Design of pressed steel water tank – Design of stays – Joints – Design of hemispherical bottom water tank – Side plates – Bottom plates – Joints – Ring girder – Design of staging.

UNIT II - CONCRETE WATER TANKS

9

Design of circular tanks – Hinged and Fixed at the base IS method of calculating shear forces and moments – Hoop tension – Design of intze tank – Dome – Ring girders – Conical dome – Staging – Bracings – Design of rectangular tanks – Approximate method and IS methods – Design of underground tanks – Design of base slab and side wall – Check for uplift.

UNIT III - CONCRETE BUNKERS AND SILOS

9

Design of square bunker – Side walls – design of pyramidal hopper bottom – Top and bottom longitudinal edge beams – Design of Cylindrical silo- wall portion – Design of conical hopper bottom – Ring beam at junction.

UNIT IV - STEEL BUNKERS AND SILOS

9

Design of Square bunker – Jansen's and Airy's theories – IS codal provisions – Design of side plates – Stiffeners – design of hopper bottom – Longitudinal beams – Design of cylindrical silo – Side plates – Ring girder – Stiffeners.

UNIT V - PRESTRESSED CONCRETE WATER TANKS AND FOUNDATION

9

Principles of circular prestressing – Design of prestressed concrete circular water tanks. Design of foundation -Design of various types of foundation like isolated, combined and raft foundation for a Water tanks, Bunkers and Silo's.

COURSE OUTCOMES

At the end of this course, students will be able to:

- CO.1 Design the Steel Water tanks including pressed steel tanks.
- CO.2 Design and Detailing of circular and rectangular water tanks.
- CO.3 Analyse and Design the steel bunkers and silos.
- CO.4 Analyse and Design of Concrete bunkers and silos
- CO.5 Explain principles of prestressing and apply design concepts on prestressed concrete structures

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TEXT BOOKS:

1. Rajagopalan K., Storage structures, Tata McGraw Hill, New Delhi, 1989.
2. Krishna Raju N., Advanced Reinforced Concrete Design, CBS Publishers and Distributors, New Delhi, 1988.

REFERENCE BOOKS:

1. Ram Chandra and VirendraGehlot, Design of Steel structures Vol – II Scientific Publishers(India), Jodhpur, 2007
2. Anand .S. Arya and J.L. Ajmani, Design of Steel structures , Nemchand& Bros,Roorkee,2007
3. B.C. Punmia, Ashokkumar Jain and Arunkumar Jain, RCC Designs, Laxmi Publications(P) Ltd, New Delhi, 2006

WEB REFERENCES:

1. <http://ethesis.nitrkl.ac.in/108/1/10401010.pdf>
2. http://www.iitk.ac.in/nicee/wcee/article/13_3017.pdf



BoS Chairman

| | | |
|-------------------------|-------------------------------|---------------|
| Course Code : 16CEE13 | Course title : TALL BUILDINGS | |
| Core/Elective: Elective | L: T : P : C | 3 : 0 : 0 : 3 |
| Type : Theory | Total Contact hours: | 45 |

PREREQUISITE: Structural Analysis II

Design of RC Elements

COURSE OBJECTIVES

The course is intended to:

1. Describe the essentials of tall building and its components
2. Describe different types of loads and their computations
3. Classify various structural systems for medium rise buildings and analyze their behaviour
4. Classify various structural systems for high rise buildings and analyze their behaviour.
5. Describe the concept of stability analysis of various systems

UNIT I - INTRODUCTION

9

Design Philosophy- vertical city concepts - Essential amenities - Fire safety -Water supply - Drainage and garbage disposal - Service systems - Structural and Foundation systems - Factors affecting height, growth and Structural form- materials – high performance concrete, fibre reinforced concrete, light weight concrete

UNIT II - LOADS

9

Gravity Loading - Dead and Live Load - Reduction of Live Load- Impact and Construction Loads. Wind loading -.Static and Dynamic Approach, Analytical method-Earthquake loading - Equivalent Lateral Force- Combination of loading.

UNIT III - BEHAVIOUR OF MEDIUM RISE BUILDINGS

9

Behaviour of Medium rise structures -Vertical and Horizontal load resistant systems - Rigid frames - Infilled frames - Approximate Analysis

UNIT IV - BEHAVIOUR OF HIGH RISE BUILDINGS

9

Behaviour of High rise structures -Vertical and Horizontal load transfer systems - Braced frames - Shear walls - Wall frames - Tubular systems - Outrigger-braced systems- Approximate Analysis methods.

UNIT V - STABILITY ANALYSIS AND DESIGN OF TALL BUILDINGS

9

Stability Analysis (Qualitative Treatment only) - Overall buckling analysis of frames, Wall frames, approximate methods, P- effects and various methods of analysis - Influence of foundation instability – Elastic Deformations. Design for various secondary effects - Creep, Shrinkage and Temperature, fire resistance

COURSE OUTCOMES

At the end of this course, students will be able to:

- CO.1 Describe the essentials of tall building and its components
- CO.2 Describe different types of loads and their computations
- CO.3 Classify various structural systems for medium rise buildings and analyze their behaviour
- CO.4 Classify various structural systems for high rise buildings and analyze their behaviour.
- CO.5 Describe the concept of stability analysis of various systems


BoS Chairman

TEXT BOOKS:

1. Taranath. B.S. , Structural Analysis and Design of Tall Buildings, McGraw Hill co., 1988
2. Bryan Stafford Smith and Alex Coull, " Tall Building Structures ", -Analysis and Design, John Wiley and Sons, Inc., 1991

REFERENCE BOOKS:

1. Lynn. S. Beedle, Advances in Tall Buildings, CBS Publishers and Distributers, New Delhi, 2001
2. Lin.T.Y. and StotesBurry.D, Structural Concepts and Systems for Architects and Engineers, John Wiley & Sons, 1988
3. Dr.Gupta.Y.P, mEditor, Proceedings of National Seminar on High Rise Structures- Design and construction Practices for Middle Level Cities, Nov.14-16,1955, New Age International Pub. Ltd., Chennai.

WEB REFERENCES:

1. http://nptel.ac.in/courses/105106113/3_multi_storey/2_loading.pdf
2. http://nptel.ac.in/courses/105106113/3_multi_storey/1_introduction.pdf
3. http://nptel.ac.in/courses/105106113/2_industrial_building/1_introduction.pdf
4. http://nptel.ac.in/courses/105106113/3_multi_storey/6_structural_forms.pdf


BoS Chairman

REMOTE SENSING STREAM

| | | |
|-------------------------|-------------------------------------|---------------|
| Course Code : 16CEE14 | Course title : ELECTRONIC SURVEYING | |
| Core/Elective: Elective | L : T : P : C | 3 : 0 : 0 : 3 |
| Type : Theory | Total Contact hours: | 45 |

PREREQUISITE:16CET35 SURVEYING

COURSE OBJECTIVES

The course is intended to:

1. Brief the fundamental principles of EDM
2. Explain the basic concepts about the electronics related to measuring devices
3. Explain the basics of electromagnetic waves and their properties for the application of measuring technology.
4. Describe the measuring technology using the EDM compared with the traditional methods.
5. Illustrate the EDM technology and other modern instruments with field applications.

UNIT I - FUNDAMENTALS

9

Methods of measuring distance, Basic Principles of Electronic Distance Measurement, Historical Development Classifications, applications and comparison with conventional surveying.

UNIT II - BASIC ELECTRONICS

9

Oscillators (Crystal controlled and Gunn diode) Kerrcell / Pockel's modulator, Frequency mixing, modulation and Demodulation Measurement of phase differences, reflectors (Corner, Antenna), Transducers and power sources.

UNIT III - ELECTROMAGNETIC WAVES

9

Classification and applications of Electromagnetic waves, propagation properties, wave propagation at lower and higher frequencies. Refractive index, factors affecting RI, Computation of group refractive index for light and near infrared waves at standard conditions and ambient conditions. Computation of RI for microwaves - Reference refractive index - Real time application of first velocity correction. Measurement of atmospheric parameters - Mean refractive index, Second velocity correction, Total atmospheric correction, Use of temperature and pressure transducers.

UNIT IV - ELECTROMAGNETIC DISTANCE MEASURING SYSTEM

9

Electro-optical system: Measuring principle, Working principle, Sources of Error, Infrared and Laser EDM instruments. Microwave system: Measuring principle, working principle, Sources of Error, Microwave EDM instruments. Comparison between Electro-optical and Microwave system.

UNIT V - FIELD STUDIES

9

Total station and its applications - Care and maintenance of EDM instruments - Modern positioning systems - EDM traversing, trilateration and base line measurement using EDM. Study of different EDM instruments and Total Station. EDM traversing, trilateration and base line measurement.

COURSE OUTCOMES

At the end of this course, students will be able to:

CO.1 Brief the fundamental principles of EDM

BoS Chairman

- CO.2 Explain the basic concepts about the electronics related to measuring devices
- CO.3 Explain the basics of electromagnetic waves and their properties for the application of measuring technology.
- CO.4 Describe the measuring technology using the EDM compared with the traditional methods.
- CO.5 Illustrate the EDM technology and other modern instruments with field applications.

TEXT BOOKS:

1. SatheeshGopi, R. Sathikumar, N. Madhu, Advanced Surveying: Total Station, GIS And Remote Sensing, Dorling Kindersley (India) Pvt Ltd., © 2007.
2. Rueger, J.M. Electronic Distance Measurement, Springer-Verlag, Berlin, 1990.
3. Laurila, S.H. Electronic Surveying in Practice, John Wiley and Sons Inc, 1993.

REFERENCE BOOKS:

1. Burnside, C.D. Electromagnetic distance measurement Crosby Lock wood staples, U.K. 1991.
2. Soastamoinen, J.J. Surveyor's guide to Electro-magnetic Distance Measurement, Adam Hilger
3. Chandra. A. M, Higher Surveying, New Age International Publishers, 2005.

WEB REFERENCES:

1. <http://sociology.soc.uoc.gr/socmedia/papageo/electronic%20survey%20technique.pdf>
2. http://web.itu.edu.tr/~coskun/contents/lessons/structure/LECTURE_2_Theodolite.pdf
3. http://www.lonestar.edu/departments/landsurveyingmapping/Surveying_Equipment.pdf



BoS Chairman

| | | |
|-------------------------|---------------------------------------|---------------|
| Course Code : 16CEE15 | Course title : REMOTE SENSING AND GIS | |
| Core/Elective: Elective | L: T : P : C | 3 : 0 : 0 : 3 |
| Type : Theory | Total Contact hours: | 45 |

COURSE OBJECTIVES

The course is intended to:

1. Describe the basic concepts and principles of Remote Sensing.
2. Classify the sensors in India and other countries with their characteristics.
3. Explain various types of image processing used for data products.
4. Describe the components of GIS and its practical applications in civil engineering.
5. Distinguish raster and vector data compression, analysis and modeling

UNIT I - PHYSICS OF REMOTE SENSING

9

Introduction of Remote Sensing - Electro Magnetic Spectrum, Physics of Remote Sensing- Effects of Atmosphere Scattering – Different types –Absorption-Atmospheric window- Energy interaction with surface features – Spectral reflectance of vegetation, soil ,and water –atmospheric influence on spectral response patterns.

UNIT II - BASICS OF SENSORS AND PLATFORM CONCEPTS

9

Passive and Active sensors - Across track and along track scanners – Multi spectral scanners and thermal scanners - Types of platforms – PSLV and GSLV – Resolution – Spatial, Spectral, Radiometric and temporal resolutions – Pay load description of LANDSAT, SPOT, IRS, INSAT, IKONOS, QUICKBIRD.

UNIT III - IMAGE PROCESSING

9

Data Products –image interpretation types – basic elements of image interpretation - visual interpretation keys – Digital Image Processing – Pre-processing – image enhancement techniques – multispectral image classification – Supervised and unsupervised.

UNIT IV - INTRODUCTION TO GEOGRAPHIC INFORMATION SYSTEM

9

Introduction – Maps – Map projections – types of map projections – GIS definition – components of GIS – standard GIS softwares – Data type – Spatial and non-spatial data – measurement scales – Input and Output devices – Analysis Tools.

UNIT V - DATA ENTRY, STORAGE AND ANALYSIS

9

Data models – vector and raster data – data compression – data input by digital and analog methods – attribute data analysis – integrated data analysis – Modeling in GIS – Different case studies in remote sensing and GIS applications

COURSE OUTCOMES

At the end of this course, students will be able to:

- CO.1 Describe the basic concepts and principles of Remote Sensing.
- CO.2 Classify the sensors in India and other countries with their characteristics.
- CO.3 Explain various types of image processing used for data products.
- CO.4 Describe the components of GIS and its practical applications in civil engineering.
- CO.5 Distinguish raster and vector data compression, analysis and modeling

TEXT BOOKS:

1. Thomas Lillesand, Ralph W. Kiefer, Jonathan Chipman, Remote Sensing and Image Interpretation. VI Edition. John Willey and Sons (Asia) Pvt. Ltd., New Delhi, 2008.


BoS Chairman

2. Anjireddy. M., Remote Sensing and Geographical Information Systems: An Introduction, BS Publications, 4th Edition, 2012.
3. BasudebBhatta, Remote Sensing and GIS, OUP Publications, 2nd revision Edition, 2011.

REFERENCE BOOKS:

1. Victor Mesev, Integration of GIS and Remote Sensing, John Wiley and Sons Ltd., 2007.
2. Dr. S. Kumar, Basics of Remote Sensing and GIS, Laxmi Publications, 2007.
3. Chandra. A. M, Ghosh. S. K., "Remote sensing and geographical information system", Alpha Science Publications, 2015

WEB REFERENCES:

1. <http://www.wamis.org/agm/pubs/agm8/Paper-1.pdf>
2. http://ags.geography.du.ac.in/Study%20Materials_files/Punyatoya%20Patra_AM.pdf
3. http://hydrologie.org/hsj/410/hysj_41_04_0593.pdf
4. http://www.wiley.com/legacy/wileychi/gis/Volume1/BB1v1_ch14.pdf
5. http://gis-lab.info/docs/books/aerial-mapping/cr1557_15.pdf



BoS Chairman

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|--------------------------------|-----------------------------------|----------------------|
| Course Code : 16CEE16 | Course title : CARTOGRAPHY | |
| Core/Elective: Elective | L: T : P : C | 3 : 0 : 0 : 3 |
| Type : Theory | Total Contact hours: | 45 |

COURSE OBJECTIVES

The course is intended to:

1. Explain the fundamentals of cartography and its modern trends.
2. Distinguish the different types of projections in map making.
3. Illustrate the various sources of data.
4. Describe the perception and design of cartography with the colour theory.
5. Produce a map with proper symbols.

UNIT I - FUNDAMENTALS OF CARTOGRAPHY

9

Cartography today – Nature of Cartography – History of Cartography – Cartographic Visualization – Web Cartography – Graticules – Cartometry – Map Characteristics - Modern Trends.

UNIT II - EARTH

9

Earth-Map Relations – Basic Geodesy – Map Projections – Scale – Reference and Coordinate system – Transformation – Basic Transformation – Affine Transformation.

UNIT III - SOURCES OF DATA

9

Sources of data – Ground Survey and Positioning – Remote Sensing data collection – Census and sampling – data – Models for digital cartographic information – Map digitizing.

UNIT IV - PERCEPTION AND DESIGN

9

Cartographic design – Colour theory and models – Colour and pattern creation and specification – colour and pattern – Typography and lettering the map – Map compilation – Demography and Statistical mapping.

UNIT V - CARTOGRAPHY ABSTRACTION

9

Selection and Generalization Principles – Symbolization – Topographic and thematic maps – Map production and Reproduction – Map series.

COURSE OUTCOMES

At the end of this course, students will be able to:

- CO.1 Explain the fundamentals of cartography and its modern trends.
- CO.2 Distinguish the different types of projections in map making.
- CO.3 Illustrate the various sources of data.
- CO.4 Describe the perception and design of cartography with the colour theory.
- CO.5 Produce a map with proper symbols.

TEXT BOOKS:

1. Anson. R.W and Ormeling. F.J, Basic Cartography for students and Technicians. Vol. I, II and III Elsevier Applied Science Publishers 3rd Edition, 2004.
2. Arthur, H. Robinson et al Elements of Cartography, Seventh Edition, John Wiley and Sons, 2004.
3. Misra. R.P, Ramesh. A, Fundamentals of Cartography, Concept Publishing Company, 2009.

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REFERENCE BOOKS:

1. John Campbell, Introductory Cartography Third Edition, Wm. C. Brown Publishers, 2004.
2. Menno – Jan Kraak&FerjanOrmeling, Cartography Visualization of Geospatial Data, Second Edition, Pearson 2004.
3. Prithvish Nag, Digital Remote Sensing, Concept Publishing Company, 1998.

WEB REFERENCES:

1. http://www.sfu.ca/gis/geog_x55/web255/icons/lec_2_basic_concept.pdf
2. <http://www.tc.umn.edu/~fharvey/courses/CompScholar/Ch1-CompleatScholar.pdf>
3. <http://cca-acc.org/resources/what-is-cartography/>


BoS Chairman

TRANSPORTATION ENGINEERING STREAM

| | | |
|-------------------------|---|---------------|
| Course Code : 16CEE17 | Course title : RAILWAYS, AIRPORTS AND HARBOUR ENGINEERING | |
| Core/Elective: Elective | L : T : P : C | 3 : 0 : 0 : 3 |
| Type : Theory | Total Contact hours: | 45 |

COURSE OBJECTIVES

The course is intended to:

1. Explain the functions of various components of railway.
2. Discuss the construction, maintenance and operation of railway tracks.
3. Explain the design concepts of the various components of Airport.
4. Describe the importance of airport layouts, visual aids, and air traffic control.
5. Explain the various components of harbors and docks.

UNIT I - RAILWAY PLANNING & DESIGN

9

Role of Indian Railways in National Development - Engineering Surveys for Track Alignment - Obligatory points – Permanent Way components: Rails - Types of Rails, Concept of Gauges, Coning of Wheels, Defects in rails – Sleepers - Functions and Materials, Density Ballasts- Functions and Materials, Ballast less Tracks. Geometric Design - Gradient and grade compensation, super elevation, Transition curve, Widening of gauges in curves.

UNIT II - RAILWAY TRACK CONSTRUCTION, MAINTENANCE AND OPERATION

9

Points and Crossings - Turnouts - Working Principle, Signaling, Interlocking and Track Circuiting, Construction & Maintenance – Conventional and Modern methods, Track Drainage - Track Modernization– Automated maintenance and upgrading technologies, Re-laying of Track - Lay outs of Railway Stations and Yards - Level Crossings.

UNIT III - AIRPORT PLANNING AND DESIGN

9

Advantages and Limitations of Air Transport, Components of Airports - Airport Planning – Site Selection, Runway Design - Orientation, Cross wind Component, Wind rose Diagram (Problems), Geometric Design and Corrections for Gradients (Problems), Taxiway Design – Geometric Design Elements - Minimum Separation Distances, Design Speed, Airport Drainage, Airport Zoning - Clearance over Highways and Railways.

UNIT IV - AIRPORT LAYOUTS, VISUAL AIDS, AND AIR TRAFFIC CONTROL

9

Airport components – Apron, Terminal Building, Hangers, Motor Vehicle Parking Area and Circulation Pattern. Airport Layouts - Airport Buildings – Primary functions, Planning Concept, Principles of Passenger Flow and Passenger Facilities. Visual Aids – Runway and Taxiway Markings, Wind Direction Indicators, Runway and Taxiway Lightings. Air Traffic Control – Components and functions.

UNIT V - HARBOUR AND DOCKS ENGINEERING

9

Definition – requirement of harbor - classification – location of harbours – planning and design of harbours – layouts and terminal facilities. Docks – types of docks - mooring and mooring accessories – Navigational aids - Coastal structures (piers, breakwaters, wharves, jetties, quays, spring fenders, dolphins, landing stage and floating landing stage) – waves and their action on coastal structures – Environmental concern in port operations.


BoS Chairman

COURSE OUTCOMES

At the end of this course, students will be able to:

- CO.1 Explain the functions of various components of railway.
- CO.2 Discuss the construction, maintenance and operation of railway tracks.
- CO.3 Explain the design concepts of the various components of Airport.
- CO.4 Describe the importance of airport layouts, visual aids, and air traffic control.
- CO.5 Explain the various components of harbours and docks.

TEXT BOOKS:

1. Subramaniam K.P., "Highway, Railway, Airport and Harbour Engineering", Scitech Publications (India) pvt Ltd. Chennai (2010)
2. Satish Chandra and Agarwal M.M, "Railway Engineering", 2nd Edition, Oxford University Press, New Delhi, 2013.
3. Khanna S K, Arora M G and Jain S S, "Airport Planning and Design", Nemchand and Brothers, Roorkee, 2012.
4. Bindra S P, "A Course in Docks and Harbour Engineering", DhanpatRai and Sons, New Delhi, 2013

REFERENCE BOOKS:

1. Saxena, S.C. Arora, S. P. "A course in Railway Engineering", DhanpatRai& Sons, New Delhi. (2009).
2. Horonjeff, R. Mckelvey, F. X. "Planning & Design of Airports", McGraw hill, New York. (1994).
3. Ashford, N. And Wright, P. H. "Airport Engineering", John wiley, New York. (1979).
4. Hay, W. W. "Railroad Engineering", John wiley and sons, New York. (1988).
5. Agarwal, M. M. "Indian railway track", Sachdeva press, Mayapuri, New Delhi. (1991).

WEB REFERENCES:

1. <http://www.rejinpaul.com/2013/06/anna-university-ce2303-notes-railways-airports-and-harbour-engineering-notes-civil-5th-sem.html>
2. <http://www.srividyaengg.ac.in/elearn1/coursematerial/civil/103641.pdf>
3. <https://annauniversityplus.com/plus/attachment.php?aid=2236>
4. <https://www.vidyarthiplus.com/vp/attachment.php?aid=9271>
5. <http://nptel.ac.in/courses/105107123/>


BoS Chairman

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|-------------------------|---|---------------|
| Course Code : 16CEE18 | Course title : TRAFFIC ENGINEERING AND MANAGEMENT | |
| Core/Elective: Elective | L: T : P : C | 3 : 0 : 0 : 3 |
| Type : Theory | Total Contact hours: | 45 |

PREREQUISITE: Highway Engineering

COURSE OBJECTIVES

The course is intended to:

1. Describe Indian Roads Congress (IRC) specifications and Guidelines
2. Explain various Traffic surveys and their studies.
3. Describe the various traffic control with computer applications in signal design
4. Design various types of grade intersections.
5. Describe various traffic control and management measures.

UNIT I - INTRODUCTION

9

Significance and scope, Characteristics of Vehicles and Road Users, Skid Resistance and Braking Efficiency (Problems), Components of Traffic Engineering- Road, Traffic and Land Use Characteristics

UNIT II - TRAFFIC SURVEYS AND ANALYSIS

9

Surveys and Analysis - Volume, Capacity, Speed and Delays, Origin and Destination, Parking, Pedestrian Studies, Accident Studies and Safety Level of Services- Problems

UNIT III - TRAFFIC CONTROL

9

Traffic signs, Road markings, Design of Traffic signals and Signal co-ordination (Problems), Traffic control aids and Street furniture, Street Lighting, Computer applications in Signal design

UNIT IV - GEOMETRIC DESIGN OF INTERSECTIONS

9

Conflicts at Intersections, Classification of Intersections at Grade, - Channelized and Unchanallised Intersection – Type of interchanges - Grade Separators - Principles of Intersection Design, Elements of Intersection Design, Channelization and Rotary design (Problems).

UNIT V - TRAFFIC MANAGEMENT

9

Traffic Management- Traffic System Management (TSM) and Travel Demand Management (TDM), Traffic Forecasting techniques, Restrictions on turning movements, One-way Streets, Traffic Segregation, Traffic Calming, Tidal flow operations, Exclusive Bus Lanes - Introduction to Intelligence Transport System (ITS)

COURSE OUTCOMES

At the end of this course, students will be able to:

- CO.1 Describe Indian Roads Congress (IRC) specifications and Guidelines
- CO.2 Explain various Traffic surveys and their studies.
- CO.3 Describe the various traffic control with computer applications in signal design
- CO.4 Design various types of grade intersections.
- CO.5 Describe various traffic control and management measures.

TEXT BOOKS:

1. Khanna K and Justo C E G, Highway Engineering, Khanna Publishers, Roorkee, 2013.
2. Kadiyali L R, Traffic Engineering and Transport Planning, Khanna Technical Publications, Delhi, 2000.


BoS Chairman

3. Khanna K and Justo C E G, Highway Engineering, Khanna Publishers, Roorkee, 2013.

REFERENCE BOOKS:

1. Guidelines of Ministry of Road Transport and Highways, Government of India.
2. Subhash C. Saxena, A Course in Traffic Planning and Design, Dhanpat Rai Publications, New Delhi, 1989.
3. Papacostas C. S., Panos D. Prevedouros, "Transportation Engineering and Planning SI", Pearson/Prentice Hall, 2005

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2. <http://nptel.ac.in/downloads/105101008/>
3. <https://annauniversityplus.com/plus/Thread-TRAFFIC-ENGINEERING-AND-MANAGEMENT-NOTES>

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|-------------------------|--|----------------|
| Course Code : 16CEE19 | Course title : TRANSPORTATION PLANNING | |
| Core/Elective: Elective | L : T : P : C | 3 : 0 : 0 : 3- |
| Type : Theory | Total Contact hours: | 45 |

PREREQUISITE: Surveying
Highway Engineering

COURSE OBJECTIVES

The course is intended to:

1. Explain the advancements of Transportation Systems Planning
2. Apply the surveying concepts in transportation planning.
3. Explain the importance of Land use transport models.
4. Brief the trip generation and distribution modeling
5. Generate different models for transportation system

UNIT I - TRANSPORTATION SYSTEM

9

Status of existing Transportation System – Systems Approach to Transport Planning — Stages in Transportation Planning – Transportation Plan – Plan Refinement -- Transport gap --Overview of Traffic Impact Studies - Transportation and Sustainability.

UNIT II - TRANSPORTATION SURVEY AND SAMPLING

9

Concepts of Zoning – Transportation Surveys –Home interview Surveys-Origin Destination Surveys – other types of surveys - Inventory of Transportation and other activities – Sampling Techniques -- Sampling Data Expansion.

UNIT III - LAND USE TRANSPORT (LUT) MODELS

9

Interdependencies between Land Use and Transport Systems –Characteristics of Land Use Forecasting -- Classification of Land Use Models –Land Use Development Models- Lowry Derivatives Model- Garin Model - Iteration processes.

UNIT IV - TRIP GENERATION AND DISTRIBUTION MODELING

9

Trip Generation Models –Multiple Linear Regression Methods- Step wise regression and their methods - Trip Distribution Models –Growth Factor and Synthetic models-Estimation of trip interchanges- Problems - Model Calibration and Validation –Gravity models.

UNIT V - MODE CHOICE AND TRIP ASSIGNMENT MODELING

9

Methods of Trip Assignment Models –Capacity Restraint Method and other methods of Trip Assignment - Multi Modal Trip Assignment – Mode Choice and Modal Split Models – Pre and post Distribution modal split Models- Multi modal Transportation Planning -- Evaluation Needs —Overview of Various Transportation Software.

COURSE OUTCOMES

At the end of this course, students will be able to:

- CO.1 Explain the advancements of Transportation Systems Planning
- CO.2 Apply the surveying concepts in transportation planning.
- CO.3 Explain the importance of Land use transport models.
- CO.4 Brief the trip generation and distribution modeling
- CO.5 Generate different models for transportation system

TEXT BOOKS:

1. Kadiyali L.R. 'Traffic Engineering and Transport Planning' Seventh Edition, Khanna Publishers, Delhi 2013.


BoS Chairman

REFERENCE BOOKS:

1. John Khisty C, Kent Lall B, Transportation Engineering – An Introduction, Third Edition, Prentice Hall of India (PHI) Learning Pvt. Ltd., New Delhi, 2012.
2. Papacostas C.S., Prevedouros, Transportation Engineering and Planning, Third Edition, Prentice Hall of India, (PHI) Learning Pvt. Ltd., New Delhi, 2010
3. Paul H. Wright Norman J. Ashford et.al. 'Transportation Engineering- Planning and Design, Fourth Edition, Institute of Transportation Engineers, Prentice Hall Inc., Washington DC, USA, 1998.
4. Myer Kutz 'Handbook of Transportation Engineering, Volume II, Second Edition, 2011.

WEB REFERENCES:

1. <https://ocw.mit.edu/courses/urban-studies-and-planning/11-540j-urban-transportation-planning-fall-2006/lecture-notes/>
2. <http://nptel.ac.in/courses/105107067/>



BoS Chairman

ARCHITECTURAL STREAM

| | | |
|-------------------------|--|---------------|
| Course Code : 16CEE20 | Course title : URBAN AND REGIONAL PLANNING | |
| Core/Elective: Elective | L : T : P : C | 3 : 0 : 0 : 3 |
| Type : Theory | Total Contact hours: | 45 |

COURSE OBJECTIVES

The course is intended to:

1. Describe the concepts, policies and programmes in Urban and Regional Development trends.
2. Explain step by step planning process.
3. Apply the socio economic concepts along with spatial planning in a sustainable development
4. Explain the concepts of project formulation and evaluation.
5. List and describe the various planning acts for urban and regional planning

UNIT I - BASIC CONCEPTS POLICIES AND PROGRAMMES

9

Definitions and Concept- Urbanization, Towns, Cities, Metropolis, Megalopolis, Satellite and New towns, CBD, Peri urban areas, Suburban areas, Census Definition, Classification of urban settlements, Transit Oriented Development (TOD) of Land Uses -- National policies, National Urban Transport Policy 2006, National Policy for Urban street vendors 2009- Programme objectives and salient features of Jawaharlal Nehru National Urban Renewal Mission (JNNURM), Urban infrastructure development scheme for small and medium towns (UIDSSMT), Rajiv AwasYojana (RAY).

UNIT II - PLANNING PROCESS

9

Steps in Planning Process- Plans; levels; objectives, content, and data requirement-regional plan, master plan, detail development plan, city development plan, development control regulation, Zoning Regulation, Layout and Building Regulations.

UNIT III - SOCIO ECONOMIC AND SPATIAL PLANNING

9

Economic and social concepts in urban and regional planning and their relevance, Economic principals of zoning, Components of sustainable development, Inclusive development, Compact cities, Quality of life-Form of cities, issues related to inner city fringe areas, and suburban areas, Application of Remote sensing and GIS in Urban and Regional planning.

UNIT IV - PROJECT FORMULATION AND EVALUATION

9

Constraints for plan implementation – Industrial, Financial and Legal Constraints, Institutional Arrangements for Urban Development – Financing of Urban Developments - Legislation related to Urban Development. Urban infrastructure projects planning, appraisal, formulation, feasibility and preparation of detailed project report, site planning, layout, road network, and service ducts under the road, Environmental impact assessment, and Traffic assessment.

UNIT V - URBAN GOVERNANCE AND MANAGEMENT

9

Planning laws -- Town and Country planning act -- Urban Development authorities Act-- Constitutional (74th Amendment) Act 1992- Local bodies, Functions, powers and Interfaces.

COURSE OUTCOMES

At the end of this course, students will be able to:

- CO.1 Describe the concepts, policies and programmes in Urban and Regional Development trends.
- CO.2 Explain step by step planning process.


BoS Chairman

- CO.3 Apply the socio economic concepts along with spatial planning in a sustainable development
- CO.4 Explain the concepts of project formulation and evaluation.
- CO.5 List and describe the various planning acts for urban and regional planning

REFERENCE BOOKS:

1. CMDA, Second Master Plan for Chennai, Chennai 2008
2. Goel, S.L Urban Development and Management, Deep and Deep publications, New Delhi 2002
3. George Chadwick, A Systems view of planning, Pergamon press, Oxford 1978
4. Singh V.B, Revitalised Urban Administration in India, Kalpaz publication, Delhi 2001
5. Edwin S.Mills and Charles M.Becker, Studies In Urban Development, A World Bank Publication, 1986
6. Thooyavan. K.R, Human Settlements – A Planning Guide to Beginners. M.A Publications, Chennai 2005.
7. Tumlin Jeffrey, Sustainable Transportation Planning Tools for Creating Vibrant Healthy and Resilient Communities, John Wiley And Sons, 2012.

WEB REFERENCES:

1. <https://caribbeansocieties.files.wordpress.com/2012/01/lecture-1.pdf>
2. <https://ocw.mit.edu/courses/urban-studies-and-planning/11-001j-introduction-to-urban-design-and-development-spring-2006/lecture-notes/>
3. <http://textofvideo.nptel.iitm.ac.in/105106058/lec2.pdf>
4. <http://nptel.ac.in/courses/105107067/>

| | | |
|--------------------------------|------------------------------------|----------------------|
| Course Code : 16CEE21 | Course title : ARCHITECTURE | |
| Core/Elective: Elective | L: T : P : C | 3 : 0 : 0 : 3 |
| Type : Theory | Total Contact hours: | 45 |

COURSE OBJECTIVES

The course is intended to:

1. Explain the concepts of architectural design
2. Describe the planning concepts
3. Design various buildings according to building rules
4. Design buildings for various climatic types
5. Explain the environmental design concepts

UNIT I - ARCHITECTURAL DESIGN

9

The Industrial Revolution: The age of revivals, the emergence of engineer, new materials and techniques. Origin of Modern Architecture: definition and concept of modern architecture, various pioneers of modern architecture.

Architectural design – an analysis – Integration of function and aesthetics – Elements of Design: Line direction. Shape, size, texture, value and color, balance, scale and proportion. Principles of Design: Repetition, gradation, harmony, contrast and unity, creation of 2 D and 3 D compositions.

UNIT II - SITE PLANNING

9

Surveys – Site analysis – Development control – Zoning regulations - Layout Regulations – Urban Planning standards – Layout design concepts.

UNIT III - BUILDING TYPES

9

Planning concepts - Residential, institutional, commercial and Industrial buildings — Application of anthropometry and space standards – Inter relationships of functions – Safety standards – Building rules and regulations – Integration of building services – Interior planning

UNIT IV - CLIMATE RESPONSIVE DESIGN

9

Factors that determine climate – Characteristics of climate types – Design for various climate types – Passive and active energy controls – Green building concept

UNIT V - ENVIRONMENTAL DESIGN

9

Urban renewal – Conservation – Principles of Landscape design – Case studies.

COURSE OUTCOMES

At the end of this course, students will be able to:

- CO.1 Explain the concepts of architectural design
- CO.2 Describe the planning concepts
- CO.3 Design various buildings according to building rules
- CO.4 Design buildings for various climatic types
- CO.5 Explain the environmental design concepts

TEXT BOOKS:

1. Francis D.K. Ching, "Architecture: Form, Space and order" 3rd edition, John Wiley & Sons, 2007
2. Givoni B., "Man Climate and architecture", Applied Science, Barking ESSEX, 1982.


BoS Chairman

REFERENCE BOOKS:

1. Edward D. Mills, "Planning the Architects Handbook", Butterworth London, 1995.
2. Gallian B. Arthur and Simon Eisner, "The Urban Pattern – City Planning and Design", Affiliated Press Pvt. Ltd., New Delhi, 1995.
3. Margaret Roberts, "An Introduction to Town Planning Techniques", Hutchinson, London, 1990.

WEB REFERENCES:

1. <http://ocw.mit.edu/courses/architecture/4-461-building-technology-i-materials-and-construction-fall-2004/lecture-notes/lect5.pdf>
2. <http://ocw.mit.edu/courses/architecture/4-461-building-technology-i-materials-and-construction-fall-2004/lecture-notes/lect6.pdf>

WATER RESOURCES & IRRIGATION STREAM

| | | |
|-------------------------|--|---------------|
| Course Code : 16CEE22 | Course title : DESIGN AND MANAGEMENT OF IRRIGATION SYSTEMS | |
| Core/Elective: Elective | L: T : P : C | 3 : 0 : 0 : 3 |
| Type : Theory | Total Contact hours: | 45 |

PREREQUISITE: Water Resources and Irrigation Engineering

COURSE OBJECTIVES

The course is intended to:

1. Compute the Irrigation system requirements.
2. Design the storage, conveyance and diversion structures
3. Design the micro irrigation system.
4. Optimize the irrigation system for improving the performance of the system
5. Explain the Local and global perceptions and approaches to participatory water resource management.

UNIT I –IRRIGATION SYSTEM REQUIREMENTS

9

Irrigation systems – Supply and demand of water – Cropping pattern– Estimation of total and peak crop water requirements – Effective and dependable rainfall – Irrigation efficiencies- Time of irrigation –Criteria for scheduling irrigation – Frequency and interval of irrigation- Types of irrigation systems and their selection criteria- Source for Irrigation water –System requirements-Main intake structure and pumping station.

UNIT II - STORAGE CONVEYANCE AND DIVERSION SYSTEM

9

Investigation necessary for planning a diversion structure & Storage structures- Storage structure and appurtenant works – Design of Dams, Spillways and energy dissipaters - Sluices and outlets- Diversion structure and appurtenant works – Design of Barrage ,Canal head regulator ,River training works, water conveyance structures – Canal-Canal sections and layout – Design of canal Components -Cross regulators, Drops – Canal lining-Maintenance.

UNIT III - FIELD APPLICATION SYSTEM

9

Methods of applying water to the field- Surface irrigation system- Design of Border irrigation system, basin irrigation system, furrow irrigation system-subsurface irrigation system-natural subsurface irrigation system, design of artificial sub surface irrigation system, micro irrigation system –components design and maintenance Sprinkler of Drip and Sprinkler irrigation system- Automation in Drip irrigation system

UNIT IV - IRRIGATION SYSTEMS AND PERFORMANCE INDICATORS

9

Systems classification – Institutions for irrigation management – Diagnostic Analysis of Irrigation Systems -Rehabilitation and modernization –Performance indicators –Improving system performance –Conjunctive management –constraints faced- Main system components –Reservoir allocation rule, Operating rule and optimization methods to improve main system performance -irrigation scheduling –Constraints.

UNIT V - PARTICIPATORY IRRIGATION MANAGEMENT AND IRRIGATION POLICY

9

Command area development principles – Participatory Irrigation Management and Irrigation management transfer – Case studies – Constraints - Present status of irrigation policy and institutions – Irrigation related conflicts –Institutional transformation needed –Constraints in effecting institutional transformation –Irrigation financing –Water pricing –Water market – Policy changes.


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COURSE OUTCOMES

At the end of this course, students will be able to:

- CO.1 Compute the Irrigation system requirements.
- CO.2 Design the storage, conveyance and diversion structures
- CO.3 Design the micro irrigation system.
- CO.4 Optimize the irrigation system for improving the performance of the system
- CO.5 Explain the Local and global perceptions and approaches to participatory water resource management.

TEXT BOOKS:

- 1. Dilip Kumar Majumdar, "Irrigation Water Management – Principles and Practice", Prentice Hall of India Pvt. Ltd., New Delhi, 2000
- 2. Hand book on Irrigation Water Requirement, R.T. Gandhi, et. al., Water Management Division, Department of Agriculture, Ministry of Agriculture, New Delhi
- 3. Svendsen, Mark Groenfeldt, David, "Case Studies in Participatory Irrigation Management", WBI Learning Resources Series, Washington, 2000.

REFERENCE BOOKS:

- 1. "Hand Book on Irrigation System Operation Practices", Water Resources Management and Training Project, Technical report No. 33, CWC, New Delhi, 1990
- 2. Maloney, C. and Raju, K.V., "Managing Irrigation Together", Practice and Policy in India, Stage Publication, New Delhi, India, 1994.
- 3. Creager, W.P. Justin, J.D., and Hinds J., "Engineering for dams", Vol.II, Wiley Eastern Private Limited, 1945.
- 4. Creager W.P. and Justin J.D. "Hydroelectric hand book", John Wiley & Sons Inc., New York, 1949.
- 5. U.S.B.R. "Design of small Dams", 1960.
- 6. Streeter, V.L. and Wylie, G.B. "Hydraulic Transients", McGraw Hill Book Company, 1967.
- 7. Hanif Chaudhry, M. "Applied Hydraulic Transients", Van Nostrand Reinhold Company, 1979.

WEB REFERENCES:

- 1. <http://nptel.ac.in/courses/105105110/pdf/m3l05.pdf>
- 2. https://umanitoba.ca/faculties/engineering/departments/biosystems/pdf/BIOE_4600.pdf
- 3. http://www.gap.metu.edu.tr/html/yayinlar/issues_in_design_AKibaroglu.pdf
- 4. <http://www.fao.org/docrep/r4082e/r4082e06.htm#5.2> conveyance and distribution system

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|-------------------------|---|---------------|
| Course Code : 16CEE23 | Course title : GROUND WATER ENGINEERING | |
| Core/Elective: Elective | L: T : P : C | 3 : 0 : 0 : 3 |
| Type : Theory | Total Contact hours: | 45 |

PREREQUISITE: Water Resources and Irrigation Engineering

COURSE OBJECTIVES

The course is intended to:

1. Explain the basics of ground water hydrology & movement of ground water-
2. Outline the objectives of groundwater hydraulics & properties of aquifer materials
3. Classify the various types of wells, construction and maintenance
4. Describe the different methods of evaluation of aquifer parameter
5. Explain the concepts involved in modeling and recharge of ground water

UNIT I - GROUNDWATER-HYDROLOGY

9

Introduction – Water bearing formations – geological formation of water supply – subsurface distribution of water - hydrological cycle – sources of groundwater – types of aquifers – aquifer parameters – groundwater movement in different rocks- Ground water table fluctuation and its interpretations Groundwater development and Potential in India.

UNIT II - GROUNDWATER HYDRAULICS

9

Objectives – Groundwater flow – Permeability – Transmissibility – Darcy's law and its limitations -properties of aquifer materials – radial flow towards a well in an unconfined aquifer – confined aquifer – relation of well size to yield – unsteady flow conditions – determination of aquifer constants – Theis method – Jacob's method – Chow's method – Theis recovery method –conditions to check for steady state – unconfined aquifer constants – well losses and well efficiency and well interfaces.

UNIT III - WELLS AND EXPLORATION

9

Types of wells – water wells design – drilling of tube wells – drilling methods – percussion drilling– rotary drilling – auger core drilling and water jet methods — construction of wells – collector wells and infiltration wells - construction of strainer type tube wells – types of strainers –construction of cavity type tube wells – construction of gravel packed (shrouded) well – construction of open wells – testing yield of tube wells – verticality of tube wells – incrustation and corrosion of tube wells.

UNIT IV - EVALUATION OF AQUIFER PARAMETERS

9

Introduction – pumping test analysis – Recuperation test - well characteristics – well capacity –confined aquifer and unconfined aquifer – hydraulics of open wells – groundwater investigation –geological methods – geophysical methods – remote sensing methods.

UNIT V - GROUNDWATER QUALITY AND CONSERVATION

9

Groundwater development – hydrological maps – groundwater quality standards– groundwater contamination - seawater intrusion – control measures – Groundwater recharge – recharge methods– Groundwater modeling – Mathematical modeling – numerical modeling.

COURSE OUTCOMES

At the end of this course, students will be able to:

- CO.1 Explain the basics of ground water hydrology & movement of ground water
CO.2 Outline the objectives of groundwater hydraulics & properties of aquifer materials
CO.3 Classify the various types of wells, construction and maintenance



BoS Chairman

CO.4 Describe the different methods of evaluation of aquifer parameter

CO.5 Explain the concepts involved in modeling and recharge of ground water

TEXT BOOKS:

1. Raghunath, H.M., "Ground Water Hydrology", Wiley Eastern Ltd., Second reprint, New Delhi, 2005.
2. Todd, D.K., "Ground Water Hydrology", John Wiley and Sons, New York, 2000.

REFERENCE BOOKS:

1. Murthy, V.V.N., "Land and Water Management Engineering", Kalyani Publishers, New Delhi, 1985.
2. Ramakrishnan S, "Ground Water", Tamil Nadu, 1998.
3. Delleur, J.W., "The Handbook of Groundwater Engineering", CRC Press, Taylors & Francis Group, 2007.

WEB REFERENCES:

1. <http://nptel.ac.in/courses/105105110/pdf/m2l07.pdf>
2. <http://nptel.ac.in/courses/105105110/pdf/m2l05.pdf>
3. <http://ocw.mit.edu/courses/civil-and-environmental-engineering/1-72-groundwaterhydrology-fall-2005/lecture-notes/>

| | | |
|-------------------------|--------------------------|---------------|
| Course Code : 16CEE24 | Course title : HYDROLOGY | |
| Core/Elective: Elective | L: T : P : C | 3 : 0 : 0 : 3 |
| Type : Theory | Total Contact hours: | 45 |

COURSE OBJECTIVES

The course is intended to:

1. Explain the basic concepts in hydrological cycle
2. Describe the features of evaporation, transpiration and infiltration
3. Illustrate the estimation and modeling of runoff
4. Carry out flood frequency analysis and flood routing
5. Estimate the aquifer parameters and yield of wells

UNIT I - INTRODUCTION

9

Engineering hydrology and its applications, Hydrologic cycle, hydrological data-sources of data. Precipitation: Types and forms, measurement, rain gauge network, presentation of rainfall data, average rainfall, continuity and consistency of rainfall data, frequency of rainfall, Intensity-Duration-Frequency (IDF) curves, Depth-Area-Duration (DAD) curves.

UNIT II - ABSTRACTIONS FROM PRECIPITATION

9

Initial abstractions. Evaporation: factors affecting, measurement, reduction Evapotranspiration: factors affecting, measurement, control. Initial losses: Interception and depression storage. Infiltration: factors affecting, Infiltration capacity curve, measurement, infiltration indices.

UNIT III - RUNOFF

9

Runoff process – Unit hydrograph – Derivation and analysis – S-hydrograph – Synthetic unit hydrograph-Instantaneous Unit hydrograph – methods of determining IUH – conceptual models of IUH – Formulation of models – concept of linear reservoir, Nash and Clark's model. general hydrological models- Chow – Kulandaiswamy model.

UNIT IV - FLOODS

9

Causes and effects, frequency analysis- Gumbel's and Log-Pearson type III distribution methods, Standard Project Flood (SPF) and Probable Maximum Flood (MPF), flood control methods and management. Flood Routing: Hydrologic routing, channel and reservoir routing- Muskingum and Puls methods of routing.

UNIT V - GROUNDWATER

9

Occurrence, types of aquifers, aquifer parameters, porosity, specific yield, permeability, transmissivity and storage coefficient, types of wells, Darcy's law, Dupuit's equation- steady radial flow to wells in confined and unconfined aquifers, yield of a open well-recuperation test.

COURSE OUTCOMES

At the end of this course, students will be able to:

- CO.1 Explain the basic concepts in hydrological cycle
- CO.2 Describe the features of evaporation, transpiration and infiltration
- CO.3 Illustrate the estimation and modeling of runoff
- CO.4 Carry out flood frequency analysis and flood routing
- CO.5 Estimate the aquifer parameters and yield of wells

TEXT BOOKS:

1. Subramanya, K., " Engineering Hydrology" , Tata McGraw Hill, 2005
2. Raghunath.H.M., "Hydrology: Principles, Analysis and Design", New Age Publications, 2006.


BoS Chairman

3. Linsley. R. L., Kholer. M. A., Paulhus. J. L.H., "Hydrology for Engineers", McGraw Hill International Book Company, 1982.

REFERENCE BOOKS:

1. Mays, L.W., "Water Resources Engineering" Wiley India Pvt. Ltd., 2013
2. Mutreja, K.N., "Applied Hydrology" " Tata McGraw Hill, 1986
3. Rastogi,A.K., "Numerical groundwater hydrology" Penram international publishing (India) Pvt. Ltd.,=2007
4. Ojha, C.S.P., Berndtsson,R., Bhunya, P., "Engineering Hydrology", Oxford University Press, 2010

WEB REFERENCES:

1. <http://nptel.ac.in/downloads/105101002/>
2. <http://ocw.unesco-ihe.org/mod/folder/view.php?id=511>
3. http://www.colorado.edu/geography/class_homepages/geog_3511_s11/


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GEOTECHNICAL ENGINEERING STREAM

| | | |
|-------------------------|------------------------------------|---------------|
| Course Code : 16CEE25 | Course title : ENGINEERING GEOLOGY | |
| Core/Elective: Elective | L: T : P : C | 3 : 0 : 0 : 3 |
| Type : Theory | Total Contact hours: | 45 |

COURSE OBJECTIVES

The course is intended to:

1. Describe the geological formations
2. Explain the rock forming minerals and their properties
3. Classify the various distinct rocks and their engineering properties.
4. Describe the importance of geology with respect to foundations for structures like dams, bridges, buildings, etc.
5. Explain the causes and prevention for earthquakes and landslides.

UNIT I - PHYSICAL GEOLOGY

9

Geology in Civil Engineering - Branches of geology - Earth structures and its composition; atmosphere and greenhouse effect – Weathering of rocks – Landforms and geological processes associated with wind, surface water (rivers, sea) and ground water and their engineering importance - sea erosion and coastal protection

UNIT II - MINERALOGY

9

Physical, chemical and engineering properties of minerals – study of the following rock forming minerals – Quartz group, Feldspar group, Pyroxene group, Amphibole and Mica group, Calcite, Garnet and Clay minerals – Formation of ore minerals – Origin and occurrence of Coal and Petroleum in India

UNIT III - PETROLOGY

9

Classification of rocks – distinction between igneous, sedimentary and metamorphic rocks – description occurrence, engineering properties and distribution of igneous rocks (Granite, Syenite, Diorite, Gabbro, Pegmatite, Dolerite, Basalt), sedimentary rocks (Sandstone, Limestone, Laterite, Shale, Conglomerate, Breccia) and metamorphic rocks (Quartzite, Marble, Slate, Phyllite, Gniess, Schist)

UNIT IV - STRUCTURAL GEOLOGY AND GEOPHYSICS

9

Attitude of beds – Outcrops - Introduction to Geological maps - study of structures – Folds, faults and joints - their bearing on engineering construction. Plate tectonics, continental drifts, earthquake and tsunami - Seismic zonation in India and earthquake belts. Geophysical methods (seismic and electrical methods) for subsurface investigations

UNIT V - GEOLOGICAL INVESTIGATIONS IN CIVIL ENGINEERING

9

Geological investigations – Prospecting ground water, oil and gases. Remote sensing techniques – study of air photos and satellite images – Interpretation for Civil Engineering projects - Geological conditions necessary for the construction of Dams, Reservoirs, Tunnels, Buildings, Road cuttings. Landslides – causes and prevention

COURSE OUTCOMES

At the end of this course, students will be able to:

- CO.1 Describe the geological formations
- CO.2 Explain the rock forming minerals and their properties
- CO.3 Classify the various distinct rocks and their engineering properties.
- CO.4 Describe the importance of geology with respect to foundations for structures like


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dams, bridges, buildings, etc.

CO.5 Explain the causes and prevention for earthquakes and landslides.

TEXT BOOKS:

1. Parbin Singh, "Engineering and General Geology", S.K. Kataria & Sons, 8th Edition, 2010
2. Varghese P.C., "Engineering Geology for Civil Engineers", PHI Learning Private Limited, New Delhi, 2012

REFERENCE BOOKS:

1. Venkat Reddy D., "Engineering Geology", Vikas Publishers, 2010, ISBN-978-81259-19032
2. Tony Waltham, "Foundations of Engineering Geology", Spon press, 2009, ISBN: 0-203-89453-7
3. Marland P. Billings, "Structural Geology", Prentice-Hall, 2009, ISBN 0-87692-059-8
4. Bell F.G., "Engineering Geology", Butterworth-Heinemann, 2007

WEB REFERENCES:

1. <https://web.viu.ca/earle/geol111/lecture-notes.htm>
2. <http://www.soest.hawaii.edu/martel/Courses/GG454/>
3. <http://nptel.ac.in/courses/105105106/>

| | | |
|-------------------------|---|---------------|
| Course Code : 16CEE26 | Course title : GROUND IMPROVEMENT TECHNIQUES | |
| Core/Elective: Elective | L: T : P : C | 3 : 0 : 0 : 3 |
| Type : Theory | Total Contact hours: | 45 |

PREREQUISITE: 16CET51 GEOTECHNICAL ENGINEERING I

COURSE OBJECTIVES

The course is intended to:

1. Explain the characteristics of problematic soils and understand the selection of suitable ground improvement in the construction field
2. Identify the methods available in the design of dewatering and drainage process
3. Apply the knowledge on earth reinforcement (geosynthetics) and grouting techniques available and used in the current scenario
4. Demonstrate the various insitu treatment of cohesive and cohesionless soil
5. Describe the insitu treatment of soils based on the knowledge gained

UNIT I - INTRODUCTION AND NEED FOR GROUND IMPROVEMENT TECHNIQUES

9

Different types of problematic soils – Lateritic, Black cotton, Alluvial - Origin, formation, preloading -Engineering properties of soft, weak and compressible deposits - Need for ground improvement – Emerging trends in ground improvement. – Relative merits and demerits of different techniques - Selection of ground improvement techniques based on soil conditions

UNIT II - GROUND IMPROVEMENT BY DRAINAGE AND DEWATERING METHODS

9

Drainage methods – well points (single, multi stage, vacuum) - Sumps and interceptor ditches - Electro-osmosis - Design of dewatering systems – preloading with drains - foundation drains, vertical drains, blanket drains

UNIT III - EARTH REINFORCEMENT AND GROUTING TECHNIQUES

9

Mechanism and concept of earth reinforcement - Geosynthetics : types, functions and applications of geogrids, geotextiles and geomembranes – Grouting – types - permeation grouting, compaction grouting, jet grouting, grouting in difficult conditions - Seepage control in soil under dams and for cut off walls-Stabilization grouting for under pinning – Case studies

UNIT IV - INSITU TREATMENT OF COHESIVE AND COHESIONLESS SOILS

9

Consolidation of cohesive and densification of cohesionless soils – Mechanical stabilization, chemical stabilization, hydraulic modification – Stabilization with cement, lime and chemicals – Stabilization of expansive soils – Under reamed piles - Stone columns - Case studies of recent ground improvement projects on cohesive and cohesionless soils – Case studies

UNIT V - INSITU GROUND TREATMENT FOR SLOPES

9

Problems in sloping ground, factors affecting slope stability – Importance of ground improvement in sloping ground – Drains, dewatering techniques, earth reinforcement, grouting techniques - Soil nailing, rock anchoring, micro-piles - Design methods and construction techniques – Case studies of recent ground improvement projects for sloping ground


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COURSE OUTCOMES

At the end of this course, students will be able to:

- CO.1 Explain the characteristics of problematic soils and understand the selection of suitable ground improvement in the construction field
- CO.2 Identify the methods available in the design of dewatering and drainage process
- CO.3 Apply the knowledge on earth reinforcement (geosynthetics) and grouting techniques available and used in the current scenario
- CO.4 Demonstrate the various insitu treatment of cohesive and cohesionless soil
- CO.5 Describe the insitu treatment of soils based on the knowledge gained

TEXT BOOKS:

1. Purushothama Raj, P., "Ground Improvement Techniques", Laxmi Publications (P) Ltd., New Delhi, 2005.

REFERENCE BOOKS:

1. Coduto, D.P. "Geotechnical Engineering Principles and Practices", Pearson Publications, 2011.
2. Koerner, R.M., "Designing with Geosynthetics", Xlibris Corporation, 2012.
3. Buddhima I. and Jian J.C., "Ground Improvement: Case Histories", Elsevier Publications, 2005.

WEB REFERENCES:

1. <http://nptel.ac.in/courses/105103097/>
2. <http://home.iitk.ac.in/~pkbd/A%20Preview%20of%20Soil%20Behavior.pdf>
3. <http://ocw.mit.edu/courses/civil-and-environmental-engineering/1-361-advanced-soilmechanics-fall-2004/lecture-notes/>
4. <http://www.aboutcivil.org/soil-mechanics.html>

| | | |
|--------------------------------|--|----------------------|
| Course Code : 16CEE27 | Course title : PAVEMENT ENGINEERING | |
| Core/Elective: Elective | L: T : P : C | 3 : 0 : 0 : 3 |
| Type : Theory | Total Contact hours: | 45 |

PREREQUISITE: Highway Engineering

COURSE OBJECTIVES

The course is intended to:

1. Describe the stress distribution and deflection in pavements.
2. Design of flexible pavement by various methods (Empirical, theoretical and IRC guidelines)
3. Design of flexible pavement by IRC guidelines and westergard approach.
4. Assess quality and serviceability conditions of road.
5. Identify the methods available for stabilization of pavements.

UNIT I - BASIC CONCEPTS

9

Introduction - Pavement as layered structure - Pavement types –Functions and characteristics of pavements - flexible and rigid -Stress and deflections in pavements - Repetition of loads – Stresses and deflection in layer system.

UNIT II - DESIGN OF FLEXIBLE PAVEMENTS

9

Flexible pavement design - Empirical - Semi empirical and theoretical Methods – Design procedure as per latest IRC guidelines – Design and specification of rural roads

UNIT III - DESIGN OF RIGID PAVEMENTS

9

Cement concrete pavements - Modified Westergard approach - Design procedure as per latest IRC guidelines –Temperature stresses - Joints in rigid pavements - Concrete roads and their scope in India – Air field pavements – Design principles.

UNIT IV - PERFORMANCE EVALUATION AND MAINTENANCE

9

Need for Highway maintenance – classification – Pavement failures – Pavement evaluation and rehabilitation – Condition and evaluation –surveys – Strengthening of existing pavement – Overlay design - Pavement maintenance. [IRC Recommendations Only]

UNIT V - STABILISATION OF PAVEMENTS

9

Stabilisation with special reference to highway pavements - Choice of stabilisers -Testing and field control – Stabilisation for rural roads in India -use of Geosynthetics (geotextiles &geogrids) in roads.

COURSE OUTCOMES

At the end of this course, students will be able to:

- CO.1 Describe the stress distribution and deflection in pavements.
- CO.2 Design of flexible pavement by various methods (Empirical, theoretical and IRC guidelines)
- CO.3 Design of flexible pavement by IRC guidelines and westergard approach.
- CO.4 Assess quality and serviceability conditions of road.
- CO.5 Identify the methods available for stabilization of pavements.

TEXT BOOKS:

1. Kadiyali, L.R and N. B. Lal, "Principles and Practice of Highway Engineering" (including Expressways and Airport Engineering),Khanna tech. Publications, New Delhi, 2005.


BoS Chairman

2. Wright, P.H., "Highway Engineers", John Wiley & Sons, Inc., New York, 1996
3. Yoder R.J and Witczak M.W., "Principles of Pavement Design", John Wiley, 1975.

REFERENCE BOOKS:

1. Design and Specification of Rural Roads (Manual), Ministry of rural roads, Government of India, New Delhi, 2001
2. Guidelines for the Design of Flexible Pavements, IRC:37 - 2001, The Indian roads Congress, New Delhi.
3. Guideline for the Design of Rigid Pavements for Highways, IRC: 58-1998, The Indian Roads Congress, New Delhi

WEB REFERENCES:

1. <https://www.scribd.com/doc/119865487/Pavement-Engineering-Notes-2012>
2. <http://notescivil.blogspot.in/2013/06/pavements.html>


BoS Chairman

| | | |
|-------------------------|--|---------------|
| Course Code : 16CEE28 | Course title : SOIL DYNAMICS AND MACHINE FOUNDATIONS | |
| Core/Elective: Elective | L : T : P : C | 3 : 0 : 0 : 3 |
| Type : Theory | Total Contact hours: | 45 |

PREREQUISITE: Geotechnical Engineering II

COURSE OBJECTIVES

The course is intended to:

1. Illustrate the importance of learning soil dynamics and the theory behind vibrations
2. Explain the concept of wave propagation in soils
3. Determine the dynamic properties of soils and estimate the liquefaction potential
4. Apply basic knowledge of dynamics of porous media and to analyse the soil structure interaction.
5. Describe about machine foundations inducing soil dynamics and its importance in the design criteria.

UNIT I - INTRODUCTION AND VIBRATION THEORY

9

Scope and objectives – Nature and types of loading – Introduction to soil dynamics – Vibration of elementary systems – Equation of motion for single degree of freedom – Types of vibrations – Free and forced with damping and without damping

UNIT II - WAVE PROPAGATION

9

Wave propagation in an elastic homogeneous isotropic medium - Waves in semi-infinite body; Waves in layered medium; Earthquake waves – P-wave, S-wave, Rayleigh wave and Love wave; Locating earthquake's epicenter

UNIT III - SOIL DYNAMIC PROPERTIES

9

Stresses in soil element - Determination of dynamic soil properties - Field tests - Laboratory tests - Model tests - Stress-strain behavior of cyclically loaded soils - Linear, equivalent-linear and non-linear models - Ranges and applications of dynamic soil tests - Cyclic plate load test - Liquefaction - Simplified procedure for liquefaction estimation-CRR correlations with SPT, CPT, SASW test values

UNIT IV - DYNAMICS OF POROUS MEDIA

9

Basic differential equations – Propagation of plane waves into porous media – Analytical periodic solution – Response to a sinusoidal wave – Approximation of the solution and Numerical verification - Generalized dynamic Winkler model for non-linear soil structure interaction analysis

UNIT V - MACHINE FOUNDATIONS

9

Types of machines - Basic design criteria - Methods of analysis - Mass-Spring-Dashpot model - Elastic-Half-Space theory - Types of foundations - Modes of vibrations - Vertical, sliding, torsional (yawing), rocking and pitching modes of oscillations - Simple design procedures for foundations under reciprocating machines

COURSE OUTCOMES

At the end of this course, students will be able to:

- CO.1 Illustrate the importance of learning soil dynamics and the theory behind vibrations
CO.2 Explain the concept of wave propagation in soils
CO.3 Determine the dynamic properties of soils and estimate the liquefaction potential
CO.4 Apply basic knowledge of dynamics of porous media and to analyse the soil structure

interaction.

CO.5 Describe about machine foundations inducing soil dynamics and its importance in the design criteria.

TEXT BOOKS:

1. Swami Saran, "Soil Dynamics and Machine Foundations", Galgotia Publications, 1999

REFERENCE BOOKS:

1. Braja M. Das and Ramana G.V., "Principles of Soil Dynamics", PWS-KENT Publishing Company, 2010
2. Shamsheer Prakash, "Soil Dynamics", McGraw-Hill Book Company, 2012
3. Steven L. Kramer, "Geotechnical Earthquake Engineering", Prentice Hall Inc., 1996
4. E. E. Richart et al. "Vibrations of Soils and Foundations", Prentice Hall Inc., 1970

WEB REFERENCES:

1. <http://nptel.ac.in/courses/105103097/>
2. <http://home.iitk.ac.in/~pkbd/A%20Preview%20of%20Soil%20Behavior.pdf>
3. <http://ocw.mit.edu/courses/civil-and-environmental-engineering/1-361-advanced-soilmechanics-fall-2004/lecture-notes/>
4. <http://www.aboutcivil.org/soil-mechanics.html>

CONSTRUCTION MANAGEMENT STREAM

| | | |
|-------------------------|---|---------------|
| Course Code : 16CEE29 | Course title : ADVANCED CONSTRUCTION TECHNIQUES | |
| Core/Elective: Elective | L: T : P : C | 3 : 0 : 0 : 3 |
| Type : Theory | Total Contact hours: | 45 |

COURSE OBJECTIVES

The course is intended to:

1. Explain the substructure construction techniques.
2. Explain the components and procedure of super structure construction.
3. Explain the construction procedure for special structures.
4. Describe the erection procedure of prefabricated & precast structures.
5. Explain various repair and demolition techniques used in construction.

UNIT I-SUB STRUCTURE

9

Box jacking- Pipe jacking- Diaphragm walls and basement- Tunneling techniques- Piling techniques- Caissons- types- sinking process-Cofferdam- Cable anchoring and grouting- Shoring for deep cutting- Dewatering for underground open excavation.

UNIT II-SUPER STRUCTURE

9

Techniques of construction for continuous concreting operation in tall buildings of various shapes and varying sections-Slipform technique- Suspended formwork- Construction sequence in cooling towers, silos, chimney, sky scraper-In-situ pre-stressing in high rise structures-Post tensioning- Aerial transporting-handling and erecting lightweight components on tall structures- Erection of lattice towers- Rigging of transmission line structures.

UNIT III- SPECIAL STRUCTURES

9

Bow string bridges, Cable stayed bridges- Launching and pushing of box decks-Laying operations for built up offshore system- Vacuum dewatered flooring- Concrete paving technology-Large span structures- launching techniques for heavy decks- Support structure for heavy equipment and conveyor-Construction sequence and methods in domes- Erection of articulated structures and space decks.

UNIT IV- PRECAST AND PREFABRICATION

9

Pre-casting techniques- Handling techniques- Transportation Storage and erection of structures. Curing techniques- steam curing, hot air blowing- skeletal and large panel constructions- Pre-cast and pre-fabricating technology for low cost and mass housing schemes - Ferro-cement in housing. Quality control - Repairs and economical aspects on prefabrication.

UNIT V- REPAIR & DEMOLITION

9

Mud Jacking and grouting for foundation - micro piling and underpinning for strengthening floor and shallow profile- Sub grade water proofing- Repair techniques for cracks in concrete-Demolition techniques- sequence of operation- Dismantling- Safety precaution in demolition and dismantling.

COURSE OUTCOMES

At the end of this course, students will be able to:

CO.1 Explain the substructure construction techniques.

CO.2 Explain the components and procedure of super structure constructions.


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CO.3 Explain the construction procedure for special structures.

CO.4 Describe the erection procedure of prefabricated & precast structures.

CO.5 Explain various repair and demolition techniques used in construction.

TEXT BOOKS:

1. S.K.Sankar, and S. Saraswati, "Construction Technology", Oxford University Press, New Delhi, 2008.
2. R. Chudley, Roger Greeno, "Advanced Construction Technology" Prentice Hall, 2006

REFERENCE BOOKS:

1. Jerry Irvine, "Advanced Construction Techniques" CA Rockers, 1984
2. Robert Wade Brown, "Practical Foundation Engineering Hand Book", McGraw Hill Publications, 1995.

WEB REFERENCES:

1. <http://nptel.ac.in/video.php?subjectId=105102088>
2. <https://sites.google.com/a/venusict.org/actech/lecture-notes>


BoS Chairman

| | | |
|-------------------------|----------------------------------|-----------------|
| Course Code : 16CEE30 | Course title : BUILDING SERVICES | |
| Core/Elective: Elective | L : T : P : C | 3 : 0 : 0 : 3 - |
| Type : Theory | Total Contact hours: | 45 |

COURSE OBJECTIVES

The course is intended to:

1. List the machineries installed in buildings and describe their functions
2. Illustrate the fundamentals of electrical systems in buildings
3. Apply the basic concepts of illumination and layouts
4. Explain fundamentals of refrigeration and identify air conditioning systems for different types of buildings
5. Describe the importance and systems of fire safety installation

UNIT I - MACHINERIES

9

Hot Water Boilers – Lifts and Escalators – Special features required for physically handicapped and elderly – Conveyors – Vibrators – Concrete mixers – DC/AC motors – Generators – Laboratory services – Gas, water, air and electricity

UNIT II - ELECTRICAL SYSTEMS IN BUILDINGS

9

Basics of electricity – Single / Three phase supply – Protective devices in electrical installations – Earthing for safety – Types of earthing – ISI specifications – Types of wires, wiring systems and their choice – Planning electrical wiring for building – Main and distribution boards – Transformers and switch gears – Layout of substations

UNIT III - PRINCIPLES OF ILLUMINATION & DESIGN

9

Visual tasks – Factors affecting visual tasks – Modern theory of light and colour – Synthesis of light – Additive and subtractive synthesis of colour – Luminous flux – Candela – Solid angle illumination – Utilisation factor – Depreciation factor – MSCP – MHCP – Lanes of illumination – Classification of lighting – Artificial light sources – Spectral energy distribution – Luminous efficiency – Colour temperature – Colour rendering. Design of modern lighting – Lighting for stores, offices, schools, hospitals and house lighting. Elementary idea of special features required and minimum level of illumination required for physically handicapped and elderly in building types.

UNIT IV - REFRIGERATION PRINCIPLES & APPLICATIONS

9

Thermodynamics – Heat – Temperature, measurement transfer – Change of state – Sensible heat – Latent heat of fusion, evaporation, sublimation – saturation temperature – Super heated vapour – Sub cooled liquid – Pressure temperature relationship for liquids – Refrigerants – Vapour compression cycle – Compressors – Evaporators – Refrigerant control devices – Electric motors – Starters – Air handling units – Cooling towers – Window type and packaged air-conditioners – Chilled water plant – Fan coil systems – Water piping – Cooling load – Air conditioning systems for different types of buildings – Protection against fire to be caused by A.C. Systems

UNIT V - FIRE SAFETY INSTALLATION

9

Causes of fire in buildings – Safety regulations – NBC – Planning considerations in buildings like non -combustible materials, construction, staircases and lift lobbies, fire escapes and A.C. systems. Special features required for physically handicapped and elderly in building types – Heat and smoke detectors – Fire alarm system, snorkel ladder – Fire lighting pump and water storage – Dry and wet risers – Automatic sprinklers.

COURSE OUTCOMES

At the end of this course, students will be able to:

- CO.1 List the machineries installed in buildings and describe their functions
- CO.2 Illustrate the fundamentals of electrical systems in buildings
- CO.3 Apply the basic concepts of illumination and layouts
- CO.4 Explain fundamentals of refrigeration and identify air conditioning systems for different types of buildings
- CO.5 Describe the importance and systems of fire safety installation

TEXT BOOKS:

1. R. Udayakumar, "A text book on Building Services", Eswar Press, Chennai, 2011.
2. E.R. Ambrose, "Heat Pumps and Electric Heating", John and Wiley and Sons, Inc., New York, 2008

REFERENCE BOOKS:

1. R.G. Hopkinson and J.D. Kay, "The Lighting of buildings", Faber and Faber, London, 1999.
2. William H. Severns and Julian R. Fellows, "Air-conditioning and Refrigeration", John Wiley and Sons, London, 2008.
3. A.F.C. Sherratt, "Air-conditioning and Energy Conservation", The Architectural Press, London, 2003.

WEB REFERENCES:

1. <https://www.scribd.com/doc/55417572/Building-Services-Notes>
2. <http://www.arca53.dsl.pipex.com/>

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|-------------------------|---------------------------------------|---------------|
| Course Code : 16CEE31 | Course title : SAFETY IN CONSTRUCTION | |
| Core/Elective: Elective | L:-T : P : C | 3 : 0 : 0 : 3 |
| Type : Theory | Total Contact hours: | 45 |

COURSE OBJECTIVES

The course is intended to:

1. Describe the causes of accident, its cost and legal implications.
2. Outline the concepts of safety programmes.
3. Elucidate the safety considerations in a construction contract.
4. Depict the importance of designing safe working culture.
5. Illustrate the responsibility of owner and designer for safety.

UNIT I - CONSTRUCTION ACCIDENTS

9

Accidents and their causes - Human factors in construction safety - Costs of construction injuries - Occupational and safety hazard assessment - Legal implications.

UNIT II - SAFETY PROGRAMMES

9

Problem areas in construction safety - Elements of an effective safety programme - Job-site safety assessment - Safety meetings - Safety incentives.

UNIT III - CONTRACTUAL OBLIGATIONS

9

Safety in construction contracts - Substance abuse - Safety record keeping.

UNIT IV - DESIGNING FOR SAFETY

9

Safety culture - Safe workers - Safety and first line supervisors - Safety and middle managers - Top management practices, company activities and safety - Safety personnel – Sub contractual obligation - Project coordination and safety procedures - Workers compensation.

UNIT V - OWNERS' AND DESIGNERS' OUTLOOK

9

Owner's responsibility for safety - Owner preparedness - Role of designer in ensuring safety - Safety clause in design document.

COURSE OUTCOMES

At the end of this course, students will be able to:

- CO.1 Describe the causes of accident, its cost and legal implications.
- CO.2 Outline the concepts of safety programmes.
- CO.3 Elucidate the safety considerations in a construction contract.
- CO.4 Depict the importance of designing safe working culture.
- CO.5 Illustrate the responsibility of owner and designer for safety.

TEXT BOOKS:

1. Jimmy W. Hinze, "Construction Safety", Prentice Hall Inc., 1997.
2. Amarjit Singh, Jimmie Hinze, "Implementation of Safety and Health on Construction sites" Taylor & Francis, 1999.

REFERENCE BOOKS:

1. Richard J. Coble, Jimmie Hinze and Theo C. Haupt, "Construction Safety and Health Management", Prentice Hall Inc., 2001.
2. Tim Howarth, Paul Watson "Construction Safety Management" John Wiley & Sons, 2008
3. Tamilnadu Factory Act, Department of Inspectorate of factories, Tamilnadu.

WEB REFERENCES:

1. <https://www.osha.gov/video/>
2. <https://www.youtube.com/watch?v=t-P6mMp23ug>
3. <http://nptel.ac.in/courses/114106017/>


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| | | |
|-------------------------|--|---------------|
| Course Code : 16CEE32 | Course title : QUALITY CONTROL AND ASSURANCE | |
| Core/Elective: Elective | L: T : P : C | 3 : 0 : 0 : 3 |
| Type : Theory | Total Contact hours: | 45 |

COURSE OBJECTIVES

The course is intended to:

1. Brief the quality management principles.
2. Explain the quality system standards.
3. Illustrate the elements of quality planning and its implication.
4. Elucidate the objectives and perform failure analysis related to QA/QC.
5. Describe the quality improvement techniques.

UNIT I - QUALITY MANAGEMENT

9

Introduction - Definitions and objectives - Factor influencing construction quality - Responsibilities and authority - Quality plan - Quality management guidelines.

UNIT II - QUALITY SYSTEMS

9

Introduction - Quality system standard - ISO 9000 family of standards - Requirements - Preparing Quality system documents - Quality related training - Implementing a quality system - Third party certification.

UNIT III - QUALITY PLANNING

9

Quality Policy, objectives and methods in construction industry - Consumers satisfaction, ergonomics - Time of completion - Statistical tolerance - Taguchi's concept of quality - Codes and standards - Documents - Contract and construction programming - Inspection procedures - Processes and products - Total QA / QC programme and cost implication.

UNIT IV - QUALITY ASSURANCE AND CONTROL

9

Objectives - Regulatory agent, owner, design, contract and construction oriented objectives, methods - Techniques and needs of QA/QC - Different aspects of quality - Appraisals, factors influencing construction quality - Critical, major failure aspects and failure mode analysis - Stability methods and tools - Optimum design - Reliability testing, reliability coefficient and reliability prediction.

UNIT V - QUALITY IMPROVEMENT TECHNIQUES

9

Selection of new materials - Influence of drawings, detailing, specification, standardization - Bid preparation - Construction activity, environmental safety, social and environmental factors - Natural causes and speed of construction - Life cycle costing - Value engineering and value analysis.

COURSE OUTCOMES

At the end of this course, students will be able to:

- CO.1 Brief the quality management principles.
- CO.2 Explain the quality system standards.
- CO.3 Illustrate the elements of quality planning and its implication.
- CO.4 Elucidate the objectives and perform failure analysis related to QA/QC.
- CO.5 Describe the quality improvement techniques.

TEXT BOOKS:

1. Frank M. Gryna, "Quality Planning and Analysis", McGraw-Hill, 2001.
2. Ashford.J.L, "The Management of Quality in Construction", E &FN Spon, 2003.


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REFERENCE BOOKS:

1. Abdul RazzakRumane, "Quality Management in Construction Projects", CRC Press, 2011.
2. Steven McCabe, "Quality Improvement Techniques in Construction", Addison Wesley Longman Ltd, 1998.
3. Hutchins.G, "ISO 9000: A Comprehensive Guide to Registration, Audit Guidelines and Successful Certification", Viva Books Pvt. Ltd., 1994.

WEB REFERENCES:

1. http://pmbook.ce.cmu.edu/13_Quality_Control_and_Safety_During_Construction.html
2. <http://nptel.ac.in/courses/116102019/>


BoS Chairman

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|-------------------------|---|---------------|
| Course Code : 16CEE33 | Course title : SMART STRUCTURES AND SMART MATERIALS | |
| Core/Elective: Elective | L : T : P : C | 3 : 0 : 0 : 3 |
| Type : Theory | Total Contact hours: | 45 |

COURSE OBJECTIVES

The course is intended to:

1. Explain the concept of Smart materials and its properties.
2. Outline the use of smart materials in structures.
3. Illustrate the knowledge on vibration absorbers.
4. Classify Control Systems and Explain functions of various controls applied in structures.
5. Describe the Biomimetics and its essentials.

UNIT I - PROPERTIES OF MATERIALS

9

Piezoelectric Materials, Piezoelectric properties, Actuation of structural components, Shape Memory Alloys, Constitutive modeling of the shape memory effect, vibration control, Embedded actuators, Applications of shape memory alloys.

UNIT II - ER AND MR FLUIDS

9

Electrorheological and magnetorheological fluids, Mechanisms and Properties, Applications of ER and MR fluids, Fiber Optics, Fiber characteristics, Fiber optic strain sensors, Applications of optical fibers.

UNIT III - VIBRATION ABSORBERS

9

Parallel damped vibration absorber, Gyroscopic vibration absorber, Active vibration, absorber, Applications, Vibration Characteristics of mistuned systems, Analytical approach

UNIT IV - CONTROL OF STRUCTURES

9

Control modeling of structures, Control strategies and limitations, classification of control systems, Classical control, Modern control, optimal control and Digital control, Active structures in practice.

UNIT V - BIOMIMETICS

9

Characteristics of natural structures, Biomimetic structural design, Biomimetic sensing, Challenges and opportunities for Biomimetics, Chemical and biochemical sensing in structural assessment, Absorptive chemical sensors, Spectroscopes.

COURSE OUTCOMES

At the end of this course, students will be able to:

- CO.1 Explain the concept of Smart materials and its properties.
- CO.2 Outline the use of smart materials in structures.
- CO.3 Illustrate the knowledge on vibration absorbers.
- CO.4 Classify Control Systems and Explain functions of various controls applied in structures.
- CO.5 Describe the Biomimetics and its essentials.

TEXT BOOKS:

1. Srinivasan. A.V., and Michael McFarland. D., "Smart Structures – Analysis and Design", Cambridge University Press, 2001.
2. M.V. Gandhi and B.S. Thompson, "Smart Materials and Structures", Chapman & Hall, London; New York, 1992


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REFERENCE BOOKS:

1. Brian Culshaw, "Smart Structures and Materials", Artech House, Boston, 1996
2. A.J. Moulson and J.M. Herbert, "Electroceramics: Materials, Properties, Applications", 2nd Edition, John Wiley & Sons, Chichester, West Sussex; New York, 2003
3. Mel. M Schwartz, "Encyclopedia of Smart Materials", John Wiley and Sons inc. 2002.

WEB REFERENCES:

1. http://nptel.ac.in/courses/112104173/Mod_1_smart_mat_lec_1.pdf
2. <http://www.me.metu.edu.tr/courses/me493/>



BoS Chairman

| | | |
|-------------------------|---|---------------|
| Course Code : 16CEE34 | Course title : INFRASTRUCTURE ENGINEERING | |
| Core/Elective: Elective | L: T : P : C | 3 : 0 : 0 : 3 |
| Type : Theory | Total Contact hours: | 45 |

COURSE OBJECTIVES

The course is intended to:

1. Explain the importance in the field of Infrastructure
2. Describe the advantage of privatization of infrastructure with case study
3. Explain the finance management concept in infrastructure
4. Describe the planning and implementation of infrastructure with case study
5. Prepare report on performance in the field of infrastructure.

UNIT I - INFRASTRUCTURE

9

Introduction to Infrastructure - Governing features - Historical overview of infrastructure development in India - power, water supply & sanitation, Road Rail Air & Port transportation sectors, Telecommunication sectors, urban infrastructure, rural infrastructure – an introduction to special economic zones- organizations and layers in the field of Infrastructure

UNIT II - PRIVATIZATION OF INFRASTRUCTURE

9

Overview of Infrastructure Privatization - The Benefits of Infrastructure Privatization, Problems with Infrastructure Privatization - A Case Study - Challenges in Privatization of Water Supply, Power, Road Transportation Infrastructure in India

UNIT III - INFRASTRUCTURE FINANCE MANAGEMENT

9

Infrastructure project budgeting & funding - Regulatory framework - Infrastructure laws – Sources of funding – Time value of money, Cash flow. Inflation, Depreciation, Taxes, personnel cost - Equipment cost- Over heads- Life cycle costing - Evaluation of alternatives (Value Engineering)- Cost Benefit Analysis- Feasibility studies

UNIT IV - INFRASTRUCTURE PLANNING AND IMPLEMENTATION

9

Mapping and Facing the landscape of Risks in Infrastructure Projects -Risks in Infrastructure projects- Economic & Demand risks in infrastructure projects-Political risks, socio – economic risks & cultural risks-Case studies -Challenges in construction and maintenance of Infrastructure

UNIT V - INFRASTRUCTURE PERFORMANCE

9

Infrastructure Inspection- Report preparation - Infrastructure Interdependencies – Sustainable Infrastructure - Performance modeling – Improving Government's role in Infrastructure performance - Future directions.

COURSE OUTCOMES

At the end of this course, students will be able to:

- CO.1 Explain the importance in the field of Infrastructure
- CO.2 Describe the advantage of privatization of infrastructure with case study
- CO.3 Explain the finance management concept in infrastructure
- CO.4 Describe the planning and implementation of infrastructure with case study
- CO.5 Prepare report on performance in the field of infrastructure.

TEXT BOOKS:

1. Vasant Desai, "Project Management", Himalaya Publishing, 4th Edition, 2015.
2. James C. Van Horne, John M. Wachowicz, "Fundamentals of Financial Management",


BoS Chairman

PHI, 13th Edition, 2008.

3. Ronald W Hudson, "Infrastructure Management: integrating design, Construction, maintenance, rehabilitation and renovation", MGH, 1st Edition, 1997.

REFERENCE BOOKS:

1. The India Infrastructure Report, Ministry of Finance, Govt. of India, 2000
2. Sengupta and Guha, "Construction Management and Planning", TMH 2nd Edition, 2002
3. Erza, Solomon, "Theory of Finance Management", Columbia University Press, 2nd Edition, 1996.

WEB REFERENCES:

1. <http://nptel.ac.in/courses/105106115/>
2. <https://mvsrcivil1.blogspot.com/2016/02/infrastructure-engineering-notes-1st.html>



BoS Chairman

| | | |
|-------------------------|--|---------------|
| Course Code : 16CEE35 | Course title : PROJECT FORMULATION AND APPRAISAL | |
| Core/Elective: Elective | L: T : P : C | 3 : 0 : 0 : 3 |
| Type : Theory | Total Contact hours: | 45 |

COURSE OBJECTIVES

The course is intended to:

1. Explain the concepts of project formulation in construction projects
2. Identify the project costs and cash flows
3. Apply the appraisal techniques in project management
4. Explain the finance and risk analysis in construction projects
5. Describe the private sector participation in infrastructure development projects

UNIT I - PROJECT FORMULATION

9

Project-Concepts – Capital investments – Generation and Screening of Project Ideas-Project identification – Preliminary Analysis, Market, Technical, Financial, Economic and Ecological - Pre-Feasibility Report and its Clearance, Project Estimates and Techno-Economic Feasibility Report, Detailed Project Report – Different Project Clearances required

UNIT II - PROJECT COSTING

9

Project Cash Flows – Elements and principles – Biases in Cash Flow Estimation–Time Value of Money– Time lines, Future Value, Present Value, Intra-Year Compounding and Discounting – Cost of Capital

UNIT III - PROJECT APPRAISAL

9

NPV–BCR–IRR –ARR–Urgency–Pay Back Period – Assessment of Various Methods – Indian Practice of Investment Appraisal – International Practice of Appraisal

UNIT IV - PROJECT FINANCING AND RISK ANALYSIS

9

Project Financing – Means of Finance – Financial Institutions – Special Schemes – Key Financial Indicators – Ratios, Analysis of Risk – Different Methods – Selection of a Project and Risk Analysis in Practice

UNIT V - PRIVATE SECTOR PARTICIPATION

9

Private sector participation in Infrastructure Development Projects - Variants of BOT – BOLT–BOOT, etc., -Technology Transfer and Foreign Collaboration - Scope of Technology Transfer

COURSE OUTCOMES

At the end of this course, students will be able to:

- CO.1 Explain the concepts of project formulation in construction projects
- CO.2 Identify the project costs and cash flows
- CO.3 Apply the appraisal techniques in project management
- CO.4 Explain the finance and risk analysis in construction projects
- CO.5 Describe the private sector participation in infrastructure development projects

TEXT BOOKS:

1. PrasannaChandra, "Projects – Planning, Analysis, Selection, Implementation Review", Tata McGraw Hill Publishing Company Ltd., New Delhi, 2009.
2. Joy P.K., "Total Project Management" - The Indian Context, New Delhi, Macmillan India Ltd.,1994


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REFERENCE BOOKS:

1. "United Nations Industrial Development Organization (UNIDO) Manual" for the Preparation of Industrial Feasibility Studies, (IDBI Reproduction) Bombay, 1987.
2. Barcus, S.W. and Wilkinson. J.W., "Hand Book of Management Consulting Services", McGraw Hill, NewYork, 1995.

WEB REFERENCES:

1. <https://www.youtube.com/watch?v=PgteLvFYizg>
2. <https://www.youtube.com/watch?v=xluLYZrJwYk>
3. <https://www.youtube.com/watch?v=wJ8HZ7hqUs8&list=PL335191DF7E62482C>


BoS Chairman

| | | |
|-------------------------|--|---------------|
| Course Code : 16CEE36 | Course title : CONTRACT LAWS AND REGULATIONS | |
| Core/Elective: Elective | L: T : P : C | 3 : 0 : 0 : 3 |
| Type : Theory | Total Contact hours: | 45 |

COURSE OBJECTIVES

The course is intended to:

1. Explain the elements of concluding, and administering contracts
2. Prepare tender documents as per the procedures and guidelines
3. Explain the importance of arbitrations
4. Describe the legal requirements in construction field.
5. Explain the labour regulations and their impact on managing of contracts.

UNIT I - CONSTRUCTION CONTRACTS

9

Indian Contracts Act – Elements of Contracts – Types of Contracts – Features – Suitability – Design of Contract Documents – International Contract Document – Standard Contract Document – Law of Torts

UNIT II - TENDERS

9

Prequalification – Bidding – Accepting – Evaluation of Tender from Technical, Contractual and Commercial Points of View – Contract Formation and Interpretation – Potential Contractual Problems – World Bank Procedures and Guidelines – Tamilnadu Transparency in Tenders Act.

UNIT III - ARBITRATION

9

Comparison of Actions and Laws – Agreements – Subject Matter – Violations – Appointment of Arbitrators – Conditions of Arbitration – Powers and Duties of Arbitrator – Rules of Evidence – Enforcement of Award – Costs

UNIT IV - LEGAL REQUIREMENTS

9

Insurance and Bonding – Laws Governing Sale, Purchase and Use of Urban and Rural Land – Land Revenue Codes – Tax Laws – Income Tax, Sales Tax, Excise and Custom Duties and their Influence on Construction Costs – Legal Requirements for Planning – Property Law – Agency Law – Local Government Laws for Approval – Statutory Regulations

UNIT V - LABOUR REGULATIONS

9

Social Security – Welfare Legislation – Laws relating to Wages, Bonus and Industrial Disputes, Labour Administration – Insurance and Safety Regulations – Workmen's Compensation Act – Indian Factory Act – Tamilnadu Factory Act – Child Labour Act - Other Labour Laws

COURSE OUTCOMES

At the end of this course, students will be able to:

- CO.1 Explain the elements of concluding, and administering contracts
- CO.2 Prepare tender documents as per the procedures and guidelines
- CO.3 Explain the importance of arbitrations
- CO.4 Describe the legal requirements in construction field.
- CO.5 Explain the labour regulations and their impact on managing of contracts.

TEXT BOOKS:

1. Patil. B.S, "Civil Engineering Contracts and Estimates", Universities Press (India) Private Limited, 2006.


BoS Chairman

2. Jimmie Hinze, "Construction Contracts", McGraw Hill, New Delhi, 2009.

REFERENCE BOOKS:

1. Gajaria G.T., "Laws Relating to Building and Engineering Contracts in India", M.M.Tripathi Private Ltd., Bombay, 1992.
2. Joseph T. Bockrath, "Contracts, the Legal Environment for Engineers and Architects", McGraw Hill, 2000
3. Oxley Rand Posicit, "Management Techniques applied to the Construction Industry", Granda publications, Noida, 2009.

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1. <http://study.com/academy/topic/contract-law-basics.html>
2. <https://www.youtube.com/watch?v=qIUYm8p9IYU>
3. <https://www.youtube.com/watch?v=FJ3ZJ1n1aeY>
4. <https://www.vidyarthiplus.com/vp/thread-36549.html#.WF5tNtJ97cs>


BoS Chairman

GENERAL ELECTIVES

| | | |
|-------------------------|--|---------------|
| Course Code : 16CEE37 | Course title : INDIAN CONSTITUTION AND SOCIETY | |
| Core/Elective: Elective | L: T : P : C | 3 : 0 : 0 : 3 |
| Type : Theory | Total Contact hours: | 45 |

COURSE OBJECTIVES

The course is intended to:

1. Explain the need for a constitution
2. Describe the structure of Union Government and list the functional duties of various union executives
3. Illustrate the structure of state government and its functional duties
4. Explain Electoral Process, special provisions, powers and functions of Municipalities, Panchayats and Co-operative Societies
5. Describe the basic human rights and its implications in India.

UNIT I - CONSTITUTION OF INDIA

9

Historical Background – Constituent Assembly of India – Philosophical foundations of the Indian Constitution – Preamble – Fundamental Rights – Directive Principles of State Policy – Fundamental Duties – Citizenship – Constitutional Remedies for citizens.

UNIT II - UNION GOVERNMENT

9

Union Government – Structures of the Union Government and Functions – President – Vice President – Prime Minister – Cabinet – Parliament – Supreme Court of India – Judicial Review.

UNIT III - STATE GOVERNMENT

9

State Government – Structure and Functions – Governor – Chief Minister – Cabinet – State Legislature – Judicial System in States – High Courts and other Subordinate Courts.

UNIT IV - FEDERAL SYSTEM

9

Indian Federal System – Center – State Relations – President's Rule – Constitutional Amendments – Constitutional Functionaries - Assessment of working of the Parliamentary System in India.

UNIT V - SOCIETY AND RIGHTS

9

Society : Nature, Meaning and definition; Indian Social Structure; Caste, Religion, Language in India; Constitutional Remedies for citizens – Political Parties and Pressure Groups; Right of Women, Children and Scheduled Castes and Scheduled Tribes and other Weaker Sections.

COURSE OUTCOMES

At the end of this course, students will be able to:

- CO.1 Explain the need for a constitution
- CO.2 Describe the structure of Union Government and list the functional duties of various union executives
- CO.3 Illustrate the structure of state government and its functional duties
- CO.4 Explain Electoral Process, special provisions, powers and functions of Municipalities, Panchayats and Co-operative Societies
- CO.5 Describe the basic human rights and its implications in India.


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TEXT BOOKS:

1. Durga Das Basu, "Introduction to the Constitution of India", Prentice Hall of India, New Delhi, 2009.
2. R.C. Agarwal, "Indian Political System", S.Chand and Company, New Delhi, 2008.
3. K.L.Sharma, (1997) "Social Stratification in India: Issues and Themes", Jawaharlal Nehru University, New Delhi.

REFERENCE BOOKS:

1. Sharma, Brij Kishore, "Introduction to the Constitution of India", Prentice Hall of India, New Delhi, 2011.
2. U.R.Gahai, "Indian Political System", New Academic Publishing House, Jalandhar, 1998.
3. R.N. Sharma, "Indian Social Problems", Media Promoters and Publishers Pvt. Ltd.1999.
4. Yogendra Singh, "Social Stratification and Change in India", Manohar, New Delhi, 1998.

WEB REFERENCES:

1. <https://www.vidyarthiplus.com/vp/thread-28159.html#.WXMoCxWGPIU>



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| | | |
|-------------------------|---|---------------|
| Course Code : 16CEE38 | Course title : INTELLECTUAL PROPERTY RIGHTS | |
| Core/Elective: Elective | L: T : P : C | 3 : 0 : 0 : 3 |
| Type : Theory | Total Contact hours: | 45 |

COURSE OBJECTIVES

The course is intended to:

1. Outline an awareness on Intellectual Property Rights (IPR)
2. Distinguish between patents and copyrights
3. Explain the application procedure of IPR
4. Describe the salient features of a national Intellectual Property Policy
5. Outline the importance of IPR in industries

UNIT I - INTELLECTUAL PROPERTY LAW

9

Introduction to Intellectual Property Law – The Evolutionary Past - The IPR Tool Kit- Para – Legal Tasks in Intellectual Property Law – Ethical obligations in Para Legal Tasks in Intellectual Property Law - Introduction to Cyber Law – Innovations and Inventions Trade related Intellectual property.

UNIT II - COPYRIGHT PROCEDURES

9

Introduction to copyright – The Rights Afforded by Copyright Law – Copy right Ownership, Transfer and duration – Right to prepare Derivative works – Rights of Distribution – Copyright Formalities and Registrations - Limitations - Copyright disputes and International copyright law.

UNIT III - PATENTS AND APPLICATION PROCEDURES

9

IP – Patents – Copyrights and related rights – Trade Marks and rights arising from Trademark registration – Definitions – Industrial Designs and Integrated circuits – Protection of Geographical Indications at national and International levels – Application Procedures.

UNIT IV - LEGISLATIONS AND POLICY

9

Indian Position Vs WTO and Strategies – Indian IPR legislations – commitments to WTO Patent Ordinance and the Bill – Draft of a national Intellectual Property Policy.

UNIT V - CASE STUDIES

9

Case Studies on – Patents (Basumati rice, turmeric, Neem, etc.) – Copyright and related rights – Trade Marks – Industrial design and Integrated circuits – Geographic indications – Protection against unfair competition.

COURSE OUTCOMES

At the end of this course, students will be able to:

- CO.1 Outline an awareness on Intellectual Property Rights (IPR)
- CO.2 Distinguish between patents and copyrights
- CO.3 Explain the application procedure of IPR
- CO.4 Describe the salient features of a national Intellectual Property Policy
- CO.5 Outline the importance of IPR in industries

TEXT BOOKS:

1. Ganguli, P., "Intellectual Property Rights", Tata Mc-Graw –Hill, New Delhi, 2004.
2. Subbaram N.R. "Handbook of Indian Patent Law and Practice ", S. Viswanathan Printers and Publishers Pvt. Ltd., 1998.


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REFERENCE BOOKS:

1. Gopalakrishnan, N.S., Agitha, T.G., "Principles of Intellectual Property", Eastern Book Company, Lucknow, 2009.
2. Cornish, W.R., "Intellectual Property", Sweet & Maxwell, London, 2000.
3. Jurisprudence, B., "The Philosophy and Method of the Law" Universal publishers, New Delhi, 1999.

WEB REFERENCES:

1. <http://www.ipindia.nic.in/>
2. <http://pfc.org.in/faqipr.pdf>
3. <http://www.giipinfo.com/>

**BoS Chairman**

| | | |
|-------------------------|---|---------------|
| Course Code : 16CEE39 | Course title : PROBABILITY AND STATISTICS | |
| Core/Elective: Elective | L : T : P : C | 3 : 0 : 0 : 3 |
| Type : Theory | Total Contact hours: | 45 |

COURSE OBJECTIVES

The course is intended to:

1. Calculate Moment generating functions for standard probability distributions.
2. Calculate Marginal and Conditional distributions for two dimensional random variables.
3. Use different statistical approach based on mean to test the given samples.
4. Use different statistical approach based on Variance to test the given samples.
5. Plot control charts for attributes.

UNIT I - RANDOM VARIABLES

9

Discrete and Continuous random variables – Moments – Moment generating functions
Binomial, Poisson, and Normal distributions - Functions of a random variable.

UNIT II - TWO-DIMENSIONAL RANDOM VARIABLES

9

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

UNIT III - TESTING OF HYPOTHESIS

9

Sampling distributions - Tests for single mean, proportion, Difference of means (large and
small samples) – Tests for single variance and equality of variances – Chi-Square test for
goodness of fit – Independence of attributes.

UNIT IV - DESIGN OF EXPERIMENTS

9

Completely randomized design – Randomized block design – Latin square design.

UNIT V - STATISTICAL QUALITY CONTROL

9

Control charts for measurements (X bar and R charts) – Control charts for attributes (p, c
and np charts) – Tolerance limits - Acceptance sampling.

COURSE OUTCOMES

At the end of this course, students will be able to:

- CO.1 Calculate Moment generating functions for standard probability distributions.
- CO.2 Calculate Marginal and Conditional distributions for two dimensional random variables.
- CO.3 Use different statistical approach based on mean to test the given samples.
- CO.4 Use different statistical approach based on Variance to test the given samples.
- CO.5 Plot control charts for attributes.

TEXT BOOKS:

1. Milton, J. S. and Arnold, J.C., "Introduction to Probability and Statistics", Tata McGraw Hill, 4th edition, (2007).
2. Johnson, R.A. and Gupta, C.B., "Miller and Freund's Probability and Statistics for Engineers", Pearson Education, Asia, 7th edition, (2007).

REFERENCE BOOKS:

1. Devore, J.L., "Probability and Statistics for Engineering and the Sciences", Thomson Brooks/Cole, International Student Edition, 7th edition, (2008).


BoS Chairman

2. Walpole, R.E., Myers, R.H., Myers, S.L. and Ye, K., "Probability and Statistics for Engineers and Scientists", Pearson Education, Asia, 8th edition, (2007).
3. Ross, S.M., "Introduction to Probability and Statistics for Engineers and Scientists, 3rd edition, Elsevier, (2004).
4. Spiegel, M.R., Schiller, J. and Srinivasan, R.A., "Schaum's Outline of Theory and Problems of Probability and Statistics", Tata McGraw Hill edition, (2004).

WEB REFERENCES:

1. <http://nptel.ac.in/courses/111105041/1>
2. <https://ocw.mit.edu/courses/mathematics/18-05-introduction-to-probability-and-statistics-spring-2014/index.htm>

| | | |
|-------------------------|---|---------|
| Course Code : 16CEE40 | Course title : PROFESSIONAL ETHICS AND HUMAN VALUES | |
| Core/Elective: Elective | L:T:P:C | 3:0:0:3 |
| Type : Theory | Total Contact hours: | 45 |

COURSE OBJECTIVES

The course is intended to:

1. Identify the core values that shape the ethical behavior of an engineer
2. Describe the role of an engineer as a responsible experimenter
3. Explain the importance of public safety in professional ethics
4. Undertake the social responsibilities of an engineer
5. Provide solutions to moral dilemmas arising in professional life

UNIT I - ENGINEERING ETHICS

9

Senses of 'Engineering Ethics' – Variety of moral issues – Types of inquiry – Moral dilemmas–Moral Autonomy – Kohlberg's theory – Gilligan's theory – Consensus and Controversy –Professions and Professionalism – Professional Ideals and Virtues – Uses of Ethical Theories.

UNIT II - ENGINEERING AS SOCIAL EXPERIMENTATION

9

Engineering as Experimentation – Engineers as responsible Experimenters – Research Ethics- Codes of Ethics – Industrial Standards - A Balanced Outlook on Law – The Challenger Case Study.

UNIT III - ENGINEER'S RESPONSIBILITY FOR SAFETY

9

Safety and Risk – Assessment of Safety and Risk – Risk Analysis – Reducing Risk – The Government Regulator's Approach to Risk - Case Studies Chernobyl and Bhopal.

UNIT IV - RESPONSIBILITIES AND RIGHTS

9

Professional Obligation – Overview of NBC - Collegiality and Loyalty – Respect for Authority – Collective Bargaining – Confidentiality –Conflicts of Interest – Occupational Crime – Professional Rights – Employee Rights – Intellectual Property Rights (IPR) – Discrimination.

UNIT V - GLOBAL ISSUES

9

Multinational Corporations – Business Ethics - Environmental Ethics – Computer Ethics – Role in Technological Development – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Honesty – Moral Leadership – Sample Code of Conduct.

COURSE OUTCOMES

At the end of this course, students will be able to:

- CO.1 Identify the core values that shape the ethical behavior of an engineer
- CO.2 Describe the role of an engineer as a responsible experimenter
- CO.3 Explain the importance of public safety in professional ethics
- CO.4 Undertake the social responsibilities of an engineer
- CO.5 Provide solutions to moral dilemmas arising in professional life

TEXT BOOKS:

1. Martin. M., Schinzinger, R. "Ethics in Engineering", McGraw Hill, New York, 2005.
2. Harris, C.E., Pritchard, M.S., Rabins, M.J., "Engineering Ethics: Concepts and Cases",

4th Edition, Wadsworth Publishing, New Delhi, 2012.

REFERENCE BOOKS:

1. Fleddermann. C.D., "Engineering Ethics", Prentice Hall, New Mexico, 1999.
2. Boatright. J.R., Patra, B.P., "Ethics and the Conduct of Business", 6th Edition, Pearson Education, Delhi, 2011
3. Seebauer. E.G., Barry, R.L., "Fundamentals of Ethics for Scientists and Engineers", Oxford University Press India, New Delhi, 2005
4. Bajaj, P.S., Agrawal, R., "Business Ethics – An Indian Perspective", Biztantra, New Delhi, 2004.

WEB REFERENCES:

1. <http://www.slideshare.net/Kalpnotomar/human-values-and-professional-ethics-notes-unit-1>
2. <https://niyatigarg.files.wordpress.com/2011/08/question-bank1.pdf>
3. http://www.bietjhs.ac.in/pdf/human_values.pdf
4. <http://www.gupshupstudy.com/note/31353131/professional-ethics-and-human-values-by-rsnaagarazan-full-ebook-pdf-download>

Pool

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OPEN ELECTIVES

| | | |
|-------------------------|-----------------------------------|---------------|
| Course Code : 16OET08 | Course title : SAFETY ENGINEERING | |
| Core/Elective: Elective | L: T : P : C | 3 : 0 : 0 : 3 |
| Type : Theory | Total Contact hours: | 45 |

COURSE OBJECTIVES

The course is intended to:

1. Explain basic concepts in safety, safety policy and its techniques
2. Explain basic concepts in Health and hygiene in the occupational environment
3. Describe fire explosion control techniques in various industries
4. Explain safety standards in construction industry
5. Describe the safety materials to be used in the field of work

UNIT I - INTRODUCTION TO CONCEPTS

9

Concept of safety - Evolution of modern safety concept- Safety policy - Safety Organization - line and staff - functions for safety- Safety Committee- budgeting for safety. Techniques- Incident Recall Technique (IRT), disaster control, Job Safety Analysis (JSA), safety survey, safety inspection, safety sampling, Safety Audit.

UNIT II - OCCUPATIONAL HEALTH AND HYGIENE

9

Physical hazards - Noise, noise exposure regulation, occupational damage, risk factors, and permissible exposure limit. Ionizing radiation, types, effects, monitoring instruments, control programs, control measures. Chemical hazards - Recognition of chemical hazards- dust, fumes, mist, vapour, fog, gases, types, concentration, Exposure vs. dose, Methods of Control. Concept and spectrum of health - functional units and activities of occupational health services, pre employment and post-employment medical examinations - occupational related diseases, levels of prevention of diseases.

UNIT III - FIRE ENGINEERING AND EXPLOSION CONTROL

9

Fire chemistry – Dynamics of fire behavior – Fire properties of solid, liquid and gas – Fire spread – Toxicity of products of combustion. Building evaluation for fire safety – Fire load – Fire resistance materials and fire testing –Structural Fire protection – Exits and egress. Statutory Rules and Techniques of fire fighting - Indian Explosive acts and rules – Techniques of fire fighting and demonstration.

UNIT IV - SAFETY IN CONSTRUCTION

9

General safety consideration – analyzing construction jobs for safety – Contract document –Safety certificate for statutory authorities for old building and construction. Safety in Erection and closing operation - Construction materials –Specifications – suitability – Limitations. Safety in typical civil structures – Dams-bridges-water Tanks-Retaining walls- Critical factors for failure-Regular Inspection and monitoring.

UNIT V - SAFETY IN MATERIAL HANDLING

9

General safety consideration in material handling - Ropes, Chains, Sling, Hoops, Clamps, Arresting gears. Selection, operation and maintenance of Industrial Trucks – Mobile Cranes – Tower crane –Checklist - Competent persons.

COURSE OUTCOMES

At the end of this course, students will be able to:

- CO 1. Explain basic concepts in safety, safety policy and its techniques
CO 2. Explain basic concepts in Health and hygiene in the occupational environment


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- CO 3. Describe fire explosion control techniques in various industries
- CO 4. Explain safety standards in construction industry
- CO 5. Describe the safety materials to be used in the field of work

TEXT BOOKS:

- 1. Krishnan N.V. "Safety Management in Industry" Jaico Publishing House, Bombay, 1997
- 2. Accident Prevention Manual for Industrial Operations", N.S.C.Chicago, 1982

REFERENCE BOOKS:

- 1. Handbook of Occupational Health and Safety, NSC Chicago, 1982
- 2. James, D., Fire Prevention Handbook, Butterworths, London, 1986.
- 3. Gupta R.S., Handbook of Fire Technology, Orient Longman, Bombay, 1997.
- 4. Fulman, J.B., Construction Safety, Security, and Loss Prevention, John Wiley and Sons, 1979
- 5. Alexandrov, M.P., Material Handling Equipment, Mir Publishers, Moscow, 1981
- 6. Rudenko N., Material Handling Equipments, Mir Publishers, Moscow, 1981.

| | | |
|-------------------------|--|---------------|
| Course Code : 16OET09 | Course title : ENVIRONMENTAL IMPACT ASSESSMENT | |
| Core/Elective: Elective | L: T : P : C | 3 : 0 : 0 : 3 |
| Type : Theory | Total Contact hours: | 45 |

COURSE OBJECTIVES

The course is intended to:

1. Describe the objectives, capability, and limitations of EIA.
2. Elucidate the methods of EIA with case studies.
3. Apply the knowledge of the impact of infrastructure projects on air quality, water quality, vegetation and wildlife.
4. Explain the environmental management plan.
5. Describe the EIA for various infrastructural projects.

UNIT I - INTRODUCTION

9

Impact of development projects under Civil Engineering on environment – Environmental Impact Assessment (EIA) - Environmental Impact Statement (EIS) – EIA capability and limitations – Legal provisions on EIA –EIA notifications –EIA consultants.

UNIT II - METHODOLOGIES

9

Methods of EIA- strength, weakness and applicability of EIA– Appropriate methodology – Process Screening – Baseline studies-Mitigations-Check lists – Matrices – Networks – Cost-benefit analysis – Analysis of alternatives.

UNIT III - AIR QUALITY, NOISE, ENERGY, WATER QUALITY, VEGETATION AND WILDLIFE IMPACT

9

Background - typical considerations and factors, Air quality impact of industry, transport systems, human settlements. Effects of noise on people, noise scales and rating methods, estimating transportation -noise impact. Energy Impact considerations, data sources, energy conservation data. Water quality criteria and standards, waste quality impacts by development projects – Vegetation impact -wild life impact - impact on flora and fauna-Socio Economic impact-Rapid EIA-Post Environmental Audit.

UNIT IV - ENVIRONMENTAL MANAGEMENT PLAN

9

Plan for mitigation of adverse impact on environment – options for mitigation of impact on water, air & land, flora and fauna; addressing the issues related to Project Affected People – ISO 14000

UNIT V - CASE STUDIES

9

EIA for infrastructure projects – Highways and Bridges – Stadium – Railways – Dams – Multi-storey Buildings – Water Supply and Drainage Projects – Power plant.

COURSE OUTCOMES

At the end of this course, students will be able to:

- CO.1 Describe the objectives, capability, and limitations of EIA.
- CO.2 Elucidate the methods of EIA with case studies.
- CO.3 Apply the knowledge of the impact of infrastructure projects on air quality, water quality, vegetation and wildlife.
- CO.4 Explain the environmental management plan.
- CO.5 Describe the EIA for various infrastructural projects.

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.
3. Anjanayulu, Y., "Environmental Impact Assessment Methodologies", B.S Publications, Hyderabad, 2011.

REFERENCE BOOKS:

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

WEB REFERENCES:

1. <http://envfor.nic.in/division/introduction-8>
2. <http://nptel.ac.in/courses/120108004>
3. <http://environmentclearance.nic.in/writereaddata/EIA%20Notifications>