SRM UNIVERSITY
(Under section 3 of UGC Act 1956)

# CIVIL INFRASTRUCTURE ENGINEERING CURRICULUM 2009-10

## (Amended for students admitted from 2010-11)

# CIVIL INFRASTRUCTURE ENGINEERING
# CURRICULUM 2009-10
# (Amended for students admitted from 2010-11)

| Subject Code | Category | Subject Name | L | T | P | C |
|---|---|---|---|---|---|---|
| **SEMESTER 1** | | | | | | |
| **THEORY** | | | | | | |
| LE 0101 | **G** | ENGLISH | 1 | 0 | 2 | 2 |
| MA 0101 | **B** | MATHEMATICS I | 3 | 2 | 0 | 4 |
| PH 0101 | **B** | PHYSICS | 3 | 0 | 0 | 3 |
| CY 0101 | **B** | CHEMISTRY | 3 | 0 | 0 | 3 |
| GE 0101 | **E** | BASIC ENGINEERING I | 4 | 0 | 0 | 4 |
| PD 0101 | **G** | PERSONALITY DEVELOPMENT –SOFT SKILL-I | 2 | 0 | 0 | 0 |
| **PRACTICAL** | | | | | | |
| GE 0107 | **G** | NCC / NSS / NSO /YOGA | 0 | 0 | 2 | 1 |
| PH 0103 | **B** | PHYSICS LABORATORY | 0 | 0 | 2 | 1 |
| CY 0103 | **B** | CHEMISTRY LABORATORY | 0 | 0 | 2 | 1 |
| GE 0105 | **B** | COMPUTER LITERACY | 0 | 0 | 2 | 1 |
| ME 0130 | **E** | ENGINEERING GRAPHICS | 1 | 0 | 4 | 3 |
| **Total** | | | **17** | **2** | **14** | **23** |
| **Total Contact Hours** | | | | | **33** | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **SEMESTER II** | | | | | | |
| **THEORY** | | | | | | |
| GE 0108 | **G** | VALUE EDUCATION | 1 | 0 | 0 | 1 |
| MA 0102 | **B** | MATHEMATICS II | 3 | 2 | 0 | 4 |
| PH 0102 | **B** | MATERIAL SCIENCE | 2 | 0 | 2 | 3 |
| GE 0102 | **B** | BIOLOGY FOR ENGINEERS | 2 | 0 | 0 | 2 |
| GE 0104 | **B** | PRINCIPLES OF ENVIRONMENTAL SCIENCE | 2 | 0 | 0 | 2 |
| GE 0106 | **E** | BASIC ENGINEERING II | 4 | 0 | 0 | 4 |
| CI0102 | **P** | ELEMENTS OF BUILDING MATERIAL SCIENCE AND ARCHITECTURE | 3 | 0 | 0 | 3 |
| PD 0102 | **G** | PERSONALITY DEVELOPMENT SOFT SKILL 2 * | 2 | 0 | 0 | 0 |
| **PRACTICAL** | | | | | | |
| CS 0140 | **E** | COMPUTER PRACTICE | 1 | 0 | 2 | 2 |
| ME 0120 | **E** | WORKSHOP PRACTICE | 0 | 0 | 4 | 2 |
| CI0104 | **P** | COMPUTER AIDED BUILDING DRAWING | 0 | 0 | 4 | 2 |
| **TOTAL** | | | 20 | 2 | 12 | 25 |
| **Total Contact Hours** | | | | | **34** | |

G: General programme comprising language/communication skills, humanities and social sciences, economics and principles of management, and NSS/NCC/NSO/YOGA.
B: Basic sciences comprising Computer Literacy with Numerical Analysis, Mathematics, Physics, and Chemistry.
E: Engineering Sciences and Technical Arts comprising Engineering Graphics, Workshop Practice, Basic Engineering, etc.

P: Professional subjects corresponding to the Branch of Studies, which will include core subjects, electives, and project work.

* Audit course

**SEMESTER III**

| | | | | | | |
|---|---|---|---|---|---|---|
| **THEORY** | | | | | | |
| LE 0201/LE 0203 / LE 0205 | **G** | GERMAN LANGUAGE PHASE I / JAPANESE LANGUAGE PHASE I / FRENCH LANGUAGE PHASE I | 2 | 0 | 0 | 2 |
| MA 0201 | **B** | MATHEMATICS III | 3 | 2 | 0 | 4 |
| CI0201 | **E** | MECHANICS OF SOLIDS | 2 | 2 | 0 | 3 |
| CI0203 | **E** | APPLIED GEOLOGY | 2 | 0 | 0 | 2 |
| CI0205 | **P** | FLUID MECHANICS | 3 | 0 | 0 | 3 |
| CI0207 | **P** | SURVEYING | 3 | 0 | 0 | 3 |
| CI0209 | **P** | BUILDING TECHNOLOGY | 3 | 0 | 0 | 3 |
| PD 0201 | **G** | PERSONALITY DEVELOPMENT –VERBAL APTITUDE I | 1 | 1 | 0 | 1 |
| **PRACTICAL** | | | | | | |
| CI0211 | **P** | SURVEY LABORATORY I | 0 | 0 | 4 | 2 |
| CI0213 | **P** | MATERIAL TESTING LABORATORY | 0 | 0 | 4 | 2 |
| **TOTAL** | | | **19** | **5** | **8** | **25** |
| **Total Contact Hours** | | | **32** | | | |

**SEMESTER IV**

| | | | | | | |
|---|---|---|---|---|---|---|
| **THEORY** | | | | | | |
| LE 0202/LE 0204/ LE 0206 | **G** | GERMAN LANGUAGE PHASE II / JAPANESE LANGUAGE PHASE II / FRENCH LANGUAGE PHASE II | 2 | 0 | 0 | 2 |
| MA 0202 | **B** | NUMERICAL METHODS | 3 | 2 | 0 | 4 |
| CI0202 | **P** | STRENGTH OF MATERIALS | 2 | 2 | 0 | 3 |
| CI0204 | **P** | STRUCTURAL DESIGN I (STEEL ) | 3 | 0 | 0 | 3 |
| CI 0206 | **P** | SOIL MECHANICS | 2 | 2 | 0 | 3 |
| CI0208 | P | ADVANCED SURVEYING AND REMOTE SENSING | 3 | 0 | 0 | 3 |
| PD 0202 | **G** | PERSONALITY DEVELOPMENT –QUANTITATIVE APTITUDE -I | 1 | 1 | 0 | 1 |
| **PRACTICAL** | | | | | | |
| CI0210 | **P** | COMPREHENSION I | 0 | 2 | 0 | 1 |
| CI0212 | **P** | SOIL MECHANICS LABORATORY | 0 | 0 | 2 | 1 |
| CI0214 | **P** | SURVEY LABORATORY II AND SURVEY CAMP | 0 | 0 | 2 | 1 |
| TOTAL | | | 16 | 9 | 4 | 22 |
| **Total Contact Hours** | | | **29** | | | |

**SEMESTER V**

| | | | | | | |
|---|---|---|---|---|---|---|
| **THEORY** | | | | | | |
| CI0301 | **P** | STRUCTURAL ANALYSIS I | 2 | 2 | 0 | 3 |
| CI0303 | **P** | STRUCTURAL DESIGN II (CONCRETE) | 3 | 0 | 0 | 3 |
| CI0305 | **P** | FOUNDATION ENGINEERING | 2 | 2 | 0 | 3 |
| CI0307 | P | CONSTRUCTION EQUIPMENT | 3 | 0 | 0 | 3 |
| CI0309 | P | ENVIRONMENTAL ENGINEERING SYSTEMS | 3 | 0 | 0 | 3 |
| PD 0301 | **G** | PERSONALITY DEVELOPMENT -QUANTITATIVE APTITUDE -II | 2 | 0 | 0 | 2 |
| **PRACTICAL** | | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| CI0311 | **P** | COMPUTER AIDED ANALYSIS AND DESIGN | 0 | 0 | 4 | 2 |
| CI0313 | P | INTEGRATED DESIGN AND DRAWING-I (STEEL) | 0 | 0 | 2 | 1 |
| | | | | | | |
| CI0315 | **P** | INDUSTRIAL TRAINING I<br>(Training to be undergone after IV semester) | 0 | 0 | 2 | 1 |
| **TOTAL** | | | **15** | **4** | **8** | **21** |
| **Total Contact Hours** | | | **27** | | | |

**SEMESTER VI**

| | | | | | | |
|---|---|---|---|---|---|---|
| **THEORY** | | | | | | |
| CI0302 | **P** | STRUCTURAL ANALYSIS II | 2 | 2 | 0 | 3 |
| CI0304 | P | TALL BUILDING STRUCTURES | 3 | 0 | 0 | 3 |
| CI0306 | P | PRESTRESSED CONCRETE STRUCTURES | 2 | 2 | 0 | 3 |
| CI0307 | **P** | HYDRAULIC STRUCTURES | 3 | 0 | 0 | 3 |
| CI310 | P | TRANSPORTATION ENGINEERING | 3 | 0 | 0 | 3 |
| PD 0302 | **G** | PERSONALITY DEVELOPMENT –Communication Assessment | 2 | 1 | 0 | 2 |
| **PRACTICAL** | | | | | | |
| CI0310 | **P** | COMPREHENSION II | 0 | 2 | 0 | 1 |
| CI0312 | P | INTEGRATED DESIGN AND DRAWING-II (RCC) | 0 | 0 | 4 | 2 |
| CI 0314 | **P** | HYDRAULIC ENGINEERING LABORATORY AND IRRIGATION CAMP | 0 | 0 | 2 | 1 |
| **TOTAL** | | | **15** | **7** | **6** | **21** |
| **Total Contact Hours** | | | **28** | | | |

**SEMESTER VII**

| | | | | | | |
|---|---|---|---|---|---|---|
| **THEORY** | | | | | | |
| **CI0401** | **P** | HIGHWAY ENGINEERING STRUCTURES | **3** | **0** | **0** | **3** |
| **CI0403** | **P** | ADVANCED CONSTRUCTION TECHNOLOGY | **3** | **0** | **0** | **3** |
| **CI0405** | **P** | EARTHQUAKE RESISTANT AND SPECIAL STRUCTURES | 3 | 0 | 0 | 3 |
| E1 | **P** | ELECTIVE I | 3 | 0 | 0 | 3 |
| E2 | **P** | ELECTIVE II | 3 | 0 | 0 | 3 |
| **PRACTICAL** | | | | | | |
| **CI0407** | **P** | INTEGRATED DESIGN AND DRAWING-III<br>(IRRIGATION AND OTHER SPECIAL STRUCTURES) | **0** | **0** | **4** | **2** |
| **CI0409** | **P** | ESTIMATING, COSTING AND PROFESSIONAL<br>PRACTICE | 0 | 0 | 4 | 2 |
| **CI0411** | **P** | INDUSTRIAL TRAINING II (Training to<br>be undergone after VI semester) | 0 | 0 | 2 | 1 |
| **CI0413** | **P** | PROJECT WORK PHASE I | 0 | 0 | 2 | 1 |
| **TOTAL** | | | **15** | **0** | **12** | **21** |
| **Total Contact Hours** | | | **27** | | | |

**SEMESTER VIII**

| | | | | | | |
|---|---|---|---|---|---|---|
| **THEORY** | | | | | | |
| CI0402 | **P** | CONSTRUCTION PLANNING AND MANAGEMENT | 3 | 0 | 0 | 3 |
| E3 | **P** | ELECTIVE 3 | 3 | 0 | 0 | 3 |
| E4 | **P** | ELECTIVE 4 | 3 | 0 | 0 | 3 |
| **PRACTICAL** | | | | | | |
| CI0404 | **P** | PROJECT WORK PHASE II | 0 | 0 | 16 | 8 |
| CI0406 | **P** | COMPREHENSIVE VIVA | 0 | 0 | 2 | 1 |
| **TOTAL** | | | **9** | **0** | **18** | **18** |
| **Total Contact Hours** | | | **27** | | | |

**Summary of Credits**

| Semester | I | II | III | IV | V | VI | VII | VIII | Total | % |
|---|---|---|---|---|---|---|---|---|---|---|
| **Total** | **23** | **25** | **25** | **22** | **21** | **21** | **21** | **18** | **176** | **100** |
| **G** | **3** | **1** | **3** | **3** | **2** | **2** | **0** | **0** | **14** | **7.90** |
| **B** | **13** | **11** | **4** | **4** | **0** | **0** | **0** | **0** | **32** | **18.2** |
| **E** | **7** | **8** | **5** | **0** | **0** | **0** | **0** | **0** | **20** | **11.40** |
| **P** | **0** | **5** | **13** | **15** | **19** | **19** | **21** | **18** | **110** | **62.5** |

**TOTAL CREDITS TO BE EARNED FOR THE AWARD OF DEGREE 176**

## LIST OF ELECTIVES

| SUBJECT CODE | CATEGORY | SUBJECT NAME | L | T | P | C |
|---|---|---|---|---|---|---|
| | | **A. STRUCTURAL ENGINEERING** | | | | |
| CIEST1 | P | COMPUTER ANALYSIS OF STRUCTURES | 3 | 0 | 0 | **3** |
| CIEST2 | P | COMPUTER AIDED DESIGN OF STRUCTURES | 3 | 0 | 0 | **3** |
| CIEST3 | P | STORAGE AND INDUSTRIAL STRUCTURES | 3 | 0 | 0 | **3** |
| CIEST4 | P | ADVANCED STRUCTURAL DESIGN | 3 | 0 | 0 | **3** |
| CIEST5 | P | DESIGN OF BRIDGES | 3 | 0 | 0 | **3** |
| CIEST6 | P | DESIGN OF STEEL CONCRETE COMPOSITE STRUCTURES | 3 | 0 | 0 | **3** |
| CIEST7 | P | DISASTER RESISTANT STRUCTURES | 3 | 0 | 0 | **3** |
| CIEST8 | P | OFFSHORE STRUCTURES | 3 | 0 | 0 | **3** |
| CIEST9 | P | PREFABRICATED STRUCTURES | 3 | 0 | 0 | **3** |
| CIEST10 | P | MAINTENANCE AND REHABILITATION OF STRUCTURES | 3 | 0 | 0 | **3** |
| CIEST11 | P | BRIDGE MAINTENANCE MANAGEMENT | 3 | 0 | 0 | **3** |
| | | **B. GEOTECHNICAL ENGINEERING** | | | | |
| CIEGT1 | P | GROUND IMPROVEMENT TECHNIQUES | 3 | 0 | 0 | **3** |
| CIEGT2 | P | INTRODUCTION TO SOIL DYNAMICS AND MACHINE FOUNDATION | 3 | 0 | 0 | **3** |
| CIEGT3 | P | ENVIRONMENTAL GEO TECHNOLOGY | 3 | 0 | 0 | **3** |
| CIEGT4 | P | STRUCTURES ON EXPANSIVE SOIL | 3 | 0 | 0 | **3** |
| | | **C. MATERIAL SCIENCE** | | | | |
| CIEMS1 | P | CONCRETE TECHNOLOGY | 3 | 0 | 0 | **3** |
| | | **D. WATER RESOURCES ENGINEERING** | | | | |
| CIEWR1 | P | GROUNDWATER ENGINEERING | 3 | 0 | 0 | **3** |
| CIEWR2 | P | COASTAL ZONE MANAGEMENT | 3 | 0 | 0 | **3** |
| CIEWR3 | P | ADVANCES IN IRRIGATION ENGINEERING | 3 | 0 | 0 | **3** |
| CIEWR4 | P | HYDROLOGY | 3 | 0 | 0 | **3** |
| CIEWR5 | P | HYDROPOWER ENGINEERING | 3 | 0 | 0 | **3** |
| | | **E. CONSTRUCTION MANAGEMENT** | | | | |
| CIECN1 | P | ESTIMATING, CONTRACTS AND VALUATION | 3 | 0 | 0 | **3** |
| CIECN2 | P | CONSTRUCTION ECONOMICS AND FINANCIAL MANAGEMENT | 3 | 0 | 0 | **3** |
| CIECN3 | P | QUALITY CONTROL AND SAFETY MANAGEMENT | 3 | 0 | 0 | **3** |

| | | | | | | |
|---|---|---|---|---|---|---|
| CIECN4 | P | CONSTRUCTION PROJECT MANAGEMENT | 3 | 0 | 0 | **3** |
| CIECN5 | P | MANAGEMENT INFORMATION SYSTEM | 3 | 0 | 0 | **3** |
| CIECN6 | P | BUILDING SERVICES | 3 | 0 | 0 | **3** |
| CIECN7 | P | SHORING ,SCAFFOLDING AND FORMWORK | 3 | 0 | 0 | **3** |
| CIECN8 | P | CONSTRUCTION PERSONNEL MANAGEMENT | 3 | 0 | 0 | **3** |
| | | **F. GIS AND REMOTE SENSING** | | | | |
| CIEGIS1 | P | GEOGRAPHICAL INFORMATION SYSTEM | 3 | 0 | 0 | **3** |
| CIEGIS2 | P | GIS IN CONSTRUCTION ENGINEERING AND MANAGEMENT | 3 | 0 | 0 | **3** |
| | | **G. ENGINEERING GEOLOGY** | | | | |
| CIEEG1 | P | ROCK MECHANICS | 3 | 0 | 0 | **3** |
| | | **H. TRANSPORTATION ENGINEERING** | | | | |
| CIET1 | P | TRAFFIC ENGINEERING AND MANAGEMENT | 3 | 0 | 0 | **3** |
| CIET2 | P | PAVEMENT ENGINEERING | 3 | 0 | 0 | **3** |
| | | **I. ENVIRONMENTAL ENGINEERING** | | | | |
| CIEENV1 | P | AIR POLLUTION AND MANAGEMENT | 3 | 0 | 0 | **3** |
| CIEENV2 | P | ENVIRONMENTAL HEALTH ENGINEERING | 3 | 0 | 0 | **3** |
| CIEENV3 | P | ENVIRONMENTAL IMPACT STUDIES | 3 | 0 | 0 | **3** |
| CIEENV4 | P | INDUSTRIAL WASTE MANAGEMENT | 3 | 0 | 0 | **3** |
| CIEENV5 | P | MUNICIPAL SOLID WASTE MANAGEMENT | 3 | 0 | 0 | **3** |

**G - GENERAL**
**B - BASIC SCIENCES**
**E - ENGINEERING SCIENCES AND TECHNICAL ART**
**P - PROFESSIONAL SUBJECTS**
**L - LECTURER HOURS**
**T - TUTORIAL HOURS**
**P - PRACTICAL HOURS**
**C - CREDITS**

**SEMESTER – I**

| | | L | T | P | C |
|---|---|---|---|---|---|
| **LE 0101** | **ENGLISH** | **1** | **0** | **2** | **2** |
| | Prerequisite | | | | |
| | Nil | | | | |

**PURPOSE**

To provide an adequate mastery of communicative English Language training primarily - reading and writing skills, secondarily listening and speaking skills.

**INSTRUCTIONAL OBJECTIVES**

To provide language training to the engineering students which will enable them to understand and acquire knowledge in technical subjects.

**LISTENING**

Listening Practice – Hints on Listening – Listening Practice

Note Taking: Note Taking Strategies

**SPEAKING**

Definitions: Expressing Opinions (agreement / disagreement )-Offering Suggestions – Technical Definitions – Describing Objects – speaking practice.

Phonetics: Pronunciation-Phonetic Transcription-Stress-Intonation

**READING**

Comprehension: Skimming-scanning-close reading-Comprehension – Transferring Information – Exercise – An unseen passage should be given and questions may be asked in the form of True or False statements, MCQ, short answers.

Transcoding : Interpreting tables, flow charts, piechart, bar diagram, tree diagram, graphs.

**WRITING**

Art of Writing : Writing Language – Rules for effective writing – Technical Essay Writing – Exercise

Report Writing : Technical Writing – Lab Report – Exercise

Letter Writing : Formal Letters – Letter to the Editor – Letter Inviting Dignitaries – Letter of Application Curriculum Vitae – Placing an Order.

Dialogue Writing

**FOCUS ON AND COMMUNICATION AND "COMPUNICATION"**

Communication : Basic Concepts – Process – Kinds – Routes – Forms – Factors – Barriers – Triangles Communication (Communicate through Computers – Power Point & Tele Conference).

**INTERNAL ASSESSMENT**

Based on the submission of Assignments and test performance of the students marks will be awarded.

**TEXT BOOKS**


1. Abraham Benjamin Samuel *'Practical Communication Communicative English LSRW2000'*– SRMEC – June 2006 Revised Edition.
2. Staff of the Department of Humanities and Social Science, Anna University, "*English for Engineers / Technologist* Vol.-I". Orient Longman, 1990.

**REFERENCE BOOKS**


1. Herbert. A. J. *"The structure of Technical English"* Orient Longman 1995.
2. Pickett and Laster, *'Technical English, Writing, Reading and Speaking'*, New York Harper and Row Publications, 1997.
3. "*Interactive course in phonetics and spoken English"* published by Acoustics Engineers(ACEN) 2002.
4. Munter, Mary, *"Business Communication Strategy and Skill",* Prentice Hall Inc.,New Jersey, 1987.


| | | L | T | P | C |
|---|---|---|---|---|---|
| **MA 0101** | **MATHEMATICS -I** | **3** | **2** | **0** | **4** |
| | Prerequisite | | | | |
| | Nil | | | | |

**PURPOSE**

To impart analytical ability in solving mathematical problems as applied to the respective branches of Engineering.

**INSTRUCTIONAL OBJECTIVES**

At the end of the course, student should be able, To apply advanced matrix knowledge to Engineering problems.

To improve their ability in solving geometrical applications of differential calculus problems to equip themselves familiar with the functions of several variables. To familiarize with the applications of differential equations. To expose to the concept of three dimensional analytical geometry.

**MATRICES**

Characteristic equation – Eigen values and eigen vectors of a real matrix – Properties of eigen values – Caley – Hamilton theorem – Orthogonal reduction of a symmetric matrix to diagonal form – Orthogonal matrices – Reduction of quadratic form to canonical form by orthogonal transformations.

**GEOMETRICAL APPLICATIONS OF DIFFERENTIAL CALCULUS**

Curvature – Cartesian and polar coordinates – Circle of curvature – Involutes and Evolutes – Envelopes – Properties of envelopes.

**FUNCTIONS OF SEVERAL VARIABLES**

Function of two variables – Partial derivatives – Total differential – Taylor's expansion – Maxima and Minima – Constrained Maxima and Minima by Lagrangean Multiplier method – Jacobians

**ORDINARY DIFFERENTIAL EQUATIONS**

Simultaneous first order linear equations with constant coefficients – Linear equations of second order with constant and variable coefficients – Homogeneous equation of Euler type – Equations reducible to homogeneous form.

**THREE DIMENSIONAL ANALYTICAL GEOMETRY**

Direction cosines and ratios – Angle between two lines – Equation of a plane – Equation of a straight line – Co-planar lines – Shortest distance between skew lines – Sphere – Tangent plane – Plane section of a sphere – Orthogonal spheres.

**TEXT BOOK**


1. Grewal B.S, Higher Engg Maths, Khanna Publications, 38th Edition., Veerajan, T., *Engineering Mathematics*, Tata McGraw Hill Publishing Co., New Delhi,2000.
2. Dr.V.Ramamurthy & Dr. Sundarammal Kesavan," *Engineering Mathematics"* – Vol I & II Anuradha Publications, Revised Edition 2006.


**REFERENCE BOOKS**


1. Kreyszig.E, "*Advanced Engineering Mathematics"*, 8th edition, John Wiley & Sons. Singapore,2001.
2. Kandasamy P etal. "*Engineering Mathematics"*, Vol.I (4th revised edition), S.Chand &Co., New Delhi,2000.
3. Narayanan S., Manicavachagom Pillay T.K., Ramanaiah G., "*Advanced Mathematics for Engineering students"*, Volume I (2nd edition), S.Viswanathan Printers and Publishers, 1992.
4. Venkataraman M.K., "*Engineering Mathematics*" – First Year (2nd edition), National Publishing Co., Chennai,2000.

| | | L | T | P | C |
|---|---|---|---|---|---|
| **PH 0101** | **PHYSICS** | **3** | **0** | **0** | **3** |
| | Prerequisite | | | | |
| | Nil | | | | |

**PURPOSE**

The purpose of this course is to develop scientific temper and analytical capability through learning physical concepts and their applications in engineering and technology. Comprehension of some basic physical concepts will enable the students to logically solve engineering problems.

**INSTRUCTIONAL OBJECTIVES**

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

1. Understand the general scientific concepts required for technology,
2. Apply the concepts in solving engineering problems,
3. Explain scientifically the new developments in engineering and technology, and
4. Get familiarized with the concepts, theories, and models behind many technological applications.

**PROPERTIES OF MATTER AND SOUND**

**Properties of Matter:** Hooke's law – Twisting couple on a cylinder – Shafts – Torsion pendulum – Bending of beams – Bending moment – Uniform bending and non-uniform bending – I shape girder. **Sound:** Shock waves – Mach number (simple problems) – Ultrasonic production (magnetostriction and piezoelectric methods) and application – Acoustics of buildings – Sources and impacts of noise – Sound level meter – Control of noise pollution.

**ELECTROMAGNETISM AND MICROWAVES**

**Electromagnetism:** Divergence, curl and gradient – Maxwell's equations – Wave equation for electromagnetic waves – Propagation in free space – Poynting vector – Rectangular and circular wave guides. **Microwaves:** Properties and applications – Generation by magnetron and reflex klystron oscillator – Travelling wave tube – Biological effects.

**OPTICS**

**Photometry:** Principles and Lummer-Brodhun photometer. **Lasers:** Principles and characteristics – Types of lasers ($CO_2$, excimer, NdYAG, GaAs, free electron) – Holographic mass storage. **Optical Fiber:** Principles – Physical structure and types – Optical fiber communication. **Photoelasticity:** Theory and applications.

**CRYSTAL PHYSICS AND CRYOGENICS**

**Crystal Physics:** Crystal directions – Planes and Miller indices – Basic symmetry elements – Translational symmetry elements – Reciprocal lattice – Diamond and HCP crystal structure – Imperfections in crystals. **Cryogenics:** Methods of liquefaction of gases (cascade process, Linde's process, and adiabatic demagnetization process) – Measurement of cryogenic temperatures.

## ENERGY PHYSICS

Introduction to non-conventional energy sources – Solar cells – Thermoelectric power generators – Thermionic power generator – Magneto hydrodynamic power generator – Fuel cells ($H_2O_2$) – Solid state batteries (Lithium) – Low voltage and high voltage nuclear cells – Thermocouple based nuclear cell – Ultra capacitors.

## TEXT BOOKS


1. Arumugam, M., "*Engineering Physics"*, 2nd edition, Anuradha Publishers, Kumbakonam, 2003.
2. Gaur and Gupta, "*Engineering Physics*", 7th edition, Dhandapani and Sons, New Delhi, 1997.
3. Thiruvadigal, J. D., Ponnusamy, S., Vasuhi, P. S. and Kumar, C., "*Physics for Technologists"*, 5th edition, Vibrant Publication, Chennai, 2007.


## REFERENCE BOOKS


1. Vasudeva, A. S., "*Modern Engineering Physic"s*, Revised edition, S. Chand and Company Ltd., New Delhi, 2004.
2. Vasudevan, D. N., "*Fundamentals of Magnetism and Electricity"*, 11th edition, S. Chand and Company Ltd., New Delhi, 1983.
3. Nair, K. P. R., "*Atoms, Molecules and Lasers"*, Narosa Publishing House, New Delhi, 2006.
4. Pillai, S. O., "*Solid State Physics"*,5th edition, New Age International (P) Ltd., New Delhi, 2004.
5. Khan, B. H., "*Non-Conventional Energy Resource"s*, Mechanical Engineering Series, Tata McGraw Hill Publishing Company Ltd., New Delhi, 2006.

| | | L | T | P | C |
|---|---|---|---|---|---|
| **CY 0101** | **CHEMISTRY** | **3** | **0** | **0** | **3** |
| | Prerequisite | | | | |
| | Nil | | | | |

**PURPOSE**

To impart a sound knowledge on the principles of chemistry involving the different application oriented topics required for all engineering branches.

**INSTRUCTIONAL OBJECTIVES**

The students should be conversant with

1. The role of applied chemistry the field of engineering.
2. The knowledge of water quality parameters and the treatment of water.
3. The principles involves in corrosion and its inhibitions.
4. Important analytical techniques, instrumentation and the applications.
5. Knowledge with respect to the phase equlibria of different systems.

**TECHNOLOGY OF WATER**

Water quality parameters: Physical, Chemical & Biological - Hardness of water – estimation of hardness (EDTA method & O. Hehner"s method), Alkalinity – determination – disadvantages of using hard water in boilers: Scale, sludge formation – disadvantages – prevention – treatment: Internal conditioning – phosphate, calgon and carbonate conditioning methods – External: Zeolite, ion exchange methods - desalination – reverse osmosis and electrodialysis - domestic water treatment.

**CORROSION AND ITS CONTROL**

Corrosion: Basic concepts – principles, mechanism of chemical, electrochemical corrosion – Pilling Bedworth rule – galvanic corrosion – differential aeration corrosion - pitting corrosion - stress corrosion - factors influencing corrosion.

Corrosion control: cathodic protection – sacrificial anodic method – corrosion inhibitor. Protective coatings: surface preparation for metallic coatings - electro plating and electroless Plating - chemical conversion coatings – anodizing, phosphating & chromate coating.

**PHASEEQUILIBRIA**

Phase rule: Statement – explanation of the terms involved - one component system (water system only). Condensed phase rule - thermal analysis – two component systems: simple eutectic, Pb-Ag; Br, Cd - solid solution Cu-Ni and compound formation Mg-Zn - applications of eutectics.

**POLYMERS AND REINFORCED PLASTICS**

Classification of polymers – types of polymerization reactions – mechanism of addition polymerization: free radical, ionic and ziegler – Natta - effect of structure on the properties of polymers – strength, plastic deformation, plastics elasticity and physical nature –Preparation and properties of important resins:- Polyethylene, PVC, PMMA, Polyester, Teflon Bakelite, Epoxy resins, compounding of plastics, moulding methods - injection, extrusion, compression and calendaring - reinforced plastics – FRP – Carbon, Graphite, Glass– applications.

**INSTRUMENTAL METHODS OF ANALYSIS**

Basic principles, instrumentation of potentiometry, flame photometry – applications. Elementary theory – principle – instrumentation of UV – visible spectroscopy and atomic absorption spectroscopy and infrared spectroscopy.

**TEXT BOOKS**


1. Jain.P.C and Monika Jain, *"Engineering Chemistry*", Danpat Raj publishing company (P) Ltd, New Delhi – 2002.
2. Dara.S.S, "*Text book of Engineering Chemistr"y*, S. Chand & Company Ltd, New Delhi 2003.
3. Willard H.A., Merit L.L and Dean J.A., *"Instrumental methods of analysis*" 6th Edition Van Nostrand, 1986.


**REFERENCE BOOKS**


1. Kuriacose J.C. and Rajaram J. "*Chemistry in Engineering and Technology"*, Volume II, Tata McGraw Hill p.b. Co., 1988.
2. Jeyalakshmi.R & Ramar. P, "*Engineering Chemistry*", 1st Edition, Devi Publications, Chennai 2006.
3. Kamaraj.P & Arthanareeswari. M, "*Applied Chemistry"*, 2nd Edition, Sudhandhira Publications, 2003.
4. Arivalagan. K," *Engineering Chemistry*", 1st Edition, Mass publications, 2007.
5. P.Kamatchi, "*Applied Chemistry-I"*, Ponnuswamy publications, Chennai.
6. Dr. Helen P Kavitha , "*Engineering Chemistry* – I" ILA Publications, 2002


| | | L | T | P | C |
|---|---|---|---|---|---|
| **GE 0101** | **BASIC ENGINEERING - I** | **4** | **0** | **0** | **4** |
| | Prerequisite | | | | |
| | Nil | | | | |

**PART A CIVIL ENGINEERING**

**PURPOSE**

To get exposed to the glimpses of Civil Engineering topics that is essential for an Engineer.

**INSTRUCTIONAL OBJECTIVES**

1. To know about different materials and their properties.
2. Engineering aspects related to buildings.
3. To know about importance of Surveying.
4. To know about the transportation systems.
5. To get exposed to the rudiments of engineering related to Dams, Water Supply, Transportation system and Sewage Disposal.

**BUILDING MATERIALS AND THEIR PROPERTIES**

Introduction - Civil Engineering – Building Materials – Brick, Stone, Cement, Steel, Concrete, timber – Properties – Uses. Units – Stress, strain and three modulii of elasticity – factor of safety - Centre of Gravity and Moment of Inertia for rectangle and circular section – simple problems.

**BUILDINGS AND THEIR COMPONENTS**

Buildings – Classification - Components of buildings and their functions Foundations - functions – classification of foundations – Bearing capacity Floorings – functions - Types - Cement Concrete flooring – Mosaic flooring - Marble flooring Roofs - Types – Requirements – Madras Terrace roof. Tall structure – types of structural systems.

**UTILITY AND SERVICES**

Surveying - Objective – Principles – Classification – Instruments used for Surveying. Dams - Purpose – Selection of site – Classification – Gravity dam (cross-section details only) Transportation system - Classification – Roadway - components – classification of roads - Railway – Cross-section of permanent way- components parts and functions. Docks and Harbour – classification – Terminology Bridges –components of a bridge - types of bridges.Water supply - Sources - Standards of drinking water (BIS) – elementary treatment methods – RO System Sewage disposal – Septic tank – function and components.

**TEXT BOOKS**

1. Raju K.V.B., Ravichandran P.T., "*Basics of Civil Engineering"*, Ayyappa Publications, Chennai, 2000.
2. Ramesh Babu, "*Civil Engineering* ", VRB Publishers, Chennai, 2000.

**REFERENCE BOOKS**

1. Rangwala,S.C., "*Engineering Materials"*, Charotar Publishing House, Anand, 1980.

2. National Building Code of India, Part V, "*Building Materials"*, 2005
3. Surendra Singh, "*Building Materials"*, Vikas Publishing Company, New Delhi, 1996

## PART B MECHANICAL ENGINEERING

### PURPOSE

To familiarize the students with the basics of Mechanical Engineering.

### INSTRUCTIONAL OBJECTIVES

To familiarize with

1. The basic machine elements
2. The Sources of Energy and Power Generation
3. The various manufacturing processes

### MACHINE ELEMENTS

**Springs:** Helical and leaf springs – Springs in series and parallel. **Cams:** Types of cams and followers – Cam profile. **Power Transmission:** Gears (terminology, spur, helical and bevel gears, gear trains). Belt drives (types). Chain drives. **Simple Problems.**

### ENERGY

**Sources:** Renewable and non-renewable (various types, characteristics, advantages/disadvantages). **Power Generation:** External and internal combustion engines - Hydro and nuclear power plants (layouts, element/component description, advantages, disadvantages, applications). **Simple Problems.**

### MANUFACTURING PROCESSES

**Sheet Metal Work:** Introduction – Equipments – Tools and accessories – Various processes (applications, advantages / disadvantages). **Welding:** Types – Equipments – Tools and accessories – Techniques employed (applications, advantages / disadvantages (gas and arc welding only)) – Gas cutting – Brazing and soldering. **Lathe Practice:** Types - Description of main components – Cutting tools – Work holding devices – Basic operations. **Simple Problems**. **Drilling Practice:** Introduction – Types – Description – Tools. S**imple Problems**.

### TEXT BOOKS

1. Kumar, T., Leenus Jesu Martin., and Murali, G., "*Basic Mechanical Engineering"*, Suma Publications, Chennai, 2007.
2. Prabhu, T. J., Jai Ganesh, V., Jebaraj, S., "*Basic Mechanical Engineering"*, Scitech Publications, Chennai, 2000.

**REFERENCE BOOKS**

1. Hajra Choudhary, S.K. and Hajra Choudhary, A. K., "*Elements of Manufacturing Technology",* Vols. I & II, Media Publishers, 1986.
2. Nag, P.K., "*Power Plant Engineering"*, Tata McGraw-Hill, New Delhi, 2006.
3. Palanichamy, M.S., "*Basic Civil & Mechanical Engineering"*, Tata McGraw-Hill , New Delhi 1991.
4. Nagpal G. R., "*Power Plant Engineering"*, Khanna Publisher, Delhi,2004

| | | L | T | P | C |
|---|---|---|---|---|---|
| **PD 0101** | **PERSONALITY DEVELOPMENT - I** | **0** | **0** | **2** | **0** |
| | Prerequisite | | | | |
| | Nil | | | | |

**PURPOSE**

The purpose of this course is to build confidence and inculcate various soft skills and to help Students to identify and achieve their personal potential

**INSTRUCTIONAL OBJECTIVES**

1. To guide thought process.

2. To groom students' attitude.

3. To develop communication skill.

4. To build confidence.

**METHODOLOGY**

The entire program is designed in such a way that every student will participate in the class room activities. The activities are planned to bring out the skills and talents of the students which they will be employing during various occasions in their real life.

1. Group activities + individual activities.

2. Collaborative learning.

3. Interactive sessions.

4. Ensure Participation

5. Empirical Learning

Self-analysis SWOT - Time management - Creative chain story telling

Vocabulary games I – Attitude - Interpersonal skills

Motivation I - Vocabulary games II - Article review

Team building exercise - Critical Thinking - Event Management

Business situation - Leadership Qualities - Review

**SCHEME OF INSTRUCTION**

Marks allocated for regular participation in all oral activities in class

**SCHEME OF EXAMINATION**

Complete Internal evaluation on a regular Basis

| | | L | T | P | C |
|---|---|---|---|---|---|
| **GE0107** | **NSS/NCC/NSO/YOGA** | **0** | **0** | **2** | **1** |
| | Prerequisite | | | | |
| | Nil | | | | |

**I. YOGA SYLLABUS**

| PRACTICE | LECTURE |
|---|---|

| | | |
|---|---|---|
| I | Meditation – Agnai, Asanas, Kiriyas, Bandas, Muthras | Benefits of Agnai Meditation |
| II | Meditation Santhi Physical Exercises (I & II) | Benefits of santhi Meditation |
| III | Kayakalpa Yoga Asanas, Kiriyas, Bandas, Muthras | Lecture & Practice |
| IV | Meditation Santhi Physical Exercises III & IV | Analysis of Thought |
| V | Meditation Thuriyam Kayakalpa Asanas, Kiriyas, Bandas, Muthras | Benefits of Thuriyam |
| VI | Meditation Thuriyam Kayakalpa Asanas, Kiriyas, Bandas, Muthras | Attitude |
| VII | Meditation Thuriyam Kayakalpa Asanas, Kiriyas, Bandas, Muthras | Importance of Arutkappy & Blessings |
| VIII | Meditation Santhi Kayakalpa Asanas, Kiriyas, Bandas, Muthras | Benefits of Blessings |
| | | **Hours = 30** |

**TEXT BOOKS:**

1. Vedatri Maharshi , *"Yoga for Modern Age"*
2. Vedatri Maharshi, " *Simplified Physical Exercises"*

**II. NATIONAL SPORTS ORGANISATION (NSO)**

Each student must select two of the following games and practice for two hours per week. An attendance of 80% is compulsory to earn the credits specified in the curriculum.

**List of games:**

1. Basket Ball
2. Football
3. Volley Ball
4. Ball Badminton
5. Cricket
6. Throwball

**III. NATIONAL CADET CORPS (NCC)**

Any student enrolling as a member of National Cadet Core (NCC) will have to attend sixteen parades out of twenty parades each of four periods over a span of academic year.

Attending eight parades in first semester will qualify a student to earn the credits specified in the curriculum.

## IV. NATIONAL SERVICE SCHEME (NSS)

A student enrolling as member of NSS will have to complete 60 hours of training / social service to be eligible to earn the credits specified in the curriculum.

| | | L | T | P | C |
|---|---|---|---|---|---|
| **PH 0103** | **PHYSICS LABORATORY** | **0** | **0** | **2** | **1** |
| | Prerequisite | | | | |
| | Nil | | | | |

**PURPOSE**

The purpose of this course is to develop scientific temper and analytical capability among the engineering students.

**INSTRUCTIONAL OBJECTIVES**

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

1. Understand scientific concepts in measurement of different physical variables
2. Develop the skill in arranging and handling different measuring instruments and
3. Get familiarized with the errors in various measurements and planning / suggesting how these contributions may be made of the same order so as to make the error in the final result small.

**LIST OF EXPERIMENTS**

1. Determination of Young's Modulus of the material – Uniform bending
2. Determination of Rigidity Modulus of the material – Torsion Pendulum
3. Determination of velocity of Ultrasonic waves in liquids
4. Determination of dispersive power of a prism using spectrometer
5. Determination of laser parameter – Divergence and wavelength for a given laser source – laser grating
6. Particle size determination using laser
7. Study of attenuation and propagation characteristics of optical fiber cable
8. Calibration of voltmeter using potentiometer.
9. Calibration of ammeter using potentiometer.
10. Construction and study of regulation properties of a given power supply using IC

**REFERENCE BOOKS**


1. Chattopadhyay, D., Rakshit, P. C. and Saha, B., "*An Advanced Course in Practical Physics*", 2nd edition, Books & Allied Ltd., Calcutta, 1990.
2. Chauhan and Singh, "*Advanced Practical Physics"*, Revised edition, Pragati Prakashan, Meerut, 1985.
3. Thiruvadigal. J. D., Ponnusamy. S., Vasuhi. P. S. and Kumar. C, "*Hand Book of Practical Physics"*, 5th edition, Vibrant Publication, Chennai, 2007.


| | | L | T | P | C |
|---|---|---|---|---|---|
| **CY 0103** | **CHEMISTRY LABORATORY** | **0** | **0** | **2** | **1** |
| | Prerequisite | | | | |

| | | | | | |
|---|---|---|---|---|---|
| | Nil | | | | |

**PURPOSE**

An integrated laboratory course consists of experiments from applied chemistry and is designed to illustrate the underlying principles of measurement techniques, synthesis, dynamics and chemical transformation.

**INSTRUCTIONAL OBJECTIVES**

Students should be able to understand the basic concept and its applications.

**LIST OF EXPERIMENTS**

1. Preparation of standard solutions.
2. Estimation of total hardness, permanent and temporary hardness by EDTA method.
3. Conductometric titration – determination of strength of an acid.
4. Estimation of iron by potentiometer – titration.
5. Determination of molecular weight of polymer by viscosity average – method.
6. Determination of dissolved oxygen in a water sample by Winkler"s method
7. Determination of Na / K in water sample by Flame photometry.
8. Estimation of Copper in ore.
9. Estimation of nickel in steel.
10. Determination of total alkalinity and acidity of a water sample.

**REFERENCE**

1. Chemistry department manual, Edition, 2003.

| | | L | T | P | C |
|---|---|---|---|---|---|
| **GE0105** | **COMPUTER LITERACY** | **0** | **0** | **2** | **1** |
| | Prerequisite | | | | |
| | Nil | | | | |

**PURPOSE**

This Lab Course will enable the students to understand the basics of computer and to know the basics of MS-Office.

**INSTRUCTIONAL OBJECTIVES**

1. To learn the basics of computer.
2. To work on Ms-Word, Ms-Excel, Ms-Power Point and Ms-Access

**EXPERIMENTS TO IMPLEMENT**

Study experiment on evolution of computer programming languages.

1. Suggest some of the Network Topologies that can be incorporated in your campus. Justify your choice.
2. Experiments to demonstrate directory creation and file creation.
3. Create a document with all formatting effects.
4. Create a document with tables.
5. Create labels in MS word.
6. Create a document to send mails using mail merge option.
7. Create an Excel File to analyze the student's performance. Create a chart for the above data to depict it diagrammatically.
8. Create Excel sheet to use built-in-function.
9. Create Excel sheet to maintain employee information and use this data to send mails using mail merge.
10. Create a Power Point presentation for your personal profile with varying animation effects with timer.
11. Consider student information system which stores student personal data, mark information and non academic details.
    * Use MS Access to create Tables and execute SQL queries to do this following

    * Display all student records.

    * Display student details with respect to his identity.

    * Delete some records from the table.

    * Find total marks obtained by student in each list.

**TEXT BOOK**

"*Introduction to Information Technology"* ITL Education Solutions Ltd., Pearson 2nd Edition, 2006.

| | | L | T | P | C |
|---|---|---|---|---|---|
| **ME 0130** | **ENGINEERING GRAPHICS** | **1** | **0** | **4** | **3** |
| | Prerequisite | | | | |

| | | | | | |
|---|---|---|---|---|---|
| | Nil | | | | |

(Only First Angle Projection is to be followed)

**PURPOSE**

1. To draw and interpret various projections of 1D, 2D and 3D objects.
2. To prepare and interpret the drawings of buildings.

**INSTRUCTIONAL OBJECTIVES**

To familiarise with

1. The construction of geometrical figures
2. The projection of 1D, 2D & 3D elements
3. Sectioning of solids and development of surfaces
4. Preparation and interpretation of building drawing

**FUNDAMENTALS OF ENGINEERING GRAPHICS**

Lettering, two dimensional geometrical constructions, conics, representation of three-dimensional objects – principles of projections – standard codes – projection of points.

**PROJECTION OF LINES AND SOLIDS**

Projection of straight lines, projection of solids – auxiliary projections

**SECTIONS AND DEVELOPMENTS**

Sections of solids and development of surfaces.

**PICTORIAL PROJECTIONS**

Conversion of projections: Orthographic projection, isometric projection of regular solids & combination of solids.

**BUILDING DRAWING**

Building Drawing – plan, elevation and section of single storied residential (or) office building with flat RCC roof and brick masonry walls having not more than 3 rooms (planning / designing is not expected in this course).

**TEXT BOOKS**


1. Jeyapoovan, T., *"Engineering Drawing and Graphics using AutoCAD 2000",* Vikas Publishing house Pvt Ltd, NewDelhi, 2005.
2. Narayanan, K.L & Kannaiah, P., *"Engineering Graphics"*, Scitech Publications, Chennai, 1999.

**REFERENCE BOOKS**


1. Bhatt, N.D., "*Elementary Engineering Drawing (First Angle Projection)"*, Charotar Publishing Co., Anand, 1999.
2. Venugopal, K. "*Engineering Drawing & Graphics"*, New Age international Pvt. Ltd., 2001.
3. Natarajan, K.V. "*Engineering Drawing & Graphics"*, Private Publication, Chennai, 1990.
4. Shah, M.B. and Rana, B.C., "*Engineering Drawing"*, Pearson Education (Singapore) Pvt. Ltd., Delhi – 110 092, 2005.

**II SEMESTER**

| | | L | T | P | C |
|---|---|---|---|---|---|
| **GE 0108** | **VALUE EDUCATION** | **1** | **0** | **0** | **1** |
| | Prerequisite | | | | |
| | Nil | | | | |

**PURPOSE**

To provide guiding principles and tools for the development of the whole person, recognizing that the individual is comprised of Physical Intellectual, Emotional and Spiritual dimensions.

**INSTRUCTIONAL OBJECTIVES**

To help individuals think about and reflect on different values.

To deepen understanding, motivation and responsibility with regard to making personal and social choices and the practical implications of expressing them in relation to themselves, others, the Community and the world at large.

To inspire individuals to choose their own personal, social, moral and spiritual values and be aware of practical methods for developing and deepening them.

Value Education—Introduction – Definition of values – Why values? – Need for Inculcation of values – Object of Value Education – Sources of Values – Types
Values:

i) Personal values
ii) Social values
iii) Professional values
iv) Moral and spiritual values
v) Behavioral (common) values

Personal values – Definition of person – Self confidence – Self discipline – Self Assessment – Self restraint – Self motivation – Determination – Ambition – Contentment – Humility and Simplicity - Sympathy and Compassion – Gratitude -Forgiveness – Honesty – Courtesy.

Social values – Definition of Society – Units of Society - Individual, family, different groups – Community – Social consciousness – Equality and Brotherhood – Dialogue – Tolerance – Sharing – Responsibility – Co-operation Freedom – Repentance and Magnanimity.

Professional values – Definition – Competence – Confidence – Devotion to duty –Efficiency – Accountablility – Respect for learning /learned – Willingness to learn-Open and balanced mind – Team spirit – Professional Ethic – Willingness for Discussion – Aims – Effort – Avoidance of Procrastination and slothfulness –Alertness.

Behavioral values – Individual values and group values – Good manners at home and outside – Equality – Purity of thought, speech and action – Understanding the role of religion – Faith – Understanding the commonness of religions – respect for other faiths – unity in diversity – Living together – Tolerance – Non-violence – Truthfulness – Common aim – Unified effort towards peace – Patriotism.

**REFERENCE BOOKS**


1. Dr. S. Ignacimuthu S. J., Values for life, Better yourself Books, Bandra Mumbai-600 050 (1999).
2. Values(Collection of Essays)., Published by : Sri Ramakrishna Math., Chennai—4.,(1996)
3. Prof. R.P.Dhokalia., Eternal Human Values NCRT –Campus Sri Aurobindo Marg., New Delhi - 110 011.
4. Swami Vivekananda., Education., Sri Ramakrishna Math., Chennai-4(1957)
5. Tirukural (English Translation by Dr.G.U.Pope).
6. The Bible
7. The Kuran
8. The Bagavath Geetha


| | | L | T | P | C |
|---|---|---|---|---|---|
| **MA 0102** | **MATHEMATICS II** | **3** | **2** | **0** | **4** |
| | Prerequisite | | | | |
| | MA0101 | | | | |

**PURPOSE**

To impart analytical ability in solving mathematical problems as applied to the respective branches of Engineering.

**INSTRUCTIONAL OBJECTIVES**

At the conclusion of the course, students should have understood Multiple Integrals , Laplace Transforms, Vector Calculus and Functions of a complex variable including contour integration and able to apply to all their Engineering problems.

**MULTIPLE INTEGRALS**

Double integration in Cartesian and polar coordinates – Change of order of integration – Area as a double integral – Triple integration in Cartesian coordinates.

**LAPLACE TRANSFORMS**

Transforms of simple functions – Basic operational properties – Transforms of derivatives and integrals – Initial and final value theorems – Inverse transforms – Convolution theorem – periodic functions – Applications of Laplace transforms for solving linear ordinary differential equations up to second order with constant coefficients only.

**VECTOR CALCULUS**

Gradient, divergence, curl – Solenoidal and irrotational fields – Vector identities (without proof) – Directional derivatives – Line, surface and volume integrals – Statements of Green's, Gauss divergence and Stroke's theorems only – Verification and applications to cubes and parallelopipeds only.

**ANALYTIC FUNCTIONS**

Definition of Analytic Function – Cauchy Riemann equations – Properties of analytic functions - Determination of harmonic conjugate – Milne-Thomson's method – Conformal mappings: 1/z, az az+b and bilinear transformation.

**COMPLEX INTEGRATION**

Line integral – Cauchy's integral theorem (without proof ) – Cauchy's integral formulae (with proof) – application of Cauchy's integral formulae – Taylor's and Laurent's expansions (statements only) – Singularities – Poles and Residues – Cauchy's residue theorem (with proof) - Evaluation of line integrals.

**TEXT BOOK**


1. Grewal B.S, *Higher Engg Maths*, Khanna Publications, 38th Edition.
2. Veerajan, T., *Engineering Mathematics*, Tata McGraw Hill Publishing Co., New Delhi,2000.

3. Dr.V.Ramamurthy & Dr. Sundarammal Kesavan, *Engineering Mathematics – Vol I & II* Anuradha Publications, Revised Edition 2006.

**REFERENCE BOOKS**


1. Kreyszig.E, *Advanced Engineering Mathematics, 8th edition*, John Wiley & Sons. Singapore,2001.
2. Kandasamy P etal. *Engineering Mathematics, Vol.I (4th revised edition)*, S.Chand &Co., New Delhi,2000.
3. Narayanan S., Manicavachagom Pillay T.K., Ramanaiah G., *Advanced Mathematics for Engineering students, Volume I (2nd edition)*, S.Viswanathan Printers and Publishers, 1992.
4. Venkataraman M.K., *Engineering Mathematics – First Year (2nd edition)*, National Publishing Co., Chennai, 2000.

| | | L | T | P | C |
|---|---|---|---|---|---|
| **PH 0102** | **MATERIALS SCIENCE** | **2** | **0** | **2** | **3** |
| | Prerequisite | | | | |
| | Nil | | | | |

**PURPOSE**

The purpose of this course is to develop comprehension of the rapidly changing technological scenario and the requisite expertise for appropriate selection of materials for specific engineering applications.

**INSTRUCTIONAL OBJECTIVES**

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

Understand electrical properties of materials,
Understand the properties and applications of semi conducting materials,
Understand general properties and applications of magnetic and dielectric materials,
Understand the behaviour of materials on exposure to light,
Understand general properties and application of modern engineering and bio materials, and
Get familiarized with the concepts of Nano Science and Technology.

**ELECTRONIC AND PHOTONIC MATERIALS**

Electronic materials: Importance of Classical and Quantum free electron theory of metals – Fermi energy and Fermi Dirac distribution function – Variation of Fermi level with temperature in intrinsic and extrinsic semiconductors – Hall effect – Dilute Magnetic Semiconductors (DMS) and their applications – High temperature Superconductivity. Photonic materials: LED and LCD materials – Photo conducting materials – Nonlinear optical materials (elementary ideas) and their applications.

**MAGNETIC, DIELECTRIC AND MODERN ENGINEERING MATERIALS**

Magnetic materials: Ferrites and garnets – Magnetic bubbles and their applications – Giant Magneto Resistance (GMR) – Colossal Magneto Resistance (CMR). Dielectric materials: Various polarization mechanisms in dielectrics (elementary ideas) and their frequency and temperature dependence – Dielectric loss – Piezo electric and ferro electric materials and their applications. Modern engineering materials: Shape memory alloys – Metallic glasses – Advanced ceramics and composites.

**BIO MATERIALS**

Classification of biomaterials – Comparison of properties of some common biomaterials – Effects of physiological fluid on the properties of biomaterials – Biological responses (extra and intra vascular system) – Metallic, Ceramic and Polymeric implant materials – Introduction to bio sensors and tissue engineering.

**NANO MATERIALS AND NANOTECHNOLOGY**

Basic concepts of Nano science and technology – Quantum wire – Quantum well – Quantum dot – Properties and technological advantages of Nano materials – Carbon Nanotubes and applications – Material processing by Sol – Gel method, Chemical Vapour deposition and Physical Vapour deposition – Microwave Synthesis of materials – Principles of SEM, TEM and AFM .

**MECHANICAL PROPERTIES OF MATERIALS**

Stress Strain diagram for different engineering materials – Engineering and true stress strain diagram – Ductile and brittle material – Tensile strength – Hardness – Impact strength – Fatigue – Creep – Fracture (Types and Ductile to brittle transition) – Factors affecting mechanical properties.

1. Band gap determination using Post office box.
2. Dielectric constant measurement.
3. Photoconductivity measurement.
4. Resistivity determination for a semiconductor wafer using Four probe method.
5. Determination of Hall coefficient and carrier type for a semiconductor material.
6. To trace the hysteresis loop for a magnetic material.
7. Magnetic susceptibility – Quincke's method.

8. Determination of thermal conductivity – Lee's Disc method
9. Visit to Nano Technology Laboratory (optional)

**TEXT BOOKS**

1. S.O. Kasap, *Principles of Electronic Materials and Devices,* Tata McGraw Hill Edition, New Delhi, 2002.
2. Van Vlack, L.H., *Material Science for Engineers*, 6th edition, .Addision Wesley, 1985.
3. Thiruvadigal, J. D., Ponnusamy, S. and Vasuhi.P. S., *Materials Science*, 5th edition, Vibrant Publications, Chennai, 2007.

**REFERENCE BOOKS**

1. Rolf E. Hummel, *Electronic Properties of materials*, Narosa Publishing House, New Delhi, 1994.
2. Raghavan.V., *Materials Science & Engineering – A First Course*, 5th edition, Prentice Hall of India, New Delhi,2005.
3. Khanna. O. P., *A Text Book of Material Science & Metallurgy*, Revised edition, Dhanpat Rai Publications, New Delhi,2006.
4. Sujata V. Bhat, *Biomaterials*, 2nd edition, Narosa Publishing House, New Delhi, 2006.
5. Mick Wilson, Kamali Kannangara, Michells Simmons and Burkhard Raguse, *Nano Technology – Basic Science and Emerging Technologies*, 1st edition, Overseas Press,New Delhi,2005.

| | | L | T | P | C |
|---|---|---|---|---|---|
| **GE 0102** | **BIOLOGY FOR ENGINEERS** | **2** | **0** | **0** | **2** |
| | Prerequisite | | | | |
| | Nil | | | | |

**PURPOSE**

To provide a basic understanding of biological mechanisms from the perspective of engineers.

**INSTRUCTIONAL OBJECTIVES**

To familiarize the students with the basic organization of organisms and subsequent building to a living being. With this knowledge, the student will be then imparted with an understanding about the machinery of the cell functions that is ultimately responsible for arious daily activities. Nervous and immune systems will be taught as examples of this signaling machinery.

**FROM ATOMS TO ORGANISMS**

The Cell: the Basic Unit of Life - Molecular Components of Cells - Expression of Genetic Information - Protein Structure and Function- Cell Metabolism - Cells Maintain Their Internal Environments - Cells Respond to Their External Environments - Cells Grow and Reproduce - Cells Differentiate

**THE MOLECULAR DESIGN OF LIFE**

Biochemistry and the Genomic Revolution- . DNA Illustrates the Relation between Form and Function-Biochemical Unity Underlies Biological Diversity-. Chemical Bonds in Biochemistry -. Biochemistry and Human Biology-. Protein Synthesis Requires the Translation of Nucleotide Sequences Into Amino Acid Sequences-.2. Aminoacyl-Transfer RNA Synthetases Read the Genetic Code- A Ribosome Is a Ribonucleoprotein Particle (70S) Made of a Small (30S) and a Large (50S) Subunit-Protein Factors Play Key Roles in Protein Synthesis-. Eukaryotic Protein Synthesis Differs from Prokaryotic Protein Synthesis Primarily in Translation Initiation

**CATALYTIC STRATEGIES**

Proteases: Facilitating a Difficult Reaction-. Making a Fast Reaction Faster: Carbonic Anhydrases-. Restriction Enzymes: Performing Highly Specific DNA-Cleavage Reactions- Nucleoside Monophosphate Kinases: Catalyzing Phosphoryl Group Exchange between Nucleotides Without Promoting Hydrolysis- metabolism-anabolism and catabolism-photosynthesis and carbon fixation- biological energy production.

**MECHANOCHEMISTRY**

How Protein Motors Convert Chemical Energy into Mechanical Work- Brief Description of ATP Synthase Structure- The F1 Motor: A Power Stroke-A Pure Power Stroke- Coupling and Coordination of Motors- Measures of Efficiency- F1-Motor of ATP synthase- The Bacterial Flagellar Motor- Motor Driven by H_ and Na_ Ion Flux- Proton Motive Force, Sodium-motive Force, Ion Flux- Molecular Motor Directionality- Chimeric Kinesin Motors- Backwards Myosins- Chimeric Myosin Motors- Bidirectional Dyneins?

**SENSORY AND IMMUNO SYSTEMS**

General Principles of Cell Signaling-Signaling via G-Protein-linked Cell-Surface Receptors-Signaling via Enzyme-linked Cell-Surface Receptors-Target-Cell Adaptation-The Logic of Intracellular Signaling: Lessons from Computer-based "Neural Networks"-The Cellular Basis of Immunity-The Functional Properties of Antibodies-The Fine Structure of Antibodies-The Generation of Antibody Diversity-T Cell Receptors and Subclasses-MHC Molecules and Antigen Presentation to T Cells-Cytotoxic T Cells-Helper T Cells and T Cell Activation-Selection of the T Cell Repertoire

**TEXT BOOK**

1. J.M.Berg, J.L.Tymosczko and L.Sryer. Biochemistry,W.H. Freeman Publications.
2. **STUDENT COMPANION** to accompany **Biochemistry, Fifth Edition -Richard I. Gumport**
3. **Frank H. Deis, Nancy Counts Gerber, Roger E. Koeppe, II** Molecular motors

**REFERENCE BOOKS**:

1. Alberts, 2003 Molecular Biology of the cell
2. Lodish, 2004 Molecular cell biology

| | | L | T | P | C |
|---|---|---|---|---|---|
| **GE 0104** | **PRINCIPLES OF ENVIRONMENTAL SCIENCE** | **2** | **0** | **0** | **2** |
| | Prerequisite | | | | |
| | Nil | | | | |

**PURPOSE**

The course provides the comprehensive knowledge in environmental science, environmental issues and the management.

**INSTRUCTIONAL OBJECTIVES**

1. The importance of environmental education, ecosystem and ethics.
2. Knowledge with respect to biodiversity and its conservation.
3. To create awareness on the various environmental pollution aspects and issues.
4. To educate the ways and means to protect the environment.
5. Important environmental issues and protection

**ENIVRONMENT AND ECOSYSTEMS**

Environmental education: definition - scope - objectives and importance. Concept of an ecosystem – types (terrestrial and aquatic ecosystems) – structure and function – ecological succession - food chains, food webs and ecological pyramids

**BIODIVERSITY**

Introduction: definition - genetic, species and ecosystem diversity - value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values - threats to biodiversity: habitat loss, poaching of wildlife - endangered and endemic species of India, Conservation of biodiversity: in-situ and ex-situ conservations.

**POLLUTION AND WASTE MANAGEMENT**

Air and water pollution – classification of pollutants and their effects – control measures of air pollution. Waste water treatment (general) – primary, secondary & tertiary stages.

Solid waste management: causes - effects of municipal waste, hazardous waste, bio medical waste - process of waste management.

**CURRENT ENVIRONMENTAL ISSUES**

Environmental ethics -issues and possible solutions- population explosion, climatic change, ozone layer depletion, global warming, acid rain and green house effect.

Sustainable development: definition, objectives and environmental dimensions of sustainable development-environmental audit for sustainable development.

**ENVIRONMENTAL PROTECTION**

National and international concern for environment: Important environmental protection acts in India – water, air (prevention and control of pollution) act, wild life conservation and forest act – functions of central and state pollution control boards - international effort – key initiatives of Rio declaration, Vienna convention, Kyoto protocol and Johannesburg summit.

**TEXT BOOKS**


1. Sharma.B.K. and Kaur, *Environmental Chemistry* Goel Publishing House, Meerut, 1994.
2. De.A.K., *Environmental Chemistry*, New Age International (p) lt., , New Delhi, 1996.
3. Kurian Joseph & R. Nagendran, *Essential of Environmental Studies* Pearson Education, 2004.


**REFERENCE BOOKS**


1. Dara S.S., *A Text Book of Environmental Chemistry and pollution contro,* S.Chand & Company Ltd., New Delhi, 2004.
2. Jeyalakshmi.R, *Principles of Environmental Science*, 1st Edition, Devi Publications, , Chennai 2006.

3. Kamaraj.P & Arthanareeswari.M, *Environmental Science – Challenges and Changes*, 1st Edition, Sudhandhira Publications, 2007.
4. Arivalagan.K, Ramar.P & Kamatchi.P, *Principles of Environmental Science*, 1st Edition, Suji Publications, 2007.

| | | L | T | P | C |
|---|---|---|---|---|---|
| **GE 0106** | **BASIC ENGINEERING – II** | **4** | **0** | **0** | **4** |
| | Prerequisite | | | | |
| | Nil | | | | |

## PART A ELECTRICAL ENGINEERING

### PURPOSE

This course provides comprehensive idea about circuit analysis, working principles of machines and common measuring instruments. It also provides fundamentals of electronic devices, transducers and integrated circuits.

### INSTRUCTIONAL OBJECTIVES

1. At the end of the course students will be able
2. To understand the basic concepts of magnetic, AC & DC circuits.
3. To explain the working principle, construction, applications of DC & AC machines & measuring instruments.
4. To gain knowledge about the fundamentals of electric components, devices, transducers & integrated circuits.

### ELECTRICAL MACHINES

Definition of mmf, flux and reluctance, leakage flux, fringing, magnetic materials and B-H relationship. Problems involving simple magnetic circuits.Faraday's laws, induced emfs and inductances, brief idea on Hysteresis and eddy currents. Working principle, construction and applications of DC machines and AC machines (1-phase transformers, 3-phase induction motors, single phase induction motors – split phase, capacitor start and capacitor start & run motors).

### AC & DC CIRCUITS

Circuit parameters, Ohms law, Kirchhoff's law. Average and RMS values, concept of phasor representation. RLC series circuits and series resonance, RLC parallel circuits (includes simple problems in DC & AC circuits)

Introduction to three phase systems – types of connections, relationship between line and phase values. (qualitative treatment only)

**WIRING & LIGHTING**

Types of wiring, wiring accessories, staircase & corridor wiring, Working and characteristics of incandescent, fluorescent, SV & MV lamps. Basic principles of earthing, simple layout of generation, transmission & distribution of power.

**TEXT BOOKS**


1. Kothari D P and Nagrath I J , Basic Electrical Engineering , Tata McGraw Hill,1991
2. Mehta V K ,Principles of Electronics S Chand & Co,1980


**REFERENCE BOOKS**


1. Kothari D P and Nagrath I J ,Basic Electrical Engineering , Tata McGraw Hill,1991
2. Mithal G K , Electronic Devices and Circuits, Khanna Publications,1997

## PART B ELECTRONICS ENGINEERING

**PURPOSE:**

This course provides comprehensive idea about circuit analysis, working principles of machines and common measuring instruments. It also provides all fundamentals of circuit components, electronic devices, transducers and integrated circuits.

**OBJECTIVE**

1. To understand the basic concept of magnetic, AC and DC circuits.
2. To explain the working principle, construction and applications of DC and AC machines.
3. To gain knowledge about the fundamentals of electric components, devices, transducers, measuring instruments and integrated circuits.

**ELECTRONIC COMPONENTS AND DEVICES**

Passive components – Resistors, Inductors and Capacitors and their types.

**Semiconductor:** Energy band diagram, Intrinsic and Extrinsic semiconductors, PN junction diodes and Zener diodes – characteristics.

**Transistors:** PNP and NPN transistors – theory of operation – Transistor configurations – characteristics – comparison.

**Special semiconductor devices :** FET – SCR – LED – V I characteristics – applications.

**Rectifiers:** Half wave and full wave rectifier – capacitive filter – wave forms – ripple factor – regulation characteristics.

**TRANSDUCERS AND MEASURING INSTRUMENTS**

**Transducers:** General features and classification of transducers, Resistive Transducers – Potentiometer, Unbonded strain gauge-Bonded strain gauge-Load cell, Inductive transducers – Differential output transducers – LVDT, Flow transducers, Temperature Transducers – Thermistors, Thermocouple and pyrometers.

**Measuring Instruments:** Basic principles and classification of instruments, Moving coil and moving iron instruments, CRO – Principle of operation.

**DIGITAL ELECTRONICS & LINEAR ICs**

**Digital Fundamentals:** Number systems – Boolean Theorems – DeMorgan's Theorem – Logic gates – Implementation of Boolean Expression using Gates.

**Integrated Circuits:** IC fabrication – Monolithic Technique, Function of Operational Amplifier.

**TEXT BOOKS**


1. Muthusubramanian.R, Salivahanan.S, Muraleedharan.K.A, "Basic Electrical, Electronics and Computer Engineering", Tata McGraw - Hill ,1999.
2. Metha V.K, "Principles of Electronics ",S. Chand & Co.,1980.
3. Kalsi H S, Electronics Instrumentation", ISTE publication,1995


**REFERENCE BOOKS**


1. Kothari D. P and Nagrath IJ, "Basic Electrical Engineering", Tata McGraw- Hill, 1991.
2. Thomas L.Floyd "Electronic devices", Addison Wesley Longman (Singapore) Pvt . Ltd., 5th Edition.


| | | L | T | P | C |
|---|---|---|---|---|---|
| **CI0102** | **ELEMENTS OF BUILDING MATERIAL SCIENCE AND ARCHITECTURE** | **3** | **0** | **0** | **3** |
| | Prerequisite | | | | |
| | Nil | | | | |

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| | **PART-A BUILDING MATERIAL SCIENCE** | **2** | **0** | **0** | **2** |

**PURPOSE**

To develop knowledge of conventional and new materials of construction.

**INSTRUCTIONAL OBJECTIVES**

1. To learn the manufacturing process, types, applications and testing procedures for materials used for load bearing purpose.
2. To know about materials that are used for protection and functional purpose. 3., To part knowledge about basis of recent paradigms,and new materials.

**LOAD BEARING MATERIALS OF CONSTRUCTION**

Introduction to conventional materials used in construction like stones, bricks, cement, mortar, concrete, steel and timber, their manufacturing process, types, applications, properties, testing procedures and availability - methods of improving ductility and fire resistance of concrete (principles only) - reinforced concrete, fibre reinforced concrete, prestressing principles, ferrocement - high strength concrete and high performance concrete - admixtures.

**NON LOAD BEARING MATERIALS OF CONSTRUCTION**

Wood based products, paints, varnishes, distempers, asbestos, glass, tiles, terracotta, porcelain, stoneware, earthernware, geasynthetics, polymer products, fibre reinforced plastics - types, process of manufacture and application.

**MODERN MATERIALS**

Elementary treatment of - Materials for thermal insulation, acoustic modification- paradigm of sustainable technology and green concrete - blended cement concrete, geopolymer concrete, bacterial concrete, recycled concrete, smart concrete, self health monitoring concrete reactive powder concrete, ready mixed concrete, self compacting concrete, high density concrete, low density concrete, roller compacted concrete etc. - TMT bars.

**TEXT BOOKS**


1. Varghese, P.C., *Building Materials*, Prentice Hall India,2005
2. Rangwala S.C. *Engineering Materials*, Charotor Publishing House, 1980.
3. Surendra Singh, *Building Materials*, Vikas Publishing Company, New Delhi, 1996. 3. Arora and Bindra S.P., Building Construction, Planning Techniques and Method of Construction", Dhanpat Rai Sons, New Delhi, 1988.


**REFERENCE BOOKS**


1. Gurucharan Singh, *Building Construction and Materials*, Standard Book House, Delhi, 1988.
2. Shetty M.S. *Concrete Technology*, S.Chand and Company, New Delhi, 1988.
3. *Lecture Notes on Special Concretes, Special Concrete*, 2007, Department of Civil Engineering, SRM Engineering College, Kattankulathur.


| | | L | T | P | C |
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| | **PART-B ARCHITECTURE** | **1** | **0** | **0** | **1** |

**PURPOSE**

To instill a broad understanding about architecture in civil engineering students.

**INSTRUCTIONAL OBJECTIVES**

To create awareness about design criteria, building bye laws, development control rules & zoning regulations. Introduction to the basic architectural principles & imparting knowledge about building services is also intended.

**PLANNING ASPECTS & REGULATIONS**

Building types & design criteria - Space standards for residential, commercial & institutional categories. Building bye laws applicable for approval by the local governing body. Development control rules for Chennai metropolitan area.

**ARCHITECTURAL PRINCIPLES**

Introduction to architecture - elements of architecture - primary forms - organizing principles - proportion , scale , balance, symmetry, hierarchy , axis with building examples from historical & contemporary architecture.

**BUILDING SERVICES**

Integration of services in buildings - water supply & plumbing layout for a residential building - elevators & escalators - planning & installation - basic components of the electrical system for a residence - typical electrical layout diagram.

Lay out of external services –water supply- sewage disposal-electrical cabling

**TEXT BOOKS**


1. Joseph De chiara & John Callendar - *Time saver standards for building types* , III Edition - Mc Graw Hill,1990.
2. Francis D.K Ching- *Architecture : Form Space & Order* Van Nastrand Reinhold, 1996.
3. Vaidyanathan G, Kulasekaran I, Sathishkumar G, *Building planning & construction companion*, Edifice Institute of Building services publication, 2002.


**REFERENCE BOOKS**


1. *National Building Code, Bureau of Indian Standars, New Delhi,* 2005.


| | | L | T | P | C |
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| **PD 0102** | **PERSONALITY DEVELOPMENT - II** | **0** | **0** | **2** | **0** |
| | Prerequisite | | | | |
| | Nil | | | | |

**PURPOSE**

The purpose of this course is to build confidence and inculcate various soft skills and to help Students to identify and achieve their personal potential

**INSTRUCTIONAL OBJECTIVES**

1. To guide thought process.
2. To groom students' attitude.
3. To develop communication skill.
4. To build confidence.

**METHODOLOGY**

The entire program is designed in such a way that every student will participate in the class room activities. The activities are planned to bring out the skills and talents of the students which they will be employing during various occasions in their real life.

1. Group activities + individual activities.

2. Collaborative learning.

3. Interactive sessions.

4. Ensure Participation.

5. Empirical Learning

Puzzles I - Poster design/Caption/Slogan writing (Social issues) - Bone of contention I – debate

Bone of contention II - Puzzle II - Survey and Reporting (favorite channel, music, food)

Interpretation of Visuals of I & II - Vocabulary games III

Book Review - Quiz I - Presentation Skills I

Presentation Skills II - Analytical Thinking - Review

**EVALUATION**

1. Activities assessed by both group and individual participation

2. Continuous assessment based on daily participation

**SCHEME OF INSTRUCTION**

Marks allocated for regular participation in all oral activities in class

**SCHEME OF EXAMINATION**

Complete Internal evaluation on a regular Basis

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| **CS0140** | **COMPUTER PRACTICE** | **1** | **0** | **2** | **2** |
| | Prerequisite | | | | |
| | Nil | | | | |

**PURPOSE**

To introduce programming languages C and C++ as tools to solve problems and to provide hands on training.

**INSTRUCTIONAL OBJECTIVES**

After completing the course, the students should be able to

Understand the program development life cycle

Design algorithms to solve simple problems using computers

Convert algorithms into C and C++ programs and execute

**PROGRAMMING FUNDAMENTALS**

Computer Basics; Program Development Life Cycle: Flow Chart, Algorithm, Compilation and Execution; Introduction to C Language: program structure, variables, keywords, data types; Input / Output functions: scanf, printf; simple programs.

**DECISION AND LOOP CONTROL STRUCTURE**

Logical operators; Decision statements : if/else, switch/case statements; Loop control statements – for, while, do/while.

**ARRAYS AND FUNCTIONS**

**Arrays:**

Introduction to arrays; one dimensional arrays: declaration , reading and printing array elememts, sorting and searching.

**Functions:**

Definition; declaration of functions; return statement; recursion.

**INTRODUCTION TO OOP CONCEPTS**

OOP concepts: data hiding, encapsulation, inheritance, overloading, polymorphism; classes and objects; constructor and destructor; simple program in C++.

**UNIT – V INHERITANCE AND OVERLOADING**

Inheritance – single, multiple, multilevel; Overloading – Function overloading, Operator overloading.

**LIST OF EXERCISES:**

**Note to the Instructors: Design exercise problems to demonstrate the use of C and C++ in the area of specialization.**

1. programs to demonstrate the use of scanf( ) and printf( ) functions
2. programs to evaluate arithmetic expressions
3. programs using conditional statements
4. programs using for,while , do…while
5. programs on arrays
6. programs to perform matrix addition and multiplication
7. programs to implement functions
8. programs to illustrate recursion
9. Program to create classes and objects using C++
10. Program to implement Constructor and Destructor in C++
11. Program to implement single inheritance in C++
12. Program to implement Function overloading in C++
13. Program to implement Operator overloading in C++

**REFERENCE BOOKS**


1. Computer Practice Laboratory Manual, SRM University
2. Kanetkar P.Yashwant,"Let us C", BPB publications, 2002.
3. Ashok N.Kamthane, "Programming with ANSI and Turbo C", Pearson Education, 2006.
4. Herbert Schildt, "The Complete Reference C++", TataMcGrawHill, 2001, 3rd Edition.
5. Robert Lafore, "Object Oriented Programming in Microsoft C++", The Waite Group, Galgotia Publications Pvt. Ltd., 2002.


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| **ME 0120** | **WORKSHOP PRACTICE** | **0** | **0** | **4** | **2** |
| | Prerequisite | | | | |

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| | Nil | | | | |

**PURPOSE**

To provide the students with hands on experience on different trades of engineering like fitting, carpentary, smithy, welding and sheet metal.

**INSTRUCTIONAL OBJECTIVES**

To familiarize with

1. The basics of tools and equipments used in fitting, carpentry, sheet metal, welding and smithy.
2. The production of simple models in the above trades.

**LIST OF EXPERIMENTS**

**EMPHASIS TO BE LAID ON REAL LIFE APPLICATIONS WHEN FRAMING THE EXERCISES.**

**FITTING**

Tools & Equipments – Practice in Filing and Drilling.

Making Vee Joints, Square, dovetail joints, Key Making.

**CARPENTARY**

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

**SHEET METAL**

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

**WELDING**

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

**UNIT 5. SMITHY**

Tools and Equipments –Making simple parts like hexagonal headed bolt, chisel.

**TEXT BOOKS**


1. Gopal, T.V., Kumar, T., and Murali, G., *"A first course on workshop practice – Theory, practice and work book",* Suma Publications, 2005.


**REFERENCE BOOKS**


1. Kannaiah,P. & Narayanan,K.C. "*Manual on Workshop Practice"*, Scitech Publications, Chennai, 1999.
2. Venkatachalapathy, V.S. , "*First year Engineering Workshop Practice"*, Ramalinga Publications, Madurai, 1999.


| | | L | T | P | C |
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| **CI0104** | **COMPUTER AIDED BUILDING DRAWING** | **0** | **0** | **4** | **2** |
| | Prerequisite | | | | |
| | Nil | | | | |

**PURPOSE**

To impart knowledge on the fundamentals of building drawing based on National Building Code, India guidelines and enabling students to prepare them manually and using AutoCAD

**INSTRUCTIONAL OBJECTIVES**

1. Preparation of plan, elevation and sections of various types of buildings manually and using AutoCAD.
2. Improve imagination and creative skills in planning and detailing various types of buildings.

**LIST OF EXPERIMENTS**

**PART – A (Manual Drawing)**

1. Preparation of plan, elevation and section of residential buildings-single storey and double storey (load bearing structures).
2. Preparation of plan, elevation and section of institutional buildings -school.(framed structure)
3. Preparation of plan, elevation and section of industrial buildings-workshop(steel structure)

**PART – B (Drawing using AutoCAD)**

1. Basic AutoCad Commands
2. Computer aided building drawing for single storey residential building (plan, elevation and section)
3. Computer aided building drawing for a RCC framed structure (residential building)-plan-elevation-section
4. Computer aided building drawing for dispensary ( plan, elevation, section )
5. Computer aided building drawing for workshop ( plan, elevation, section )

**TEXT BOOKS**

1. David S. Cohn, *AtoCAD2000,* Tata McGraw Hill, Publishing Company, New Delhi, 2000.

**REFERENCE**

1. Yarwood, A., *An Introduction to AutoCAD, 2000*, Pearson Education Limited, England 2000
2. *National Building Code, Bureau of Indian Standards*, New Delhi,2005.

**III SEMESTER**

| | | L | T | P | C |
|---|---|---|---|---|---|
| **LE0201** | **GERMAN LANGUAGE PHASE I** | **2** | **0** | **0** | **2** |
| | Prerequisite | | | | |
| | Nil | | | | |

**PURPOSE**

Enabling the Engineering Students to one more Foreign Language, especially German, which is scientific and technical language. This may be useful in the field of employment opportunities as well as helping them to develop projects on browsing German websites.

**INSTRUCTIONAL OBJECTIVES**

Developing pronunciation so that they can read the text and e-mail during their employment, instructing them to write their own C V and developing a fundamental conversation with any German national.

**INTRODUCTION**

German Language, Alphabets and Pronunciation.

**THEMEN**

Name, Land, Leute, Beruf, Familie geschwister, Einkaufen, Reisen, Zahlen, Haus, Freunden, Essen and Stadium, Fest, Zeit.

**LISTENING**

Listening to the cassette and pay special attention to the meaning and sounds. Listening Comprehension – Announcements / Airport / Station / General.

**READING**

Listening to the cassette and reading it allowed.

READING COMPRENSION BASICS / STATION / NEWS / NOTICE BOARDS.

**GLOSSARY**

Technical Words Lesson (1-5)

**TEXT BOOK WITH CASSETTES**

Grundkurs Deutsch

Momentmal (Max Mueller Bhavan – Goethe Institute, Germany).

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|---|---|---|---|---|---|
| **LE0203** | **JAPANESE LANGUAGE PHASE I** | **2** | **0** | **0** | **2** |
| | Prerequisite | | | | |
| | Nil | | | | |

**PURPOSE**

In view of globalization, learning Foreign Language by Engineering graduates enhances their employment opportunities.

Get awareness of understanding of International culture.

Widening the Linguistic Skills of the Students.

**INSTRUCTIONAL OBJECTIVES**

To learn the scripts of Japanese Languages namely Hiragana, Katakana and Kanji, Vocabularies etc. To learn basic grammar and acquire basic communication skills. To understand Japanese culture.

## 8Alphabets (Hiragana ), Self Introduction, Greetings, Classroom expressions, Numbers,

Conversation.

Alphabets Hiragana (continued),Vocabularies.

Counters .Time expression. Conversation

Katakana and related vocabulary.

Kanjis –introduction. conversation.

Lesson-1 Watashiwa Nihonjin desu. Grammar,Marume &Sentence pattern.Marume.

Conversation.

**TEXT BOOKS**

Nihongo Shoho I main Text sold in India by the Japanese Language Teachers Association Pune.

Hiragana and Katakana Work Book published by AOTS Japan

Grammar and Kotoba ( Work Book )

Japanese for Dummies.(Conversation) CD.

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| **LE0205** | **FRENCH LANGUAGE PHASE I** | **2** | **0** | **0** | **2** |
| | Prerequisite | | | | |
| | Nil | | | | |

**PURPOSE**

As language skills are as valuable as technical skills a knowledge of French enables the engineering graduates in career orientation.

As a second international global Lang after English there is a wider choice of job opportunities in the inter national employment market and also multinationals in India and an understanding of French culture thro language.

**INSTRUCTIONAL OBJECTIVE**

Characterised by the Roman script, grammar, vocabulary and colloquial expressions are taught which enables them to communicate effectively with any native speaker.

**INTRODUCTION AND PRONUNCIATION**

Introduction of the French Language, Alphabets and Pronunciation, Greetings (Wishing, Thanking and Bidding good bye), Introducing oneself & someone Presenter quelqu'un et se presenter - conversational French sentences based on the topics discussed above.

**VOCABULARY**

Numbers and Dates, Days, Months and Seasons, Time, Nouns, Professions and Nationalities. C;onversational sentences on weather, time, and professions.

**GRAMMAR**

Basic Verbs (Avoir, Etre, Aller, Faire) – Conjugation – Present tense, Affirmative, Negative, Interrogative, Adjectives (Qualitative), Subject Pronouns and Disjunctive Pronouns.

**CONVERSATION AND LISTENING**

Conversational sentences on physical description and expressions with verbs like avoir, etre and faire

**GRAMMAR**

Prepositions ( a, de,dans, en, sur,sous, pour….),Contracted Articles, Question Tag

(Qui, Quel, Ou, ……etc)

**TEXT BOOK**

Panorama – Goyal Publishers

Apprenons le Francais I, Sarawathy publication.

| | | L | T | P | C |
|---|---|---|---|---|---|
| **MA0201** | **MATHEMATICS – III** | **3** | **2** | **0** | **4** |
| | Prerequisite | | | | |
| | Fundamentals of differential calculus and statistics | | | | |

(Common for **Civil, Mech., & Chemical)**

**PURPOSE**

To impart analytical ability in solving mathematical problems as applied to the respective branches of Engineering.

**INSTRUCTIONAL OBJECTIVES**

At the end of the course, student should be able,

To grasp the concept of Fourier Series and its applications

To solve partial differential equations

To be familiar with boundary value problems

To learn more about Fourier Transforms

To understand thoroughly fundamentals of statistics

**FOURIER SERIES**

Dirichlet's conditions – General Fourier series – Half range Sine and Cosine series – Parseval's identity – Harmonic Analysis.

**PARTIAL DIFFERENTIAL EQUATIONS**

Formation – Solution of standard types of first order equations – Lagrange's equation – Linear Homogeneous partial differential equations of second and higher order with constant coefficients.

**BOUNDARY VALUE PROBLEMS**

Classification of second order linear partial differential equations – Solutions of one-dimensional wave equation, one-dimensional heat equation – Steady state solution of two-dimensional heat equation – Fourier series solutions in Cartesian coordinates.

**FOURIER TRANSFORMS**

Statement of Fourier integral theorem – Fourier transform pairs – Fourier Sine and Cosine transforms – Properties – Transforms of simple functions – Convolution theorem – Parseval's identity.

**STATISTICS**

Review of Measures of central tendency, measures of dispersion (No questions should be asked) – Moments – Skewness and kurtosis based on moments – Linear correlation and regression – Tests based on Normal and t distribution for means and difference of means - $\chi^2$ test for Goodness of fit.

**TEXT BOOK**


1. Grewal B.S., Higher Engineering Mathematics, 36$^{h}$ edition, Khanna Publishers, 2002. (**Unit I** – Chapter 10 section 10.2. – 10.7, 10.9, 10.11, **Unit II** – Chapter 17 Section 17.2, 17.5, 17.6, 17.8 – 17.10, **Unit III** – Chapter 18 Section 18.4(2), 18.5(2), 18.7, Chapter 28 Section 28.2, **Unit IV** – Chapter 22 Section 22.3 – 22.7, **Unit V** – Chapter 23 section 23.5 – 23.11, 23.34, 23.35, 23.36, 23.37.


**REFERENCE BOOKS**


1. Kreyszig.E, Advanced Engineering Mathematics, 8$^{th}$ edition, John Wiley & Sons, Singapore, 2000.
2. Miller I.R. and Freund J.E., Probability and Statistics for Engineers, Prentice Hall, 1995.
3. Kandasamy P etal. Engineering Mathematics, Vol. II & Vol. III (4$^{th}$ revised edition), S.Chand & Co., New Delhi, 2000.
4. Narayanan S., Manicavachagom Pillay T.K., Ramanaiah G., Advanced Mathematics for Engineering students, Volume II & III (2$^{nd}$ edition), S.Viswanathan Printers and Publishers, 1992.
5. Venkataraman M.K., Engineering Mathematics – Vol.III – A & B (13th edition), National Publishing Co., Chennai, 1998.


| | | L | T | P | C |
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| **CI0201** | **MECHANICS OF SOLIDS** | **2** | **2** | **0** | **3** |
| | Prerequisite | | | | |
| | Nil | | | | |

**PURPOSE**

To know the basics of solid mechanics. To understand the concepts of mechanics of structures.
To understand the behaviour, determine the internal forces and analyse the stresses of various structural elements under action of different types of forces.

**INSTRUCTIONAL OBJECTIVES**

Resolution of forces and to comprehend the various forces (Internal and External) and their action on different structural elements and determine the stresses and strains.

Awareness on the properties of plane areas.

To analyse and determine the internal forces in pin jointed plane trusses by various methods.

To study the behaviour of determinate beams and examine the internal forces, stresses induced and learn the theory of torsion and stresses developed in solid , hollow shafts and helical springs.

To analyse the state of stress ( two dimensional ) and evaluate the principal stresses and principal planes by analytical and graphical treatment.

**BASICS OF MECHANICS, STRESS, STRAIN AND DEFORMATION OF SOLIDS**

Vectors-Concept of forces-Concept of particle and rigid body -Non-concurrent and parallel forces in a plane – Moment of force and Varignon's theorem -Free body diagram-conditions of equilibrium-Principle of virtual work-equivalent force system. Rigid bodies and deformable solids – tension, compression and shear stresses – strain – Lateral strain – Poisson's ratio – Volumetric strain – Deformation of simple and compound bars – Elastic constants – Composite sections – Thermal stresses – Thin Cylinders and spherical Shells – Deformation of thin Shells – Stresses at a point in thin Shells.

**CENTRE OF GRAVITY AND MOMENT OF INERTIA**

Areas and volumes – Theorems of Pappus and Guldinus - Centroid of simple areas and volumes by integration – centroid of composite areas – Second and product moment of areas – radius of gyration – parallel axis and perpendicular axis theorems - moment of inertia of simple areas by integration –moment of inertia of composite areas – mass moment of inertia of thin plates and simple solids.

**ANALYSIS OF STATICALLY DETERMINATE PLANE TRUSSES**

Stability and Equilibrium of plane frames – Perfect frames – Types of Trusses – Analysis of forces in truss members – Method of joints – Method of Sections – Tension Co-efficient method – Graphical method.

**BENDING OF BEAMS AND TORSION OF SHAFTS**

Beams – types of Support – Types of load – S.F and B.M in beams – Cantilevers, Simply supported and Overhanging beams with different types of loading – Relationship between B.M and S.F – Theory of simple bending – Bending stress and Shear stress distribution for various Cross sections – Analysis of stresses – load carrying capacity – Proportioning of sections – Shear flow- beams of uniform strength. Theory of pure torsion – stresses and deformation in Circular solid and Hollow shafts –Power transmitted by shafts-Stresses in helical springs – deflection of springs.

**ANALYSIS OF STATE OF STRESS**

Two Dimensional – Stresses on inclined planes – Combined stresses – Principal stresses and Principal planes – Graphical Treatment – Mohr's circle of stress.

Thick Cylinders – Lame's equation – Compound cylinders - Shrink fit.

**TEXT BOOKS**


1. Beer and Johnson , *Mechanics for Engineers*, *Statics and Dynamics*, Mc Graw Hill Book Company,1987
2. Punmia.B.C., Ashok Kumar Jain, Arun Kumar Jain, *Mechanics of Materials,* Laxmi Publications (P) Ltd., 2003.
3. Rajput.R.K., *Strength of Materials*,(Mechanics of Solids), S.Chand and Company Ltd., New Delhi, 2004.


**REFERENCE BOOKS**


1. Rajasekharan and Sankarasubramaniyan.M., *Engineering Mechanics*, (Statics and Dynamics), Vikey Publishing House Pvt. Ltd., 1999.
2. Timoshenko.S.P. and Gere.J.M., *Mechanics of Materials*, CBS Publishers, Delhi, 2 Ed. 1984.
3. Ramamrutham.S and Narayanan.R., *Strength of Materials*, Dhanpat Rai Publishing, Company-2002.
4. Junnarkar. S. B., *Mechanics of Structures*, Vol. I, 21st Edition, Charotar Publishing House, Anand, 1995.
5. Srinath. L. N., *Advanced Mechanics of Solids*, Tata McGraw Hill Publishing Company Ltd., New Delhi, 1994.


| | | L | T | P | C |
|---|---|---|---|---|---|
| CI 0203 | **APPLIED GEOLOGY** | **2** | **0** | **0** | **2** |
| | Prerequisite | | | | |
| | Nil | | | | |

**(Applicable for students admitted from 2010-11 onwards)**

**PURPOSE**

To understand the basics and application of engineering geology technology.

**INSTRUCTIONAL OBJECTIVES**

1. To study the origin , development and ultimate fate of various surface features of the earth.
2. To understand the basic building units of which the solid crust of the earth.
3. To understand the nature of geographic distribution of rocks and engineering properties of rock on the earth.
4. To understand the nature of geological structures and their importance on the civil engineering structures.
5. To know the importance of geology in civil engineering practices.

**GENERAL GEOLOGY**

The Scope of Geology in Engineering – Geological Agencies – External Agencies – Weathering, Wind, River, Sea, Landslide – Internal Agencies – Earthquake, Plate Tectonics, Ground Water.

**MINERALS OF THE EARTH'S CRUST**

Internal Structure of the Earth and their Composition – Rock Forming Minerals – Physical Properties of Minerals – Quartz, Feldspar, Mica – Calcite – Engineering Significance of Clay Minerals, Coal, Petroleum.

**ROCKS OF THE EARTH'S CRUST**

Rocks and their study – Rock Cycle – Igneous Rocks - Sedimentary Rocks – Metamorphic Rocks – Engineering Properties, Uses and Indian Occurrence of the following rocks – Granite, Diorite, Dolerite, Pegmatite, Basalt, Shale, Sandstone, Limestone, Breccia and Conglomerate, Gneiss, Schist, Slate, Quartzite and Marble.

**STRUCTURAL FEATURES OF ROCKS**

Introduction – Terminology – Outcrop – Geological Map – Clinometer – Geological Structures – Folds, Faults and Joints – Engineering Considerations involves Structures.

**GEOLOGY FOR ENGINEERING PROJECTS**

Geological Investigations – Geophysical Investigations – Remote Sensing Techniques – Geological Considerations for Dam Reservoirs, Tunnels and Road Cuts – Practice in Geology – Demonstration for Clinometer, Electrical Resistivity Meter, Geological Maps – Identification of Crystals, Minerals and Rocks.

**TEXT BOOKS**


1. Garg S.K., *Physical and Engineering Geology*, Khanna Publication, New Delhi, 1999.
2. Parbin Singh, *Engineering and General Geology*, Katson Publication House, 1997.


**REFERENCE BOOKS**


1. Blyth, *Geology for Engineers*, ELBS, 1995.
2. Legeet, *Geology and Engineering*, McGrawHill Book Company, 1998.
3. M.T.Maruthesha Reddy, *Engineering Geology Practical*, New Age International Pvt Ltd, 2003.


| | | L | T | P | C |
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| **CI0205** | **FLUID MECHANICS** | **3** | **0** | **0** | **3** |
| | **Prerequisite** | | | | |
| | **Nil** | | | | |

**PURPOSE**

To learn fundamental concepts in the field of fluid mechanics.

**INSTRUCTIONAL OBJECTIVES**

1. To know the importance, application and inter-relationship of various properties of fluid.
2. To study theories those explain the behaviour and performance of fluid when the fluid is at rest.
3. To study theories those explain the behaviour and performance of fluid when the fluid is in motion.
4. To study theories those explain the behaviour and performance of fluid when the fluid is flowing through the pipe.
5. To understand the utilization of dimensional analysis as a tool in solving problems in the field of fluid mechanics.

**FLUID PROPERTIES**

Importance and application of fluid mechanics – Mass density, Weight density, Specific volume, Specific gravity – Viscosity, Newton's Law of viscosity – Surface tension – Pressure inside a water droplet, soap bubble and liquid jet – Capillarity – Compressibility and Bulk modulus – Vapour pressure

**HYDROSTATIC**

Total pressure and Centre of pressure – Pressure on plane and curved surfaces – Horizontal, vertical and inclined surfaces – Buoyancy – Centre of Buoyancy – Types of Equilibrium – Metacentre and Metacentric height

**FLUID KINEMATICS AND DYNAMICS**

Description of fluid motion – Types of fluid flow – Velocity and Acceleration – Types of flow lines – Control Volume – Continuity Equation in Cartesian co-ordinates – Velocity potential and Stream function – Flow nets – Methods – Uses – Navier-Strokes Equation – Euler's equation – Bernoulli's equation – Vortex motion, Forced vortex flow, Free vortex flow – Momentum, Energy and Moment of momentum.

**FLOW THROUGH PIPES**

Boundary Layer Theory – Types(definition only) – Reynolds experiment – Laminar and Turbulent flow – Major energy losses – Darcy – Weisbach equation – Moody's diagram – Minor Energy losses – Hydraulic Gradient Line and Total Energy Line – Pipe in series – Equivalent pipe – Flow between reservoirs – Pipes in parallel – Pipe network

**DIMENSIONAL ANALYSIS**

Units and Dimensions – Dimensional Homogeneity – Rayleigh's Method – Buckingham's $\pi$ method – Model analysis – Similitude – Dimensionless numbers and theirs significance - Model laws – Type of models, undistorted and distorted models

**TEXT BOOKS**


1. P.N. Modi and S.M. Seth, *Hydraulics and Fluid Mechanics*, Standard Book House, 2005
2. Rajput R.K., *Fluid Mechanics and Hydraulic Machines*, S.Chand and Company Ltd., 2005


**REFERENCE BOOKS**


1. K.Subramanya, *Theory and Applications of Fluid Mechanics*, Tata McGraw Hill Publishing Company, 2002.
2. R.K.Bansal, *Fluid Mechanics and Hydraulic Machines*, Laxmi Publications 2005.

| | | L | T | P | C |
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| **CI0207** | **SURVEYING** | **3** | **0** | **0** | **3** |
| | Prerequisite | | | | |
| | Nil | | | | |

**PURPOSE**

To measure the land area, to prepare map and to find out the elevation of a point for constructional purpose.

**INSTRUCTIONAL OBJECTIVES**

1. To measure the land area by chaining and the methods of clearing the obstacles.
2. To measure the area and distance between the points by compass and plane table.
3. To measure the elevation of points for the preparation of map.
4. To measure the height and distance by theodolite.
5. To know the setting out works for construction purposes.

**CHAIN, COMPASS AND PLANE TABLE SURVEYING**

CHAIN : Definition – Principles – Classification – field and office work –conventional signs – Ranging and Chaining – Reciprocal ranging – Setting perpendiculars- Well-conditioned triangles.
COMPASS : Prismatic compass – Surveyor's compass – Bearing systems and conversions – Local attraction – Magnetic declination – dip – Traversing – Plotting – Adjustment of error.
PLANE TABLE SURVEYING : Plane table instruments and accessories – merits and demerits – methods – Radiation- Intersection – Resection – Traversing.

**LEVELLING AND THEODOLITE SURVEYING**

LEVELLING : Level line – Horizontal line – Levels and Staves – Spirit level – sensitiveness – Bench marks – Temporary and Permanent adjustments – Fly and check levelling – Booking – Reduction – Curvature and Refraction – Reciprocal levelling – Longitudinal and Cross sections – Plotting .
THEODOLITE : Theodolite – Vernier and Microptic – Description and uses - Temporary and Permanent adjustments of vernier transit – Horizontal angles – Heights and Distances –Traversing – Closing error and distribution.

**TACHEOMETRIC SURVEYING**

Tacheometric Systems – Tangential, Stadia and substense methods, Stadia systems – horizontal and inclined sights – vertical and normal staff – fixed and movable hair – stadia constants, anallatic lens – subtense bar- Self reducing tacheometers.

**TRIANGULATION SURVEYING**

Horizontal and vertical control – methods -triangulation –network- Signals. Base line – choices – instruments and accessories – extension of base lines - corrections - Satellite station – reduction to centre – Intervisibility of height and distances - Trigonometric levelling – Axis single corrections.

**ENGINEERING SURVEYS**

Reconnaissance, Preliminary and location surveys for engineering projects – layout – setting out works

CURVES : Curve ranging – Horizontal and Vertical curves – Simple curves –setting with chain and tapes, tangential angles by theodolite – compound and reverse curves – Transistion curves.

CONTOUR : Contouring – Methods – Characteristics and uses of contours – Plotting – Calculation of areas and volumes.

**TEXT BOOKS**


1. Kanetkar, T.P., *Surveying and Levelling*, Vols. I and II, United Book Corporation, Pune, 1994.
2. Punmia, B.C., *Surveying*, Vols. I and II, Laxmi Publications,1999.
3. Chandra .A.M. *Plane Surveying* and *Higher Surveying*, New Age International (P) Limited, Publishers, Chennai, 2002.


**REFERENCE BOOKS**


1. Bannister .A and Raymond.S., *Surveying*, ELBS", Sixth edition, 1992.
2. James M. Anderson and Edward M. Mikhail, *Introduction to Surveying,* McGraw Hill Book Company, Second Edition, 1986.
3. Clark.D., *Plane and Geodetic Surveying*, Vols. I and II, C.B.S. Publishers and Distributors, Delhi, Sixth Edition, 1991.
4. Arora.K.P., *Surveying*, Volume 3, Standard Book House, 2000.


| | | L | T | P | C |
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| **CI0209** | **BUILDING TECHNOLOGY** | **3** | **0** | **0** | **3** |
| | Prerequisite | | | | |
| | Nil | | | | |

**PURPOSE**

It is aimed to develop a through understanding of the basics of building components.

**INSTRUCTIONAL OBJECTIVES**

1. To build an awareness about the type of masonry, floors, and roofs.
2. To understand types of doors and stairs and its uses.

**GENERAL**

Principles of Planning – Planning regulations and bye – laws – Preparation of layout plan – orientation of building – Executions and timbering.

**MASONRY**

Masonry – stone masonry – rubble and ashlar masonry – Brick masonry – Bond – Definition need and scope – Types of bonds – English and Flemish bond - merits and demerits – composite masonry – solid and hollow block masonry-soil-cement briks-Load bearing and non-load bearing walls-codal provisions

**FLOORS AND ROOFS**

Floors – Types of floor – Details of concrete and terrazzo floors – Roofs – Types of Roofs – Types of Flat roofs – sloping roofs – different types and usage – shell roofs – roof coverings-AC sheets-GI sheets-FRP roofs

Water proofing treatment of roofs –tar felt treatment- chemical treatment- Types of weathering courses

**STAIRS AND VENTILATION**

Stair case – requirements of a good stair case – types of staircase – types of doors and windows – wooden and metallic door frames, ventilators – Fixtures and fastening for doors and windows.

**BUILDING AMENITIES**

Thermal insulation – Heat transference – insulating material – method of application – ventilation – requirements – types of ventilation – Air conditioning – Fire proof construction methods – Principles of acoustical design of building.

**TEXT BOOKS**


1. Varghese, P.C., *Building Constructon*, Prentice Hall India,2007

2. Arora and Bindra S.P., *Building Construction, Planning Techniques and Method of Construction*, Dhampatrai sons, New Delhi, 1988.
3. Punmia B.K., Ashok Kumar Jain, Arn Kumar Jain, *Building Construction*, Laxmi Publications Pvt. Ltd., New Delhi, 1987.


**REFERENCE BOOKS**


1. *National Building Code, Bureau of Indian Standards, New Delhi,* 2005.
2. Chudley. R, *Construction Technology*, ELBS Publishers, 1987.
3. Gurucharan Singh, *Building Construction and Materials*, Standard Book House, Delhi, 1988.


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| **PD 0201** | **PERSONALITY DEVELOPMENT -III** | **0** | **0** | **2** | **1** |
| | Prerequisite | | | | |
| | Nil | | | | |

**PURPOSE**

The purpose of this course is to build confidence and inculcate various soft skills and to help Students to identify and achieve their personal potential

**INSTRUCTIONAL OBJECTIVES**

1. To guide thought process.

2. To groom students' attitude.

3. To develop communication skill.

4. To build confidence.

**METHODOLOGY**

The entire program is designed in such a way that every student will participate in the class room activities. The activities are planned to bring out the skills and talents of the students which they will be employing during various occasions in their real life.

1. Group activities + individual activities.

2. Collaborative learning.

3. Interactive sessions.

4. Ensure Participation.

5. Empirical Learning

Goal Setting - Problem Solving - Emotional Quotient

Assertiveness - Stress Management - Quiz II

Lateral Thinking (Situational) - Team Work (Role Plays) Impromptu - Text Analysis

Business plan presentation I - Business plan presentation II - Chinese Whisper

Picture Perfect - Case Studies - Review

**SCHEME OF INSTRUCTION**

Marks allocated for regular participation in all oral activities in class

**SCHEME OF EXAMINATION**

Complete Internal evaluation on a regular Basis

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| **CI0211** | **SURVEY LABORATARY I** | **0** | **0** | **4** | **2** |
| | Prerequisite | | | | |
| | Nil | | | | |

**PURPOSE**
To measure the land area, preparation of map, elevation of point, setting out works by practical work.

**INSTRUCTIONAL OBJECTIVES**
Practical experiments in chaining, compass, plane table, leveling and theodolite will give experience in handling surveying equipments and help in civil engineering career.
**EXPERIMENTS**

1. Simple chain survey – calculation of area using cross staff.
2. Traversing - Measurement of bearing of survey lines by prismatic compass – Local attraction.
   i. Running closed and open compass traverse.
   ii. Plotting and adjustments of traverse.
3. Plane table survey by Radiation and Intersection methods.
   Resection : Field solution of two and three point problems (any one method).

4. Reduction of levels : (a) Height of collimation method
   (b) Rise and Fall method

5. Theodolite - Measurement of horizontal angles by reiteration and repetition.

6. Theodolite - Measurement of vertical angles and determination of height of an object.
7. Heights and distances : Single plane method and Double plane method

**REFERENCE**

1. Laboratory Manual.

| | | L | T | P | C |
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| **CI0213** | **MATERIAL TESTING LABORATORY** | **0** | **0** | **4** | **2** |
| | Prerequisite | | | | |
| | Nil | | | | |

**PURPOSE**

To be exposed to testing of different materials under the action of various forces and to determine the characteristics experimentally.

**INSTRUCTIONAL OBJECTIVES**

1. Learn the properties of different materials like steel, concrete, timber, bricks and other materials.
2. Study the behaviour of different structural elements by conduct of different tests like tension, compression, torsion, impact, shear, bending and hardness tests and develop skill in use of measuring instruments.

**LIST OF EXPERIMENTS**

1. TENSION TEST on Mild Steel and H.T.S. rods
2. DOUBLE SHEAR TEST on Mild Steel rods.
3. HARDNESS TEST on metals like Mild Steel, Brass, Copper and Aluminium.
4. TORSION TEST
5. IMPACT TEST on metal specimens -Charpy and lzod test.
6. COMPRESSION TESTS ON Wood specimen, Bricks & Concrete cubes.
7. TESTS ON HELICAL SPRINGS.
8. DEFLECTION TEST on Steel, Aluminium and Timber beams with different cross sections.
9. DEFLECTION TEST on Carriage Spring.
10. FLEXURE TEST on steel and timber beams with strain/deflection measurements.

**REFERENCE**


1. Laboratory Manual .
2. Syed Danish Hasan, *Civil Engineering Materials and their Testing*, Narosa Publishing House 2006.

3. Rajpu.R.K., *Strength of Materials*, S.Chand and Company Ltd., New Delhi, 2004.

**IV SEMESTER**

| | | L | T | P | C |
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| **LE0202** | **GERMAN LANGUAGE PHASE - II** | **2** | **0** | **0** | **2** |
| | **Prerequisite** | | | | |
| | **GERMAN LANGUAGE PHASE - I** | | | | |

**PURPOSE**

Enabling the Engineering Students to one more Foreign Language, especially German, which is scientific and technical language. This may be useful in the field of employment opportunities as well as helping them to develop projects on browsing German websites.

**INSTRUCTIONAL OBJECTIVES**

Developing pronunciation so that they can read the text and e-mail during their employment, instructing them to write their own C V and developing a fundamental conversation with any German national.

**SPEAKING;**

Dialogue – Questioning / Basic queries / Conversational with practical exposure.

**GRAMMATIK (WRITING)**

Verben, Wortstellung, Nomen, Pronomen, Artikel, Nominitativ, Akkusativ, Dativ, Adjective, Prasens, Perfect and Neben Satze.

**GLOSSARY**

Technical words. Lesson (6-10)

**TEXT BOOK WITH CASSETTES**

A. Grundkurs Deutsch
B. Momentmal
(Prescribed by Max Mueller Bhavan – Goethe Institute, Germany).

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| **LE0204** | **JAPANESE LANGUAGE PHASE II** | **2** | **0** | **0** | **2** |
| | Prerequisite | | | | |
| | **JAPANESE LANGUAGE PHASE I** | | | | |

**PURPOSE**

1. In view of globalization, learning Foreign Language by Engineering graduates enhances their employment opportunities.
2. Get awareness of understanding of International culture.
3. Widening the Linguistic Skills of the Students.

**INSTRUCTIONAL OBJECTIVES**

To learn the scripts of Japanese Languages namely Hiragana, Katakana and Kanji, Vocabularies etc. To learn basic grammar and acquire basic communication skills. To understand Japanese culture.

Lesson 2-{Korewa Tsukue desu } – Grammar, Sentence pattern, Marume .

Conversation

Lesson 3 – [Kokoni denwa ga arimasu] - Grammar, Sentence pattern, Marume .Copnversation

Lesson 4– {Asokoni hito ga imasu} - Grammar, Sentence pattern, Marume .

Lesson 5– {Akairingo wa ikutsu arimasu ka}-Grammar, Sentence pattern, Marume . Conversation.

Lesson 6– {Barano hana wa ippon ikura desu ka}- Grammar, Sentence pattern.Marume.Conversation

**TEXT BOOKS**

1. Nihongo Shoho Imain Text sold in India by the Japanese Language Teachers Association Pune.
2. Hiragana and Katakana Work Book published by AOTS Japan
3. Grammar and Kotoba ( Work Book )
4. Japanese for Dummies.(Conversation) CD.

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| **LE0206** | **FRENCH LANGUAGE PHASE II** | **2** | **0** | **0** | **2** |
| | **Prerequisite** | | | | |
| | **FRENCH LANGUAGE PHASE I** | | | | |

**PURPOSE**

1. As language skills are as valuable as technical skills a knowledge of French enables the engineering graduates in career orientation.
2. As a second international global Lang after English there is a wider choice of job opportunities in the inter national employment market and also multinationals in India and an understanding of French culture thro language.

**INSTRUCTIONAL OBJECTIVE**

Characterised by the Roman script, grammar, vocabulary and colloquial expressions are taught which enables them to communicate effectively with any native speaker.

Sports (Ski, natation, tennis, Tour de France), Cuisine (French dishes),Cinema

(Review of a film) – Articles on these topics and group discussion will be followed.

**GRAMMAR**

Possessive Adjectives, Demonstrative Adjectives, Past tense – Passé Compose( Verbe Auxiliare:.Etre et Avoir)

Culture and Civilization French Monuments (Tres celebres), French History (Jeanne d' Arc, Louis XIV, Prise de la Bastille), Culture and Civilisation (vin, fromage, mode, parfums)

Transport system, government and media in France – articles on these topics.

Comprehension and Grammar Comprehension passages and conversational sentences in different situations (at the restaurant, at the super market)

**TEXT BOOK:**

1. Panorama – Goyal Publishers
2. Apprenons le Francais II, Sarawathy Publications

| | | L | T | P | C |
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| **MA 0202** | **NUMERICAL METHODS** | **3** | **2** | **0** | **4** |
| | Prerequisite | | | | |
| | Fundamentals of differential calculus | | | | |

**(Common for Civil, Mech, EEE & Chemical)**

**PURPOSE**

To impart analytical ability in solving mathematical problems as applied to the respective branches of Engineering.

**INSTRUCTIONAL OBJECTIVES**

At the end of the course, student should be able,

1. To the familiar with numerical solution of equations
2. To get exposed to finite differences and interpolation
3. To be thorough with the numerical Differentiation and integration
4. To find numerical solutions of ordinary and partial differential equations

## CURVE FITTING AND NUMERICAL SOLUTION OF EQUATIONS

Method of Least Squares – Fitting a straight line – Fitting a parabola – Fitting an exponential curve – Fitting a curve of the form $y = ax^b$ – Calculation of the sum of the squares of the residuals.- Newton-Raphson method – Gauss Elimination method – Gauss Jacobi method – Gauss Seidel method.

## FINITE DIFFERENCES AND INTERPOLATION

First and Higher order differences – Forward differences and backward differences and Central Differences – Differences of a polynomial – Properties of operators – Factorial polynomials – Shifting operator E – Relations between the operators. Interpolation – Newton-Gregory Forward and Backward Interpolation formulae - Divided differences – Newton's Divided difference formula – Lagrange's Interpolation formula – Inverse interpolation.

## NUMERICAL DIFFERENTIATION AND INTEGRATION

**Numerical Differentiation and Integration:** Newton's forward and backward differences formulae to compute first and higher order derivatives – The Trapezoidal rule – Simpson's one third rule and three eighth rule.

## NUMERICAL SOLUTIONS OF ORDINARY DIFFERENTIAL EQUATIONS

Solution by Taylor's series – Euler's method – Improved and modified Euler method – Runge-Kutta methods of fourth order (No proof) – Milne's Method - Adam's Bashforth method.

## NUMERICAL SOLUTIONS OF PARTIAL DIFFERENTIAL EQUATIONS

Classification of Partial differential equations of the second order - Difference quotients – Laplace's equation and its solution by Liebmann's process – Solution of Poisson's equation – Solutions of Parabolic and Hyperbolic equations.

## TEXT BOOK

1. B.S. Grewal, Numerical Methods, Khanna Publishers, 6th edition.
   (**Unit I** – Chapter 5 Section 5.3, 5.5, 5.6, 5.8, Chapter 2 Section 2.1, 2.9, 2.10, 2.12, Chapter 3 Section 3.4 (4), 3.5(1,2), Chapter 4 Section 4.2 **Unit II** – Chapter 7 Section 7.1, 7.2, 7.4, 7.12 – 7.14 Chapter 6 Section 6.6, 6.7 **Unit III** – Chapter 8 Section 8.2, 8.10 (1,2), 8.41 – 8.43 **Unit IV** – Chapter 10 Section 10.3 - 10.6, 10.8 – 10.10 **Unit V** – Chapter 11 section 11.3 – 11.6, 11.8, 11.9(1,2), 11.11,11.12).

## REFERENCE BOOKS


1. Dr. M.K. Venkataraman, Numerical Methods in Science and Engineering, National Publishing Co., 1999.
2. S.S. Sastry, Introductory Methods of Numerical Analysis, 2001.
3. E. Balagurusamy, Computer Oriented Statistical and Numerical Methods – Tata McGraw Hill., 2000.
4. M.K.Jain, SRK Iyengar and R.L.Jain, Numerical Methods for Scientific and Engineering Computation, Wiley Eastern Ltd., 1987.

5. M.K.Jain, Numerical Solution of Differential Equations, 1979.
6. Dr.P.Kandasamy etal., Numerical Methods, S.Chand & Co., New Delhi, 2003.

| | | L | T | P | C |
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| **CI0202** | **STRENGTH OF MATERIALS** | **2** | **2** | **0** | **3** |
| | Prerequisite | | | | |
| | CI0201 | | | | |

**PURPOSE**

To study advanced concepts in strength of materials like deflection, energy principles, stability criteria, theories of failure, unsymmetrical bending, behaviour of curved bars and locating shear centre.

**INSTRUCTIONAL OBJECTIVES**

1. To determine the deflections in beams by various methods which is an important criteria in design.
2. To analyse the structural elements by energy concepts and find stresses and deflections.
3. To examine the behaviour of columns and development of various theories in evaluating the critical loads and design of columns.
4. To investigate state of stress in three dimensions and various theories of failure in designing the structural members.
5. To understand advanced concepts like unsymmetrical bending, stressed in curved bars and locating shear centre.

**DEFLECTION OF BEAMS**

Determination of deflection curve – Computation of Slopes and Deflections in Beams - Double integration method - Macaulay's method – Area moment method – Conjugate beam method - effect of shear on deflection – Deflection of leaf springs.

**ENERGY PRINCIPLES**

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 theorem - Principle of virtual work – Application of Energy theorem for computing deflection in Determinate structures-Beams, pin jointed plane frames and rigid plane frames - dummy unit load method - Williot Mohr's diagram - Maxwell's reciprocal theorem.

**COLUMNS**

Euler's theory of long columns – Critical loads for Prismatic columns with different end conditions – Rankine Gordon's formula and Secant formula –Eccentrically loaded long columns. Combined bending and axial load – IS code recommendations.

**STATE OF STRESS IN THREE DIMENSIONS**

Spherical and deviatric components of stress tensor – 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 theory – application in analysis of stress .

**SPECIAL TOPICS**

Unsymmetrical bending of Beams of Symmetrical and Unsymmetrical Sections –Box Sections and its importance – Curved bars – Winkler Bach formula – Shear Centre-simple problems only .Static friction- inclined plane and bearings-Kinematics and kinetics of particles-D'Alembert's principle- flywheel.

**TEXT BOOKS**


1. Rajput R.K., *Strength of Materials*, S.Chand of Company Ltd - New Delhi.2001.
2. Punmia.B.C., Ashok Kumar Jain, Arun Kumar Jain, *Strength of Materials and Theory of Structures*, Vol 1, Laxmi Publications, 9th edition.1992.
3. Beer and Johnson , "Mechanics for Engineers", *Statics and Dynamics*, Mc Graw Hill Book Company,1987


**REFERENCE BOOKS**


1. Timoshenko.S.P and Gere J.M. *Mechanics of Materials*, CBS Publishing,Delhi. 2 Edn. 1984.
2. Gupta.S.P., Pandit.G.S., Gupta.R, *Theory of Structures*, Vol.I Tata McGraw Hill Publishing Company, 1999.

| | | L | T | P | C |
|---|---|---|---|---|---|
| **CI0204** | **STRUCTURAL DESIGN I (STEEL)** | **3** | **0** | **0** | **3** |
| | Prerequisite | | | | |
| | CI0201 | | | | |

**PURPOSE**

To develop knowledge in designing structural elements made of steel and timber.

**INSTRUCTIONAL OBJECTIVES**

1. To learn the properties of steel sections and design basics and codal provisions Design of connections.
2. To design steel members subjected to tension and compression members.
3. Design steps involved in beams, built up beams and connections in beam-column etc.
4. Design of element in roof trusses, joints, etc. use of hand hooks in steel trusses design.
5. To design plate girders, gantry girders and light gauge sections

**STEEL STRUCTURES**

INTRODUCTION - Type of steel Structures – Properties of Indian standard rolled steel sections- allowable stresses in steel- Types of load – load analysis- applicable codes for load estimation – load combination- general design requirements –increase in allowable stresses- light gauge steel as structural material – uses and application – applicable IS codes for light gauge steel. JOINTS - Bolted and welded connections- failure of joints – permissible stresses for various types of bolts and welds – Design of bolted connections for members subjected to axial forces- strength of fillet and butt welded joints- design of brackets, design of welded joints for eccentrically loaded connections.

**TENSION AND COMPRESSION MEMBERS**

Design of simple and built up members subjected to tension- tension splices- maximum slenderness ratio- maximum slenderness ratio of compression member- IS code provisions of compression member- design of simple and built up compression members with lacing and battens – design of slab base and gusseted base.

**BEAMS**

Design of simple beams based on strength and stiffness as per IS code – design of built up beams – curtailment of flange plates- connection of flange plates and beams- Need for lateral support for compression Flange – Design of Welded Plate Girder (simple design – no stiffeners).

**ROOF TRUSSES**

Types of roof trusses for different spans- Estimation of dead, live and wind loads - design of joints - Design of purlins – Use of SP 38 – Use of Rolled steel sections and pipes for roof trusses - Design of Gantry Girder.
Introduction to tension structures

**LIGHT GAUGE SECTIONS**

Design of light gauge steel members- local and post buckling of thin element- light gauge steel compression members- tension members- beams and connections.

**TEXT BOOKS**

1. Ramchandra .S., *Design of Steel of Structures*, Vol 1&2.Standard Book House, Delhi, $10^{th}$ Edn., 1992.

2. Duggal.S.K. *Design of Steel Structures*, Tata McGraw Hill Publishing Company, New Delhi, 2nd Edn., 2000.
3. Ramamrutham S. & Narayanan.R, *Design of Steel Structures*, Dhanpat Rai & Sons, Delhi 1997.

**REFERENCE BOOKS**

1. Vazirani V.N. and Ratwani .M.M.- *Steel Structures*, Khanna Publications New Delhi, 1992.
2. Arya.A.S. & Ajmani.J.L., *Design of Steel Structures*, Nemchand & Bros., Roorkee.(U.P) 3rd Edn. 1986.
3. Dayarathnam.P., *Design of Steel Structures*, Wheelers Publishing Co. Ltd., 2nd Edn. 1996.
4. Kazimi. S. M. A. and Jindal. R. S., *Design of Steel Structures*, 2nd Edition, Prentice Hall of India, New Delhi - 1988.
5. IS CODES : IS 800, IS 801, IS 811 AND SP6(1) (Steel & Light gauge sections)

| | | L | T | P | C |
|---|---|---|---|---|---|
| **CI 0206** | **SOIL MECHANICS** | **2** | **2** | **0** | **3** |
| | Prerequisite | | | | |
| | Nil | | | | |

**(Applicable for students admitted from 2010-11 onwards)**

**PURPOSE**

This course is aimed to develop analytical skills in dealing with soil as a medium of water flow, a medium for structural support and a primary building material.

**INSTRUCTIONAL OBJECTIVES**

1. Provide the description and classification of soil and analysis of stresses in soils under different loading conditions.
2. To develop an understanding of the principles of effective stress in saturated soils, and its application to one dimensional compression and consolidation.
3. Familiarize the students an understanding of permeability and seepage of soils.

**BASIC CONCEPTS**

Definition of Soil and Soil Mechanics – Soil Problems in Civil Engineering Field – Type of Soils – Basic definition in soil mechanics – Three phase systems & relation – Specific gravity – Pycnometer and density bottle methods – Field density from sand replacement and core cutter method.

**INDEX PROPERTIES**

Grain size analysis – Stoke's law and hydrometer analysis – Atterberg limits – Plasticity, liquidity and consistency indexes – Classification of coarse grained and fine grained soils as per BIS.

**PERMEABILITY AND SEEPAGE**

One dimensional flow through soil – permeability – Darcy's law – field and laboratory permeability tests – flow through stratified soils – factors affecting permeability – seepage – Introduction to flow nets - quick sand phenomenon.

**COMPACTION AND CONSOLIDATION**

Compaction – Proctor's test – moisture – density relations – field compaction methods – factors affecting compaction – California Bearing Ratio (CBR) test. Consolidation – definition – Terzaghi's theory of one dimensional consolidation partial differential equations (no analytical solutions) Laboratory test – Determination of co-efficient of consolidation –

**STRESS DISTRIBUTION AND SHEAR STRENGTH**

Stresses in soils – Geostatic stresses – concept of effective and neutral stresses – stress distribution in soil media – Boussinesq and Westergards equation – Pressure bulb. Shear strength – Shear strength of cohesive and cohesionless soils – Mohr – coulomb's theory – Laboratory and field test : Direct, triaxial, vane and unconfined shear strength test – factors affecting shear strength.

**TEXT BOOKS**


1. Raju K.V.B. & Ravichandran P.T, *Mechanics of Soils*, Ayyappaa Publications, 2000.
2. Gopal Ranjan, Rao.A.S.R., *Basic and Applied Soil Mechanics*, Wiley Eastern Ltd., 2000.
3. Punmia B.C., *Soil Mechanics and Foundations*, Laxmi Publications Pvt. Ltd., 2000.


**REFERENCE BOOKS**


1. Terzaghi K., Peck R.B., *Soil Mechanics in Engineering Practice*, John Wiley Ltd., 1967.
2. Lambe T.W., Whitman, *Soil Mechanics*, John Wiley Ltd., 1979.
3. Capper and Cassie, *Soil Mechanics*, McGraw Hill, 1971.


| | | L | T | P | C |
|---|---|---|---|---|---|
| **CI0208** | **ADVANCED SURVEYING AND REMOTE SENSING** | **3** | **0** | **0** | **3** |
| | Prerequisite | | | | |
| | CI0207 | | | | |

**PURPOSE**

The basic purpose of a course in remote sensing is to understand the basic principles and application of the many areas particularly related to civil engineering projects.

**INSTRUCTIONAL OBJECTIVES**

1. To understand the remote sensing techniques, concepts, components of remote sensing.
2. To approximate the remote sensing systems and how to obtain the remote sensing data.
3. To study the various sensors and platforms used in remote sensing.
4. To understand the how to use measurements from the remote sensing.
5. To study the basic principles of remote sensing, merits and demerits and application of remote sensing in many fields.

**EDM, TOTAL STATION, GPS SURVEYING**

Electro-optical system, Measuring Principle, Working Principle, Sources of error, Total station, Microwave system Measuring and working principle, Sources of error, GPS – Fundamentals – Introduction space, Control segments – Observation principle, Orbit Representation.

**PHOTOGRAMMETRY SURVEYING**

Introduction – terrestrial and aerial photographs – photo theodolite – applications – vertical and oblique photographs – height determination contouring – photographic interpretations - stereoscopy – parallax bar.

**BASIC PRINCIPLES OF REMOTE SENSING**

Introduction – Definition – Historical – Remote Sensing in India – Electromagnetic Radiation ( EMR )– Electromagnetic Spectrum – Effect of Atmosphere on EMR – EMR with matter.

**PLATFORMS AND SENSOR SYSTEMS**

Introduction – Airborne Platforms – Space borne Platforms – Sensors – Definition – Parameter – Spectral Band Selection – Scanners – Radiometer – Radar – Path-Row System.

**APPLICATIONS OF REMOTE SENSING**

Introduction – Merits and Demerits of Remote Sensing Data – Applications of Remote Sensing for Resources Mapping – Geology, Groundwater, Land use and Land cover, Soil Mapping, Flood Mapping, Disaster Structures Mapping, Coastal Studies, Environmental Impact Assessment.

**TEXT BOOKS**


1. C.S.Agarwal, P.K.Garg, *Remote Sensing*, Wheekrs Publishing Co., 2000.
2. P.R.Wolf, *Elements of Photogrammetry*, Tata MaGrawHill Co., 1997.
3. Burnside, C.D., *Electromagnetic Distance Measurement*, Beekman Publishers, 1971
4. M.Anji Reddy, *Remote sensing and Geographical information system*, B.S Publications, 2006


**REFERENCE BOOKS**


1. Leudr.D.R., *Aerial Photographic Interpretation*, McGrawHill, 1959.
2. Arora.K.P., *Surveying* ,Volume III, Standard Book House, 2000.


| | | L | T | P | C |
|---|---|---|---|---|---|
| **CI0210** | **COMPREHENSION I** | **0** | **2** | **0** | **1** |
| | Prerequisite | | | | |
| | Courses prescribed till IV semester | | | | |

**PURPOSE**

To provide a compete picture of civil/Infrastructure Engineering topics covered in I to IV semesters so that a comprehensive understanding of civil/Infrastructure engineering is achieved so that students are well prepared to face job interviews and subjects related competitive examinations.

**INSTRUCTIONAL OBJECTIVES**

1. To provide overview of all civil/ Infrastructure engineering topics covered I to IV semesters given below.
2. To assess the overall knowledge level of civil/ Infrastructure engineering standards and guide them to take corrective measures where deficiencies are detected.

**COMPREHENSION**

A. Review of the following topics of civil engineering:

1. Properties and Characteristics of various engineering materials.
2. Building Technology
3. Basics of Engineering Mechanics, Applied Mechanics and Strength of Materials.
4. Elements of engineering geology
5. Elementary analysis of determinate and indeterminate structures.
6. Overview of Design of Steel Structures.
7. Overview on Fluid Mechanics
8. Overview of Elements of Hydraulic Structures.
9. Overview on Surveying and remote sensing

B. Seminar/group discussion

Students shall have seminar/group discussion sessions on the topics listed under A above under the guidance of staff.

**(Evaluation shall consist of a 3 hour duration end semester examination consisting of objective type as well as conventional questions )**

| | | L | T | P | C |
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| **PD 0202** | **PERSONALITY DEVELOPMENT - IV** | **0** | **0** | **2** | **1** |
| | Prerequisite | | | | |
| | Nil | | | | |

**PURPOSE**

The purpose of this course is to build confidence and inculcate various soft skills and to help students to identify and achieve their personal potential

**INSTRUCTIONAL OBJECTIVES**

1. To guide thought process.

2. To groom student's attitude.

3. To develop communication skill.

4. To build confidence.

**METHODOLOGY**

The entire program is designed in such a way that every student will participate in the class room activities. The activities are planned to bring out the skills and talents of the students which they will be employing during various occasions in their real life.

1. Group activities + individual activities.

2. Collaborative learning.

3. Interactive sessions.

4. Ensure Participation.

5. Empirical Learning

Motivation II - Interpretation of Visuals of I & II

Humor in real life - Body language - Collage and poster designing and slogan writing

Brain Teasers – JAM - Current News Update I

Current News Update II - Enactment (SKIT –I) - Enactment (SKIT – II)

Survey and Reporting (heroes, sports persons etc.) - Quiz III - Review

**EVALUATION:**

1. Activities assessed by both group and individual participation

2. Continuous assessment based on daily participation

**SCHEME OF INSTRUCTION**

Marks allocated for regular participation in all oral activities in class

**SCHEME OF EXAMINATION**

Complete internal evaluation on a regular Basis

| | | L | T | P | C |
|---|---|---|---|---|---|
| **CI0212** | **SOIL MECHANICS LABORATORY** | **0** | **0** | **2** | **1** |
| | Prerequisite | | | | |
| | CI0206 | | | | |

**(Applicable for students admitted from 2009-10 onwards)**

**PURPOSE**

To provide the hands on training in determination of Engineering and index properties of soils, applied in field problems.

**INSTRUCTIONAL OBJECTIVES**

1. Familiarize the students to do the experiments as per the guidelines of BIS.
2. To provide the knowledge on the use of experimental results pertaining to foundation problems.

**LIST OF EXPERIMENTS**

1. Water content determination ( Oven drying method ).
2. Grain size distribution – Sieve analysis.
3. Determination of Specific gravity by Pycnometer and density bottle method.
4. Determination of Liquid and Plastic limit (Casagrande method).
5. Determination of Shrinkage limit of soil
6. Determination of moisture-density relationship (Standard Proctor's).
7. Determination of Permeability by Constant and Variable head method.
8. Determination of in-situ density by sand replacement and core cutter method.
9. Determination of Relative density – Sand.
10. Unconfined compression test for fine grained soils.
11. California Bearing Ratio (CBR) Test.
12. Triaxial Compression Test
13. Direct shear test.

**REFERENCE**

Laboratory Manual.

| | | L | T | P | C |
|---|---|---|---|---|---|
| **CI0214** | **SURVEY LABORATORY II AND SURVEY CAMP** | **0** | **0** | **4** | **2** |
| | Prerequisite | | | | |
| | CI0207 | | | | |

**(Applicable for students admitted from 2009-10 onwards)**

**SURVEY LAB II**

**PURPOSE**

To measure the elevation of points by advanced methods and instruments under field conditions.

**INSTRUCTIONAL OBJECTIVES**

Experiments related to finding height and distances by tacheometric, single plane and double plane method. Setting out simple curve for construction of road purposes. Setting out of works for foundation marking, use of stereoscope for 3-D viewing, Co-ordinate measurements by GPS and Traversing by Total station.

**LIST OF EXPERIMENTS**

1. Tacheometry
   a. Constants of Tacheometer.
   b. Stadia Tacheometry
   c. Tangential Tacheometry
2. Subtense bar method
3. Setting out simple circular curve *
   a. Single Theodolite Method.
   b. Double Theodolite Method
4. Contouring *
5. GPS Surveying – Co-ordinate Measurements
6. Total Station Surveying * – Measurements of Distances and angles, Slope distances, Height, Traversing, setting out, etc
7. Use of Stereoscope for 3-D Viewing
8. Height determination from a Stereo pair using the Parallax bar.
9. Triangulation *
10. Setting out Building *

* To be carried out under field conditions.

**REFERENCE**

1. Laboratory Manual.

## SURVEY CAMP (1 WEEK)

## PURPOSE

Experiments in the various types of surveying to provide better knowledge and skill in facing field work.

## INSTRUCTIONAL OBJECTIVES

Depending upon the field, various methods of chaining, traversing, leveling can be adopted selected to get wide experience.

## LIST OF EXPERIMENTS

a. Triangulation b. Total Station c. Contouring d. GPS e. Road survey ( LS and CS)

**REFERENCE**
Laboratory Manual

***Camp Report is mandatory for evaluation of CI0214**

**SEMESTER V**

| | | L | T | P | C |
|---|---|---|---|---|---|
| **CI0301** | **STRUCTURAL ANALYSIS – I** | **2** | **2** | **0** | **3** |
| | Prerequisite | | | | |
| | CI0202 | | | | |

**PURPOSE**
Preparation of influence lines and effect of rolling loads. Introduce classical methods in analysing indeterminate structures (trusses, beams and plane frames).

**INSTRUCTIONAL OBJECTIVES**
1. Concept of rolling loads and study its characteristics in structures.
2. Preparation of influence line diagrams for statically determinate structures.
3. Analysis of indeterminate structures (beams, frames and trusses) for internal forces, deflections etc.
4. Classical methods – slope deflection method – use in analysing indeterminate beams and plane frames with and without sway.
5. Moment distribution method – Iterative method often used in analysing indeterminate structures.

**ROLLING LOADS**
Rolling loads – Single Concentrated load – Uniformly distributed load – Two Concentrated loads –System of moving loads- Curves of maximum B.M.D. and S.F.D. – Equivalent UDL.

**INFLUENCE LINE FOR STATICALLY DETERMINATE STRUCTURES**
Influence line for Statically Determinate Beams for Bending moment and Shear force – Absolute max. B.M. – Concentrated Load and UDL – Influence for forces in members for Statically determinate trusses –Parallel chord truss- Reversal of stresses-Focal length

**STATICALLY INDETERMINATE STRUCTURES**

Static and Kinematic indeterminancy – Two and three dimensional Pin jointed and rigid jointed structures. Beams – Propped, fixed and Continuous beams – Theorem of Three Moments – Shear force and B.M Diagrams.

**INDETERMINATE TRUSSES** – Energy method – application to analysis of indeterminate pin jointed Plane trusses – lack of fit – temperature effects.

**SLOPE DEFLECTION METHOD**
Analysis of Continuous beams and Rigid plane frames with and without sway.

**MOMENT DISTRIBUTION METHOD**

Stiffness and Distribution factors – Carry over factors – Analysis of Continuous beams – Plane rigid frames with and without sway- Introduction to Kani's method and Column analogy method applied to indeterminate beams.

**TEXT BOOKS**


1. Bhavikatti.S.S, *Structural Analysis*,Vol.1andVol.2, Vikas Publishing House Pvt.Ltd.,1999.
2. V.N. Vazirani and M.M.Ratwani, *Analysis of Structures*, Volume II – Khanna Publishers, 1989.
3. Vaidhyanathan.R and Perumal.P, *Comprehensive Structural Analysis*, Volume I and II, Lakshmi Publications (P) Ltd.New Delhi, 2004.
4. Khurmi. R.S., *Theory of Structures*, S. Chand and Company Ltd., New Delhi, 1994.


**REFERENCE BOOKS**


1. Wang.C.K., *Statically Indeterminate Structures* McGraw Hill International Book Company, 1984.
2. Harry.H.West., *Analysis of Structures*, John Wiley &Sons.1980
3. Junnarkar S.B., *Mechanics of Structures*, Vol. 2, Charotar Publishing House, Anand, 1995.
4. Charles Head Norris, John Benson Wilbur, Senol Utku, *Elementry Structural Analysis*, 3rd Edn. McGraw Hill International Editions, Structures Series, 1987.
5. Timoshenko. S.P & Young D.H., *Theory of Structures*, 2 Edn. McGraw Hill Book Company, International Ed. 1965.
6. Thandavamoorthy . T.S., *Analysis of Structures*, Oxford University Press, 2005.


| | | L | T | P | C |
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| **CI0303** | **STRUCTURAL DESIGN –II** | **3** | **0** | **0** | **3** |
| | Prerequisite | | | | |
| | CI0202 | | | | |

**PURPOSE**

To impart comprehensive knowledge on the design of masonry and reinforced concrete structures

**INSTRUCTIONAL OBJECTIVES**

1. To design masonry structures like walls, columns, and foundation incorporating earthquake resistant features.
2. To bring about an understanding of the behaviour of reinforced concrete and the design philosophies
3. To design RCC beams, slabs, columns and footings including structural design of piles and pile caps

**MASONRY**

Strength of bricks and masonry- design of walls, piers, columns-design of footings for walls and columns-use of nomograms - earthquake resistant features in masonry buildings as per BIS codes – Masonry retaining walls.

**MIX DESIGN AND LIMIT STATE METHOD OF DESIGN OF SLAB**

Grades of concrete- concrete mix design of nominal mix and design mix as per BIS codes - Theories of basic design concepts- working stress method - limit state method of design - codal recommendations for limit state method - Limit state method of design of one-way slabs and two-way slabs.

**LIMIT STATE METHOD OF DESIGN OF BEAMS**

Transfer of load from slab to beam - Limit state method of design of Singly reinforced beams, doubly reinforced beams, Flanged beams – Design of Staircases -Use of Design Aids(SP16) — Use of SP34.

**LIMIT STATE METHOD OF DESIGN FOR COLUMNS**

Limit state method of design of short and long columns - Uni-axial and biaxial bending using Bressler's method - use of interaction curve (SP16)- Extension of design of columns to piles – Use of SP34.

**LIMIT STATE METHOD OF DESIGN FOR FOUNDATIONS**

Limit state method of design of foundations- individual footings- combined footings – Pile foundation - pile caps (4 piles).

**TEXT BOOKS**


1. Varghese, P.C., *Advanced Reinforced Cement Concrete*, Pretince-Hall India, 2001.
2. Unnikrishna pillai, S. and Deavadas Menon, *Reinforced Concrete Design*, Tata MacGraw Hill Publishing Company Limited, New Delhi, 1998.
3. R. Krishnaraju, R. N. Pranesh, *Design of Reinforced concrete IS : 456-2000*, New age International Publication (P) Ltd., New Delhi.


**REFERENCE BOOKS**


1. *Code of Practice for Plain and Reinforced Concrete IS456-2000*, BIS, New Delhi.
2. *Recommended guidelines for Concrete Mix Design IS 10262-1982*, BIS, New Delhi.
3. *Design Aids for Reinforced Concrete to IS 456*, Special Publication (SP16), BIS New Delhi,1980
4. *Code of Practice for Structural use of Unreinforced Masonry*, IS1905-1987, BIS, New Delhi.
5. *Code of practice for Earthquake Resistant Design and Construction of Buildings IS4326-1976, BIS*, New Delhi.


| | | L | T | P | C |
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| **CI0305** | **FOUNDATION ENGINEERING** | **2** | **2** | **0** | **3** |
| | Prerequisite | | | | |
| | CI0203 | | | | |

**PURPOSE**

To develop an understanding of the behavior of foundations for engineering structures and to gain knowledge of the design methods that can be applied to practical problems.

**INSTRUCTIONAL OBJECTIVES**

1. Provide the students with a basic understanding of the essential steps involved in a geotechnical site investigation.
2. Introduce to the students, the principal types of foundations and the factors governing the choice of the most suitable type of foundation for a given solution.
3. Familiarize the student with the procedures used for : a) bearing capacity estimation, b) end bearing capacity, c) skin friction

**SITE INVESTIGATION AND SELECTION OF FOUNDATIONS**

Introduction – Objectives of soil exploration – Methods of exploration – Geophysical methods – Borings – Penetration tests (SPT & SCPT) – depth of exploration – Number and disposition of bore holes – sampling and sample disturbance – Selection of foundation based on soil condition.

**BEARING CAPACITY**

Bearing Capacity – Types of failure – Terzaghi's formula – Skempton's formula – BIS formula – Effect of water table – Allowable bearing pressure – bearing pressure based on SPT value – Plate load test – Methods of improving bearing capacity.

**FOOTINGS AND RAFTS**

Types of foundation – Assumptions in conventional design – Method of proportioning – Design of combined and raft foundation – Codal provisions - components of settlement – immediate and time dependent settlement – causes of settlement – method of minimizing settlement – codal provisions.

**PILE FOUNDATION**

Function of Piles – Classification of pile – Load carrying capacity – Static and Dynamic formulae – Pile load test – Pile group – Spacing – Pile cap - Negative skin friction.

Introduction to well foundations-diaphragm walls-anchors

**EARTH PRESSURE**

Lateral earth pressure – Rankine's theory – soil stratification – Coulomb's theory – Graphical method (Culmann's method alone) – Stability of slopes – Infinite and finite slopes – Types of failure –Causes of failure – Slip circle methods – Friction circle method.

**TEXT BOOKS**

1. Punmia,B.C., *Soil Mechanics and Foundations*, Laxmi Publications Pvt Ltd., 2000.
2. Venkatramaiah.C., *Geotechnical Engineering*, New Age International Publishers, 1995.

**REFERENCE BOOKS**

1. Joseph E.Bowles, *Foundation Analysis and Design*, McGrawHill Publishing Co., 1986.
2. Peck,R.B., Hanson and Thornburn, *Foundation Engineerng*, Wiley Eastern Ltd., 1974.
3. Tomlinson,M.J., *Foundation Engineering*, Wiley Eastern Ltd., 1980.

| | | L | T | P | C |
|---|---|---|---|---|---|
| **CI307** | **TRANSPORTATION ENGINEERING** | **3** | **0** | **0** | **3** |
| | Prerequisite | | | | |
| | Nil | | | | |

**PURPOSE**

To study in details about different modes of transportation systems.

**INSTRUCTIONAL OBJECTIVE**

1. To study the modern transit systems
2. To study railway track construction and operation.
3. To know about the fundamentals of airports and harbours
4. To study the economics of transportation projects

.**UNIT 1 DIFFERENT TRANSPORT MODES**

Characteristics and operational aspects of bus, Rapid Transit Systems (RTS), LRT and suburban train services- overhead and underground RTS- coordination between different modes of transport- constructional aspects of underground and overhead RTS

**RAILWAYS**

Permanent way, its components and functions of each component – Gauges in railway tracks – coning of Wheels – Geometric design of railway tracks – Gradient – Super elevation, Widening of gauges in curves, Grade compensation – Speed on curves, Points and crossings, Creep of rail signaling interlocking and Track circuiting , Track drainage – Lay outs of railway stations and yards

**AIRPORTS**

Airport Planning, components of Airport, site selection, Runway Orientation, design of runway, Geometric design – orientation and correction for gradients, Terminal area- airport layout- airport buildings-passenger facilities-parking area-airport zoning

**PORTS AND HARBOURS**

Definition of terms – harbours, ports, Docks, Tides and waves, Requirements of harbours, Classification – site investigation for satellite ports – Terminal facilities – Port buildings- Warehouses- Transit sheds—inter modal transfer facilities-Mooring accessories Navigational aids. Piers, Breakwaters, Wharves, Jetties,

Quays, spring fenders.

**ECONOMIC EVALUATION OF TRANSPORTATION PROJECTS**

Evaluation Of highway and railway projects-cost-benefit analysis-benefit cost ratio- Net present value-Internal rate of returns-Environmental impact assessment- financial appraisal- Build, operate and transfer for highways- (basic concepts only)

**TEXT BOOKS**


1. Khanna. S.K., C.E.G. Justo – *Highway Engineering,* Nemchand & Bros, Rookies. 2001.
2. Saxena S.C., St. Satyapal Arora, *A course in Railway Engineering*, Dhanpat Rai and Soars, Delhi 2000
3. Khanna. K., Arora M,G, Jain S.S *Airport Planning And Design* Nemchand and Bros,Roorkee, 2000
4. Bindra S,P, A *Course in Docks and Harbors Engineering,* Dhanpat Rai and Sons, New Delhi, 2001.


**REFERENCE BOOKS**


1. Kadiyali L.R. *Principles and Practice of highway Engineering*, Khanna Publishers Delhi 1992.


| | | L | T | P | C |
|---|---|---|---|---|---|
| **CI309** | **ENVIRONMENTAL ENGINEERING SYSTEMS** | **3** | **0** | **0** | **3** |
| | Prerequisite | | | | |
| | Nil | | | | |

**PURPOSE**

To understand the water supply and sewerage systems and carry out functional design of associated units.

**INSTRUCTIONAL OBJECTIVES**

To study the water supply demand and distribution

To carryout functional design of water treatment units.

To understand the sewerage system and functional design of sewage treatment units.

To introduce the concepts of environmental auditing

**WATER SUPPLY**

Development of public water supply – Objectives of water supply systems – Water supply Scheme – Quantity of water – estimation – per capita consumption – population forecast.

Intake structures – types of pipes for conveyance – laying and testing of pipes – selections of pumps – storage and distribution reservoirs – capacity calculations – Analysis of distribution system.

**WATER TREATMENT**

Objectives of water treatment – methods and sequence of treatment of water – aeration – coagulation – filteration – disinfection – functional design of sedimentation and filter units – Iron and manganese removal – deflouridation and demineralization.

**SEWERAGE SYSTEMS**

Water carriage systems – Types – Quantity of sewage – Self cleansing velocity – Non-Scouring velocity – Straps of sewers – Materials – Design of sewers – Construction of sewers testing – Appurtenances – Sewage pumping.

**SEWAGE TREATMENT**

Sewage characteristics – BOD – COD – Population equivalent – Relative stability – Designing of waste water treatment units – Screens – Grit chamber – Skimming tank – Sedimentation – Biological treatment methods – Trickling filters – Activated sludge process exidation pond – Rotating biological contactors – Design of septic tank and final disposal unit – Disposal of sludge.

**ENVIRONMENTAL IMPACT ASSESSMENT AUDITING**

Environment – Ecology – Description of environmental settings – Environmental indices and indicators – Audit procedure – Pre audit activities – Post audit activities – Prediction and assessment of impacts on the air environment – Surface water environment – Noise environment.

**TEXT BOOKS**


1. Garg .S.K. *Environmental Engineering*, Vol. I & II, Khannan Publishers, New Delhi, 1994.
2. Paneerselvam R. *Environmental Engineering*", Vol. I & II, SPGS Publishers Chennai – 88.
3. Duggal.K.N., *Elements of Environmental Engineering*, S. Chand & Company Ltd., New Delhi, 2002.

**REFERENCE BOOKS**


1. *Manual on Water Supply and Treatment*, CPHEEO, Ministry of Urban Development, Government of India, New Delhi, 1999.

2. *Manual on Sewerage & Sewage Treatment*, CPHEEO, Ministry of Urban Development, Government of India, New Delhi, 1999.


| | | L | T | P | C |
|---|---|---|---|---|---|
| **PD 0301** | **PERSONALITY DEVELOPMENT - V** | **1** | **0** | **2** | **2** |
| | Prerequisite | | | | |
| | Nil | | | | |

**PURPOSE**

The purpose of this course is to build confidence and inculcate various soft skills and to help Students to identify and achieve their personal potential

**INSTRUCTIONAL OBJECTIVES**

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

1. Acquire the important soft skills for employment

2. Take part in group discussions and job interviews confidently

3. Appear for placement aptitude tests confidently

4. Gain self confidence to face the placement process

**METHODOLOGY**

The entire program is designed in such a way that every student will participate in the class room activities. The activities are planned to bring out the skills and talents of the students which they will be employing during various occasions in their real life.

1. Group activities + individual activities.

2. Collaborative learning.

3. Interactive sessions.

4. Ensure Participation.

5. Empirical Learning

Syllogism - Binary Logic [cause & effect] - Assertive & Counter Argument - Simple Interest - Time & Work - Time & Distance

Upstream &Downstream Reasoning - Verbal Comprehension I - Verbal Comprehension II- Compound InterestLogarithms - Surds & Indices

Verbal Reasoning I - Verbal Reasoning II - Verbal Reasoning III – Percentage – Test – Averages

Deductive Reasoning I - Deductive Reasoning II - Language Usage I - Decimal Fractions - Profit & Loss - Probability

Language Usage II - Logic Games I - Logic Games II – Area - Pipes & Cisterns – Test.

**SCHEME OF INSTRUCTION**

Marks allocated for regular participation in all oral activities in class

**SCHEME OF EXAMINATION**

Complete Internal evaluation on a regular Basis.

| | | L | T | P | C |
|---|---|---|---|---|---|
| **CI0311** | **COMPUTER AIDED ANALYSIS AND DESIGN** | **0** | **0** | **4** | **2** |
| | Prerequisite | | | | |
| | CI0204 | | | | |

Purpose

To train in developing programmes for simple problems and use of standard software packages

Instructional Objectives

1. To familiarize with the use of standard packages of structural analysis and design

2. To train in developing custom made programs for design of steel and concrete elements and RCC foundations.
3. To familiarize with Expert Systems and GIS

List of Experiments

1. Using Staad Package Analysis and design of following structures
   (i) Steel Roof trusses (8)
   (ii) RCC plane frames (Including dynamic analysis) (8)
   (iii) RCC space frames (Including dynamic analysis) (12)
2. Using MS-Excel package, development of programs for
   (i) Design of RCC beams (8)
   (ii) Design of RCC foundation (8)
   (iii) Modal Analysis (12)
3. Introduction to Expert Systems GIS packages (4)

**Text Book**

Lab manual for computer aided and analysis and design

| | | **L** | **T** | **P** | **C** |
|---|---|---|---|---|---|
| **CI0313** | **INTEGRATED DESIGN AND DRAWING I (STEEL)** | **0** | **0** | **2** | **1** |
| | Prerequisite | | | | |
| | CI0204 | | | | |

Purpose

To apply the principles of structural steel design to the full scale structural planning, analysis and design of different types of steel buildings.

Instructional Objectives

1. To inculcate the basic concepts and layout of a typical workshop type building.
2. To carry out structural planning and arrive at a suitable structural system.
3. To give practice in estimation of loads, analysis and design
4. To prepare neat sketches of the different structural components and their connections.

List of Experiments

1. Design of pitched roof industrial buildings involving following tasks
   (i) Functional Layout (1)

   (ii) Structural Layout (1)

(iii) Structural System and Components

including wind girders (2)

(iv) Estimation of loads (2)

(v) Analysis (4)

(vi) Design (3)

(vii) Preparing sketches (2)

2. Design of a large span industrial building involving following tasks

(i) Functional Planning (1)

(ii) Structural Planning (2)

(iii) Structural system and its components

including wind grider (3)

(iv) Estimation of loads (2)

(v) Analysis (3)

(vi) Design including foundation (3)

(vii) Preparing sketches (1)

**TEXT BOOKS**


1. Ramchandra .S., *Design of Steel of Structures*, Vol 1&2.Standard Book House, Delhi, 10th Edn., 1992.
2. Duggal.S.K. *Design of Steel Structures*, Tata McGraw Hill Publishing Company, New Delhi, 2nd Edn., 2000.
3. Ramamrutham S. & Narayanan.R, *Design of Steel Structures*, Dhanpat Rai & Sons, Delhi 1997.
4. Lab manual


**REFERENCE BOOKS**


1. Vazirani V.N. and Ratwani .M.M.- *Steel Structures*, Khanna Publications New Delhi, 1992.
2. Arya.A.S. & Ajmani.J.L., *Design of Steel Structures*, Nemchand & Bros., Roorkee.(U.P) 3rd Edn. 1986.
3. Dayarathnam.P., *Design of Steel Structures*, Wheelers Publishing Co. Ltd., 2nd Edn. 1996.
4. Kazimi. S. M. A. and Jindal. R. S., *Design of Steel Structures*, 2nd Edition, Prentice Hall of India, New Delhi - 1988.
5. IS CODES : IS 800, IS 801, IS 811 AND SP6(1) (Steel & Light gauge sections)

| | | L | T | P | C |
|---|---|---|---|---|---|
| **CI0315** | **INDUSTRIAL TRAINING I** | **0** | **0** | **2** | **1** |
| | Prerequisite | | | | |
| | Nil | | | | |

**(Training to be undergone after IV Semester)**

**PURPOSE**

To provide hands-on experience at site where Civil/Infrastructure Enggineering projects are executed.

**INSTRUCTIONAL OBJECTIVES**

1. To enable the students to gather a first hand experience on site.

**INDUSTRIAL TRAINING I**

1. Students have to undergo two - week practical training in Civil/Infrastructure Enggineering related project sites. At the end of the training they have to submit a report together with a certificate in the format prescribed and make a presentation which shall be evaluated.

**SEMESTER VI**

| | | L | T | P | C |
|---|---|---|---|---|---|
| **CI0302** | **STRUCTURAL ANALYSIS - II** | **2** | **2** | **0** | **3** |
| | Prerequisite | | | | |
| | CI0301 | | | | |

**PURPOSE**

To learn advanced methods like matrix methods of structural analysis of structures, plastic theory, analysis of special structures like arches and suspension cables and influence line for indeterminate structures.

**INSTRUCTIONAL OBJECTIVES**

1. Preparation of influence line diagrams for indeterminate structures.
2. Analysis of arches and suspension cables.
3. Plastic theory and its application in analysis of indeterminate structures.
4. Matrix methods of analysis – Flexibility method and stiffness method – which are basis for almost all structural analysis software available.

**INFLUENCE LINES-STATICALLY INDETERMINATE STRUCTURES**

Influence lines – Maxwell Betti's Theorem – Muller Breslau's Principles and its application to determine the influence lines of reactions. S.F and B.M at a section of continuous beams – Qualitative influence lines for Horizontal thrust, reactions and moments for portal frames.

**ARCHES AND SUSPENSION CABLES**

Analysis of Three Hinged and Two Hinged Arches – Parabolic and Circular- Fixed Arches – Influence lines for Three and Two hinged arches for Horizontal thrust, Shear force and B.M. at any section – Length of Cable, Maximum tension – Types of supports – Forces in Towers.

**PLASTIC ANALYSIS OF STRUCTURES**

Plastic moment of resistance – Plastic Modulus – Shape factor – Load factor – Plastic Hinge and mechanism – Analysis of indeterminate beams and frames- static and mechanism method.

**MATRIX FORCE METHOD- FLEXIBILITY METHOD**

Concepts–co-ordinates -element transformation approach-Applications to Analysis of Indeterminate pin jointed plane frames, Continuous beams and rigid jointed plane frames.

**MATRIX STIFFNESS METHOD**

Concepts -Element and Global stiffness matrices — Co-ordinate transformations – Rotation matrix – Transformation of stiffness matrices, load vectors and displacement vectors – Analysis of Continuous Beams, pin jointed plane frames and rigid plane frames. To familiarize with the use of standard packages of structural analysis.

**TEXT BOOKS**


1. Pandit.G.S.,Gupta.S.P., *Structural Analysis- A Matrix approach*, Tata McGraw-Hill Publishing Company Ltd, New Delhi.1994.
2. Bhavikatti.S.S, .*Structural Analysis*, Vol.1andVol.2, Vikas Publishing House Pvt.Ltd.,1999.
3. Vaidhyanathan.R and Perumal.P, *Comprehensive Structural Analysis*, Volume I and II, Lakshmi Publications (P) Ltd.New Delhi.2004.

**REFERENCE BOOKS**


1 Sterling Kinney.J., *Indeterminate Structural Analysis*, Narosa Publishing House.1987.

2. Jr. William Weaver and James .M.Gere , *Matrix Analysis of Framed Structures*, CBS Publishers and Distributors, Delhi, 1995.

3. Rajasekaran S. and Sankarasubramanian .G., *Computational Structural Mechanics*, Prentice Hall of India, 2001.

4. Manickaselvam.V.K, *Elementary Matrix Analysis of Structures*, Khanna Publishers, New Delhi, 1994.

5. Thadani.B.N., Desai.J.P., *Structural Mechanics*, Weinall Book Corporation, 1998.


| | | L | T | P | C |
|---|---|---|---|---|---|
| **CI0304** | **TALL BUILDING STRUCTURES** | **3** | **0** | **0** | **3** |
| | Prerequisite | | | | |
| | Nil | | | | |

**PURPOSE**

To impart the overall knowledge about the elements and systems with planning, analysis and design involved in Tall Buildings.

**INSTRUCTIONAL OBJECTIVES**

1. To introduce various aspects of planning of Tall Buildings
2. To know about different types of loads
3. To introduce various structural systems for medium rise buildings with their behaviour and analysis.
4. To introduce various structural systems for high rise buildings with their behaviour and analysis.
5. To impart knowledge about stability analysis of various systems and to know about advanced topics.

**INTRODUCTION**

Design Philosophy-History-Advantages and disadvantages – 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 – Human comfort criteria.

**LOADS**

Gravity Loading – Dead and Live Load – Reduction of Live Load- Impact and Construction Loads. Wind loading –. Earthquake loading (Qualitative Treatment only) – Equivalent Lateral Force– Combination of loading.

**MEDIUM RISE BUILDINGS-BEHAVIOUR AND ANALYSIS**

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

**HIGH RISE BUILDINGS-BEHAVIOUR AND ANALYSIS**

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.

**ADVANCED TOPICS**

Stability Analysis (Qualitative Treatment only) – Overall buckling analysis of frames, Wall frames, approximate methods, P-Δ effects and various methods of analysis – Influence of foundation instability, out of plumb effects – Elastic Deformations.

Analysis for various secondary effects – Creep, Shrinkage and Temperature.

**TEXT BOOKS**


1. Schuller.W.G. *High Rise Building Structures*, John Wiley & Sons, 1977
2. Smith.B.S and Coull. A, *Tall Building structures- Analysis and Design* John Wiley & Sons, 1991
3. Taranath. B.S. , *Structural Analysis and Design of Tall Buildings,* Mc Graw Hill co., 1988


**REFERENCE BOOKS**


1. Lynn.S.Beedle, *Advances in Tall Buildings*, CBS Publishers and Distributers, New Delhi,1986
2. Lin.T.Y. and Stotes Burry.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.
4. Lecture Notes on, *Tall Buildings* – Short term Course Organised by Civil Engineering Dept., SRM Engineering College, Kattankulathur. June 2002


| | | L | T | P | C |
|---|---|---|---|---|---|
| **CI0306** | **PRESTRESSED CONCRETE STRUCTURES** | **2** | **2** | **0** | **3** |
| | Prerequisite | | | | |
| | CI0303 | | | | |

**PURPOSE**

To get exposed to the design of Prestressed Concrete Structures and Structural Elements

## INSTRUCTIONAL OBJECTIVES

1. Prestressing methods, principles and concepts are essential for the basic concept of the subject.
2. Analysis of prestress and the resultant stresses using different concepts is dealt here.
3. Determination of losses in concrete & Anchorage zone stresses in end block can be brought out using IS method.
4. Determination of shear strength and ultimate shear resistance capacity as per IS code is dealt.
5. Design of prestresses concrete section, stresses at transfer, service load, limit state of collapse in flexure and shear is dealt here.
6. Design of prestressed concrete slab is also dealt here.

## INTRODUCTION AND ANALYSIS FOR STRESS

Basic concepts – terminology – system of prestressing – pretensioning – post tensioning – principle of prestressing – types of prestressing .Assumptions - analysis of prestress- concentric & eccentric tendon – resultant stresses – rectangle – I-section (symmetrical only) –concepts of prestressing - stress concept, strength concept and load balancing concept.

## LOSSES OF PRESTRESS AND ANCHORAGE ZONE STRESSES

Losses of prestress – types – losses due to elastic deformation of concrete – shrinkage of concrete – creep of concrete – friction – anchorage slip. Anchorage zone stresses -stress distribution in end block – investigations on anchorage zone stresses –Indian code provision only.

## SHEAR STRENGTH

Shear strength – principal stresses – Ultimate shear resistance – Indian Standard code provision.

## FLEXURAL DESIGN OF PRESTRESSED CONCRETE

Design of sections for flexure – stress condition – minimum section modulus – stresses at transfer – service loads – prestressing force – eccentricity – check for stresses – initial and final conditions – limit state of collapse in flexure – shear. (Rectangular Section only)

## DESIGN OF PRESTRESSED CONCRETE SLAB

Types of prestressed concrete slab – design of one-way slab - design of two-way slab - design of simple flat slab.

## TEXT BOOKS


1. Krishna Raju. N, *Prestressed Concrete* 4th edition Tata McGraw Hill Company, New Delhi – 1998.
2. N.C. Sinha and S.K.Roy, *Fundamentals of prestressed Concrete*, S. Chand and Co., 1985.

3. N.Rajagopalan, *Prestressed Concrete*, *Narosa Publishing House*, New Delhi-2002.

**REFERENCE BOOKS**

1. T.Y.Lin Design of , *Prestressed Concrete Structures*, Asia Publishing House, Bombay 1995.
2. Guyon. V., *Limit State Design of Prestressed Concrete,* Vol.I & II Applied Science Publishers, London, 1992.
3. Dayarathnam.P, *Prestressed Concrete Structures*, Tata McGraw Hill Company, New Delhi, 1999.

| CI0308 | CONSTRUCTION EQUIPMENT | L | T | P | C |
|---|---|---|---|---|---|
| | Prerequisite | **3** | **0** | **0** | **3** |
| | Nil | | | | |

**PURPOSE**

To introduce various construction equipments and study the efficient utilization of the same using scientific principles.

**INSTRUCTIONAL OBJECTIVES**

1. To introduce various construction equipment like equipment for earthwork, material handling and other miscellaneous equipment
2. To study the working of the equipment mentioned above and apply scientific principles for effectively utilizing them

**CONSTRUCTION EQUIPMENT MANAGEMENT**

Identification -Planning. Equipment Management in Projects - Maintenance Management – Replacement - Cost Control of Equipment – Depreciation Analysis - Safety Management.

**EQUIPMENT FOR EARTHWORK**

Fundamentals of Earth Work Operations - Earth Moving operations .Types of EarthWork Equipment - Tractors, Motor Graders, Scrapers, Front end Loaders, Ear1h Movers.

**OTHER CONSTRUCTION EQUIPMENT**

Equipment for Dredging, Trenching, Tunneling, Drilling, Blasting. Equipment for compaction - Erection Equipment

-Types of pumps used in Construction - Equipment for Dewatering and Grouting - Foundation and Pile Driving

Equipment.

**MATERIALS HANDLING EQUIPMENT**

Forklifts and related equipment - Portable Material Bins - Conveyors - Hauling Equipment -equipment used in demolition – Chain Pulley Blocks.

**EQUIPMENT FOR PRODUCTION OF AGGREGATE & CONCRETING**

Crushers – Feeders - Screening Equipment - Handling Equipment Batching and Mixing Equipment - Hauling, Pouring and Pumping Equipment –Transporters.

**TEXT BOOKS**


1. Peurifoy, R.L., Ledbetter, W.B. and Schexnayder.C, "Construction Planning Equipment and Methods", McGraw Hill. Singapore 1995.
2. Sharma S.C. "Construction Equipment and Management", Khanna Publishers, Delhi, 1988.


**REFERENCE BOOKS**


1. Deodhar, S.V. "Construction Equipment and Job Planning" Khanna Publishers Delhi, 1988.
2. Dr. Mahesh Varma, "Construction Equipment and its planning and application", Metropolitan Book Company, New Delhi 1983.


| | | L | T | P | C |
|---|---|---|---|---|---|
| **CI0310** | **COMPREHENSION II** | **0** | **2** | **0** | **1** |
| | Prerequisite | | | | |
| | Courses prescribes/opted for till VI semester | | | | |

**PURPOSE**

To provide a compete picture of Infrastructure Enggineering topics covered in I to IV semesters including the related topics covered in I to IV semesters so that a comprehensive understanding of Civil Engineering/ Infrastructure Engineering is achieved so that students are well prepared to face job interviews and subjects related competitive examinations

**INSTRUCTIONAL OBJECTIVES**

1. To provide overview of all Infrastructure engineering topics covered in V and VI semesters including the related topics covered in I to IV semesters as given below.
2. To assess the overall knowledge level of Infrastructure engineering standards and guide them to take corrective measures where deficiencies are detected.

**3. COMPREHENSION**

A. Review of the following topics of Infrastructure engineering:

1. Basics of Engineering Mechanics, Mechanics of Solids, Strength of Materials and Structural Analysis
2. Overview of Design of Concrete structures.
3. Overview of Elements of Environmental systems
4. Overview of Elements of construction equipment
5. Overview of Elements of prestressed concrete structures
6. Overview of Tall building structures

B. Seminar/group discussion

Students shall have seminar/group discussion sessions on the topics listed under A above under the guidance of staff.

**(Evaluation shall consist of a 3 hour duration end semester examination consisting of objective type as well as conventional questions )**

| | | L | T | P | C |
|---|---|---|---|---|---|
| **PD 0302** | **PERSONALITY DEVELOPMENT VI** | **1** | **0** | **2** | **2** |
| | Prerequisite | | | | |
| | Nil | | | | |

**PURPOSE**

The purpose of this course is to build confidence and inculcate various soft skills and to help Students to identify and achieve their personal potential

**INSTRUCTIONAL OBJECTIVES**

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

1. Acquire the important soft skills for employment

2. Take part in group discussions and job interviews confidently

3. Appear for placement aptitude tests confidently

4. Gain self confidence to face the placement process

**METHODOLOGY**

The entire program is designed in such a way that every student will participate in the class room activities. The activities are planned to bring out the skills and talents of the students which they will be employing during various occasions in their real life.

1. Group activities + individual activities.

2. Collaborative learning.

3. Interactive sessions.

4. Ensure Participation.

5. Empirical Learning

Self Introduction - Narration - Current News Update – Numbers - Height & Distance - Square & Cube Roots

Current Tech Update - Verbal Aptitude Test I - GD –I - Odd man out series - Permutation & Combination - Problems on ages

GD –II - Resume Writing - Mock Interview I / reading comprehension - Problems on trains – Allegation of Mixtures - Test

Mock Interview II / reading comprehension - Mock Interview III/ reading comprehension - GD – III - Ratio & Proportion - Clocks - H.C.F & L.C.M

GD – IV – Verbal Aptitude Test II – Review – Partnership – Puzzles – Test

**SCHEME OF INSTRUCTION**

Marks allocated for regular participation in all oral activities in class

**SCHEME OF EXAMINATION**

Complete Internal evaluation on a regular Basis.

| | | L | T | P | C |
|---|---|---|---|---|---|
| **CI0312** | **INTEGRATED STRUCTURAL DESIGN II (RCC)** | **0** | **0** | **4** | **2** |
| | Prerequisite | | | | |
| | CI0303 | | | | |

Purpose

To apply the principles of RCC design to the full-scale design of medium to high size RCC buildings

Instructional Objectives

1. To train the students to carry out structural planning based on the functional planning.
2. To arrive at an appropriate structural system and its components.
3. To estimate the loads and their transfer to different elements.
4. To analysis and design using structural engineering softwares.

List of experiments

1. Design of G+3 RCC framed structure building involving following tasks

   i. Preparing structural layout from the given architectural drawing
   ii. Estimation of loads after carrying out slab design
   iii. Modelling, analyzing and designing using STAAD Pro.
   iv. Design of foundation (isolated and combined footing)
   v. Detailing

2. Design of G+9 RCC building with frames and shear involving following tasks

   i. Preparing structural layout from given architectural drawing
   ii. Carrying out slab design and estimating the loads including earthquake loads
   iii. Modelling, Analysis and design using STAAD pro
   iv. Foundation, Design – pile foundation and raft
   v. Detailing

3. Design of a flab slab structural system (G+3) involving following tasks

   i. Arriving at the structural system from architectural drawing
   ii. Estimation of loads
   iii. Design of Flat slab
   iv. Load transfer to columns
   v. Design of columns and foundation
   vi. Detailing

**TEXT BOOKS**


1. Varghese, P.C., *Advanced Reinforced Cement Concrete*, Pretince-Hall India, 2001.
2. Unnikrishna pillai, S. and Deavadas Menon, *Reinforced Concrete Design*, Tata MacGraw Hill Publishing Company Limited, New Delhi, 1998.

3. R. Krishnaraju, R. N. Pranesh, *Design of Reinforced concrete IS : 456-2000*, New age International Publication (P) Ltd., New Delhi.
4. Short course on *Seismic design of reinforced concrete buildings*, CEP, IIT, Kanpur, Dec.1995.
5. Lab Manual

**REFERENCE BOOKS**

1. *Code of Practice for Plain and Reinforced Concrete IS456-2000*, BIS, New Delhi.
2. *Design Aids for Reinforced Concrete to IS 456*, Special Publication (SP16), BIS New Delhi,1980
3. Dayaratnam,P., *Design of Reinforced concrete structures, Oxford and IBH publishing Co., New Delhi, 1984*
4. *Criteria for earthquake resistant design of structures, IS: 1893-2002* BIS, New Delhi

| | | L | T | P | C |
|---|---|---|---|---|---|
| **CI 0314** | **HYDRAULIC ENGINEERING LABORATORY AND IRRIGATION CAMP** | **0** | **0** | **2** | **1** |
| | Prerequisite | | | | |
| | CI 0205 | | | | |

**(Applicable for students admitted from 2009-10 onwards)**

**PURPOSE**

To get exposure about the function of various hydraulic equipments.

**INSTRUCTIONAL OBJECTIVES**

1. To learn the aim, working principle, components, function of hydraulic equipments.
2. To get hand-on experience in the operation of hydraulic equipments.
3. To study to take observations while the equipment is in operation.
4. To study to do calculations and to draw characteristic curves.
5. To interpret the results obtained to arrive a conclusion.

**LIST OF EXPERIMENTS**

1. Measurement of Flow using Venturimeter.
2. Measurement of Flow using Orificemeter.
3. Determination of Friction Factor of the Pipe Material.
4. Losses due to Sudden Contraction and Sudden Enlargement of the Pipe.
5. Measurement of Flow through Orifice.
6. Measurement of Flow thorough Mouthpiece.
7. Measurement of Flow through Notch.
8. Determination of Metacentric Height.
9. Performance Test on Centrifugal Pump.
10. Performance Test on Reciprocating Pump.
11. Performance Test on Pelton Wheel.
12. Performance Test on Francis Turbine.

**REFERENCE**

1. Laboratory Manual.

# IRRIGATION CAMP

**<u>Purpose</u> To physically inspect various irrigation structures and features studied under CI0307 Hydraulic Engineering Structures and form a clear idea of their utilities and layout.**

Duration of the camp shall be 3 days and it will cover following aspects

1) Visiting a site rich with irrigation system featuring canal networks, dams, cross drainage works, regulators etc**.**
2) Students are expected to inspect them in detail, take photographs and prepare a brief note on each of the features photographed.
3) At the end of the camp, a camp report shall be submitted highlighting the activities of the camp, group wise.
4) The camp report submitted by student groups shall be evaluated and internal marks awarded.
5) Attending the camp and submitting the camp report are mandatory for completion of the course CI0314.

**VII SEMESTER**

| | | L | T | P | C |
|---|---|---|---|---|---|
| **CI401** | **HIGHWAY ENGINEERING STRUCTURES** | **3** | **0** | **0** | **3** |
| | **Prerequisite** | | | | |
| | **CI0303** | | | | |

**PURPOSE**

To understand the principles of highway geometric design and carry out structural design of pavements and bridges.

**INSTRUCTIONAL OBJECTIVES**

1. To understand the highway geometric design.
2. To carry out pavement design.
3. To design highway bridges.

**HIGHWAY GEOMETRIC DESIGN**

Design of Camber – Super Elevation – Slopping and overtaking sight – Distances – Design of horizontal and vertical transition curves.

**HIGHWAY PAVEMENT DESIGN**

Flexible and rigid pavement design using IRC codes.

**HYDRAULIC DESIGN OF BRIDGES**

Computation of peak flood flow – methods of flow assessment discharge – Hydraulic geometry – Economic span of bridges.

**STRUCTURAL DESIGN OF BRIDGES**

IRC loads – Slab bridges – Box culverts – Beam and slab bridges – Pig eaud curves.

**STRUCTURAL DESIGN OF BRIDGES SUBSTRUCTURE**

Abutments – Types of pipes – Solid – Trestle – Hammer head – Framed – Cellular – Well foundation – Pile foundation bearings – Elastomeric bearings.

**TEXT BOOKS**


1. Khana. S.K., C.E.G. Justo – *Highway Engineering,* Nemchand & Bros, Rookies. 2001.
2. Krishnaraju, N., *Design of Bridges*, CBS Publishers and Distributors, Delhi, 1986.


**REFERENCE BOOKS**


1. *IRC Standards*
2. *Bureau of Indian Standards Publication on highway materials.*
3. Kadiyali L.R. *Principles and Practice of highway Engineering*, Khanna Publishers Delhi 1992.


| | | L | T | P | C |
|---|---|---|---|---|---|
| **CI0403** | **ADVANCED CONSTRUCTION TECHNOLOGY** | **3** | **0** | **0** | **3** |
| | Prerequisite | | | | |
| | Nil | | | | |

**PURPOSE**

To bring about the complete understanding of advanced construction techniques in substructure and super structure construction.

**INSTRUCTIONAL OBJECTIVE**

1. To study substructure construction techniques like box jacking and sheet piling etc,
2. To create awareness of superstructure construction methods like slide form techniques, launching techniques and erection procedures associated with tall, large span and off shore structures
3. To study the fundamental of repair construction techniques.

**SUBSTRUCTURE CONSTRUCTION**

Box jacking-pipe jacking-underwater construction of diaphragm walls-basement tunneling techniques-piling techniques-driving well foundation and caissons- sinking cofferdam-cable anchoring and grouting-driving diaphragm walls and sheet piling- laying operations for built-up offshore systems- shoring for deep cutting- large reservoir construction with membranes and earth systems-well points-dewatering and stand-by plant and equipment for underground open excavation- trench less technology

**SUPERSTRUCTURE CONSTRUCTION- TALL STRUCTURES**

Techniques of construction for continuous concreting operation in tall buildings of various shapes and varying sections- launching techniques- slip-form techniques- suspended formwork-erection techniques of tall structures- large span structures- launching techniques for heavy decks-in-situ prestressing in high rise structures- aerial transporting-handling and erecting light weight components of tall structures-erection of lattice towers and rigging of transmission line structures- construction sequence in cooling tower silos- chimneys and sky scrappers.

**SUPERSTRUCTURE CONSTRUCTION- LARGE SPAN STRUCTURES**

Bow string bridges-cable stayed bridges- launching and pushing of box decks- construction sequence and methods in domes and prestressed domes-support structure for heavy equipment and conveyor and machinery in heavy industries.

**SUPERSTRUCTURE CONSTRUCTION-MISCELLANEOUS**

Advanced construction techniques in offshore construction practice- vacuum dewatering of concrete flooring- concrete paving technology-erection of articulated structures-braced domes and space decks

**REPAIR CONSTRUCTION**

Mud jacking-grout through slab foundation-micro piling for strengthening floor--protecting sheet piles- screw anchors- subgrade water proofing- underpinning- advanced techniques and sequence in demolition and dismantling.

**TEXT BOOKS**


1. Jerry Irwine, “Advanced Construction Techniques” CA Rockers, 1984
2. Patric Powers, J.,” Construction Dewatering: New Methods and Applications”, John Wiley & Sons, 1992.


**REFERENCE BOOKS**


1. Robertwade Brown, “ Practical Foundation Engineering Hand Bok”, McGraw Hill Publications, 1995

| | | L | T | P | C |
|---|---|---|---|---|---|
| **CI0405** | **EARTHQUAKE RESISTANT AND SPECIAL STRUCTURES** | **3** | **0** | **0** | **3** |
| | Prerequisite | | | | |
| | Nil | | | | |

**PURPOSE**

To impart the knowledge about the fundamentals of load calculation, systems, design and detailing aspects of structures subject to earthquake loading including recent techniques.

**INSTRUCTIONAL OBJECTIVES**

1. To develop systematically from basic principles of structural dynamics the characteristic of dynamic behaviour of the structure, namely, response spectrum.
2. To expose important aspects of various theories of cause of earthquake and measurement of its effects on the structure as loads.
3. To impart knowledge about materials and structural systems for structures subject to earthquake.
4. To introduce basic principles of design and detailing for ductility.
5. To expose aspects of modern methods for seismic damage evaluation, control, repair and rehabilitation.

**INTRODUCTION**

Systems with single degree of freedom – Equation of motion – Analysis of free vibrations – Response for harmonic, impulsive, periodic and general dynamic loading – free and forced vibration- response of multi degree of freedom - damped and undamped systems – evaluation of natural frequencies and modes by modal method – Base excited systems – Concepts of spectral quantities and response spectrum.

**FUNDAMENTALS OF EARTHQUAKE ENGINEERING**

Earthquake characterizations – Elements of engineering seismology – Indian and world seismicity – learning from past earthquake history –Lessons from failures of structures.

**PRINCIPLES OF ASEISMIC DESIGN**

Codal provision for design – IS 1893-2002 - aspects in planning and layout – regular and irregular buildings- Structural systems -Principles of design – choice of materials – ductility based design – Various methods of estimating loads- seismic coefficient and response spectra methods.

**DESIGN AND DETAILING**

Determination of design forces and drift in water tanks and multistoreyed buildings sensitive to earthquakes- IS 1893

Codal provision for detailing for earthquake resistance- IS 13920-1993 – shear wall design and detailing .

**SPECIAL TOPICS**

Repair and Rehabilitation techniques – seismic damage ratings – Passive and Active control of vibration – New and favorable materials – case studies in repair and rehabilitation.

**TEXT BOOKS**

1. Short course on *Seismic design of reinforced concrete buildings*, CEP, IIT, Kanpur, Dec.1995.
2. A.K.Chopra, *Dynamics of structures (Theory and Applications to Earthquake Engineering)*, 2nd Edition, Prentice Hall of India Private Limited. New Delhi, 2003.
3. Short term course on *Seismic Retrofit of Multistoreyed Reinforced concrete Buildings*, National Programme on Earthquake Engineering Education (NPEEE), IIT,Madras,July,2005.
4. Santhakumar.A.R., *Concrete Technology*, Oxford University Press,2007.

**REFERENCE BOOKS**

1. Paulay.T and Priestly. M.N.J., *A seismic Design of Reinforced Concrete and Masonry Building,* John Wiley and Sons, 1991.
2. JaiKrishna, A.R.Chandrasekaran and BrijeshChandra, *Elements of Earthquake Engineering*, 2nd Edition, South Asian Publishers, Pvt. Ltd.
3. Course Notes on *Structural Design for Dynamic Loads*, SRM Engineering College, Dec2002.
4. Lecture notes on *Health Monitoring of Structures- A Proactive Strategy*, ISTE sponsored course held at SRM Engineering College, Jan,2003.
5. *Learning earthquake Design and Construction* , Earthquake Tips 1 to 24, Authored by C.V.R. Murthy, IIT, Kanpur. eqtips @iitk.ac.in
   Web sites: www.nicee.org

| | | L | T | P | C |
|---|---|---|---|---|---|
| **CI0407** | **INTEGRATED STRUCTURAL DESIGN III (IRRIGATION AND OTHER SPECIAL STRUCTURES)** | **0** | **0** | **4** | **2** |
| | Prerequisite | | | | |
| | CI0307 | | | | |

**(Applicable for students admitted from 2009-10 onwards)**

**Purpose**

To design special type of structures like water tanks, retaining wall and towers and irrigation structures .

**Instructional Objectives**

To analyse and design water tanks
To analyse and design retaining walls
To analyse and design steel towers
To analyse and design irrigation structures

**List of experiments**

1. Design of overhead Intze type water tank, and rectangular/circular tank involving following tasks (6 periods)
   a. Arriving at tank dimensions from given capacity
   b. Analysis and design including staging and foundation
   c. Detailing – free hand sketch only
2. Design of cantilever and counterfort retaining walls ( 4 periods)
   a. Overall dimensions
   b. Structural analysis and design of various components including key
   c. Detailing – free hand sketch only
3. Design of steel towers (6 periods)
   a. From given requirement finalizing type of tower and

overall dimensions
   b. Estimation of loads
   c. Analysis and design using STAAD. pro
   d. Design of foundation (No drawing)

4. Design and Drawing of (40 periods)
   a) Tank Sluice
   b) Tank Weir
   c) Canal Head Regulator
   d) Canal Cross Regulator
   e) Canal Drop
   f) Aqueduct
   g) Syphon Aqueduct
   h) Escape

**TEXT BOOKS**


1. Punmia, B.C., Ashok Kumar Jain, Arun Kumar Jain, *Reinforced Concrete Structures*, Laxmi Publications, New Delhi, 1988
2. Jain. A. K., *Reinforced Concrete Structures*, Nem Chand & Brothers, Roorkee, 2002.
3. Dayarathnam.P., *Design of Steel Structures*, Wheelers Publishing Co. Ltd., 2nd Edn. 1996.
4. Sathyanarayana Murthy.C., *Design of Minor Irrigation and Canal Structures*, Wiley Eastern Limited, 2002.
5. Santhosh Kumar Garg, *Irrigation Engineering*, 2000.
6. Agor.R., *Irrigation Engineering*, 2000.


**REFERENCE BOOKS**


1. *Code of practice for Plain and Reinforced Concrete IS456-2000*, BIS, New Delhi
2. *Design Aids for Reinforced Concrete to IS 456*, Special Publication (SP16), BIS New Delhi,1980
3. Purushothaman, P., *Reinforced Concrete Structural Elements*, Tata MacGraw Hill Publishing Company Limited, New Delhi,1984.
4. Dayaratnam,P., *Design of Reinforced concrete structures, Oxford and IBH publishing Co., New Delhi, 1984*
5. IS CODES : IS 800, IS 801, IS 811 AND SP6(1) (Steel & Light gauge sections)
6. Ellis, Manual of Irrigation.


| | | L | T | P | C |
|---|---|---|---|---|---|
| **CI0409** | **ESTIMATING, COSTING AND PROFESSIONAL PRACTICE** | **0** | **0** | **4** | **2** |
| | Prerequisite | | | | |
| | Nil | | | | |

**PURPOSE**

To study comprehensively the estimation of buildings, roads, and bridges and to study the elements of rate analysis and use of computers in estimation and project management
To simulate real life situations related to civil engineering construction projects and bring about an exposure to different types of problems associated with them and guiding towards finding practical solutions.

**INSTRUCTIONAL OBJECTIVES**

1. To study estimation of buildings including R.C.C. members.
2. To study the estimation of roads covering culverts and bridges.
3. To study rate analysis.

4. To impart hands-on experience in reading architectural and structural drawings, setting out on ground and estimation of material and labour
5. To bring about an exposure to field problems associated with roads/bridge marking and estimation of roadwork quantities.
6. Hands on experience on the use of software like Primavera, MS Excel and Build Superfast.

**EXERCISE**

**I. ESTIMATION COSTING AND FIELD PRACTICE**

*A) Buildings*

i) Studying architectural drawings in conjunction with structural drawings and specifications.
ii) Preparation of centerline diagrams and lay out of foundations
iii) Marking on ground
iv) Estimation of quantities stage wise, i.e., foundation-plinth level-lintel level etc
v) Estimation of labor required stage wise
vi) Carry out rate analysis and costing for different stages of work
vii) Prepare bills of quantities as required for tendering

*B) Roads and Bridges*

i) Setting out road alignment and leveling
ii) Preparation of longitudinal and cross sections using AutoCAD
iii) Estimation of earthwork and other roadwork quantities
iv) Studying bridge drawings and preparation of centerline drawings for alignment, abutments and wing and return walls and setting out on ground
v) Estimation of T beam bridges

**II. COMPUTER APPLICATION IN CONSTRUCTION MANAGEMENT**

i) Building estimation using MS Excel
ii) Introduction to estimation softwares like Build Superfast
iii) Introduction to construction planning software –PRIMAVERA-MS-Project

**III. TENDERING AND CONTRACTS**

i. Basic concepts of tendering
ii. Types of contracts

**TEXT BOOKS**

1. Chakraborti.M., *Estimating Costing*, Specification and Valuation in Civil Engineering, 2001.
2. Dutta.B.N., *Estimating and Costing in Civil Engineering Theory and Practice*, 2000.
3. Joglekar, P.T., *Practical Information for Quantity Surveyors*, Mrs. Mandakini Joglekar, Pune,1990

**REFERENCE BOOKS**

1. Birdie.G.S., *A Text Book on Estimating and Costing*, Dhanpat Rai and Sons, New Delhi, 2000.

2. RangwalaS.C., *Elements of Estimating and Costing*, Charotar Publishing House, Anand, 1987.
3. Rangwala.S.C., *Valuation of Real Properties*, Charotar Publishing House,Anand, 1984.
4. Jagannathan G, *Getting More at Less Cost*, – The Value Engineering Way, Tata McGraw Hill, New Delhi, 1992
5 Lecture notes on *Development of Real Estate Business*- Department of Civil Engineering, S.R.M. Engineering College, 2002.

| | | L | T | P | C |
|---|---|---|---|---|---|
| **CI0411** | **INDUSTRIAL TRAINING II** | **0** | **0** | **2** | **1** |
| | Prerequisite | | | | |
| | Nil | | | | |

**(Training to be undergone after VI Semester)**

**PURPOSE**

To provide hands-on experience at site where Infrastructure Engineering projects are executed.

**INSTRUCTIONAL OBJECTIVES**

1. To enable the students to gather a first hand experience on site.

**INDUSTRIAL TRAINING II**

1. Students have to undergo two - week practical training in Infrastructure Engineering related project sites. At the end of the training they have to submit a report together with a certificate in the format prescribed and make a presentation which shall be evaluated.

| | | L | T | P | C |
|---|---|---|---|---|---|
| **CI 0413** | **PROJECT WORK PHASE I** | **0** | **0** | **2** | **1** |
| | Prerequisite | | | | |
| | Should have studied the Civil Infrastructure Engineering Subjects Prescribed / opted for upto VI SEMESTER | | | | |

**(Applicable for students admitted from 2009-10 onwards)**

**PURPOSE**

To simulate real life situations related to civil infrastructure engineering and impact adequate training so that confidence to face and tackle any problem in the field is developed in the college itself.

**INSTRUCTIONAL OBJECTIVES**

To guide the students such a way that the students carry out a comprehensive work on the chosen topic which will stand them in good stead as they face real life situations. The project work so chosen by the student shall culminate in gaining of major design experience in the related area of specialization

**PROJECT**

Each student is given an exercise which will cover all the aspects ( to the extent possible) like investigation, planning, designing, detailing and estimating of a civil infrastructure engineering structure in which the aspects like analysis, application of relevant codes, etc., will find a place. Alternately, a few research problems also may be identified for investigation and the use of laboratory facilities to the fullest extent may be taken as a project work. Alternately, a student is encouraged to take an industrial project with any civil engineering organization or firm.

- The outcomes to be attained by students by doing the project work shall be spelt out clearly.
- Evaluation of project work shall be outcome driven.
- Reviews will be conducted to finalize the grading to the awarded to the students.

A project report is to be submitted on the topic which will be evaluated during the final review.

**VIII SEMESTER**

| | | L | T | P | C |
|---|---|---|---|---|---|
| **CI0402** | **CONSTRUCTION PLANNING AND MANAGEMENT** | **3** | **0** | **0** | **3** |
| | Prerequisite | | | | |
| | Nil | | | | |

**PURPOSE**

To inculcate the fundamental principles of construction planning and management as applicable in Civil Engineering Projects.

## INSTRUCTIONAL OBJECTIVES

1. To introduce a concepts of projects formulation
2. To impart the idea about planning and scheduling of activities.
3. To introduce the concepts of resource planning and allocation and control.
4. To provide a bird's eye view of optimization techniques.

## CONSTRUCTION PROJECT FORMULATION

Introduction-Principles of Management – different types of construction projects –Project Life Cycle- phases in project life cycle- Pre-feasibility report and clearance- project estimate – Techno Economic feasibility report – Detailed project report

## CONSTRUCTION PLANNING AND SCHEDULING

Introduction – work breakdown structure- plan development process- scheduling-definition –types of construction schedules-scheduling techniques-CPM – Terms and definitions –Earliest and Latest times – different types of floats – significance- calculation of critical path method-PERT – terms and definitions – network and solving problems using PERT – standard deviation and probability calculation in PERT.

## RESOURCE PLANNING

**Materials :** Quantity of materials – time of purchase- inventory control – terms and definitions – types of inventory –EOQ –reasons for maintain inventory – different tools for inventory.

**Equipment :** Classification of major construction equipment- planning and selecting of equipment- task consideration – cost consideration.

**Labour :** Classes of labour – cost of labour- labour schedule – optimum use of labour.

## RESOURCE ALLOCATION AND CONTROL

Introduction- resurce allocation-resource leveling-resource loading graph – cost control – earned value concepts- "S" curve technique in cost control – Risk cost management- stages in risk management- controlling the risk.

## OPTIMISATION TECHNIQUES

Introduction to optimization- Linear programming – formulation of LP problems- solving LP problem using graphical method-Transportation problems-Assignment problems – replacement model (Value of money does not change with time) –Time cost trade off – crashing- computer application in construction management.

**TEXT BOOKS**


1. Chitkara.K.K, *Construction Project Management: planning, Scheduling and control,* Tata McGraw Hill Publishing Company, New Delhi,1998.
2. Joy.P.K, *Total Project Management* –The Indian context, Macmillan IndiaLtd, New Delhi,1992
3. Vohra.N.D., *Quantitative Techniques in Management*, Tata Mcgraw Hill Publishing Company,New Delhi,1998.


**REFERENCES**


1. Billy E.Giliet., *Introduction to Operation Research – Computer Oriented Algorithmic Approach*, Tata McGraw Hill,1990
2. Galhot.P.S., and Dhir.B.M., *Construction Planning and Managemen,* New Age Publishers,New Delhi,2002
3. Kasana.H.S,and Kumar.K.D., *Introductory to Operation Research: Theory and Application*, Springer Publisher,New Delhi., 2004.


| | | L | T | P | C |
|---|---|---|---|---|---|
| **CI0404** | **PROJECT WORK PHASE II** | **0** | **0** | **16** | **8** |
| | Prerequisite | | | | |
| | Should have studied the Civil Infrastructure Engineering Subjects Prescribed / opted for upto VII SEMESTER | | | | |

**(Applicable for students admitted from 2009-10 onwards)**

**PURPOSE**

To simulate real life situations related to civil infrastructure engineering and impact adequate training so that confidence to face and tackle any problem in the field is developed in the college itself.

**INSTRUCTIONAL OBJECTIVES**

. To guide the students such a way that the students carry out a comprehensive work on the chosen topic which will stand them in good stead as they face real life situations. The project work so chosen by the student shall culminate in gaining of major design experience in the related area of specialization

**PROJECT**

Each student is given an exercise which will cover all the aspects ( to the extent possible) like investigation, planning, designing, detailing and estimating of a civil infrastructure engineering structure in which the aspects like analysis, application of relevant codes, etc., will find a place. Alternately, a few research problems also may be identified for investigation and the use of laboratory facilities to the fullest extent may be taken as a project work. Alternately, a student is encouraged to take an industrial project with any civil engineering organization or firm.

- The outcomes to be attained by students by doing the project work shall be spelt out clearly.
- Evaluation of project work shall be outcome driven.
- Reviews will be conducted to finalize the grading to the awarded to the students.
- A project report is to be submitted on the topic which will be evaluated.

| | | L | T | P | C |
|---|---|---|---|---|---|
| **CI0406** | **COMPREHENSIVE VIVA** | **0** | **0** | **2** | **1** |
| | Prerequisite | | | | |
| | Courses prescribed/opted for till VIII semester | | | | |

**PURPOSE**

To provide a complete picture of Civil/Infrastructure Engineering comprising of all the topics covered in the programme so that a comprehensive understanding of civil engineering is achieved.

**INSTRUCTIONAL OBJECTIVES**

1. To provide overview of all Civil/ Infrastructure engineering topics covered in the syllabus given below.
2. To assess the overall knowledge level of Civil/Infrastructure Engineering standards and guide them to take corrective measures where deficiencies are detected.

**COMPREHENSIVE VIVA**

Review of the following topics of Civil/ Infrastructure engineering:

1. Properties and Characteristics of various engineering materials.
2. Basics of Applied Mechanics and Strength of Materials.
3. Elementary analysis of determinate and indeterminate structures.
4. Various classical methods in analysis of structures.
5. Matrix methods of analysis of structures.
6. Overview of Design of, RCC and Steel Structures and prestressed structures.
7. Overview on Fluid Mechanics
8. Overview of Elements of Hydraulic Structures.
9. Overview on Surveying.
10. Overview on Environmental Engineering systems
11. Overview of Transportation Engineering covering Roads, Railway, Docks and Airport Engineering.
12. Overview of Aspects of Geotechnical Engineering.
13. Overview of Tall building structures
14. Overview of construction equipment and advanced construction technology

**(Evaluation shall consist of a 3 hour duration end semester examination of objective type question paper pattern covering all aspects of Civil Infrastructure engineering covered under UG programmme)**

## ELECTIVES

## A. STRUCTURAL ENGINEERING

| | | L | T | P | C |
|---|---|---|---|---|---|
| **CIEST1** | **COMPUTER ANALYSIS OF STRUCTURES** | **3** | **0** | **0** | **3** |
| | **Prerequisite** | | | | |
| | **CI0302** | | | | |

**PURPOSE**

To introduce matrix force and displacement methods and apply to two and three-dimensional structures with programming aspects.

**INSTRUCTIONAL OBJECTIVES**

1. To introduce fundamentals of matrix analysis – Principle of superposition and to formulate flexibility and stiffness matrices of spring systems and elements.
2. To apply energy concepts to develop nodal load vectors.
3. To analyse a structure by stiffness and flexibility methods.
4. To analyse and design a structure using computer software packages.
5. To introduce Finite Element Method

**INTRODUCTION**

Force and Displacement measurement – generalized or independent measurements – constrained or dependent measurements – n dimensional space – principle of superposition – methods of structural analysis.
Structure with single and two coordinates – flexibility and stiffness matrices in n coordinates – examples – symmetric nature – constrained measurements – stiffness and flexibility matrices of the element as well as the system – computing the influence coefficient.

**ENERGY CONCEPTS**

Strain energy in terms of stiffness and flexibility matrices – interpretation of coefficient – Betti's law – other energy theorems using matrix notation.

**FLEXIBILITY AND STIFFNESS METHODS(ELEMENT APPROACH)**

Choice of redundant – ill and well condition equation – Transformation Matrices – transformation of one set redundant to other set -thermal expansion – lack of fit- application to pin - jointed plane truss – continuous beams, frames and grids
Development of stiffness method – analogy between flexibility and stiffness – analysis due to thermal expansion, lack of fit – Stiffness matrix with rigid body motion – application to pin jointed plane and space trusses – continuous beams – frames and grids – static condensation techniques
Problem solving by computer - choice of the method.

**COMPUTER APPLICATIONS**

Analysis and Design of Pin-jointed and Rigid-jointed Framed Structures using STADD pro (2D and 3D)

**INTRODUCTION TO FINITE ELEMENT METHOD**

Basic concepts –Raleigh-Ritz Method- Finite Difference method- Variational Principles- MWR (theory only)-Steps in Finite Element Method- Axial Element Force Formulation by Dispalcement method only-Theory of Stress Model –Displacement Model- Hybrid Models.

**TEXT BOOKS**


1. Mcquire and Gallagher, R.H., *Matrix Structural Analysis*, John Wiley, 1979.
2. Rubinstein,M.F., *Matrix Computer Analysis of Structures*, Prentice Hall, 1966.
3. Krishnamoorthy.C.S.,Rajeev.S., *Computer Aided Design*, Narosa Publishing House, New Delhi 1991.


**REFERENCE BOOKS**


1. Beaufait, F.W. *Computer Methods of Structural Analysis*, Prentice Hall, 1970.
2. Meek.J.L., *Matrix Structural Analysis*, McGraw Hill Kogakusha Ltd.,1971.
3. Harrision.H.B., *Structural Analysis and Design* Vol. II, Pergamon Press, 1991 & I.
4. Hinton.E.,Owen.D.R.J., *Finite Element Programming*, Academic press, 1977.
5. Billy E.Gillet, *Introduction to Operations Research*, *A Computer Oriented Algorithmic approach*, Tata McGraw Hill Co., 1982.


| | | L | T | P | C |
|---|---|---|---|---|---|
| **CIEST2** | **COMPUTER AIDED DESIGN OF STRUCTURES** | **3** | **0** | **0** | **3** |
| | **Prerequisite** | | | | |
| | **CI0302** | | | | |

**PURPOSE**

To familiarize with hardware, software aspects of computer graphics including application of FEM and optimisation technique.

**INSTRUCTIONAL OBJECTIVES**

1. To know about graphic primitives.
2. To impart knowledge about optimization and design principles.
3. To introduce finite element method and to apply for simple problems.
4. To train in use of standard software packages for analysis.
5. To know about various structural analysis packages.

**INTRODUCTION & COMPUTER GRAPHICS**

Fundamentals of CAD – Hardware and Software requirements – Design process – Application and benefits – Graphic primitives, wire frame modeling and solid modeling – drafting packages – Applications to layout of buildings and structures, use of AUTOCAD.

**DESIGN & OPTIMIZATION**

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- MS PROJECT- PRIMAVERA-introduction only.

**INTRODUCTION TO FINITE ELEMENT ANALYSIS**

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

**ANALYSIS OF STRUCTURES BY FINITE ELEMENT METHOD**

Analysis of plane truss, space truss, plane frames, space frames using FEM packages – STRUDL – Programming for FEM – SAP 2000.

**STRUCTURAL ENGINEERING PACKAGES**

Introduction of various structural engineering packages – Analysis and design of structures by using STADD, STRUDL.

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


**REFERENCE BOOKS**


1. Grover M.P. and Zimmers E.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 Edn. – McGraw Hill Co., 1993.


| | | L | T | P | C |
|---|---|---|---|---|---|
| **CIEST3** | **STORAGE AND INDUSTRIAL STRUCTURES** | **3** | **0** | **0** | **3** |
| | Prerequisite | | | | |
| | CI0204,CI0303 | | | | |

**PURPOSE**

To get exposed to the design of industrial structures and its functional requirements.

**INSTRUCTIONAL OBJECTIVES**

1. Planning and layout play a very important role in industrial structures and they are important.
2. Types of industrial building, lighting and ventilation in each cases are dealt with here.
3. Design of steel gable frame with knee joint, beam column, base plate and anchor bolt are dealt with here
4. Design of RC silos, bunkers, chimneys and cooling tower are dealt with here.
5. General principles of prefabrication and functional requirements of precast concrete units and composite sections are analysed.

**INTRODUCTION AND FUNCTIONAL REQUIREMENTS**

Classification of Industries and Industrial structures - General requirements for industries like cement, chemical and steel plants - site layout - Lighting - Ventilation - Fire safety electrical installations - Guidelines from factories etc.

**DESIGN OF STEEL GABLE FRAME AND BEAM COLUMNS**

Design of steel gable frame with knee joint, beam column, base plate and anchor bolt.

**DESIGN OF RC SILOS AND BUNKERS**

Design of silos and bunkers.

**DESIGN OF RC CHIMNEYS AND COOLING TOWER**

Design of chimneys and cooling tower.

**PREFABRICATION**

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

**TEXT BOOKS**


1. P. Dayaratnam, *Design of Concrete Structure*, S. Chand and Co.,- New Delhi, 1999.
2. Ramchandra, *Design of Steel Structures*, Vol . I & II Standard Book House, New Delhi, 1996.

3. Krishna Raju, *Advanced Concrete Structures*, McGraw Hill, New Delhi, 2000.

**REFERENCE BOOKS**

1. Edwin H. Gaylord, Charles N. Gaylord . Japes R. Stallmeyer, *Steel Structures*, McGraw Hill, New Delhi, 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. Koncz.T., *Manual of precast construction*, Vol. I , II, and III, Bauverlag, GMBH, 1971.
6. Murashew. V., Sigalov. E., and Bailov. V., *Design of reinforced concrete structures*, Mr. Publishers, 1968.
7. CBRI, *Building materials and Components*, India, 1990.

| | | L | T | P | C |
|---|---|---|---|---|---|
| **CIEST4** | **ADVANCED STRUCTURAL DESIGN** | **3** | **0** | **0** | **3** |
| | **Prerequisite** | | | | |
| | **CI0303** | | | | |

**PURPOSE**

To bring about a thorough understanding of Limit state design of continuous beams, design of grid floors and design of space frames, analysis of frames, design of Bridges, Shells and folded plates.

**INSTRUCTIONAL OBJECTIVES**

1. To study the limit state design methodology as applicable to continuous beams.
2. To understand the behaviour of grid floors, to carry out their design and to study principles of steel space frames.
3. To study approximate analysis methods of medium rise framed building.
4. To get exposed to the design of small span bridges and design principles of steel bridges
5. To study the analysis and design of folded plates and shells

**LIMIT ANALYSIS OF CONTINUOUS BEAMS**

Behaviour of reinforced concrete members in bending and shear- plastic hinge- rotation capacity- factors affecting rotation capacity of a section- plastic moment- moment curvature relationship- redistribution of moments- analysis and limit state design of continuous beams(Two Span only)-Fixed Beams (Single Span only)

**GRID FLOORS AND SPACE FRAMES**

Design of waffle slab and grid system as per IS456-2000

Steel Space frames-types-analysis and design principles

**MEDIUM RISE FRAMED BUILDINGS**

Planning of structural layout- slabs-beams-columns- Computation of design moments and shears using substitute frame method of IS 456 and explanatory handbooks- estimation of wind and seismic forces and analysis by portal and cantilever methods- combination of internal forces due to live, dead and lateral loads- design of key members using design aids (SP16)

**DESIGN OF BRIDGES**

IRC Specifications for Road Bridges- Standard Live loads, other forces on Bridges-General Design Considerations- Discharge and Linear water way calculations- Design of Slab Culverts, Tee beam and Slab bridges

Steel Bridges-Railway bridges-types- Deck type girders-Through type girders-loading-Design principles

**SHELLS AND FOLDED PLATES**

Analysis and design of prismatic folded plates and circular cylindrical shells using beam method.

**TEXT BOOKS**


1. Krishnaraju, N., *Advanced Concrete Design*, CBS Publishers and Distributors, Delhi, 1986.
2. Varghese, P.C., *Advanced Reinforced Concrete Design*, Pretince-Hall India, 2nd edition.
3. Krishnaraju, N., *Design of Bridges*, CBS Publishers and Distributors, Delhi, 1986.


**REFERENCE BOOKS**


1. *Code of practice for Plain and Reinforced Concrete IS456-2000*, BIS, New Delhi
2. *Design Aids for Reinforced Concrete to IS 456*, Special Publication (SP16), BIS New Delhi, 1980.
3. Johnson Victor.D, *Design of Bridges, Tata McGraw Hill Publishing Company Limited*, New Delhi, 1991.
4. Ramaswamy,G.S., *Design and Construction of Concrete Shell Roofs*, CBS Publishers. 1986.
5. Punmia, B.C., Ashok Kumar Jain, Arun Kumar Jain, *Reinforced Concrete Structures*, Laxmi Publications, New Delhi, 1988.
6. Subramanian.N, *Principles of Space Structures*, Wheeler Publishing Co.,1999

| | | L | T | P | C |
|---|---|---|---|---|---|
| **CIEST5** | **DESIGN OF BRIDGES** | **3** | **0** | **0** | **3** |
| | **Prerequisite** | | | | |
| | **CI0303** | | | | |

**PURPOSE**

To get exposed to the design aspects of various types of Bridges.

**INSTRUCTIONAL OBJECTIVES**

1. IRC specifications for road bridges and general design considerations
2. Design of slab culverts, the beam and slab bridges
3. Principles of continuous bridges and composite bridges
4. Design of prestressed concrete bridges
5. Design of plate girder bridges and design of station structures for MRTS

**INTRODUCTION**

IRC specifications for Road Bridges, Standard live loads, other forces on bridges – general design considerations – Discharge and Linear water way calculations – Retrofitting and strengthening aspects.

**SHORT SPAN BRIDGES**

Design of slab culverts, tee beam & slab bridges.

**LONG SPAN GIRDER BRIDGES**

Principles of continuous bridges – box girder bridges – balanced cantilever bridges – Composite Bridges.

**PRESTRESSED CONCRETE BRIDGES.**

Design of prestressed concrete bridges.

**PLATE GIRDER BRIDGES**

Design of plate girder bridges- Different materials used for bearings and their design - Design of station structures for MRTS.

**REFERENCES**


1. Krishna Raju.N. "Design of Bridges", Oxford & IBM Publishing Co, Bombay, 1988.
2. Raina.V.K. "Concrete Bridge Practice", Tata McGraw Hill Publishing Co., New Delhi – 1991.
3. Taylor F.W, Thomson S.E. and Smulski.E. "Reinforced Concrete Bridges", John Wiley & Sons, New York 1955.
4. Johnson Victor D., "Design of Bridges", Tata McGraw Hill Publishing Co., New Delhi – 1991.


| | | L | T | P | C |
|---|---|---|---|---|---|
| **CIEST6** | **DESIGN OF STEEL CONCRETE COMPOSITE STRUCTURES** | **3** | **0** | **0** | **3** |
| | **Prerequisite** | | | | |
| | **CCI0204,CI0303** | | | | |

**PURPOSE**

To bring about an exposure to composite structural members and carry out the design of connections and girder bridges.

**INSTRUCTIONAL OBJECTIVES**

1. To understand the concept of steel – concrete composite member
2. To understand the behaviour of composite beams, columns.
3. To design composite girder bridges and understand the seismic behaviour of composite structures.

**INTRODUCTION**

Introduction to Steel –Concrete Composite Construction – Theory of Composite Structures – Introduction to Steel – Concrete – Steel – Sandwich Construction.

**DESIGN OF COMPOSITE MEMBER**

Behaviour of composite beams – columns – Design of Composite beam – Concrete Composite Columns – Design of Composite Trusses.

**DESIGN OF CONNECTIONS**

Types of Connections – Design of Connections in Composite structures – Shear Connections – Design of Connections in composite trusses.

**COMPOSITE GIRDER BRIDGES**

Behaviour of girder bridges – Design concepts.

**GENERAL**

Case Studies on steel – concrete composite construction structures in buildings – Seismic behaviour of composite structures.

**REFERENCES**


1. "Teaching Resource Material for Structural Steel Design", Volume 2/3 jointly prepared by 1. I.I.T., MS 2. Anna University 3. SERC, MS 4. "Institute for Steel Development and growth", Calcutta.
2. Owens .G.W. & Knowels.P. "Steel Designs Manual", (Fifth Edition) Steel Concrete Institute (UK) Oxford Black well Scientific Publications, 1992.
3. Johnson.R.P. "Composite Structures of Steel and Concrete" .Vol-I, Blackwell Scientific Publications (Second Edition) U.K. 1994.


| | | L | T | P | C |
|---|---|---|---|---|---|
| **CIEST7** | **DISASTER RESISTANT STRUCTURES** | **3** | **0** | **0** | **3** |
| | **Prerequisite** | | | | |
| | **Nil** | | | | |

**PURPOSE**

To get an exposure to types of disaster and understand the concept behind the design of disaster resistant structures.

**INSTRUCTIONAL OBJECTIVES**

1. To understand the design philosophy for loads, earthquake and wind.
2. To study the materials to be used, and design to be made for disaster resistant structures.
3. To study damage assessment and retrofitting.

**BEHAVIOUR OF LIFE LINE STRUCTURES**

Design philosophy to resist flood, cyclone, and earthquake and fire disasters-National and International Codes of practice – By-laws of urban and semi-urban areas – Past history and lessons from disasters – Approach to traditional and Modern Structures – Concept of life period based Design – case studies.

**COMMUNITY STRUCTURES**

Safety analysis and rating - Reliability assessment repairs and Retrofitting techniques of Community Structures – Protection of Nuclear Structures - Dams, bridges and buildings.

**REHABILITATION AND RETROFITTING**

Testing and evaluation – Classification according to safety level – methods and materials for strengthening for different disasters – qualification test.

**MATERIALS, DESIGN AND DETAILING**

Modern Materials for disasters reduction – Detailing aspects of structures subject to probable disasters – Construction techniques – Analysis methodology – Techniques for optimal performance – Provisions for artificial disasters – blast and impact.

**ECHNIQUES OF DAMAGE ASSESSMENT**

Damage surveys – Maintenance and modification to improve hazard resistance – application GIS in disaster management – foundation improvement techniques

**REFERENCE BOOKS**


1. Raiker, R.N. "Learning from failures, Deficiencies in Design, Construction and Service", R&D Center, Raiker Bhavan, 1987.
2. Allen.R.T., and Edwards.S.C., "Repairs of Concrete Structure", Blackie and Sons, U.K.1987.
3. Moskvin.V "Concrete and Reinforced Concrete" - Deterioration and protection – MIR Publishers – Moscow 1980
4. Lecture notes on the course "Disasters Management"- conducted by Anna University, 2000.

| | | L | T | P | C |
|---|---|---|---|---|---|
| **CIEST8** | **OFFSHORE STRUCTURES** | **3** | **0** | **0** | **3** |
| | **Prerequisite** | | | | |
| | **Nil** | | | | |

**PURPOSE**

To get exposed to special features of offshore structures like geometry, forces encountered, structural modeling for design purpose together with their design.

**INSTRUCTIONAL OBJECTIVES**

1. To develop the knowledge of wave generalized process and wave theories
2. To understand the forces on offshore structure
3. To develop an idea about foundation and structural modeling
4. To familiarize with foundation analysis and dynamics of offshore structures
5. Design of offshore structures with failure probability.

**WAVE THEORIES**

Wave generation process, small and finite amplitude wave theories.

**FORCES ON OFFSHORE STRUCTURES**

Wind forces, wind forces on vertical, inclined cylinders, structures – current forces and use of Morrison equation.

**OFFSHORE SOIL AND STRUCTURE MODELLING**

Different type of offshore structures, foundation modeling, structural modeling

**ANALYSIS OF OFFSHORE STRUCTURES**

Static methods of analysis, foundation analysis and dynamics of offshore structures.

**DESIGN OF OFFSHORE STRUCTURES**

Design of platforms, helipads, jacket tower and mooring cables and pipelines – Corrosion and Fatigue Failure.

**REFERENCES BOOKS**


1. Chakrabarti, S.K., "Hydrodynamics of Offshore Structures", Computational mechanics, Publications, 1987.
2. Thamas H Dawson, "Offshore Structural Engineering", Prentice Hall Inc. Englewood, Cliffs, N.J. 1983.
3. API Recommended Practice for Planning, Designing and Constructing Fixed Offshore Platform, American Petroleum Institute Publication, RP2A, Dallas, Texas, 1983.
4. Wiegel.R..L, "Oceanographical Engineering", Prentice Hall Inc. Englewood, Cliffs, N.J. 1964.
5. Brebia, C.A Walker.S., "Dynamic Analysis of Offshore Structures", New – Nes Butterworths, U.K 1979.
6. Reddy DV and Arockiasamy M., "Offshore Structures", Vol.1, Krieger Publication Company, Malabar, Florida, 1991.


| CIEST9 | PREFABRICATED STRUCTURES | L | T | P | C |
|---|---|---|---|---|---|
| | Prerequisite | **3** | **0** | **0** | **3** |
| | Nil | | | | |

**PURPOSE**

To impart the overall knowledge about the production, components systems and design principles involved in prefabricated structures.

**INSTRUCTIONAL OBJECTIVES**

1. To study on the production, various components and erection of prefabricated structures.
2. To study the design principles, joints in prefabricated structural members and design for abnormal loads.

**INTRODUCTION**

Need for prefabrication – Principles- Materials – modular co-ordination – standardization – Systems – production – Transportation – Erection.

**PREFABRICATED COMPONENTS**

Behaviour of structural components – Large panel constructions – Construction of roof and floor slabs – Wall panels- Columns –shear walls.

**DESIGN PRINCIPLE**

Disuniting of structures – Design of cross section based on efficiency of material used – Problems in design because of joint flexibility – allowance for joint deformation

**JOINTS IN STRUCTURAL MEMBERS**

Joints for different structural connections – Dimensions and detailing – Design of expansion joints – Hoisting technology – Equipments for hoisting and erection

**DESIGN FOR ABNORMAL LOADS**

Progressive collapse – Code provision – Equivalent design loads for considering abnormal effects such as

Earthquakes, cyclones etc., Importance of avoidance of progressive collapse- Application of prestressing

in prefabrication

**TEXT BOOKS**


1. CBRI, Building materials and components, India, 1990.
2. Laszlo Mokk, " Prefabricated concrete for Industrial and Public structures". Publishing House of the Hungarian Academy of Science", Budapest, 1964.


**REFERENCE BOOKS**


1. Koncz. T., Manual of Precast Concrete Construction ,Vol.I,II&III- Bauverlag, GMBH, Wiesbaden and Berlin – 1971.
2. Gerostiga.C.Z., Hendrikson.C and Rehat.D.R., " Knowledge based process planning for construction and manufacturing- Academic Press Inc.1989.
3. Structural Design Manual , Precast Concrete Connection details, Society for the studies in the use of precast concrete- Netherlands Betar Verlay,1978.


| | | L | T | P | C |
|---|---|---|---|---|---|
| **CIEST10** | **MAINTENANCE AND REHABILITATION OF STRUCTURES** | **3** | **0** | **0** | **3** |
| | **Prerequisite** | | | | |
| | **Nil** | | | | |

**PURPOSE**

To provide a comprehensive knowledge on the diagnosis, assessment and material application relating to maintenance and rehabilitation of structures.

**INSTRUCTIONAL OBJECTIVES**

1. To assess the diagnosis of distress
2. To assess the extent of distress
3. To choose the appropriate material and its application
4. To study strengthening and demolition of structural components.

**GENERAL ASPECTS**

Performance of construction materials and components in services for strength permeability, thermal properties and cracking effects due to climate, temperature, chemicals, wear and erosion, Design and construction errors, Effects of cover thickness

**MAINTENACE AND DIAGNOSIS OF FAILURE**

Definitions **:** Maintenance, Repair and rehabilitation, Facets of Maintenance, Importance of Maintenance, Preventive measures based on various aspects of inspection- Assessment procedure for evaluating a damaged structure. Diagnosis of construction failures.

**DAMAGES AND THEIR REMEDIES**

Corrosion damage of reinforced concrete, methods of corrosion protection, corrosion inhibitors, corrosion resistant steels, coatings, cathodic protection, rust eliminators. Causes of deterioration of concrete, steel, masonry and timber structures, surface deterioration, efflorescence, causes, prevention and protection.

## MATERIALS AND TECHNIQUES OF REPAIR

Special concrete and mortar, concrete chemicals, expansive cement, polymer concrete sulphur infiltrated concrete, Ferro cement, fiber reinforced concrete. Methods of repair in concrete, steel, masonry and timber structures. Gunite and shotcrete, expoxy injection.

## STRENGTHENING AND DEMOLITION ASPECT

Strengthening of existing structures - repairs to overcome low member strength, deflection, cracking, chemical disruption, weathering, wear, fire, leakage, marine exposure, coatings for set concrete and steel reinforcement, use of non destructive testing techniques for evaluation, load testing of structure - Demolition of structures using engineered and non engineered techniques - case studies.

## REFERENCE BOOKS


1. Shetty.M.S., "Concrete, Technology", Theory and Practice, S.Chand and Company, New Delhi 1992.
2. Raiker.R.N. "Learning from Failures, Deficiencies in Design, Construction and Service", - R&D Centre (SDCPL), Raikar Bhavan, Bombay 1987.
3. "Repair & Rehabilitation" "Compilation from The Indian Concrete Journal",– ACC – RCD Publication 2001.
4. "Health Monitoring of Structures" – A Proactive strategy –proceedings of the ISTE sponsored short course", organized by the Department of Civil Engineering, S.R.M.Engineering College, S.R.M.Nagar, January 2003.
5. Revision compbell, Allen and Itarold Roper, "Concrete Structures Materials Maintenance and Repair" Longman Scientific and Technical UK 1991.
6. Allen.R.T. and Edwards.S.C., "Repair of Concrete Structures"


## B. GEOTECHNICAL ENGINEERING

| | | L | T | P | C |
|---|---|---|---|---|---|
| **CIEGT1** | **GROUND IMPROVEMENT TECHNIQUES** | **3** | **0** | **0** | **3** |
| | **Prerequisite** | | | | |
| | **Nil** | | | | |

**PURPOSE**

To develop an understanding of the ground improvement techniques and use of new materials and its behaviour for ground improvement techniques.

**INSTRUCTIONAL OBJECTIVES**

1. To develop an awareness of problematic soils and selection of ground improvement techniques based on soil conditions.
2. To understand drainage, dewatering, grouting technique and use of geosynthetics in ground improvement method.

**INTRODUCTION**

Role of ground improvement in foundation engineering – Ground improvement methods – Geotechnical problems in lateritic, alluvial and black cotton soils – selection of Ground improvement techniques based on soil conditions-use of piezometers-inclinometers in field

**DRAINAGE AND DEWATERING**

Well point system – Vacuum dewatering system – Electro-osmatic method – Seepage analysis for two dimensional flow – fully penetrating slots in homogeneous deposits (simple cases only).

**INSITU TREATMENT OF SOILS**

Insitu densification of Granular and consolidation of cohesive soils – Dynamic compaction – Vibrofloatation – Sand pile compaction – Stone Column - Preloading with sand drains and fabric drains.

**GROUTING TECHNIQUE**

Suspension grouts – solutions grouts – Grouting equipment and method – Grouting with soil, Bentonite – cement mixes and asphalt – Grout monitoring schemes.

**GEOSYNTHETICS APPLICATIONS**

Types of Geosynthetic materials- Geotextile – Types – Geotextiles in Filtration, Drainage, seperation and reinforcement – Geomembranes – Containments and barriers – Application to Ground Anchors.

**TEXT BOOKS**


1. Koerner.R.M., *Construction and Geotechnical Methods in Foundation Engineering*, McGraw Hill Publishing Company, New york, 1984.
2. Purusothamaraj.P., *Ground Improvement Techniques*, Laxmi Publication (P) Ltd., New Delhi, 2000.


**REFERENCE BOOKS**


1. Moseley. M.P., *Ground Improvement*, Blackie Academic and Professional, Chapman and Hall, Glassgow, 1993.
2. Manfred R.Hausmann, *Engineering Principles of Ground Modification*, McGraw Hill Publishing Company, New york, 1990.
3. John, N.W.M., *Geotextiles*, John Blackies and Sons Ltd., London, 1987.


| | | L | T | P | C |
|---|---|---|---|---|---|
| **CIEGT2** | **INTRODUCTION TO SOIL DYNAMICS AND MACHINE FOUNDATION** | **3** | **0** | **0** | **3** |
| | **Prerequisite** | | | | |
| | **Nil** | | | | |

**PURPOSE**

To develop an understanding of the behaviour of machine foundation and to gain knowledge of design method that can be applied to practical problems.

**INSTRUCTIONAL OBJECTIVES**

1. Familiarize the student to learn wave and wave propagation and dynamic properties of soils.
2. Familiarize the student with the procedure used for machine foundation design.
3. Introduce the vibration isolation and screening techniques.

**INTRODUCTION**

**Nature of Dynamic loads – Vibration of elementary system – Vibratory motion – single degree of freedom system – Free and forced vibrations with and without damping**.

**WAVES AND WAVE PROPAGATION**

Wave propagation in an elastic homogeneous isotropic medium – compression, shear and Rayleigh waves – wave propagation in elastic, half space (no theoretical treatment or derivation) – relevance to earth quake.

**DYNAMIC PROPERTIES OF SOILS**

Determination of elastic properties of soils (Dynamic condition) – Co-efficient of elastic uniform and non-uniform compression and shear – Determination of dynamic properties of soils – Field & laboratory methods.

**DESIGN PROCEDURE FOR SIMPLE MACHINE FOUNDATIONS**

General requirements of machine foundation – Design criteria for foundation of reciprocating and Impact type machine – Simple procedure of design of foundations for Reciprocating and Impact type machines (treated single degree freedom only).

**VIBRATION ISOLATION AND SCREENING**

Vibration isolation technique passive and active isolation – Mechanical isolation, foundation isolation, isolation by location – isolations by barriers.

**TEXT BOOKS**


1. Prakash.S., and Puri,V.K., *Foundation for Machines*, McGraw Hill Publishing Company, Newyork, 1988.
2. Srinivasulu.P. & Vaidanathan.C., *Hand book on Machine Foundations*, McGraw Hill Publishing Company, New york, 1986.


**REFERENCE BOOKS**


1. F.E.Richard.R.D., Woods & J.R.Hall, *Vibrations of Soils and Foundations*, Prentice Hall, 1962.
2. *IS Code of Practice for Design and Construction of Machine Foundations*, IS-2974 (Part I to IV), 1987.


| | | L | T | P | C |
|---|---|---|---|---|---|
| **CIEGT3** | **ENVIRONMENTAL GEOTECHNOLOGY** | **3** | **0** | **0** | **3** |
| | **Prerequisite** | | | | |
| | **Nil** | | | | |

**PURPOSE**

To develop an understanding of the geotechnical aspects of the design and management of domestic, industrial and hazardous waste handling and disposal systems.

**INSTRUCTIONAL OBJECTIVES**

1. To gain an advanced understanding of the role of geotechniques in the design of waste management system.

2. To understand interaction between waste and soil, and pollutant movement in the ground.

**INTRODUCTION**

Introduction to Environmental Geotechniques – Environmental cycles and interaction – Soil water Environmental interaction relating to geotechnical problems – Effect of pollution on soil-water behaviour.

**SELECTION OF SITE**

Wastes – Sources – Classification of wastes – Criteria for selection of sites for waste disposal - parameters controlling the selection of waste disposal sites.

**DISPOSAL METHODS**

Subsurface disposal technique – Passive containment systems – Leechate contamination – Use of geomembrane and other techniques in waste disposal.

**HYDROLOGY**

Hydrological design for ground water pollution control – Ground water pollution downstream of landfills – Pollution of aquifers by mining and liquid wastes – Protection of aquifers – Remedial measures for contaminated ground – remediation Technology – Bio-remediation.

**HAZARDOUS WASTE**

Definition and Identification of Hazardous Wastes - Hazardous waste control and storage system – stabilization/ solidification of wastes – Processes and Functions – Land fill liners including geomembrane; Rigid liners, Flexible liners – Seepage cut off walls.

**TEXT / REFERENCE BOOKS**


1. Koerner.R.M., *Construction and Geotechnical Methods in Foundation Engineering*, McGraw Hill Publishing Company, New york, 1996.
2. Fried,J.J., *Ground water Pollution*, Elsevier, 1993.
3. Daniel,D.E., *Geotechnical Practice for Waste Disposal*, Chapman and Hall, London, 1993.
4. Wentz,C.A., Hazardous, *Waste Management*, McGraw Hill Publishing Company, Singapore, 1989.

| | | L | T | P | C |
|---|---|---|---|---|---|
| **CIEGT4** | **STRUCTURES ON EXPANSIVE SOIL** | **3** | **0** | **0** | **3** |
| | **Prerequisite** | | | | |
| | **Nil** | | | | |

**PURPOSE**

To get exposure about various aspects of structures especially constructed on expansive soil.

**INSTRUCTIONAL OBJECTIVES**

1. To know the occurrence and distribution of expansive soil.
2. To study the properties of expansive soil.
3. To understand various methods of prediction of heave.
4. To study the design procedure for foundation.
5. To understand various methods of stabilization.

**GEOTECHNICAL PROBLEM**

Occurrence and distribution - moisture equilibrium - Soil, structure, environmental interaction, distress symptoms, case histories.

**EXPANSIVE SOIL PROPERTIES**

Clay mineralogy - swell potential - field exploration - laboratory tests for identification.

**HEAVE PREDICTION**

Methods of prediction of heave, Empirical methods - double oedometer tests - soil moisture suction - field observations, shrinkage.

**FOUNDATION DESIGN**

Recommendations for type of foundation in expansive soils - Design consideration – Individual and continuous footings, stiffened mats, underreamed piles, codal provisions.

**STABILIZATION**

Method – mechanical stabilization – cement stabilization – bituminous stabilization – chemical stabilization – Thermal stabilization.

**TEXT / REFERENCE BOOKS**


1. Chenn. F.R., *Foundation on Expansive Soils* – Elsevier, 1973.
2. Parcher. J.V. & R.E. Means, *Soil Mechanics and Foundations*, Columbus, 1968.
3. Boominathan. S., *Lecture Notes on Structures on Expansive Soil*, 1990, College of Engineering, Guindy, Anna University, Chennai.

4. Park, R. and Paulay, T., *Reinforced Concrete Structures*, John Wiley & Sons, Inc., New York, 1981.
5. Purushothaman, P., *Reinforced Concrete Structural Elements*, Tata MacGraw Hill Publishing Company Limited, New Delhi, 1984.
6. Neville, A.M., *Properties of Concrete*, Pitman Publishing Co, London, 1973.

## C. MATERIAL SCIENCE

| | | L | T | P | C |
|---|---|---|---|---|---|
| **CIEMS1** | **CONCRETE TECHNOLOGY** | **3** | **0** | **0** | **3** |
| | **Prerequisite** | | | | |
| | **Nil** | | | | |

**PURPOSE**

To get exposed to behavioural aspects in concrete making and special concretes

**INSTRUCTIONAL OBJECTIVES**

1. To develop systematic knowledge of concrete constituents
2. To familiarize with the fundamentals of concrete
3. Principles involved for high performance concrete
4. To understand the basic concepts of special concretes
5. To introduce fundamentals of concreting methods

**CONCRETE MAKING MATERIALS**

Introduction to concrete technology- materials used for making concrete. Cement- types of cement - chemical composition of cement-hydration of cement-testing on cement: fineness-setting time-soundness-strength

Aggregate: classification of aggregate according to the formation, size and shape-properties of aggregate: physical properties - specific gravity-bulk density-porosity and absorption-moisture content-bulking of sand- mechanical properties - strength-crushing value-abrasion value-impact value. Sieve analysis-fineness modulus-grading curve-methods of combining aggregates-grading requirements as per IS Specifications. Water - quality of water-chemical admixtures – superplasticisers - different types.

**PROPERTIES OF CONCRETE**

Fresh concrete properties- hardened concrete properties- elastic properties-creep and shrinkage- durability properties-factors affecting fresh and concrete properties. Test on fresh concrete: workability - density-air content. Test on hardened concrete properties: compressive strength- modulus of rupture-modulus of elasticity- permeability –test on permeability- RCPT- half cell- construction and measurement- determination of $P^H$ of concrete-phenolphthalein test- water absorption. Non-destructive testing of concrete.

**MIX DESIGN**

Principles of mix design - grades of concrete-strength requirements of concrete-ordinary and controlled concrete-methods of proportioning- trail mixes-example on the design of mixes using BS method - BIS method-quality control.

**SPECIAL CONCRETE**

Introduction- types of special concrete - Properties, application and materials used for special concretes-mix design-: Light Weight Concrete (LWC) - High Strength Concrete (HSC) - High Performance Concrete (HPC) - Special considerations for curing- Fibre Reinforced Concrete (FRC) - Polymer Concrete (PC) -Ferro-Cement (FC) . Ready Mixed Concrete (RMC).

**CONCRETING OPERATIONS**

Process and manufacturing of concrete: Mixing-methods of transportation, placing and compacting- finishing-curing-different types of curing. Cold weather concrete-hot weather concrete-prepacked concrete- form work for concrete-Guniting- short-creting

**TEXT BOOKS**


1. M.S.Shetty, *Concrete Technology*, S. Chand and Company Ltd., Delhi, 1988.
2. Neville,A.M., *Properties of Concrete*, Longman Scientific & Technical, England, 2000.
3. SanthaKumar.A.R, *Concrete Technology*, Oxford University Press, New Delhi, 2007


**REFERNCE BOOKS**


1. Rixon, M.R., *Chemical Admixtures for Concrete*, John Wiley & Sons, 1977.
2. Krishnaraju.N., *Design of Concrete Mixes*, Sehgal Educational Consultants & Publishers Pvt. Ltd., Faridabad, 2002.
3. IS: 10262, *Recommended guidelines for Concrete Mix Design*, 1982.
4. Gambhir, *Concrete Technology*, 1995.
5. Varchney. R.S., *Concrete Technology*, Oxford and IBH Publishers, 1982.


## D. WATER RESOURCES ENGINEERING

| | | L | T | P | C |
|---|---|---|---|---|---|
| **CIEWR1** | **GROUNDWATER ENGINEERING** | **3** | **0** | **0** | **3** |
| | **Prerequisite** | | | | |
| | **Nil** | | | | |

**PURPOSE**

To understand the basic, principles and application of ground water engineering.

**INSTRUCTIONAL OBJECTIVES**

1. To understand the sources of ground water, aquifers, water occurrence in different types of rocks.
2. To understand the ground water potential theory, movement of ground water.
3. To study the various types of wells, construction, maintenance, etc.
4. To study the evaluation of aquifer parameter.
5. To study the ground water pollution, recharge of ground water, etc.

**GEO-HYDROLOGY**

Introduction – Water bearing formations – geological formation of water supply – subsurface distribution of water - hydrological cycle – sources of groundwater – types of aquifers – aquifer parameters – groundwater in different rocks.

**GROUNDWATER MOVEMENT**

Introduction – 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 – Thesis method – Jacob's method – Chow's method – Thesis recovery method – conditions to check for steady state – unconfined aquifer constants – well losses and well efficiency and well interfaces.

**WELLS AND EXPLORATION**

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.

**EVALUATION OF AQUIFER PARAMETERS**

Introduction – pumping test analysis – Recuperatation test - well characteristics – well capacity – confined aquifer and unconfined aquifer – hydraulics of open wells – groundwater investigation – geological methods – geophysical methods – remote sensing methods.

**ENVIRONMENTAL GROUNDWATER**

Groundwater development – hydrological maps – groundwater quality – groundwater contamination - seawater intrusion – control measures – Groundwater recharge – recharge methods – Groundwater modeling – Mathematical modeling – numerical modeling.

**TEXT BOOKS**


1. Todd D.K. *Groundwater Hydrology*, John Wiley and Sons, 1987.
2. Raghunath H.M. *Groundwater,* Wiley Eastern Ltd., 1986.


**REFERENCE BOOKS**


1. V.V.N. Murthy, *Land and Water Management Engineering*. 1985. Kalyani Publishers, New Delhi.


| | | L | T | P | C |
|---|---|---|---|---|---|
| **CIEWR2** | **COASTAL ZONE MANAGEMENT** | **3** | **0** | **0** | **3** |
| | **Prerequisite** | | | | |
| | **Nil** | | | | |

**PURPOSE**

To learn about the coastal features and to obtain knowledge about managing the coastal zone.

**INSTRUCTIONAL OBJECTIVES**

1. To know the basics and features of coastal waters and coastal ecosystems.
2. To study classification, characteristics, and theories of waves, tides and currents.
3. To learn about coastal processes and manmade structures.
4. To study the environmental impacts in coastal zone with seawater intrusion.
5. To learn about coastal zone management and the applications of RS and GIS in CZM.

**COASTAL FEATURES**

Basic Concepts – Coastal Waters, Estuaries, Wetlands and Lagoons – Pollution Stresses on Coastal Waters – Beaches – Types of Beaches – Beach Profiles – Longshore Drift – Marine Sediments –Sediment Transport, Texture, Composition and Distribution – Living Resources in the Coastal Zone and their Conservation and Utilization – Non-living Resources and their Exploration and Exploitation.

**WAVES, TIDES AND CURRENTS**

Waves – Classification – Characteristics – Wave Theories – Stokian, Solitary and Cnoidal Wave Theories – Water Particle Kinematics – Wave Energy – Wave Deformation – Reflection, Refraction, Diffraction and Breaking of

Waves – Wave Forecasting – Spectral Description of Ocean Waves – Tides – Currents – Classification of Currents – Scour and Other Effects of Currents.

**COASTAL PROCESSES AND MANMADE STRUCTURES**

Plate Tectonics and Coasts – Types of Coasts – Coastal Erosion – Causes, Effects and Protection – Shifting River Mouth and Delta Formation – Sea Level Change – Ocean Thermal Energy Conversion – Wave–Tidal Engineering Structures and Other Infrastructure in Coastal Zone – Wave Force on Structures.

**ENVIRONMENTAL IMPACTS IN COASTAL ZONE**

Land Use in Coastal Zone – Seawater Intrusion – Ghyben–Herzberg Relation – Sea Water and Fresh Water Interfaces – Upconing of Saline Water – Control of Seawater Intrusion – Desalination – Brackish Water Aquaculture and its Impact on Coastal Zone – Natural Hazards in Coastal Zone.

**COASTAL ZONE MANAGEMENT AND RS & GIS APPLICATIONS**

Coastal Zone Management – Concepts and Development – Database for Coastal Zone Management – Remote Sensing Data for CZM – GIS – Concepts and Models Used in Coastal Zone – Case studies.

**TEXT BOOKS**


1. Garrison, T., *Oceanography*, Wadsworth Publications, 1996.
2. Sorenson, R. M., *Coastal Zone Engineering*, Chapman & Hall, 1997.
3. Todd, D. K., *Groundwater Hydrology*, John Wiley & Sons, 1980.
4. *UNESCO Resources for CZM, Internet*.


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| **CIEWR3** | **ADVANCES IN IRRIGATION ENGINEERING** | **3** | **0** | **0** | **3** |
| | **Prerequisite** | | | | |
| | **Nil** | | | | |

**PURPOSE**

To learn about the irrigation engineering aspects and to obtain knowledge about operation and management of irrigation water.

**INSTRUCTIONAL OBJECTIVES**

1. To know the basics of irrigation.
2. To study the relationship between soil, plant and water.
3. To learn about importance, location and function various conveyance and distribution systems.
4. To study the problems and remedial measures of drainage and salinity.
5. To learn about irrigation water management.

**IRRIGATION**

Irrigation – definition – Need – Advantages and disadvantages – Sources of irrigation – Irrigation methods – Surface and subsurface – Pressurized irrigation – Drip, Sprinkler, Lift Irrigation.

**SOIL-PLANT-WATER RELATIONSHIP**

Soil-Water relationship – Field capacity – Permanent wilting point – Evapotranspiration, Potential evapotranspiration and Consumptive use – Measurements – Crop and cropping seasons – Assessment of crop water requirement – Net irrigation requirement – Duty and delta relationship.

**CONVEYANCE AND DISTRIBUTION SYSTEM**

Canal – Types of canals – Canal alignment – Canal Losses – Canal Lining – Distribution System – Weirs, Sluices, Barrages – Canal head works – Control structures – Drops, Escapes, Shutters – Opening devices and Diversion boxes – Cross drainage works.

**DRAINAGE AND SALINITY**

Water logging – Caused and Control – Salinity – Reclamation – Types – Drainage systems – Types.

**IRRIGATION WATER MANAGEMENT**

Irrigation Efficiencies – Need for optimization – Management and productivity – Participatory approach – On farm development – Command area development.

**TEXT BOOKS**


1. Asawa G.L., *Irrigation Engineering*, New Age International Publishers, 1996.
2. Asawa G.L., *Irrigation and Water Resources Engineering*, New Age International Publishers, 2007.


**REFERENCE BOOKS**


1. Santhosh Kumar Garg,, *Irrigation Engineering*, Khanna Publications, Delhi,2000.


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| **CIEWR4** | **HYDROLOGY** | **3** | **0** | **0** | **3** |
| | **Prerequisite** | | | | |

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| | **Nil** | | | | |

**PURPOSE**

To get exposure in the filed of hydrology.

**INSTRUCTIONAL OBJECTIVES**

1. To know the basic concepts in hydrology.
2. To study the features of precipitation, evaporation and infiltration.
3. To learn basics, estimation, and modeling of runoff.
4. To understand estimation, forecasting and control of flood.
5. To familiarize with computer applications in hydrology.

## HYDROLOGY

World's water resources – India's water resources – Hydrology – Hydrologic cycle – Hydrologic budget – Hydrometerology.

## PRECIPITATION, EVAPORATION AND INFILTRATION

Precipitation – Types – Measurement – Raingauge density – Estimate of missing data – Optimum rain gauge network – DAD curves – Analysis of rainfall data – Evaporation – Transpiration – Measurement and estimation – Pan evaporation – Blaney-Criddle method – Infiltration – Measurement and estimation - $\phi$ index, W index, Horton's model.

## RUNOFF

Runoff – Components of stream flow – Catchment characteristics – Factors affecting runoff – Estimation of runoff – Flow duration curve – Rainfall-runoff modeling – Hydrograph – Unit hydrograph – S-curve hydrograph – Synthetic hydrograph – Application –

## FLOOD ESTIMATION AND FORECASTING

Estimation of peak flood – Flood frequency studies – Methods of flood control – Flood routing thorough a reservoir – Channel flow routing – Muskingam method Flood forecasting and warning.

## COMPUTER APPLICATIONS IN HYDROLOGY

Hydrologic models – Determination of IUH – Synthetic stream flow – Flow at ungauged sited – Mass curves – Reservoirs capacity – Flood forecasting.

## TEXT / REFERENCE BOOKS


1. Linsley.R.L.,et.al., Kholer.M.A., Paulhus.J.L.H., Hydrology for Engineers, McGraw Hill International Book Company, 1982.
2. Raghunath.H.M., Hydrology : Principles, Analysis and Design, New Age Publications, 2006.
3. Ian Watson and Alister D.Burnett, Hydrology – An Environmental Approach, Lewis Publishers, 1995.

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| **CI – EWR5** | **HYDROPOWER ENGINEERING** | **3** | **0** | **0** | **3** |
| | **Prerequisite** | | | | |
| | **Nil** | | | | |

**PURPOSE**

The student is introduced to the concept of hydropower projects including investigation, planning and design aspects.

**INSTRUCTIONAL OBJECTIVES**

To introduce the concepts of

1. Hydropower plant development
2. Estimation hydropower potential
3. Diversion structures / Water Conductor system
4. Layout of generation system

**HYDROPOWER PLANT DEVELOPMENT**

Sources and forms of energy, types of power plants, elements of hydropower scheme, hydropower development in India and World – Hydropower plants classification – Layout and components- Development of hydropower schemes – Comparison of Hydro, thermal and nuclear power – Survey and Investigation – Concept of feasibility and detailed project reports- Review of IS codes.

**POWER POTENTIAL AND DIVERSION STRUCTURES**

Estimation of Hydropower potential – Flow duration curve, firm power, secondary power, Load and Load duration curves, Load factor, firm capacity, reservoir capacity, capacity factor,

**DAMS**

Selection of site, preliminary investigation, Final investigations, Types of dams/barrage:- Rigid dams, Gravity dams, Arch and buttress dams, Basic principles of design and details of construction – Earthen dams, rockfill dams, Design considerations – Types, spillway gates, Design of stilling basins.

**WATER CONDUCTOR SYSTEM**

Intake structures: Location function and types of intakes, energy losses at intake trash rock, design of intakes – Power canals, Alignment – Design of power canals – Flumes, Covered, conduits and tunnels – Drainage and ventilation in tunnels – Penstocks:- Alignment, types of penstock, economic diameter of penstocks, Anchor blocks.

**HRT AND SURGE TANKS**

Head Race Tunnel (HRT) – Types – Determination of optimum HRT size – Design – Adits – Rigid and elastic water column theories – water hammer pressure – Behavior of surge tanks, types of surge tanks, hydraulic design, design of simple surge tank- Stability.

**LAYOUT AND PARTS OF GENERATION SYSTEM**

General Layout of power house and arrangement of hydropower units – Design considerations- Tail Race Channel / Tunnel – Forebay – Types of Turbines and their utility- selection, characteristic curves, governing of turbine – Transmission system: General introduction - Financial implications of hydropower plants – Public Private Partnership in Hydropower projects.

**TEXT BOOKS**


1. Barrows, H.K. “Water Power Engineering”, Tata McGraw Hill Publishing Company Ltd., New Delhi, 1999.
2. Varshney, R.S. “Hydropower Structure “, Nem Chand Brothers, Roorkee, 2001.
3. Arora, K.R. “Irrigation water power and Water Resources Engineering”, Standard Publishers Distributers, Delhi,2002.


**References:**

1. Nigam, P.S. “Handbook of Hydroelectric Engineering “
2. Dandekar, M.M. “Water Power Engineering”
3. Deshmukh, M.M “Water Power Engineering “,Danpat Rai & Sons, Nai Sarak, Delhi, 1978.

Creager and Justin. “ Hydro Electric Handbook”, John Wiley & Sons New York.

## E. CONSTRUCTION MANAGEMENT

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| **CIECN1** | **PLANNING, ESTIMATING, CONTRACTS AND VALUATION** | **3** | **0** | **0** | **3** |
| | **Prerequisite** | | | | |
| | **Nil** | | | | |

**PURPOSE**

To study comprehensively the functional planning of building, estimate, specifications of works in buildings and the concept of tendering & contracting the works. And also the concepts and applications of valuation are to be studied.

**INSTRUCTIONAL OBJECTIVES**

1. To study the functional planning of buildings as per standards
2. To study the estimate types and terms involved in estimation
3. To study the important specifications necessary for the works in buildings
4. To study the concepts of tenders and contracts
5. To inculcate the concepts of valuation and their applications to buildings.

**FUNCTIONAL PLANNING OF BUILDINGS**

General –basic things – external influences – needs –internal planning – essential services – location – plot – types of buildings – provision of common amenities – layout approval – space around building – building plan approval - National Building Code – Indian Standard.

**ESTIMATE**

Estimate – estimating – types of estimates –how to prepare a detailed estimate – factors to be considered during the preparation of detailed estimate - Terms involved: quantity survey – plinth area – floor area – circulation area - carpet area – external services – complete estimate of a project – examples of preliminary estimate.

**SPECIFICATIONS AND TENDERS**

**Specifications**: Necessity of specifications – how to write specification – sources of information for specification - types of specifications – general specifications – detailed specifications – standard specification – special specifications – general specification of I, II, III, IV class building – detailed specification of earthwork – foundation concrete – CC 1:2:4 – RCC – DPC – Brickwork – plastering – pointing – floor – white wash – colour wash – painting.

**Tenders:** Tender form – tender documents – tender notice – tender types –scrutiny of tenders - acceptance of tender – work order – EMD – security deposit – model tender.

**VALUATION**

Valuation – value and valuation – purposes of valuation – different forms of value – out goings – factors affecting value of a property – sinking fund – depreciation - method of calculating depreciation – Year's purchase – fixation of rent.

**CONTRACTS**

Contracts – essentials of contracts – types of contracts – advantages and disadvantages – contract documents – contracts conditions – duties and liabilities of owner, engineer, and contractor – rights of contractor – standard measurement book – loss of M.book – refund of security deposit – model contract documents – termination of contracts.

**TEXT BOOKS**


1. *Estimating and Costing in Civil Engineering* – B.N.Dutta, S.Dutta & Company, Lucknow.
2. *Estimating, Costing and Specification in Civil Engineering* – M. Chakraborti, 21 b, Bhabananda road, Kolkatta-26.


**REFERENCE BOOKS**


1. *Civil Engineering Estimating & Costing* – V.N. Vazirani, S.P. Chandola, Khanna publishers, Delhi.
2. *How best to plan & build your home* – Debjani Raychaudhuri Dutt, Pustak mahal, Delhi.
3. *Elements of Estimating and Costing* – S.C.Rangwala, Charotar Publishing House, (W.RLY) India.
4. Lecture notes on *Development of Real Estate Business* Department of Civil Engineering, SRM Engineering College, 2002.


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| **CIECN2** | **CONSTRUCTION ECONOMICS AND FINANCIAL MANAGEMENT** | **3** | **0** | **0** | **3** |
| | **Prerequisite** | | | | |
| | **Nil** | | | | |

**PURPOSE**

To bring about an exposure to construction economics, financing and accounting methods and their usefulness in controlling construction projects.

**INSTRUCTIONAL OBJECTIVES**

1. To study the elements of construction economics
2. To study the need for financial management and means of achieving the same
3. To study a few accounting methods
4. To study the elements of lending to the contractors

**ECONOMICS**

Role of civil engineering in industrial development - Advances in civil engineering and engineering economics - Support matters of economy as related to engineering Market demand and supply choice of technology and quality control and quality production - Audit in economic, Law of returns governing production.

**CONSTRUCTION ECONOMICS**

Construction development in housing, transport and other infrastructures –Economics of ecology, environment, energy resources, local material selection, form and functional designs –Construction workers - Urban problems - Poverty - Migration -Unemployment - Pollution.

**FINANCING**

The need for financial management - Types of financing - Short term borrowing - Long term borrowing –Leasing - Equity financing - Internal generation of funds - External commercial borrowings - Assistance from government budgeting support and international finance corporations - analysis of financial statement – Balance Sheet - Profit and Loss account - Funds flow statement - Ratio analysis - Investment and financing decision –Financial control Job control and centralized management.

**ACCOUNTING METHOD**

General overview - Cash basis of accounting - Accrual basis of accounting - Percentage - Completion method - Completed contract method - Accounting for tax reporting purposes and financial reporting purposes.

**LENDING TO CONTRACTORS**

Loans to contractors - Interim construction financing - Security and risk aspects.

**REFERENCES:**


1. Warneer Z, Hirsch, "Urban Economics", Macmillan, New York, 1993.
2. Prasanna Chandra, "Project Management", TMH 1997.
3. Kwaku A, Tenah and jose M.Guevara, "Fundamental of Construction Management and organization", Prentice - Hall of India, 1995.
4. K K Chitkara, "Construction Project Management", Tata McGraw Hill.1998.


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| **CIECN3** | **QUALITY CONTROL AND SAFETY MANAGEMENT** | **3** | **0** | **0** | **3** |
| | **Prerequisite** | | | | |
| | **Nil** | | | | |

**PURPOSE**

To create a complete understanding on quality planning, quality assurance, quality control and safety management.

**INSTRUCTIONAL OBJECTIVES**

1. To understand the elements of quality planning and the implication
2. To become aware of objectives and advantage of quality assurance
3. To be exposed to means of quality control
4. To study the relationship between quality and safety management

**CONSTRUCT1ON ORGANISAT10N**

Types of organizations-Inspection. control and enforcement -Quality Management Systems and method - Responsibilities and authorities In quality assurances and quality Control- Architects, engineers, contractors, and special consultants, Quality circle.

**UNIT II QUALITY PLANNING**

Quality policy -Objectives and methods In Construction Industry -Consumers satisfaction, Economics-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 *I* QC programme and cost implication.

**QUALITY ASSURANCE**

Objectives -Regularity agent, owner, design, contract and construction oriented objectives, methods -Techniques and needs of QA/QC -Different aspects of quality - Appraisals, Factors Influencing construction quality.

**QUALITY CONTROL**

Critical, major failure aspects and failure mode analysis -Stability methods and tools, optimum design –Reliability testing- reliability coefficient and reliability prediction -Selection of new materials -Influence of drawings detailing, specification, standardization -Bid preparation- Reliability Based Design.

**SAFETY MANAGEMENT**

Construction activity, environmental safety. Social and environmental factors- Natural causes and speed of Construction -Life cycle costing- Reliability and Probabilistic methods-Value engineering and value analysis

**REFERENCES:**


1. James, J.O Brian, "Construction Inspection Handbook -Quality Assurance and Quality Control", Van Nostrand, New York(, 1989.
2. Kwaku, A., Tenah, Jose. M. Guevara, "Fundamentals of Construction Management and Organization", Reston Publishing Co., Inc., Virginia, 1985.
3. Juran Frank, J.M. and Gryna, F.M. "Quality Planning and Analysis", Tata McGraw Hill 1982.
4. Hutchins.G, "ISO 9000", Viva Books. New Delhi 1993.
5. Clarkson H. Oglesby, "Productivity Improvement in Construction", McGraw-Hill, 1989.
6. John L. Ashford, "The Management of Quality in Construction". E & F.N, Spon. New York, 1989.
7. Steven McCabe, "Quality Improvement Techniques in Construction", Addison Wesley Longman Ltd, England. 1998

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| **CIECN4** | **CONSTRUCTION PROJECT MANAGEMENT** | **3** | **0** | **0** | **3** |
| | **Prerequisite** | | | | |
| | **Nil** | | | | |

**PURPOSE**

To study the elements of construction project management consisting of owners' perspective, organization, design and construction procedures, resource utilization and cost estimation.

**INSTRUCTIONAL OBJECTIVES**

1. To study how the owner view a project in consideration with project life cycle, construction agencies legal requirements etc.
2. To study the various types of organization and their impact on and suitability to construction projects
3. To study the design and construction procedures along with labour material and equipment utilization
4. To study the elements of cost of a project

**THE OWNERS' PERSPECTIVE**

Introduction -The Project life Cycle -Major Types of construction- Selection of Professional Services -Construction Contractors -Financing of Constructed Facilities- Legal and Regulatory Requirements- The Changing Environment of the Construction Industry- The Role of Project Managers

**ORGANIZING FOR PROJECT MANAGEMENT**

What is Project Management? -Trends in Modern Management -Strategic Planning and Project Programming -Effects of Project Risks on Organization. Organization of Project Participants -Traditional Designer-Constructor Sequence. Professional Construction Management -Owner-Builder Operation –Turnkey Operation –Leadership and Motivation for the Project Team. Interpersonal Behavior in Project Organizations -Perceptions of Owners and Contractors

**THE DESIGN AND CONSTRUCTION PROCESS**

Design and Construction as an Integrated System- Innovation and Technological Feasibility -Innovation and Economic Feasibility -Design Methodology -Functional Design- Physical Structures-Geo-technical Engineering Investigation -Construction - Site Environment -Value Engineering -Construction Planning -Industrialized Construction and Pre-fabrication -computer-Aided Engineering.

**LABOUR, MATERIAL AND EQUIPMENT UTILIZATION**

Historical Perspective- Labor Productivity -Factors Affecting Job-Site Productivity- Labor Relations in Construction -Problems In Collective bargaining -Materials Management -Material Procurement and delivery -Inventory Control -Tradeoffs of Costs In Materials Management. –Construction equipment -Choice of Equipment and Standard Production Rates. Construction Processes Queues and Resource Bottle- necks

**COST ESTIMATION**

Costs Associated with Constructed Facilities -Approaches to Cost Estimation -Type of Construction Cost Estimates -Effects of Scale on Construction Cost -Unit Cost Method of Estimation- Methods for Allocation of Joint Costs -Historical Cost Data- Cost Indices. Applications of Cost Indices to Estimating -Estimate Based on Engineer's List of Quantities-Allocation of Construction Costs Over time -Computer Aided Cost Estimation- Estimation of Operating Costs.

**REFERENCES**


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- 1998.
3. Frederick E. Gould, "Construction Project Management", Went worth Institute of Technology, Vary E. Joyce, Massachusetts Institute of Technology, 2000.
4. Choudhury, S "Project Management", Tata McGraw-Hill Publishing company New Delhi 1988.
5. Ernest E. Ludwig. "Applied Project Engineering and Management", Gulf Publishing Company, Houstan, Texas, 1988.
6. Harold Kerzner, "Project Management -A Systems Approach to Planning Scheduling and Controlling", CBS Publishers & Distributors, Delhi1988.
7. Joy, P.K., "Total Project Management" -The Indian Context Management New Delhi 1982.


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| **CIECN5** | **MANAGEMENT INFORMATION SYSTEM** | **3** | **0** | **0** | **3** |
| | **Prerequisite** | | | | |
| | **Nil** | | | | |

**PURPOSE**

To study the various models of management information systems and their application to project management.

**INSTRUCTIONAL OBJECTIVES**

1. To bring about an exposure to information systems in a formal manner
2. To study the development of information systems
3. To study the means of applying information systems models to project management
4. To introduce system audit and to study its features.

**INTRODUCTION**

Information Systems -Establishing the Framework -Business Models -Information System Architecture- Evolution of formation Systems

**SYSTEM DEVELOPMENT**

Modern Information System -Systems Development-life Cycle-.Structured Methodologies -Designing Computer Based methods, Procedures Control- Designing Structured Programs.

**INFORMATION SYSTEMS**

Integrated Construction Management- Information System- Project Management- Information System- Functional Areas finance, Marketing Production, Personnel –levels, DSS, EIS, ES- Comparison Concepts and Knowledge representation –Managing

Inter- national Information System

**IMPLEMENTATION AND CONTROL**

Control -Testing Security- Coding Techniques- Defection of Error –Validating -Cost Benefit Analysis -Assessing the value and risk of Information System.

**SYSTEM AUDIT**

Software engineering qualities- Design. Production. Service, Software specification- Software Metrics, Software quality assurance –Systems Methodology -Objectives.

Time and Logic, Knowledge and Human Dimension -Software life cycle models- Verification and Validation.

**REFERENCES**


1. Kenneth C Laudon and Jane Price Laudon, "Management Information Systems. Organization and Technology", Prentice Hall, 1996.
2. Gordon B. Davis, "Management Information System: Conceptual Foundations Structure and Development", McGraw Hill 1974.
3. Joyce J Elam, "Case series for Management Information Systems", Simon and Schuster Custom Publishing, 1996.
4. Ralph H Sprague and Huge J Watson, "Decision Support for Managers, Prentice Hall 1996.
5. Michael W. Evans and John J Marciniah, "Software Quality Assurance and Management", John Wiley and Sons, 1987.
6. Card and Glass, "Measuring Software Design Quality", Prentice Hall. 1990.


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| CIECN6 | BUILDING SERVICES | 3 | 0 | 0 | 3 |
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| | **Prerequisite** | | | | |
| | **Nil** | | | | |

**PURPOSE**

To study the elements of building services like water supply sanitation, electrical installations air conditioning, and fire safety.

**INSTRUCTIONAL OBJECTIVES**

1. To study the components of water supply and sanitation arrangements in a building
2. To study the rudiments of electrical installations in a building
3. To bring about an exposure to air conditioning and fire safety arrangement
4. To introduce the concepts of intelligent building

**BUILDING SANITATION**

Water quality, Purification and treatment- water supply systems-distribution systems in small towns –types of pipes used- laying jointing ,testing-testing for water tightness plumbing system for building-internal supply in buildings-municipal bye laws and regulations - Rain Water Harvesting - Sanitation in buildings-arrangement of sewerage systems in housing -pipe systems- storm water drainage from buildings -septic and sewage treatment plant – collection, conveyance and disposal of town refuse systems –.

**ELECTRICAL INSTALLATIONS IN BUILDINGS**

Types of wires , wiring systems and their choice –planning electrical wiring for building –main and distribution boards –transformers and switch gears –modern theory of light and colour –synthesis of light –luminous flux – candela- lans of illumination-lighting design-design for modern lighting.

**AIR CONDITIONING SYSTEM AND APPLICATIONS**

Ventilation and its importance-natural and artificial systems-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.

**FIRE SAFETY –GENERAL PROVISIONS**

Causes of fire in buildings-safety regulations-NBC-planning considerations in buildings like Non-combustible materials, construction, staircases and A.C. systems, special features required for physically handicapped and elderly in building types-heat and smoke detectors-dry and wet risers-Automatic sprinklers - Capacity determination of OHT and UGT for fire fighting needs..

**ADVANCED TOPICS**

Intelligent buildings-Building automation-Smart buildings- Building services in high rise buildings.

REFERANCES**:**
1. G.M.Fair,J.C.Geyer and D.Okun, Water and Waste Engineering", Vol.II,John Wiley &sons,Inc.,New York. 1968.
2. R.G.Hopkinson and J.D.Kay, "The Lighting of Buildings, Faber and Faber", London, 1969.
3. "Hand book for Building Engineers in Metric Systems", NBC, New Delhi, 1968..
4. "Philips Lighting in Architecture Designs", McGraw Hill, New York, 1964.
5. "Time Saver Standards for Architecture Design Data", Callendar JH ,McGraw Hill, 1974.
6. William H.Severns and Julian R.Fellows, "Air conditioning and Refrigeration", John Wily and sons , London,1988.

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| **CIECN7** | **SHORING, SCAFFOLDING AND FORMWORK** | **3** | **0** | **0** | **3** |
| | **Prerequisite** | | | | |
| | **Nil** | | | | |

**PURPOSE**

To bring about a thorough exposure to all aspects of shoring, scaffolding and formwork by studying the materials, planning aspects, design and erection.

**INSTRUCTIONAL OBJECTIVES**

1. To study the materials associated with formwork
2. To study the design aspects of formwork under various requirements.
3. To study the planning and erection aspects of form work
4. To study about a few special types of forms

**MATERIALS AND ACCESSORIES**

Form work Lumber - Types - Finish - Sheathing ratio working stresses -Repetitive member stress - Plywood -Types and grades -Textured surfaces and strength - Reconstituted wood -Steel -Aluminum Form lining materials - Hardware and fasteners - Nails in Plywood -Bolts lag screws and connectors - Bolt loads.

**FORM AND SHORE DESIGN**

Design factors for form-concrete pressure on form work- Concrete density -Height of discharge -Temperature -Rates of Placing -Consistency of concrete - Live loads and wind pressure -Vibration Hydrostatic pressure and pressure distribution -Examples - Vertical loads - Uplift on shores -Adjustment for non-standard conditions.Basic simplification - Beam formulas - Allowable stresses - Deflection bending lateral stability - Shear, Bearing - Examples in wall forms - Slab forms - Beam forms - Ties, Anchors and Hangers - Column forms - Examples in each.

Simple wood stresses -Slenderness ratio -Allowable load -Tubular steel shores patented shores -Site Preparation, Size and spacing -Steel Tower Frames -Safety practices -Horizontal shores shoring for multi stories -More concentrated shore loads T -heads -Tow Tier wood shores -Ellis shores -Dayton sure grip and Baker Roos shores -Safway Symons shores -Beaver -advance shores Dead shore -Raking and Flying shores.

**PLANNING**

Overall Planning -detail planning - Standard units - Corner units – Schedule For column formwork - Formwork elements - Planning at Tender stage – Development of basic system - Planning for maximum reuse -Economical form construction – Planning examples -Crane size, effective scheduling estimate -Recheck plan details - Detailing the forms. Site equipment-Crane arrangements - Site layout plan - Transporting plant – Formwork beams - Formwork ties -Wales and ties -scaffold frames from accessories – Vertical transportable form work..

**ERECTION OF FORMWORK AND FORM WORK FAILURE**

Location of job mill -Storage -Equipment. Footings -wall footings -Column footings Sloped footing forms -Slab on grade and paving work -Highway and airport paving Curb and gutter forms -wall forms -External vibration - Prefabricated panel systems - Giant forms curved wall forms –Wall openings Joints -Tolerance for walls Erections Practices –column heads-Beam or girder forms -Beam pockets -Suspended forms- Suggested Tolerances -Concrete Joint construction -Flying system forms.

Causes of failures -Inadequate shoring Inadequate bracing of members –Improper vibration -Premature stripping - Errors In design -Failure to follow codes –How formwork affects concretes quality-ACI-Case studies- Planning for safety-Achieving economy -Finish of exposed concrete design deficiencies -Safety factors –Reshore installation - Prevention of rotation -Stripping sequence -Advantages of reshoring Material properties.

**SPECIAL TYPE OF FORMS**

Hemispherical, Parabolic, Translational typical barrel valuts, Hyperbolic Folded plates –Shell

form design considerations loads -Inserts, Anchors bolts -Building forms- Placing concrete –

Form removed -Strength requirements -Tunnel forming components -Curb forms Invert forms -Arch forms - Concrete placement methods - Cut and cover construction -General design considerations inf1uence of placing equipment -Tolerances -Form construction – Shafts.Slip forms-Principles -Types -advantages -Functions of various components-Planning - Desirable characteristics of concrete-Common problems faced -Safety In slip forms special structures built with slip form Technique -Codal provisions –Types of scaffolds -Putlog and Independent scaffold - Single pole scaffolds -Fixing ties Spacing of ties plan- bracing –knots safety net -Genera! safety requirement-precautions against particular hazards -Truss suspended -Gantry and system scaffolds – Shuttering for Precast members and continuous casting forms.

**REFERENCE**

1. Robert L. Peurifoy and Garold D. Oberlender, “Formwork For Concrete Structures”, McGraw- Hill, 1996.

2. Hurd, M.K., “Formwork for Concrete”, Special Publication No.4 Fifth Edition American Concrete Institute, Detroit, 1983.
3. Michael P. Hurst, “Construction Press”, London & New York, .
4. Austin, C.K., “Formwork for Concrete”, Cleaver- Hume Press ltd., London 1986.
5. Tudor Dinescu and Constantin Radulescu, “Slip Form Techniques” Abacus Press Tum Bridge Wells, Kent, 1982.
6. “Guide for Concrete Formwork”, American Concrete Institute, Box No. 9150, Michigan 48219..
7. “Safety Requirements for Scaffolding”, American National Standards Institute. Broadway, New York, 10018.
8. Indian Concrete Institute “Technical Monograph for Formwork”, 2002.

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| **CIECN8** | **CONSTRUCTION PERSONNEL MANAGEMENT** | **3** | **0** | **0** | **3** |
| | **Prerequisite** | | | | |
| | **Nil** | | | | |

**PURPOSE**

To introduce the elements of human behaviour and their impact on construction personnel management.

**INSTRUCTIONAL OBJECTIVES**

1. To bring about awareness on fundamentals of human behaviour under varying stress conditions.
2. To apply the studied behaviour pattern to manpower planning in organizational setups To study the means of management of construction personnel and utility of training as a tool for improvement.

**MANPOWER PLANNING**

Manpower Planning, Organizing, Staffing, directing, and controlling -Personnel Principles

**ORGANISATION**

Organization -Span of Control -Organization Charts -Staffing Plan -Development and Operation of human resources -Managerial Staffing -Recruitment -Selection - Placement,

**HUMAN BEHAVIOUR**

Introduction to the field of people management -basic Individual psychology- motivation -job deign and performance management -Managing groups at work - self-managing work teams-Intergroup behaviour and conflict in organizations – Leadership- Behavioral aspects of decision-making; and communication for people management

**MANAGEMENT AND DEVELOPMENT METHODS**

Compensation- Wages and Salary, Employee Benefits, employee appraisal and assessment- Employee services -Safety and Health -Discipline and discharge -Special Human resource problems, Performance appraisal -.Employee hand book and personnel manual -Job descriptions and organization structure and human relation.. -Productivity of Human resources.

**TRAINING AND DEVELOPMENT**

Identification of training needs- training calendar- outsourcing for training- in-house training- training to overcome deficiencies- evaluation of training.

**REFERENCES**


1. Carleton Counter II and Jill Justice Coutler, "The Complete Standard Handbook of Construction Personnel Management" Prentice Hall, Inc., New Jersey, 1989.
2. Memoria,C,B "Personnel Management", Himalaya Publishing Co., 1992.
3. Josy.J. Familaro, "Handbook of Human Resources Administration", McGraw-Hill Intemational Edition, 1987.
4. Pringle Charles, "Management Longenecker" Emerricle Publishing Company, 1981
5. Dwived R.S. "Human Relations and Organisational Behaviour BH -1987.


## F. GIS AND REMOTE SENSING

| | | L | T | P | C |
|---|---|---|---|---|---|
| **CIEGIS1** | **GEOGRAPHICAL INFORMATION SYSTEM** | **3** | **0** | **0** | **3** |
| | Prerequisite | | | | |
| | Nil | | | | |

**PURPOSE**

To appreciate the basic concepts, scope and application of the powerful tool of GIS.

**INSTRUCTIONAL OBJECTIVES**

1. To understand the GIS, background, development and components of GIS.
2. To study the how to data capturing for GIS techniques and data bank management.
3. To study the analysis of various spatial and non-spatial data in GIS.
4. To study the generation DEM and making model.
5. To appreciate the application GIS.

**INTRODUCTION**

Definition – Historical background – Concepts Development – Qualification – Requirements – Elements of GIS – Cartography – Map and Map analysis – Co-ordinate Systems.

**DATA BASE MANAGEMENT**

Introduction – Types of data – Spatial, Non-spatial data, Data input, Data output, Software modulus - Vector data – Raster data – merits and demerits.

**DATA ANALYSIS**

Introduction – Spatial data analysis – Non-spatial data analysis – Manipulation – Data retrieval – Query – Record modeling in GIS – Expert system.

**DIGITAL ELEVATION MODEL**
Introduction – Data capture – Generation of DEM – Parameters – Cost and Path analysis – Application of DEM.

**APPLICATION OF GIS**
Use of GIS in Resource mapping – Groundwater, Runoff modeling, Flood monitoring, Wetland management, Forest management, Land use and Land cover analysis, Regional and urban planning, Geology, Agriculture soil integrated with remote sensing.

**TEXT BOOKS**


1. Jeffrey Star and John Estes, *Geographical Information System – An Introduction*, Prentice Hall, 1990.
2. Chestern, *Geo Informational Systems – Application of GIS and Related Spatial Information Technologies*, ASTER Publication Co., 1992.
3. M.Anji reddy, *Remote sensing and Geographical information system*, B.S Publications, 2006


**REFERENCE BOOKS**


1. Agarwal C.S., *Remote Sensing*, Wheeler Publishing, 2000.
2. Burrough,P.A., *Principles of GIS for Land Resources Assessment*, Oxford Publication, 1980.
3. Robert Laurini, *Fundamental of Spatial Information Systems*, CPPS Publications, 1996.


## G. ENGINEERING GEOLOGY

| | | L | T | P | C |
|---|---|---|---|---|---|
| **CIEEG1** | **ROCK MECHANICS** | **3** | **0** | **0** | **3** |
| | Prerequisite | | | | |
| | Nil | | | | |

**PURPOSE**

To understand the basics, application of rock mechanics.

**INSTRUCTIONAL OBJECTIVES**

1. To understand the properties of rocks.
2. To study the various types of strength of rocks.
3. To study stress-strain relation of rocks.
4. To understand the what is grouting, system, testing.
5. To study the application of rocks for engineers.

**INDEX PROPERTIES OF ROCKS**

Introduction – Physical and Mechanical Properties of Rocks – Elastic Parameters of Rocks – Dynamic Property of Rocks – Static and Dynamic Module.

**ROCK STRENGTH**

Types of Waves – Theory of Wave Propagation – Factors influencing Wave Velocity in Rock Mass – Modest of Rock Failure – Strength of Rock – Shear – Tensile – Compressive – Measurements.

**DEFORMABILITY OF ROCKS AND STRESS**

Stress-Strain Behaviour – Initial Stress – Influence of Joints – Distribution of Stresses – Measurements of Initial Stresses.

**ROCK GROUTING**

Introduction – Grouting – Types of Grouting – Rock Bolt – Types – Systems – Testing of Rock Bolts.

**ROCK ENGINEERING**

Introduction – Application – Merits and Demerits – Tunneling – Rock Openings – Rocks for Mining Subsidence, Dam, Road Cuts, Slabs and Foundations.

**TEXT BOOKS**


1. Goodman.P.E., *Introduction of Rock Mechanics*, John Wiley and Sons, 1989.
2. Verma.B.P., *Rock Mechanics for Engineers*, Khanna Publication, 1997.


**REFERENCE BOOKS**


1. Brow.E.T., *Rock Characterisation*, Testing and Monitoring", Pergman Press, 1981.
2. Hock and Bray.J., *Rock Slate Engineering*, Institute of Mining and Metallurgy", 1981.
3. Stillburg, *Professional User Handbook for Rock Bolting*, Tran Tech Publications, 1989


## H. TRANSPORTATION ENGINEERING

| | | L | T | P | C |
|---|---|---|---|---|---|
| **CIET1** | **TRAFFIC ENGINEERING AND MANAGEMENT** | **3** | **0** | **0** | **3** |
| | **Prerequisite** | | | | |
| | **Nil** | | | | |

**PURPOSE**

To study in details about Traffic Engineering and Management.

**INSTRUCTIONAL OBJECTIVES**

1. To know the characteristics of traffic elements.
2. To know the traffic control measures.
3. To study about the driver and pedestrian behaviour.
4. To study about the scope of traffic management.

**CHARACTERISTICS OF TRAFFIC ELEMENTS**

Road user, vehicle, highway and street systems and environment, Geometric, design of roads – Lane, road width, classification of urban and rural roads, cross section of different classes of roads – surface characteristics – Camber, Gradient, extra width and super elevations – sight distance types of vertical and horizontal curves – Various types of intersections and interchanges.

**SPEED AND VOLUME STUDIES**

Definition of Various speeds Design speeds on classified roads – Surveys for evaluation – average speed of vehicles – Definition of capacity – Factors affecting capacity – Measurements of traffic volumes delays in road traffic flow.

**TRAFFIC CONTROL MEASURES**

Traffic designs, classification of usage – Road markings – various types – Color and materials used, traffic signals – Manual and automatic signals fixed and variable signals – Pedestrian signals recent trends in signal control traffics.

**ROAD ACCIDENTS**

Process of accidents – Driver and Pedestrian behaviors – road conditions – Inter section movements, mixed traffic flow – Data collection and analysis of locations, vehicles and time of occurrence.

**TRAFFIC MANAGEMENT**

Scope of traffic management – measures, restrictions of turning movements, one way streets tidal flow cycle tracks and exclusive bus lanes – Necessity of street lighting and various types of lighting arrangement and parking practice.

**TEXT BOOKS**


1. Kadiyali L.R., *Traffic Engineering and Transportation Planning*, 1989.
2. Justo and Khanna, *Highway Engineering 2000*.


**REFERENCE BOOKS**


1. Hobbs F.D. and Richardson P.R., *Traffic Engineering* Vol I & II Pergamon Press, London, 1967.
2. S.P. Bindra, *A course in Highway Engineering*, Dhanpat Rai & Sons, Delhi 1988.

3. Sharma, *Principles and Practice of Highway Engineering*, 1999.
4. Vazirani and Chandola, *Transportation Engineering*, Vol I, 2000.

| | | L | T | P | C |
|---|---|---|---|---|---|
| **CIET2** | **PAVEMENT ENGINEERING** | **3** | **0** | **0** | **3** |
| | **Prerequisite** | | | | |
| | **Nil** | | | | |

**PURPOSE**

To develop an understanding of the design, evaluation and maintenance of road pavements.

**INSTRUCTIONAL OBJECTIVES**

1. To provide an introduction to the types of pavement and factors affecting pavement stability.
2. Familiarize the student with the procedure used for pavement designs.
3. Provide method of evaluation and maintenance of roads.

**GENERAL PRINCIPLE OF PAVEMENT DESIGN**

Components of a road and their function – Factors affecting pavement stability – Equivalent Single wheel load – Vehicle and traffic factors, moisture, Climate and soil factors – Stress distribution in different conditions.

**FLEXIBLE PAVEMENT DESIGN**

Various approaches of flexible pavement design methods – empirical, Semi-empirical method – IRC design method.

**RIGID PAVEMENT DESIGN**

General design consideration – Stresses in concrete pavement- Design procedure as per IRC method – Design of different joints in concrete pavement and their functions.

**PAVEMENT EVALUATION AND STRENGTHENING**

Method of pavement evaluation – Distress in flexible pavements – Distress in rigid pavements – Structural evaluation of flexible and rigid pavements – Evaluation by deflection measurements.

**HIGHWAY MAINTENANCE**

Maintenance of Bituminous surface, Concrete roads and low cost roads – Maintenance of shoulders and drainage system.

**TEXT BOOKS**


1. S.K.Khanna and E.G.Justo, *Highway Engineering*, Nemchand Brothers, Rookee, 1987.
2. S.K.Sharma, *Principles, Practice and Design of Highway Engineering* – S.Chand & Co. Ltd., New Delhi, 1985.


**REFERENCE BOOKS**


1. Kadiyali,L.R., *Principles and Practice of Highway Engineering*, Khanna Tech. Publications, New Delhi, 2000.
2. *Guidelines for the Design of Flexible Pavements, IRC :37-1984*, The Indian Road Congress, New Delhi, 1984.
3. *Guidelines for the Design of Rigid Pavements for Highways*, IRC:58-1988, The Indian Road Congress, New Delhi, 1988.

## I. ENVIRONMENTAL ENGINEERING

| | | L | T | P | C |
|---|---|---|---|---|---|
| **CIEENV1** | **AIR POLLUTION AND MANAGEMENT** | **3** | **0** | **0** | **3** |
| | **Prerequisite** | | | | |
| | **Nil** | | | | |

**PURPOSE**

To study sources, dispersion, effects, and control air pollution.

**INSTRUCTIONAL OBJECTIVES**

1. To know the various sources of air pollution and their effect on human beings, materials and vegetation.
2. To learn about dispersion of air pollutant.
3. To study processes, approaches, and devices used to control air pollution.
4. To familiarize with control of gaseous pollutant.
5. To know about standards, monitoring, and indices of air quality with case studies of some industries.

**SOURCES AND EFFECTS OF AIR POLLUTANTS**

Classification of air pollutants – Particulates and gaseous pollutants – Sources of air pollution – Source inventory – Effects of air pollution on human beings, materials, vegetation, animals – global warming-ozone layer depletion, Sampling and Analysis – Basic Principles of Sampling – Source and ambient sampling – Analysis of pollutants – Principles.

**DISPERSION OF POLLUTANTS**

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

**IR POLLUTION CONTROL**

Concepts of control – Particulates control by gravitational, centrifugal, filtration, scrubbing, electrostatic precipitation – Selection criteria for equipment - gaseous pollutant control by adsorption, absorption, condensation,

combustion .

**AIR QUALITY MANAGEMENT**

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

**NOISE POLLUTION**

Sources of noise pollution – Effects – Assessment - Standards – Control methods - Prevention

**TEXT BOOKS**


1. Anjaneyulu, D., *Air Pollution and Control Technologies*, Allied Publishers, Mumbai, 2002.
2. Rao, C.S., *Environmental Pollution Control Engineering*, Wiley Eastern Ltd., New Delhi, 1996.
3. Rao M.N., and Rao H. V. N., *Air Pollution Control*, Tata-McGraw-Hill, New Delhi, 1996.


**REFERENCES**


1. W.L.Heumann, *Industrial Air Pollution Control Systems*, McGraw-Hill, New Yark, 1997
2. Mahajan S.P., *Pollution Control in Process Industries*, Tata McGraw-Hill Publishing Company, New Delhi, 1991.
3. Peavy S.W., Rowe D.R. and Tchobanoglous G. *Environmental Engineering*, McGraw Hill, New Delhi, 1985.
4. Garg, S.K., *Environmental Engineering,* Vol. II", Khanna Publishers, New Delhi
5. Mahajan, S.P., *Pollution Control in Process Industries*, Tata McGraw-Hill, New Delhi, 1991


| | | L | T | P | C |
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| **CIEENV2** | **ENVIRONMENTAL HEALTH ENGINEERING** | **3** | **0** | **0** | **3** |
| | **Prerequisite** | | | | |
| | **Nil** | | | | |

**PURPOSE**

To get exposure in the field of environmental health engineering.

**INSTRUCTIONAL OBJECTIVES**

1. To know the characteristic, collection, conveyance, disposal of refuse.
2. To study the aspects of health full housing like ventilation and air conditioning.
3. To learn about characteristics, transmission, and control of diseases.
4. To obtain knowledge on milk sanitation.
5. To familiarize with sources, effects, prevention, and control of air and noise pollution.

**REFUSE SANITATION**

Refuse - definition & terms connected with it - quality and characteristics of refuse - collection, conveyance and disposal methods - waste recycling - biogas and gobar gas plants.

**VENTILATION AND AIR CONDITIONING**

Basic principles of health full housing - heating, ventilation, lighting and conditioning -definition - composition of air - airspace requirements - other effects on human occupancy -systems of ventilation - air conditioning systems.

**MALARIA INCIDENTAL TO ENGINEERING**

Introduction - mosquito characteristics - transmission of diseases -engineering aspect of the problem - control measures.

**FOOD AND MILK SANITATION**

Food borne diseases - bacterial treatment of kitchen utensils - bacteriological contents of milk sanitation - dairy barn sanitation - pasteuration methods - milk test.

**AIR AND NOISE POLLUTION CONTROL**

Pollutants and their sources - effects on human health, vegetation and climate - prevention and control of air pollution - air pollution control legislation - noise pollution - sources and effects - control measures.

**TEXT BOOKS**


1. Park J.E. and Park K., *Text Book of Presenting and Social Medicine*, M/s Banarsidos - Bhanot, Jalapur, 1980.

2. Salvato, *Environmental Sanitation*, John Wiley and Sons, New York 1982.


**REFERENCE BOOKS**


1. P.F Cuniff, *Environmental Noise Pollution*, John Wiley and Sons, New York 1987.

2. Garg, S.K. *Environmental Engineering*, Khanna Publication 2000.

3. Duggal K.N., *Elements of Environmental Engineering*, "S. Chand & Company Ltd. 2002.

| | | L | T | P | C |
|---|---|---|---|---|---|
| **CIEENV3** | **ENVIRONMENTAL IMPACT STUDIES** | **3** | **0** | **0** | **3** |
| | **Prerequisite** | | | | |
| | **Nil** | | | | |

**PURPOSE**

To get exposure in the field of environmental impact studies.

**INSTRUCTIONAL OBJECTIVES**

1. To know the objectives, capability, and limitations of environmental impact assessment.
2. To learn methodologies and legal aspects of environmental impact assessment.
3. To study socio economic impact assessment.
4. To obtain knowledge in impact of air quality and noise impact.
5. To familiarize with impact of energy, water quality, vegetation, and wild life.

**INTRODUCTION**

Impact of development on environment and Environmental impact assessment (EIA) and Environmental Impact Statement (EIS) - objectives - Historical perspective of environmental protection laws and acts in India - EIA capability and limitations - Legal Provision On EIA.

**METHODOLOGIES AND LEGAL ASPECTS**

Methods of EIA-strength, weakness and applicability - Appropriate methodology- constitutional provisions, fiscal incentive for environmental protection, minimum national standards Bureau of Indian Standards and WHO standards.

**SOCIO ECONOMIC IMPACT**

Types, steps in performing socioeconomic impact assessment, analysis of public services and facilities impacts, social impacts, impacts of economic profile of the community.

**AIR QUALITY IMPACT AND NOISE IMPACT**

Background - typical considerations and factors, air quality impact of industry, transport systems, human settlements, mitigation methods -Noise and sound, the effects of noise on people, noise scales and rating methods, estimating transportation -noise impact.

**ENERGY IMPACT, WATER QUALITY IMPACT AND VEGETATION AND WILD LIFE IMPACT**

Energy Impact considerations, data sources, energy conservation data - EIA of hydro thermal and nuclear power plants -Water quality criteria and standards, waste quality impacts by development projects –Vegetation impact - wild life impact -Biological concepts and terms , impact on flora and fauna, mitigating measures and alternatives.

**TEXT BOOKS**


1. Canter.R.L, *Environmental Impact Assessment*, McGraw Hill, New Delhi, 1996.

2. Shukla,S.K., Srivastava.P.R., *Concepts in Environmental Impact Analysis*, Common Wealth Publishers, New Delhi, 1992.


**REFERENCE BOOKS**


1. Barathwal.R.R., *EIA*, New age International publishers

2. John G. Rau and David C. Hooten (Ed), *EIA Handbook*, McGraw Hill Book Company, 1990.

3. Judith Petts, *Handbook of Environment IA*. Vol I and II Backwell Science, 1999.

4. *Environmental Assessment Source book*", Vol. I, II & III ,The World Bank, Washington, D.C, 1991.

| | | L | T | P | C |
|---|---|---|---|---|---|
| **CIEENV4** | **INDUSTRIAL WASTE MANAGEMENT** | **3** | **0** | **0** | **3** |
| | **Prerequisite** | | | | |
| | **Nil** | | | | |

**PURPOSE**

To study sources, effects, and control measures of industrial waste.

**INSTRUCTIONAL OBJECTIVES**

This subject deals with the pollution from major industries and methods of controlling the same. The student is expected to know about the polluting potential of major industries in the country and the methods of controlling the same.

**INTRODUCTION**

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

**CLEANER PRODUCTION**

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

**POLLUTION FROM MAJOR INDUSTRIES**

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

**TREATMENT TECHNOLOGIES**

Equalisation – Neutralisation - Combined treatment of industrial and municipal wastes – Residue management – Dewatering - Disposal

**HAZARDOUS WASTE MANAGEMENT**

Hazardous wastes - Physico chemical treatment – solidification – incineration – Secured land fills

**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.


**REFERENCES**


1. T.T.Shen, *Industrial Pollution Prevention*, Springer, 1999.
2. R.L.Stephenson and J.B.Blackburn, Jr., *Industrial Wastewater Systems Hand book*, Lewis Publisher, New Yark, 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.


| | | L | T | P | C |
|---|---|---|---|---|---|
| **CIEENV5** | **MUNICIPAL SOLID WASTE MANAGEMENT** | **3** | **0** | **0** | **3** |
| | **Prerequisite** | | | | |
| | **Nil** | | | | |

**PURPOSE**

To study sources, disposal, effects, and management of solid waste.

**INSTRUCTIONAL OBJECTIVES**

This subject covers the various sources and characterization of municipal solid wastes and the on-site/off-site processing of the same and the disposal methods. The student is expected to know about the various effects and disposal options for the municipal solid waste.

**SOURCES AND TYPES OF MUNICIPAL SOLID WASTES**

Sources and types of solid wastes - Quantity – factors affecting generation of solid wastes; characteristics – methods of sampling and characterization; Effects of improper disposal of solid wastes – public health effects. Principle of solid waste management – social & economic aspects; Public awareness.

**ON-SITE STORAGE & PROCESSING**

On-site storage methods – materials used for containers – on-site segregation of solid wastes – public health & economic aspects of storage – options under Indian conditions – Critical Evaluation of Options.

**COLLECTION AND TRANSFER**

Methods of Collection – types of vehicles – Manpower requirement – collection routes; transfer stations – selection of location, operation & maintenance; options under Indian conditions.

**OFF-SITE PROCESSING**

Processing techniques and Equipment; Resource recovery from solid wastes – composting, incineration, Pyrolysis - options under Indian conditions.

**DISPOSAL**

Dumping of solid waste; sanitary land fills – site selection, design and operation of sanitary landfills – Leachate collection & treatment

**TEXT BOOKS**


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


**REFERENCES**

1. *Manual on Municipal Solid Waste Management*, CPHEEO, Ministry of Urban Development, Government of India, New Delhi, 2000

2. R.E.Landreth and P.A.Rebers, *Municipal Solid Wastes – problems and Solutions*, Lewis Publishers, 1997.

3. Bhide A.D. and Sundaresan, B.B., *Solid Waste Management in Developing Countries*, INSDOC, 1993.