Bachelor of Technology (B. Tech.)
in
Civil Engineering

Curriculum and Syllabus 2007

Faculty of Engineering and Technology
SRM University

SRM Nagar, Kattankulathur
Kancheepuram District
Tamilnadu, India, 603203
www.srmuniv.ac.in

CURRICULUM

The minimum credit hours and distribution in accordance with the current syllabus are given in the following tables. The following notations are used:

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, mathematics, physics, chemistry, biology, geology, and environmental science

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

L – Lecture Hours   T – Tutorial Hours   P – Practical Hours   C – Credits

I year

COURSE CODE	COURSE NAME	Category	L	T	P	C
SEMESTER 1						
THEORY						
LE 0101	ENGLISH	G	1	0	2	2
MA 0101	MATHEMATICS I	B	3	2	0	4
PH 0101	PHYSICS	B	3	0	0	3
CY 0101	CHEMISTRY	B	3	0	0	3
GE 0101	BASIC ENGINEERING I	E	4	0	0	4
PRACTICAL						
PD 0101	PERSONALITY DEVELOPMENT I *	G	1	0	1	0
GE 0107	NCC / NSS / NSO /YOGA	G	0	0	2	1
PH 0103	PHYSICS LABORATORY	B	0	0	2	1
CY 0103	CHEMISTRY LABORATORY	B	0	0	2	1
GE 0105	COMPUTER LITERACY	G	0	0	2	1
ME 0130	ENGINEERING GRAPHICS	E	1	0	4	3
Total			16	2	15	23
Total Contact Hours			33			
SEMESTER II						
THEORY						
GE 0108	VALUE EDUCATION	G	1	0	0	1
MA 0102	MATHEMATICS II	B	3	2	0	4
PH 0102	MATERIAL SCIENCE	B	2	0	2	3
GE 0102	BIOLOGY FOR ENGINEERS	B	2	0	0	2
GE 0104	PRINCIPLES OF ENVIRONMENTAL SCIENCE	B	2	0	0	2
GE 0106	BASIC ENGINEERING II	E	4	0	0	4
CE 0102	ELEMENTS OF BUILDING MATERIAL SCIENCE AND ARCHITECTURE	P	4	0	0	4
PRACTICAL						
PD 0102	PERSONALITY DEVELOPMENT II *	G	1	0	1	0
CS 0140	COMPUTER PRACTICE	E	1	0	2	2
ME 0120	WORKSHOP PRACTICE	E	0	0	4	2
CE 0104	COMPUTER AIDED BUILDING DRAWING	P	0	0	4	2
Total			20	2	13	26
Total Contact Hours			35			

II Year

COURSE CODE	COURSE NAME	Category	L	T	P	C
SEMESTER III						
THEORY						
LE 0201/LE 0203 / LE 0205	GERMAN LANGUAGE PHASE I / JAPANESE LANGUAGE PHASE I / FRENCH LANGUAGE PHASE I	G	2	0	0	2
MA 0201	MATHEMATICS III	B	3	2	0	4
CE 0201	MECHANICS OF SOLIDS	E	3	2	0	3
CE 0203	ENGINEERING GEOLOGY	B	3	0	0	3
CE 0205	FLUID MECHANICS	P	3	0	0	3
CE 0207	SURVEYING	P	3	0	0	3
CE 0209	BUILDING TECHNOLOGY	P	3	0	0	3
PD 0201A	PERSONALITY DEVELOPMENT III	G	2	0	0	1
PRACTICAL						
CE 0211	SURVEY LABORATORY I	P	0	0	4	2
CE 0213	STRENGTH OF MATERIALS LABORATORY	P	0	0	4	2
Total			22	4	8	26
Total Contact Hours			34			
SEMESTER IV						
THEORY						
LE 0202/LE 0204/ LE 0206	GERMAN LANGUAGE PHASE II / JAPANESE LANGUAGE PHASE II / FRENCH LANGUAGE PHASE II	G	2	0	0	2
MA 0202	NUMERICAL METHODS	B	3	2	0	4
CE 0202	STRENGTH OF MATERIALS	P	2	2	0	3
CE 0204	STRUCTURAL DESIGN I (STEEL & LIGHT GAUGE SECTIONS)	P	3	0	0	3
CE 0206	APPLIED HYDRAULIC ENGINEERING	P	3	0	0	3
CE 0208	ADVANCED SURVEYING AND REMOTE SENSING	P	3	0	0	3
CE 0210A	COMPREHENSION I	P	0	2	0	1
PD 0202A	PERSONALITY DEVELOPMENT IV	G	2	0	0	1
PRACTICAL						
CE 0212	CONCRETE AND HIGHWAY LABORATORY	P	0	0	2	1
CE 0214	SURVEY LABORATORY II AND SURVEY CAMP	P	0	0	4	2
Total			18	6	6	23
Total Contact Hours			30			

III Year

COURSE CODE	COURSE NAME	Category	L	T	P	C
SEMESTER V						
THEORY						
CE 0301	STRUCTURAL ANALYSIS I	P	2	2	0	3
CE 0303	STRUCTURAL DESIGN II	P	3	0	0	3
CE 0305	SOIL MECHANICS	P	2	2	0	3
CE 0307	ENVIRONMENTAL ENGINEERING I	P	3	0	0	3
CE 0309A	HYDRAULIC AND IRRIGATION STRUCTURES	P	3	0	0	3
PD 0301A	PERSONALITY DEVELOPMENT V	G	2	0	0	2
PRACTICAL						
CE 0311	SOIL MECHANICS LABORATORY	P	0	0	4	2
CE 0313A	HYDRAULIC ENGINEERING LABORATORY AND IRRIGATION CAMP	P	0	0	4	2
CE 0315	INDUSTRIAL TRAINING I (Training to be undergone after IV semester)	P	0	0	2	1
Total			**15**	**4**	**10**	**22**
Total Contact Hours				**29**		
SEMESTER VI						
THEORY						
CE 0302	STRUCTURAL ANALYSIS II	P	2	2	0	3
CE 0304	STRUCTURAL DESIGN III	P	3	0	0	3
CE 0306	FOUNDATION ENGINEERING	P	2	2	0	3
CE 0308	ENVIRONMENTAL ENGINEERING II	P	3	0	0	3
CE 0314	IRRIGATION STRUCTURES - DESIGN AND DRAWING	P	2	0	2	3
PD 0302A	PERSONALITY DEVELOPMENT VI	G	2	1	0	2
PRACTICAL						
CE 0310A	COMPREHENSION II	P	0	0	2	1
CE 0312	ENVIRONMENTAL ENGINEERING LABORATORY	P	0	0	4	2
Total			**14**	**5**	**8**	**20**
Total Contact Hours				**27**		

IV Year

COURSE CODE	COURSE NAME	Category	L	T	P	C
SEMESTER VII						
THEORY						
CE 0403	TRANSPORTATION ENGINEERING	P	3	0	0	3
CE 0407	EARTHQUAKE RESISTANT AND SPECIAL STRUCTURES	P	3	0	0	3
MA0461	PROBABILITY AND STATISTICS	B	3	0	0	3
E1	ELECTIVE I	P	3	0	0	3
E2	ELECTIVE II	P	3	0	0	3
PRACTICAL						
CE 0409A	PROJECT WORK PHASE I	P	0	0	2	1
CE 0411	ESTIMATING, COSTING AND PROFESSIONAL PRACTICE	P	0	0	4	2
CE 0413	INDUSTRIAL TRAINING II (Training to be undergone after VI semester)	P	0	0	2	1
Total			15	0	8	19
Total Contact Hours			23			
SEMESTER VIII						
THEORY						
CE 0402	CONSTRUCTION PLANNING AND MANAGEMENT	P	3	0	0	3
E3	ELECTIVE III	B	3	0	0	3
E4	ELECTIVE IV	P	3	0	0	3
PRACTICAL						
CE 0404A	PROJECT WORK PHASE II	P	0	0	16	8
CE 0406	COMPREHENSIVE VIVA	P	0	0	2	1
Total			9	0	18	18
Total Contact Hours			27			

LIST OF ELECTIVES

COURSE CODE	COURSE NAME	Category	L	T	P	C
A. STRUCTURAL ENGINEERING						
CE-EST1	COMPUTER ANALYSIS OF STRUCTURES	P	3	0	0	3
CE-EST2	COMPUTER AIDED DESIGN OF STRUCTURES	P	3	0	0	3
CE-EST3	TALL BUILDINGS	P	3	0	0	3
CE-EST4	STORAGE AND INDUSTRIAL STRUCTURES	P	3	0	0	3
CE-EST5A	PRESTRESSED CONCRETE STRUCTURES	P	3	0	0	3
CE-EST6	ADVANCED STRUCTURAL DESIGN	P	3	0	0	3
B. GEOTECHNICAL ENGINEERING						
CE-EGT1	GROUND IMPROVEMENT TECHNIQUES	P	3	0	0	3
CE-EGT2	INTRODUCTION TO SOIL DYNAMICS AND MACHINE FOUNDATION	P	3	0	0	3
CE-EGT3	ENVIRONMENTAL GEO TECHNOLOGY	P	3	0	0	3
CE-EGT4	STRUCTURES ON EXPANSIVE SOIL	P	3	0	0	3
C. MATERIAL SCIENCE						
CE-EMS1	CONCRETE TECHNOLOGY	P	3	0	0	3
D. WATER RESOURCES ENGINEERING						
CE-EWR1	GROUNDWATER ENGINEERING	P	3	0	0	3
CE-EWR2	COASTAL ZONE MANAGEMENT	P	3	0	0	3
CE-EWR3	ADVANCES IN IRRIGATION ENGINEERING	P	3	0	0	3
CE-EWR4	HYDROLOGY	P	3	0	0	3
CE-EWR5	HYDROPOWER ENGINEERING	P	3	0	0	3
E. CONSTRUCTION MANAGEMENT						
CE-ECN1	PLANNING, ESTIMATING, CONTRACTS AND VALUATION	P	3	0	0	3
CE-ECN2	ADVANCED CONSTRUCTION TECHNIQUES	P	3	0	0	3
F. GIS AND REMOTE SENSING						
CE-EGIS1A	GEOGRAPHICAL INFORMATION SYSTEM	P	3	0	0	3
G. ENGINEERING GEOLOGY						
CE-EEG1	ROCK MECHANICS	P	3	0	0	3

H. TRANSPORTATION ENGINEERING						
CE-ET1	TRAFFIC ENGINEERING AND MANAGEMENT	P	3	0	0	3
CE-ET2	PAVEMENT ENGINEERING	P	3	0	0	3
I. ENVIRONMENTAL ENGINEERING						
CE-EENV1	AIR POLLUTION AND MANAGEMENT	P	3	0	0	3
CE-EENV2	ENVIRONMENTAL HEALTH ENGINEERING	P	3	0	0	3
CE-EENV3	ENVIRONMENTAL IMPACT STUDIES	P	3	0	0	3
CE-EENV4	INDUSTRIAL WASTE MANAGEMENT	P	3	0	0	3
CE-EENV5	MUNICIPAL SOLID WASTE MANAGEMENT	P	3	0	0	3

SUMMARY OF CREDITS										
Semester	**I**	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VIII**	**Total**	**%**
Total	**23**	**26**	**26**	**23**	**22**	**20**	**19**	**18**	**177**	**100**
G	4	1	3	3	2	2	0	0	15	8.5
B	12	11	7	4	0	0	3	0	37	20.9
E	7	8	3	0	0	0	0	0	18	10.1
P	0	6	13	16	20	18	16	18	107	60.5
Total credits to be earned for the award of the degree: 177										

		L	T	P	C
LE 0101	**English**	**1**	**0**	**2**	**2**
	Prerequisite				
	Nil				

PURPOSE

To provide an adequate mastery of technical communicative English Languages training primarily, reading 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 - Practice Questions. Note Taking: Note Taking Strategies.

SPEAKING

Definitions: Expressing Opinions (agreement/ disagreement) - Offering Suggestion - Technical Definition - Defining - 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 Report Writing - Lab Report - Exercise.Letter Writing: Formal Letters - Letter to the Editor - Letter Inviting Dignitaries - Letter of Application - Placing an Order - Placing 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 and test performance of the students marks may be awarded.

TEXT BOOKS

- Abraham Benjamin Samuel '*Practical Communication (Communicative English) LSRW2000*' - SRMEC - June 2002 Edition
- Staff of the Department of Humanities and Social Science, Anna University, "*English for Engineers/ BEC and Technologist Vol.-I*". Orient Longman, 1990

REFERENCE BOOKS

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

	LE0101 English (R)											
	Course designed by	Department of English and Foreign Languages										
1	Student outcome	a	b	c	d	e	f	g	h	i	j	k
								x				
2	Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts (E)			Professional Subjects (P)			
		x										
3	Broad area (for 'P'category)	Structural Engineering		Geotechnical Engineering		Water Resources Engineering			Geomatics Engineering			
4	Course Coordinator	Dr. K. Anbazhagan										

		L	T	P	C
MA0101	**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 - Coplanar lines - Shortest distance between skew lines - Sphere - Tangent plane - Plane section of a sphere - Orthogonal spheres.

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

REFERENCE BOOKS

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

MA0101 Mathematics I (R)													
	Course designed by	Department of Mathematics											
1	Student outcome	a	b	c	d	e	f	g	h	i	j	k	
		x				x							
2	Category	General (G)			Basic Sciences (B)		Engineering Sciences and Technical Arts (E)			Professional Subjects (P)			
					x								
3	Broad area (for 'P'category)	Structural Engineering		Geotechnical Engineering		Water Resources Engineering			Geomatics Engineering				
4	Course Coordinator	Dr. K. Ganesan											

		L	T	P	C
PH0101	Physics	3	2	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:
- To understand the general scientific concepts required for technology,
- Apply the concepts in solving engineering problems,
- Explain scientifically the new developments in engineering and technology, and
- 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 - Pointing 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

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

REFERENCE BOOKS

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

PH0101 Physics (R)											
Course designed by	Department of Physics										
1 Student outcome	a	b	c	d	e	f	g	h	i	j	k
	x				x						
2 Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts (E)			Professional Subjects (P)			
			x								
3 Broad area (for 'P'category)	Structural Engineering		Geotechnical Engineering		Water Resources Engineering			Geomatics Engineering			
4 Course Coordinator	Dr. D. John Thiruvadigal Dr. C. Kumar										

		L	T	P	C
CY0101	**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
- The role of applied chemistry in the field of engineering
- The knowledge of water quality parameters and the treatment of water
- The principles involved in corrosion and its inhibitions
- Important analytical techniques, instrumentation and the applications
- 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.

PHASE EQUILIBRIA
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

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

REFERENCE BOOKS

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

<table>
<tr><td colspan="6" align="center">CH0101 Chemistry (R)</td></tr>
<tr><td colspan="2">Course designed by</td><td colspan="4">Department of Chemistry</td></tr>
<tr><td rowspan="2">1</td><td rowspan="2">Student outcome</td><td>a</td><td>b</td><td>c</td><td>d</td><td>e</td><td>f</td><td>g</td><td>h</td><td>i</td><td>j</td><td>k</td></tr>
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<tr><td colspan="2"></td><td colspan="2"></td><td colspan="2"></td><td colspan="2"></td></tr>
<tr><td>4</td><td>Course Coordinator</td><td colspan="4" align="center">Dr. R. Jeyalakshmi
Dr. P. Kamaraj</td></tr>
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		L	T	P	C
GE0101	**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
- To know about different materials and their properties
- Engineering aspects related to buildings
- To know about importance of Surveying
- To know about the transportation systems
- 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 waycomponents 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
- Raju K.V.B., Ravichandran P.T., *Basics of Civil Engineering*, Ayyappa Publications, Chennai, 2000
- Ramesh Babu, *Civil Engineering* , VRB Publishers, Chennai, 2000

REFERENCE BOOKS
- Rangwala,S.C., *Engineering Materials*, Charotar Publishing House, Anand, 1980
- National Building Code of India, Part V, *Building Materials*, 2005
- Surendra Singh, *Building Materials*, Vikas Publishing Company, New Delhi, 1996.

GE0101 Basic Engineering – I (R)										
Course designed by	Department of Civil Engineering									
1 Student outcome	a	b	c	d	e	f	g	h	i	j	k
	x				x		x				x

2	Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts(E)		Professional Subjects(P)	
						x			

3	Broad area (for 'P'category)	Structural Engineering		Geotechnical Engineering		Water Resources Engineering		Geomatics Engineering	

4	Course Coordinator	Mr. G. Venkatasamy

PART B MECHANICAL ENGINEERING

PURPOSE
To familiarize the students with the basics of Mechanical Engineering.

INSTRUCTIONAL OBJECTIVES
To familiarize with
• The basic machine elements
• The Sources of Energy and Power Generation
• 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 **Simple Problems**

TEXT BOOKS

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

REFERENCE BOOKS

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

GE0101 Basic Engineering – I (R)										
Course designed by	Department of Mechanical Engineering									
1 Student outcome	a	b	c	d	e	f	g	h	i	j	k
	x				x						
2 Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts(E)			Professional Subjects(P)			
						x					
3 Broad area (for 'P' category)	Structural Engineering		Geotechnical Engineering		Water Resources Engineering			Geomatics Engineering			
4 Course Coordinator	Dr.T.V.Gopal										

PD 0101	PERSONALITY DEVELOPMENT - I	L	T	P	C
	Prerequisite	1	0	1	0
	Nil				

PURPOSE
To enhance holistic development of students and improve their employability skills

INSTRUCTIONAL OBJECTIVES
- To guide thought process
- To groom students' attitude
- To develop communication skill
- To build confidence

SOFT SKILL - 1

UNIT – I
Self Analysis

UNIT- II
Attitude and Change Management

UNIT – III
Motivation

UNIT – IV
Goal Setting and Time Management

UNIT – V
Creativity

TEXT BOOK:
- INSIGHT, Career Development Center, SRM Publications Chennai, 2009.

REFERENCE:

- Convey Sean., Seven Habit of Highly Effective Teens, New York, Fireside Publishers, 1998.
- Carnegie Dale, How to win Friends and Influence People, New York: Simon & Schuster, 1998.

PD0101 PERSONALITY DEVELOPMENT - I (E)											
Course designed by	Career Development Center										
Program outcomes	a	b	c	d	e	f	g	h	i	j	k
						x	x		x		
Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts(E)		Professional Subjects(P)				
	x										
Staff responsible for preparing the	Career Development Center										

		L	T	P	C
	syllabus				
GE0107	NSS/NCC/NSO/YOGA	0	0	2	1
	Prerequisite				
	Nil				

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
- Vedatri Maharshi, "*Yoga for Modern Age*"
- 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:
Basket Ball
Football
Volley Ball
Ball Badminton
Cricket
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.

<table>
<tr><td colspan="13" align="center">GE0107 NSS/NCC/NSO/YOGA (R)</td></tr>
<tr><td colspan="2">Course designed by</td><td colspan="11" align="center">Department of NCC & NSS</td></tr>
<tr><td rowspan="2">1</td><td rowspan="2">Student outcome</td><td>a</td><td>b</td><td>c</td><td>d</td><td>e</td><td>f</td><td>g</td><td>h</td><td>i</td><td>j</td><td>k</td></tr>
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<tr><td rowspan="2">3</td><td rowspan="2">Broad area (for 'P'category)</td><td colspan="3" align="center">Structural Engineering</td><td colspan="2" align="center">Geotechnical Engineering</td><td colspan="3" align="center">Water Resources Engineering</td><td colspan="3" align="center">Geomatics Engineering</td></tr>
<tr><td colspan="3"></td><td colspan="2"></td><td colspan="3"></td><td colspan="3"></td></tr>
<tr><td>4</td><td>Course Coordinator</td><td colspan="11" align="center">Prof.K.Shanmugam
Prof.L.R.Ganapathysubramaniam</td></tr>
</table>

PH0103	Physics Laboratory	L	T	P	C
	Prerequisite	0	0	2	1
	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:

- Understand scientific concepts in measurement of different physical variables
- Develop the skill in arranging and handling different measuring instruments and
- 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

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

REFERENCE BOOKS

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

PH0103 Physics Laboratory (R)											
Course designed by		Department of Physics									
1	Student outcome	a	b	c	d	e	f	g	h	i	j	k
		x	**x**			**x**						
2	Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts (E)			Professional Subjects (P)			
				x								
3	Broad area (for 'P'category)	Structural Engineering		Geotechnical Engineering		Water Resources Engineering			Geomatics Engineering			
4	Course Coordinator	Dr. D. John Thiruvadigal Dr. P.S. Vasuhi										

		L	T	P	C
CY0103	**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

* Preparation of standard solutions
* Estimation of total hardness, permanent and temporary hardness by EDTA method
* Conductometric titration - determination of strength of an acid
* Estimation of iron by potentiometer - titration
* Determination of molecular weight of polymer by viscosity average - method
* Determination of dissolved oxygen in a water sample by Winkler"s method
* Determination of Na / K in water sample by Flame photometry
* Estimation of Copper in ore
* Estimation of nickel in steel
* Determination of total alkalinity and acidity of a water sample

REFERENCE BOOKS

* *Chemistry department manual*, Edition, 2003

<table>
<tr><td colspan="12" align="center">CY0103 Chemistry Laboratory (R)</td></tr>
<tr><td colspan="2">Course designed by</td><td colspan="10">Department of Chemistry</td></tr>
<tr><td rowspan="2">1</td><td rowspan="2">Student outcome</td><td>a</td><td>b</td><td>c</td><td>d</td><td>e</td><td>f</td><td>g</td><td>h</td><td>i</td><td>j</td><td>k</td></tr>
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<tr><td>4</td><td>Course Coordinator</td><td colspan="10" align="center">Dr. R. Jeyalakshmi
Dr. P. Kamaraj</td></tr>
</table>

		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 MSOffice.

INSTRUCTIONAL OBJECTIVES
- To learn the basics of computer
- To work on Ms-Word, Ms-Excel, Ms-Power Point and Ms-Access

EXPERIMENTS TO IMPLEMENT
- Study experiment on evolution of computer programming languages
- Suggest some of the Network Topologies that can be incorporated in your campus. Justify your choice
- Experiments to demonstrate directory creation and file creation
- Create a document with all formatting effects
- Create a document with tables
- Create labels in MS word
- Create a document to send mails using mail merge option
- Create an Excel File to analyze the student's performance. Create a chart for the above data to depict it diagrammatically
- Create Excel sheet to use built-in-function
- Create Excel sheet to maintain employee information and use this data to send mails using mail merge
- Create a Power Point presentation for your personal profile with varying animation effects with timer
- 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.

center	**GE0105 Computer Literacy (R)**											

	Course designed by	Department of Computer Science Engineering										
1	Student outcome	a	b	c	d	e	f	g	h	i	j	k
		x								**x**		**x**
2	Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts (E)			Professional Subjects (P)			
				x								
3	Broad area (for 'P'category)	Structural Engineering		Geotechnical Engineering		Water Resources Engineering			Geomatics Engineering			
4	Course Coordinator	Mr. K. Manikandan Mrs.P. Vishalakshi										

		L	T	P	C
ME0130	**Engineering Graphics**	1	0	4	2
	Prerequisite				
	Nil				

(Only First Angle Projection is to be followed)

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

INSTRUCTIONAL OBJECTIVES
- To familiarise with
- The construction of geometrical figures
- The projection of 1D, 2D & 3D elements
- Sectioning of solids and development of surfaces
- 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
- Jeyapoovan, T., "*Engineering Drawing and Graphics using AutoCAD 2000*", Vikas Publishing house Pvt Ltd, NewDelhi, 2005
- Narayanan, K.L & Kannaiah, P., "*Engineering Graphics*", Scitech Publications, Chennai, 1999

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

ME0130 Engineering Graphics (R)											
Course designed by	Department of Mechanical Engineering										
1 Student outcome	a	b	c	d	e	f	g	h	i	j	k
		x	x				x				
2 Category	General (G)			Basic Sciences (B)			Engineering Sciences and Technical Arts (E)			Professional Subjects (P)	
							x				
3 Broad area (for 'P'category)	Structural Engineering			Geotechnical Engineering			Water Resources Engineering			Geomatics Engineering	
4 Course Coordinator	Dr. D. Kingsly Jeba Singh Dr. T. V. Gopal										

		L	T	P	C
GE0108	**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:
* Personal values
* Social values
* Professional values
* Moral and spiritual values
* 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 - Cooperation 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 - Nonviolence - Truthfulness - Common aim - Unified effort towards peace - Patriotism.

REFERENCE BOOKS

* Dr. S. Ignacimuthu S. J., Values for life, *Better yourself Books*, Bandra Mumbai - 600 050 (1999)
* Values(Collection of Essays)., Published by : Sri Ramakrishna Math., Chennai - 4.,(1996)

- Prof. R.P.Dhokalia., Eternal Human Values NCRT - Campus Sri Aurobindo Marg., New Delhi - 110 011
- Swami Vivekananda., Education., Sri Ramakrishna Math., Chennai-4(1957)
- Tirukural (English Translation by Dr.G.U.Pope)
- The Bible
- The Kuran
- The Bagavath Geetha.

<table>
<tr><td colspan="12" align="center">GE0108 Value Education (R)</td></tr>
<tr><td colspan="2">Course designed by</td><td colspan="10">Career Development Center</td></tr>
<tr><td rowspan="2">1</td><td rowspan="2">Student outcome</td><td>a</td><td>b</td><td>c</td><td>d</td><td>e</td><td>f</td><td>g</td><td>h</td><td>i</td><td>j</td><td>k</td></tr>
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<tr><td rowspan="2">3</td><td rowspan="2">Broad area (for 'P'category)</td><td colspan="3">Structural Engineering</td><td colspan="2">Geotechnical Engineering</td><td colspan="3">Water Resources Engineering</td><td colspan="2">Geomatics Engineering</td></tr>
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<tr><td>4</td><td>Course Coordinator</td><td colspan="10" align="center">Dr. Kaveri</td></tr>
</table>

		L	T	P	C
MA0102	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 BOOKS

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

REFERENCE BOOKS

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

<table>
<tr><td colspan="12" align="center">MA0102 Mathematics II (R)</td></tr>
<tr><td colspan="2">Course designed by</td><td colspan="10">Department of Mathematics</td></tr>
</table>

		a	b	c	d	e	f	g	h	i	j	k
1	Student outcome	x				x						

		General (G)		Basic Sciences (B)	Engineering Sciences and Technical Arts (E)	Professional Subjects (P)
2	Category					
				x		

		Structural Engineering	Geotechnical Engineering	Water Resources Engineering	Geomatics Engineering
3	Broad area (for 'P'category)				

4	Course Coordinator	Dr. K. Ganesan

		L	T	P	C
PH0102	**Material 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.

PRACTICALS
- Band gap determination using Post office box
- Dielectric constant measurement
- Photoconductivity measurement
- Resistivity determination for a semiconductor wafer using Four probe method
- Determination of Hall coefficient and carrier type for a semiconductor material
- To trace the hysteresis loop for a magnetic material
- Magnetic susceptibility - Quincke's method
- Determination of thermal conductivity - Lee's Disc method
- Visit to Nano Technology Laboratory (optional)

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

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

PH0102 Materials Science (R)										
Course designed by	Department of Physics									
1 Student outcome	a	b	c	d	e	f	g	h	i	j	k
	x										
2 Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts (E)			Professional Subjects (P)			
			x								
3 Broad area (for 'P' category)	Structural Engineering		Geotechnical Engineering		Water Resources Engineering			Geomatics Engineering			
4 Course Coordinator	Dr. D. John Thiruvadigal Dr. P.S. Vasuhi										

		L	T	P	C
GE0102	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- metabolismanabolism 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 SYSTEMS6
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 BOOKS
- J.M.Berg, J.L.Tymosczko and L.Sryer. Biochemistry, W.H. Freeman Publications
- **STUDENT COMPANION** to accompany **Biochemistry, Fifth Edition -Richard I. Gumport**
- **Frank H. Deis, Nancy Counts Gerber, Roger E. Koeppe, II** Molecular motors

REFERENCE BOOKS
- Alberts, 2003 Molecular Biology of the cell
- Lodish, 2004 Molecular cell biology

<table>
<tr><td colspan="13" align="center">GE0102 Biology for Engineers (R)</td></tr>
<tr><td colspan="2">Course designed by</td><td colspan="11">Department of Biotechnology</td></tr>
<tr><td rowspan="2">1</td><td rowspan="2">Student outcome</td><td>a</td><td>b</td><td>C</td><td>d</td><td>e</td><td>f</td><td>g</td><td>h</td><td>i</td><td>j</td><td>k</td></tr>
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<tr><td rowspan="2">3</td><td rowspan="2">Broad area (for 'P'category)</td><td colspan="3">Structural Engineering</td><td colspan="3">Geotechnical Engineering</td><td colspan="2">Water Resources Engineering</td><td colspan="3">Geomatics Engineering</td></tr>
<tr><td colspan="3"></td><td colspan="3"></td><td colspan="2"></td><td colspan="3"></td></tr>
<tr><td>4</td><td>Course Coordinator</td><td colspan="11" align="center">Dr. K. Ramaswamy</td></tr>
</table>

		L	T	P	C
GE0104	**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

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

ENVIRONMENT 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

- Sharma.B.K. and Kaur, "*Environmental Chemistry*" Goel Publishing House, Meerut, 1994
- De.A.K., "*Environmental Chemistry*", New Age International (p) lt., , New Delhi, 1996

- Kurian Joseph & R. Nagendran, "*Essential of Environmental Studies*" Pearson Education, 2004

REFERENCE BOOKS:

- Dara S.S., *A Text Book of Environmental Chemistry and pollution control*, S.Chand & Company Ltd., New Delhi, 2004
- Jeyalakshmi.R, *Principles of Environmental Science*, 1st Edition, Devi Publications, Chennai 2006
- Kamaraj.P & Arthanareeswari.M, *Environmental Science - Challenges and Changes*, 1st Edition, Sudhandhira Publications, 2007
- Arivalagan.K, Ramar.P & Kamatchi.P, *Principles of Environmental Science*, 1st Edition, Suji Publications, 2007 .

GE0104 Principles of Environmental Science (R)											
Course designed by	Department of Chemistry										
1	Student outcome	a	b	c	d	e	f	g	h	i	j	k
		x		x					x	x		
2	Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts (E)			Professional Subjects (P)			
				x								
3	Broad area (for 'P' category)	Structural Engineering		Geotechnical Engineering		Water Resources Engineering			Geomatics Engineering			
4	Course Coordinator	Dr. R. Jeyalakshmi										

		L	T	P	C
GE0106	**Basic Engineering II**	**4**	**0**	**0**	**4**
	Prerequisite				
	Nil				

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

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

PART A ELECTRICAL ENGINEERING

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

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

PART B ELECTRONICS ENGINEERING

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

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

REFERENCE BOOKS

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

GE0106 Basic Engineering II (R)										
Course designed by	Department of Electrical & Electronics Engineering									
1 Student outcome	a	b	c	d	e	f	g	h	i	j	k
	x				x						
2 Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts (E)		Professional Subjects (P)				
						x					
3 Broad area (for 'P'category)	Structural Engineering		Geotechnical Engineering		Water Resources Engineering		Geomatics Engineering				
4 Course Coordinator	Dr. S. Malarvizhi Mr. A. Rathinam										

		L	T	P	C
CE0102	**Elements of Building Material Science and Architecture**	**4**	**0**	**0**	**4**
	Prerequisite				
	Nil				

PART A BUILDING MATERIAL SCIENCE

PURPOSE
To develop knowledge of conventional and new materials of construction.

INSTRUCTIONAL OBJECTIVES
- To learn the manufacturing process, types, applications and testing procedures for materials used for load bearing purpose
- 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
- Varghese, P.C., *Building Materials*, Prentice Hall India,2005
- Rangwala S.C. *Engineering Materials*, Charotor Publishing House, 1980
- 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
- Gurucharan Singh, *Building Construction and Materials*, Standard Book House, Delhi, 1988
- Shetty M.S. *Concrete Technology*, S.Chand and Company, New Delhi, 1988
- *Lecture Notes on Special Concretes, Special Concrete*, 2007, Department of Civil Engineering, SRM Engineering College, Kattankulathur

PART B ARCHITECTURE

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

REFERENCE BOOK
- National Building Code, *Bureau of Indian Standars*, New Delhi, 2005.

CE0102 Elements of Building Material Science and Architecture (R)											
Course designed by	Department of Civil Engineering										
1 Student outcome	a	b	c	d	e	f	g	h	i	j	k
	x				**x**			**x**			**x**
2 Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts (E)			Professional Subjects (P)			
					x						
3 Broad area (for 'P'category)	Structural Engineering		Geotechnical Engineering		Water Resources Engineering			Geomatics Engineering			
4 Course Coordinator	Dr. M. Lakshmipathy										

PD0102	PERSONALITY DEVELOPMENT - II	L	T	P	C
	Prerequisite	1	0	1	0
	Nil				

PURPOSE
To enhance holistic development of students and improve their employability skills

INSTRUCTIONAL OBJECTIVES
To guide thought process
To groom students' attitude
To develop communication skill
To build confidence

SOFT SKILL – 2

UNIT – I
Interpersonal Skill and Team Work

UNIT – II
Leadership Skills

UNIT – III
Stress Management and Emotional Intelligence

UNIT – IV
Conflict Resolution

UNIT –V
Decision Making
TEXT BOOK:
INSIGHT, Career Development Center, SRM Publications Chennai, 2009 .

REFERENCE:
Convey Steven, Principle Centered Leadership, New York, Simon & Schuster, 1991.
Lambert Jonamay & Mayers Selena, 50 Activities for conflict resolution.

<table>
<tr><td colspan="12" align="center">PD0102 Personality Development II (E)</td></tr>
<tr><td colspan="2">Course designed by</td><td colspan="10" align="center">Career Development Center</td></tr>
<tr><td rowspan="2">1</td><td rowspan="2">Student outcome</td><td>a</td><td>b</td><td>c</td><td>d</td><td>e</td><td>f</td><td>g</td><td>h</td><td>i</td><td>j</td><td>k</td></tr>
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<tr><td colspan="3" align="center">x</td><td colspan="2"></td><td colspan="3"></td><td colspan="2"></td></tr>
<tr><td rowspan="2">3</td><td rowspan="2">Broad area (for 'P'category)</td><td colspan="3" align="center">Structural Engineering</td><td colspan="2" align="center">Geotechnical Engineering</td><td colspan="3" align="center">Water Resources Engineering</td><td colspan="2" align="center">Geomatics Engineering</td></tr>
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<tr><td>4</td><td>Course Coordinator</td><td colspan="10" align="center">Career Development Center</td></tr>
</table>

		L	T	P	C
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 elements, 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++.

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.
- programs to demonstrate the use of scanf( ) and printf( ) functions
- programs to evaluate arithmetic expressions
- programs using conditional statements
- programs using for,while, do...while
- programs on arrays
- programs to perform matrix addition and multiplication

- programs to implement functions
- programs to illustrate recursion
- Program to create classes and objects using C++
- Program to implement Constructor and Destructor in C++
- Program to implement single inheritance in C++
- Program to implement Function overloading in C++
- Program to implement Operator overloading in C++

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

<table>
<tr><td colspan="13" align="center">CS0140 Computer Practice (R)</td></tr>
<tr><td colspan="2">Course designed by</td><td colspan="11" align="center">Department of Computer Science and Engineering</td></tr>
<tr><td rowspan="2">1</td><td rowspan="2">Student outcome</td><td>a</td><td>b</td><td>c</td><td>d</td><td>e</td><td>f</td><td>g</td><td>h</td><td>i</td><td>j</td><td>k</td></tr>
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<tr><td>4</td><td>Course Coordinator</td><td colspan="11" align="center">Dr. S. Malarvizhi</td></tr>
</table>

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		L	T	P	C
ME0120	**Workshop Practice**	**0**	**0**	**4**	**2**
	Prerequisite				
	Nil				

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

INSTRUCTIONAL OBJECTIVES
To familiarize with
- The basics of tools and equipments used in fitting, carpentry, sheet metal, welding and smithy
- 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.

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

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

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

ME0120 Workshop Practice (R)										
Course designed by	Department of Mechanical Engineering									
1 Student outcome	a	b	c	d	e	f	g	h	i	j	k
		x	x				x				

2	Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts (E)		Professional Subjects (P)	
						x			

3	Broad area (for 'P'category)	Structural Engineering		Geotechnical Engineering		Water Resources Engineering		Geomatics Engineering	

4	Course Coordinator	Dr. D. Kingsly Jeba singh Dr. T. V. Gopal

		L	T	P	C
CE0104	**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

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

LIST OF EXPERIMENTS
PART - A (Manual Drawing)

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

PART - B (Drawing using AutoCAD)

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

TEXT BOOKS

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

REFERENCE

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

CE0104 COMPUTER AIDED BUILDING DRAWING (R)											
Course designed by		Department of Civil Engineering									
1	Student outcome	a	b	c	d	e	f	g	h	i	j	k
		x		x								x
2	Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts(E)		Professional Subjects(P)				
									x			
3	Broad area (for 'P'category)	Structural Engineering		Geotechnical Engineering		Water Resources Engineering		Geomatics Engineering				
		x										
4	Course Coordinator	N.Umamaheswari										

		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 paying 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).

LE0201 German Language Phase - I (R)											
Course designed by		Department of English and Foreign Languages									
1	Student outcome	a	b	c	d	e	f	g	h	i	j	k
								x				
2	Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts (E)		Professional Subjects (P)			
		x									
3	Broad area (for 'P'category)	Structural Engineering		Geotechnical Engineering		Water Resources Engineering		Geomatics Engineering			
4	Course Coordinator	Ms. Barathi									

		L	T	P	C
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.

Alphabets (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.

LE0203 Japanese Language Phase - I (R)												
Course designed by		Department of English and Foreign Languages										
1	Student outcome	a	b	c	d	e	f	g	h	i	j	k
								x				
2	Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts (E)			Professional Subjects (P)			
		x										
3	Broad area (for 'P'category)	Structural Engineering		Geotechnical Engineering		Water Resources Engineering			Geomatics Engineering			
4	Course Coordinator	Mr. Natarajan										

		L	T	P	C
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 BOOKS

- Panorama - Goyal Publishers
- Apprenons le Francais I, Sarawathy publication

LE0205 French Language Phase - I (R)											
Course designed by	Department of English and Foreign Languages										
1 Student outcome	a	b	c	d	e	f	g	h	i	j	k
							x				

2	Category	General (G)		Basic Sciences (B)	Engineering Sciences and Technical Arts (E)	Professional Subjects (P)
		x				

3	Broad area (for 'P'category)	Structural Engineering	Geotechnical Engineering	Water Resources Engineering	Geomatics Engineering

4	Course Coordinator	Mr. Krishnamourthy

		L	T	P	C
MA0201	**Mathematics III**	**3**	**2**	**0**	**4**
	Prerequisite				
	MA0101, MA0102				

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 - x2 test for Goodness of fit.

TEXT BOOK
- Grewal B.S., Higher Engineering Mathematics, 36h 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

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

MA0201 Mathematics - III (R)											
	Course designed by	Department of Mathematics									
1	Student outcome	a	b	c	d	e	f	g	h	i	j	k
		x				**x**						
2	Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts (E)			Professional Subjects (P)			
				x								
3	Broad area (for 'P'category)	Structural Engineering		Geotechnical Engineering		Water Resources Engineering			Geomatics Engineering			
4	Course Coordinator	Dr. K. Ganesan										

		L	T	P	C
CE0201	**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
- Beer and Johnson, *Mechanics for Engineers, Statics and Dynamics*, Mc Graw Hill Book Company, 1987
- Punmia.B.C., Ashok Kumar Jain, Arun Kumar Jain, *Mechanics of Materials*, Laxmi Publications (P) Ltd., 2003
- Rajput.R.K., *Strength of Materials*, (Mechanics of Solids), S.Chand and Company Ltd., New Delhi, 2004

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

<table>
<tr><td colspan="13" align="center">CE0201 Mechanics of solids (R)</td></tr>
<tr><td colspan="2">Course designed by</td><td colspan="11" align="center">Department of Civil Engineering</td></tr>
<tr><td rowspan="2">1</td><td rowspan="2">Student outcome</td><td>a</td><td>b</td><td>c</td><td>d</td><td>e</td><td>f</td><td colspan="2">g</td><td>h</td><td>i</td><td>j</td><td>k</td></tr>
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<tr><td>4</td><td>Course Coordinator</td><td colspan="11" align="center">Dr.K.S.Satyanarayanan</td></tr>
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		L	T	P	C
CE0203	**Engineering Geology**	**3**	**0**	**0**	**3**
	Prerequisite				
	Nil				

PURPOSE
To understand the basics and application of engineering geology technology.

INSTRUCTIONAL OBJECTIVES
- To study the origin , development and ultimate fate of various surface features of the earth
- To understand the basic building units of which the solid crust of the earth
- To understand the nature of geographic distribution of rocks and engineering properties of rock on the earth
- To understand the nature of geological structures and their importance on the civil engineering structures
- 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
- Garg S.K., *Physical and Engineering Geology*, Khanna Publication, New Delhi, 1999
- Parbin Singh, *Engineering and General Geology*, Katson Publication House, 1997

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

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<tr><td>4</td><td>Course Coordinator</td><td colspan="10">Dr. R. SIVAKUMAR</td></tr>
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		L	T	P	C
CE0205	**Fluid Mechanics**	3	0	0	3
	Prerequisite				
	Nil				

PURPOSE
To learn fundamental concepts in the field of fluid mechanics.

INSTRUCTIONAL OBJECTIVES
- To know the importance, application and inter-relationship of various properties of fluid
- To study theories those explain the behaviour and performance of fluid when the fluid is at rest
- To study theories those explain the behaviour and performance of fluid when the fluid is in motion
- To study theories those explain the behaviour and performance of fluid when the fluid is flowing through the pipe
- 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 π method - Model analysis - Similitude - Dimensionless numbers and theirs significance - Model laws - Type of models, undistorted and distorted models.

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

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

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<tr><td colspan="2">Course designed by</td><td colspan="10" align="center">Department of Civil Engineering</td></tr>
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<tr><td>4</td><td>Course Coordinator</td><td colspan="10" align="center">Mr. R. Sathyanathan</td></tr>
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		L	T	P	C
CE0207	**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
* To measure the land area by chaining and the methods of clearing the obstacles
* To measure the area and distance between the points by compass and plane table
* To measure the elevation of points for the preparation of map
* To measure the height and distance by theodolite
* 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
- Kanetkar, T.P., *Surveying and Levelling*, Vols. I and II, United Book Corporation, Pune, 1994
- Punmia, B.C., *Surveying*, Vols. I and II, Laxmi Publications,1999
- Chandra .A.M. *Plane Surveying and Higher Surveying*, New Age International (P) Limited, Publishers, Chennai, 2002

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

<table>
<tr><td colspan="13" align="center">CE0207 Surveying (R)</td></tr>
<tr><td colspan="2">Course designed by</td><td colspan="11" align="center">Department of Civil Engineering</td></tr>
<tr><td rowspan="2">1</td><td rowspan="2">Student outcome</td><td>a</td><td>b</td><td>c</td><td>d</td><td>e</td><td>f</td><td>g</td><td>h</td><td>i</td><td>j</td><td>k</td></tr>
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<tr><td>4</td><td>Course Coordinator</td><td colspan="11" align="center">Ms.M.Gouthampriya</td></tr>
</table>

		L	T	P	C
CE0209	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
* To build an awareness about the type of masonry, floors, and roofs
* 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
* Varghese, P.C., *Building Constructon*, Prentice Hall India, 2007
* Arora and Bindra S.P., *Building Construction, Planning Techniques and Method of Construction*, Dhampatrai sons, New Delhi, 1988
* Punmia B.K., Ashok Kumar Jain, Arn Kumar Jain, *Building Construction*, Laxmi Publications Pvt. Ltd., New Delhi, 1987

REFERENCE BOOKS
* *National Building Code, Bureau of Indian Standards, New Delhi*, 2005
* Chudley. R, *Construction Technology*, ELBS Publishers, 1987

- Gurucharan Singh, *Building Construction and Materials*, Standard Book House, Delhi, 1988

CE0209 Building Technology (R)										
Course designed by	Department of Civil Engineering									
1 Student outcome	a	b	c	d	e	f	g	h	i	j	k
	x				x						x
2 Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts(E)		Professional Subjects(P)				
									x		
3 Broad area (for 'P'category)	Structural Engineering		Geotechnical Engineering		Water Resources Engineering		Geomatics Engineering				
	x										
4 Course Coordinator	Dr.M.Lakshmipathy										

		L	T	P	C
PD 0201A	**PERSONALITY DEVELOPMENT - III**	**2**	**0**	**0**	**1**
	Prerequisite				
	Nil				

PURPOSE
To enhance holistic development of students and improve their employability skills

INSTRUCTIONAL OBJECTIVES
To improve verbal aptitude, vocabulary enhancement and reasoning ability of the student.
To help them qualify the written test of competitive exams, campus placements & PSUs.
To adopt new strategies in solving vocabulary section.

VERBAL APTITUDE

UNIT – I
Critical Reasoning

UNIT – II
Synonyms – Antonyms - Odd Word - Idioms & Phrases

UNIT – III
Word Analogy - Sentence Completion

UNIT – IV
Spotting Errors - Error Correction - Sentence Correction

UNIT – V
Sentence Anagram - Paragraph Anagram - Reading Comprehension

TEXT BOOK:
Personality Devolpment Verbal Book, Career Development Center, SRM Publications Chennai, 2009

PD0201A- Personality Development III (R)											
Course designed by		Career Development Center									
1	Student outcome	a	b	c	d	e	f	g	h	i	j	k
							x	x		x	x	
2	Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts(E)			Professional Subjects(P)			
		x										
3	Broad area (for 'P'category)	Structural Engineering		Geotechnical Engineering		Water Resources Engineering			Geomatics Engineering			
4	Course Coordinator	Career Development Center										

		L	T	P	C
CE0211	**Survey Laboratory I**	**0**	**0**	**4**	**2**
	Prerequisite				
	CE0207				

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

- Simple chain survey - calculation of area using cross staff
- Traversing - Measurement of bearing of survey lines by prismatic compass - Local attraction
- Running closed and open compass traverse
- Plotting and adjustments of traverse
- Plane table survey by Radiation and Intersection methods. Resection : Field solution of two and three point problems (any one method).
- Reduction of levels
- Height of collimation method
- Rise and Fall method
- Theodolite - Measurement of horizontal angles by reiteration and repetition
- Theodolite - Measurement of vertical angles and determination of height of an object
- Heights and distances : Single plane method and Double plane method

REFERENCE

Laboratory Manual

<table>
<tr><td colspan="7" align="center">CE0211 Survey Laboratory I (R)</td></tr>
<tr><td colspan="2" align="center">Course designed by</td><td colspan="5" align="center">Department of Civil Engineering</td></tr>
<tr><td rowspan="2">1</td><td rowspan="2">Student outcome</td><td>a</td><td>b</td><td>c</td><td>d</td><td>e</td><td>f</td><td>g</td><td>h</td><td>i</td><td>j</td><td>k</td></tr>
</table>

1	Student outcome	a	b	c	d	e	f	g	h	i	j	k
		x	**x**					**x**			**x**	

2	Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts(E)		Professional Subjects(P)	
									x

3	Broad area (for 'P'category)	Structural Engineering		Geotechnical Engineering		Water Resources Engineering		Geomatics Engineering	
									x

4	Course Coordinator	Mr. K. Prasanna

		L	T	P	C
CE0213	**Strength of Materials Laboratory**	**0**	**0**	**4**	**2**
	Prerequisite				
	CE0201				

PURPOSE

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

INSTRUCTIONAL OBJECTIVES

- Learn the properties of different materials like steel, concrete, timber, bricks and other materials
- 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

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

REFERENCE

- Laboratory Manual
- Syed Danish Hasan, *Civil Engineering Materials and their Testing*, Narosa Publishing House 2006
- Rajpu.R.K., *Strength of Materials*, S.Chand and Company Ltd., New Delhi, 2004 .

CE0213 Strength of Materials Laboratory (R)										
Course designed by	Department of Civil Engineering										
1 Student outcome	a	b	c	d	e	f	g	h	i	j	k
	x	**x**									**x**

2	Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts(E)		Professional Subjects(P)	
									x

3	Broad area (for 'P'category)	Structural Engineering		Geotechnical Engineering		Water Resources Engineering		Geomatics Engineering	
		x							

4	Course Coordinator	Dr.K.S.Satyanarayanan

		L	T	P	C
LE0202	**German Language Phase - II**	**2**	**0**	**0**	**2**
	Prerequisite				
	LE 0201				

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

- Grundkurs Deutsch
- Momentmal (Prescribed by Max Mueller Bhavan - Goethe Institute, Germany)

LE0202- German Language Phase – II (R)											
Course designed by		Department of English and Foreign Languages									
1	Student outcome	a	b	c	d	e	f	g	h	i	j	k
								x				
2	Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts(E)		Professional Subjects(P)				
		x										
3	Broad area (for 'P'category)	Structural Engineering		Geotechnical Engineering		Water Resources Engineering		Geomatics Engineering				
4	Course Coordinator	Ms. Barathi										

		L	T	P	C
LE0204	**Japanese Language Phase - II**	2	0	0	2
	Prerequisite				
	LE 0203				

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.
Lesson 2- {Korewa Tsukue desu } - Grammar, Sentence pattern, Marume.Conversation
Lesson 3- [Kokoni denwa ga arimasu] - Grammar, Sentence pattern, Marume. Conversation
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
- Nihongo Shoho Imain 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.

LE0204 Japanese Language Phase II (R)											
Course designed by		Department of English and Foreign Languages									
1	Student outcome	a	b	c	d	e	f	g	h	i	j	k
								x				
2	Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts(E)		Professional Subjects(P)				
		x										
3	Broad area (for 'P'category)	Structural Engineering		Geotechnical Engineering		Water Resources Engineering		Geomatics Engineering				
4	Course Coordinator	Mr. Natarajan										

70

		L	T	P	C
LE0206	**French Language Phase - II**	**2**	**0**	**0**	**2**
	Prerequisite				
	LE 0205				

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.

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 BOOKS

- Panorama - Goyal Publishers
- Apprenons le Francais II, Sarawathy Publications.

LE0206- French Language Phase – II (R)											
Course designed by		Department of English and Foreign Languages									
1	Student outcome	a	b	c	d	e	f	g	h	i	j	k
								x				
2	Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts(E)		Professional Subjects(P)				
		x										
3	Broad area (for 'P'category)	Structural Engineering		Geotechnical Engineering		Water Resources Engineering		Geomatics Engineering				
4	Course Coordinator	Mr. Krishnamourthy										

		L	T	P	C
MA0202	**Numerical Methods**	3	2	0	4
	Prerequisite				
	MA0101, MA0102				

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 the familiar with numerical solution of equations
- To get exposed to finite differences and interpolation
- To be thorough with the numerical Differentiation and integration
- 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
- 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

- Dr. M. K. Venkataraman, Numerical Methods in Science and Engineering, National Publishing Co., 1999
- S. S. Sastry, Introductory Methods of Numerical Analysis, 2001
- E. Balagurusamy, Computer Oriented Statistical and Numerical Methods - Tata McGraw Hill., 2000
- M. K. Jain, SRK Iyengar and R. L. Jain, Numerical Methods for Scientific and Engineering Computation, Wiley Eastern Ltd., 1987
- M. K. Jain, Numerical Solution of Differential Equations, 1979
- Dr. P. Kandasamy etal., Numerical Methods, S. Chand & Co., New Delhi, 2003

<table>
<tr><td colspan="12" align="center">MA0202- Numerical Methods (R)</td></tr>
<tr><td colspan="2">Course designed by</td><td colspan="10" align="center">Department of Mathematics</td></tr>
</table>

	Student outcome	a	b	c	d	e	f	g	h	i	j	k
1		x				x						

2	Category	General (G)		Basic Sciences (B)	Engineering Sciences and Technical Arts(E)	Professional Subjects(P)
				x		

3	Broad area (for 'P'category)	Structural Engineering	Geotechnical Engineering	Water Resources Engineering	Geomatics Engineering

4	Course Coordinator	Dr. K. Ganesan

		L	T	P	C
CE0202	**Strength of Materials**	2	2	0	3
	Prerequisite				
	CE0201				

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

- To determine the deflections in beams by various methods which is an important criteria in design
- To analyse the structural elements by energy concepts and find stresses and deflections
- To examine the behaviour of columns and development of various theories in evaluating the critical loads and design of columns
- To investigate state of stress in three dimensions and various theories of failure in designing the structural members
- 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 frictioninclined plane and bearings-Kinematics and kinetics of particles-D'Alembert's principle- flywheel.

TEXT BOOKS

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

REFERENCE BOOKS

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

<table>
<tr><td colspan="13" align="center">CE0202 Strength of Materials (R)</td></tr>
<tr><td colspan="2">Course designed by</td><td colspan="11" align="center">Department of Civil Engineering</td></tr>
</table>

		a	b	c	d	e	f	g	h	i	j	k
1	Student outcome	**x**				**x**						**x**

		General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts(E)		Professional Subjects(P)	
2	Category								
								x	

		Structural Engineering		Geotechnical Engineering		Water Resources Engineering		Geomatics Engineering	
3	Broad area (for 'P'category)								
		x							

4	Course Coordinator	Dr.K.S.Satyanarayanan

		L	T	P	C
CE0204	**Structural Design I (Steel & Light Gauge Sections)**	**3**	**0**	**0**	**3**
	Prerequisite				
	CE0201, CE0202				

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

INSTRUCTIONAL OBJECTIVES
- To learn the properties of steel sections and design basics and codal provisions Design of connections
- To design steel members subjected to tension and compression members
- Design steps involved in beams, built up beams and connections in beam-column etc.
- Design of element in roof trusses, joints, etc. use of hand hooks in steel trusses design
- 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 ratiomaximum 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
- Ramchandra .S., *Design of Steel of Structures*, Vol 1&2.Standard Book House, Delhi, 10th Edn., 1992

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

REFERENCE BOOKS

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

CE0204 Structural Design I (Steel & Light Gauge Sections) (R)											
Course designed by	Department of Civil Engineering										
1	Student outcome	a	b	c	d	e	f	g	h	i	j	k
		x		x		x						x
2	Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts(E)			Professional Subjects(P)			
										x		
3	Broad area (for 'P'category)	Structural Engineering		Geotechnical Engineering		Water Resources Engineering			Geomatics Engineering			
		x										
4	Course Coordinator	Dr. R. Padmapriya										

		L	T	P	C
CE0206	**Applied Hydraulic Engineering**	3	0	0	3
	Prerequisite				
	CE0205				

PURPOSE

To get exposure about the application of hydraulic engineering in the field by means of studying the various devices, equipments, machinery, and structures.

INSTRUCTIONAL OBJECTIVES

- To study the features and function of various devices used to measure the pressure of fluid
- To study the features and function of various devices used to measure the velocity and discharge of fluid
- To study theories those explain the behaviour and performance of fluid when the fluid is flowing in an open channel
- To understand the components, function, and use of different types of pumps
- To understand the components, function, and use of different types of turbines

PRESSURE MEASUREMENT

Pressure and Pressure head of a liquid - Pascal's law - Absolute and Gauge pressure - Measurement of Pressure, Manometers , Simple Manometers, Differential Manometers - Advantages and Limitation of Manometers - Mechanical gauges - Bourdan tube gauge.

VELOCITY AND DISCHARGE MEASUREMENT

Velocity - Pitot tube - Current meter - Floats - Discharge / Flow rate - Venturimeter - Orificemeter - Rotometer - Types of Notches - Rectangular, Triangular, Trapezoidal, Stepped Notch or Weir - Effect of Discharge due to error in head measurement - Broad - crested, Narrow crested and Ogee weir.

OPEN CHANNEL FLOW

Open channel - Definitions - Types of channels - Types of flow in channels - Uniform flow - Chezy's formula - Kutter's formula - Manning's formula - Most economical section of a channel - Rectangular and trapezoidal section - Non-Uniform flow - Specific Energy and Specific Energy curves - Hydraulic Jump - Measurement of flow of irregular channels.

PUMPS

Classification of pumps - Centrifugal pump - Component and Working - Velocity triangle - Workdone - Losses and Efficiencies - Specific speed - Multi-stage Centrifugal pump - Characteristic curves - Net Positive Suction Head - Reciprocating pump - Component and Working - Discharge, workdone, Coefficient of discharge, slip - Indicator diagram - Effect of acceleration and friction - Air vessel.

TURBINES

Components of Hydro Electric Power Plant - Classification - Pelton wheel - Kaplan turbine - Francis turbine - Construction and working - Velocity triangles - Work done - Design aspects - Draft tube theory - Specific speed - Cavitation - Selection of turbines.

TEXT BOOKS

- P.N. Modi and S.M. Seth, *Hydraulics and Fluid Mechanics*, Standard Book House, 2005

- Rajput R.K., *Fluid Mechanics and Hydraulic Machines*, S.Chand and Company Ltd., 2005.

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

CE0206 Applied Hydraulic Engineering (R)												
Course designed by		Department of Civil Engineering										
1	Student outcome	a	b	c	d	e	f	g	h	i	j	k	
		x	**x**	**x**		**x**						**x**	
2	Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts(E)			Professional Subjects(P)				
											x		
3	Broad area (for 'P'category)	Structural Engineering		Geotechnical Engineering		Water Resources Engineering			Geomatics Engineering				
						x							
4	Course Coordinator	Dr. Deeptha Thattai											

		L	T	P	C
CE0208	**Advanced Surveying and Remote Sensing**	3	0	0	3
	Prerequisite				
	CE0207				

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

- To understand the remote sensing techniques, concepts, components of remote sensing
- To approximate the remote sensing systems and how to obtain the remote sensing data
- To study the various sensors and platforms used in remote sensing
- To understand the how to use measurements from the remote sensing
- 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

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

REFERENCE BOOKS

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

CE0208 Advanced Surveying and Remote Sensing (R)											
Course designed by	Department of Civil Engineering										
1 Student outcome	a	b	c	d	e	f	g	h	i	j	k
	x			x	x			x			x
2 Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts(E)			Professional Subjects(P)			
									x		
3 Broad area (for 'P'category)	Structural Engineering		Geotechnical Engineering		Water Resources Engineering			Geomatics Engineering			
									x		
4 Course Coordinator	Dr. M. Nagarajan										

		L	T	P	C
CE0210A	**Comprehension I**	**0**	**2**	**0**	**1**
	Prerequisite				
	Should have studied the Civil Engineering subjects prescribed/opted for up to IV semester				

PURPOSE

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

INSTRUCTIONAL OBJECTIVES

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

COMPREHENSION

Review of the following topics of civil engineering:

* Properties and Characteristics of various engineering materials
* Building Technology
* Basics of Engineering Mechanics, Applied Mechanics and Strength of Materials
* Elements of engineering geology
* Elementary analysis of determinate and indeterminate structures
* Overview of Design of Steel and Timber Structures
* Overview on Fluid Mechanics and Machinery
* Overview of Elements of Irrigation and Hydraulic Structures
* Overview on Surveying and remote sensing

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)

CE0210A- Comprehension I (R)											
Course designed by		Department of Civil Engineering									
1	Student outcome	a	b	c	d	e	f	g	h	i	j	k
		x				**x**		**x**		**x**	**x**	**x**
2	Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts(E)		Professional Subjects(P)				
										x		
3	Broad area (for 'P'category)	Structural Engineering		Geotechnical Engineering		Water Resources Engineering		Geomatics Engineering				
		x		**x**		**x**		**x**				
4	Course Coordinator	Dr.K.S.Satyanaranan, Mr.C.P.Shanmuganathan, Mr.S.Pradeep, Mrs.S.Santhanaselvi										

		L	T	P	C
PD0202A	**Personality Development IV**	**2**	**0**	**0**	**1**
	Prerequisite				
	Nil				

PURPOSE
To enhance holistic development of students and improve their employability skills

INSTRUCTIONAL OBJECTIVES
To improve aptitude, problem solving skills and reasoning ability of the student.
To help them qualify the written test of competitive exams, campus placements & PSUs.
To collectively solve problems in teams & group.
To adopt new techniques in solving problem.

QUANTITATIVE APTITUDE - 1
UNIT – I
Numbers - Averages

UNIT – II
Simple Interest & Compound Interest - Word Problems

UNIT – III
Permutation and Combination - Probability

UNIT – IV
Reasoning (Analytical) - Reasoning (Logical)

UNIT – V
Clocks - Calender

REFERENCE:
- Abhijit Guha, Quantitative Aptitude for Competitive Examinations, Tata Mcgraw Hill, 3rd Edition
- Edgar Thrope, Test Of Reasoning for Competitive Examinations, Tata Mcgraw Hill, 4th Edition
- http://fw.freshersworld.com/placementweek/papers.asp.

PD0202A- Personality Development IV (R)										
Course designed by		Career Development Center									
1	Student outcome	a	b	c	d	e	f	g	h	i	j	k
					x					**x**	**x**	
2	Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts(E)		Professional Subjects(P)				
		x										
3	Broad area (for 'P'category)	Structural Engineering		Geotechnical Engineering		Water Resources Engineering		Geomatics Engineering				
4	Course Coordinator	Career Development Center										

		L	T	P	C
CE0212	**Concrete and Highway Laboratory**	0	0	2	1
	Prerequisite				
	Nil				

PURPOSE
To understand and perform various tests on cement, aggregates and concrete.

INSTRUCTIONAL OBJECTIVES
- To do tests on cement as per IS codes of practice
- To do tests on fine and coarse aggregates according to IS codes of Practice
- To do tests on fresh and hardened concrete as pr IS codes of practice

LIST OF EXPERIMENTS
Review of the following topics of civil engineering:

- **TESTS ON CEMENT** : specific Gravity, Fineness Specific surface, Soundness, consistency, initial and final setting time, compressive Strength of cement
- **TESTS ON FINE AGGREGATE**
  - o Size distribution of particles
  - o Specific gravity/voids Ratio
  - o Bulking of sand
  - o Uniformity Co-efficient and fineness modulus
- **TESTS ON COARSE AGGREGATE** : Particle size Uniformity Co-Efficient and fineness modulus, mixing of aggregates - flakiness index, elongation index, sieve analysis, specific gravity, crushing and impact strength and Abrasion test.
- **TESTS ON FRESH AND HARDENED CONCRETE** : Slump test, compaction factor test. Tests for compressive strength-split tensile strength-modulus of elasticity-modulus of rupture.

REFERENCE
Laboratory Manual

CE0212 CONCRETE AND HIGHWAY LABORATORY (R)												
Course designed by		Department of Civil Engineering										
1	Student outcome	a	b	c	d	e	f	g	h	i	j	k
		x	**x**									**x**
2	Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts(E)		Professional Subjects(P)				
									x			
3	Broad area (for 'P'category)	Structural Engineering		Geotechnical Engineering		Water Resources Engineering		Geomatics Engineering				
		x										
4	Course Coordinator	Mr. K. Gunasekaran										

		L	T	P	C
CE 0214	Survey Laboratory II and Survey Camp	0	0	4	2
	Prerequisite				
	Nil				

(Amended and applicable for students admitted from 2009-10 onwards)
SURVEY LABORATORY II

PURPOSE
To measure the elevation of points by advanced methods and instruments.

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

- Tacheometry
  - o Constants of Tacheometer
  - o Stadia Tacheometry
  - o Tangential Tacheometry
- Subtense bar method
- Setting out simple circular curve
  - o Single Theodolite Method
  - o Double Theodolite Method
- Contouring
- GPS Surveying - Co-ordinate Measurements
- Total Station Surveying - Measurements of Distances and angles, Slope distances, Height, Traversing, setting out, etc.
- Use of Stereoscope for 3-D Viewing
- Height determination from a Stereo pair using the Parallax bar

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 CE0214

		L	T	P	C
CE0301	Structural Analysis I	2	2	0	3
	Prerequisite				
	CE0201, CE0202				

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

INSTRUCTIONAL OBJECTIVES
- Concept of rolling loads and study its characteristics in structures
- Preparation of influence line diagrams for statically determinate structures
- Analysis of indeterminate structures (beams, frames and trusses) for internal forces, deflections etc.
- Classical methods - slope deflection method - use in analysing indeterminate beams and plane frames with and without sway
- 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
- Bhavikatti.S.S, *Structural Analysis*,Vol.1andVol.2, Vikas Publishing House Pvt.Ltd.,1999

- V.N. Vazirani and M.M.Ratwani, *Analysis of Structures*, Volume II - Khanna Publishers, 1989
- Vaidhyanathan.R and Perumal.P, *Comprehensive Structural Analysis*, Volume I and II, Lakshmi Publications (P) Ltd.New Delhi, 2004
- Khurmi. R.S., *Theory of Structures*, S. Chand and Company Ltd., New Delhi, 1994

REFERENCE BOOKS

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

CE0301 STRUCTURAL ANALYSIS I (R)										
Course designed by	Department of Civil Engineering									
1 Student outcome	a	b	c	d	e	f	g	h	i	j	k
	x				x						
2 Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts(E)		Professional Subjects(P)				
							X				
3 Broad area (for 'P'category)	Structural Engineering		Geotechnical Engineering		Water Resources Engineering		Geomatics Engineering				
	x										
4 Course Coordinator	Prof. G. Augustine Maniraj Pandian										

		L	T	P	C
CE0303	**Structural Design II**	**3**	**0**	**0**	**3**
	Prerequisite				
	CE0204				

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

INSTRUCTIONAL OBJECTIVES
- To design masonry structures like walls, columns, and foundation incorporating earthquake resistant features
- To bring about an understanding of the behaviour of reinforced concrete and the design philosophies
- 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
- Varghese, P.C., *Advanced Reinforced Cement Concrete*, Pretince-Hall India, 2001
- Unnikrishna pillai, S. and Deavadas Menon, *Reinforced Concrete Design*, Tata MacGraw Hill Publishing Company Limited, New Delhi, 1998
- R. Krishnaraju, R. N. Pranesh, *Design of Reinforced concrete IS : 456-2000*, New age International Publication (P) Ltd., New Delhi

REFERENCE BOOKS

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

<table>
<tr><th colspan="12">CE0303 Structural Design II (R)</th></tr>
<tr><td></td><td>Course designed by</td><td colspan="10">Department of Civil Engineering</td></tr>
<tr><td rowspan="2">1</td><td rowspan="2">Student outcome</td><td>a</td><td>b</td><td>c</td><td>d</td><td>e</td><td>f</td><td>g</td><td>h</td><td>i</td><td>j</td><td>k</td></tr>
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<tr><td rowspan="2">3</td><td rowspan="2">Broad area (for 'P'category)</td><td colspan="3">Structural Engineering</td><td colspan="2">Geotechnical Engineering</td><td colspan="2">Water Resources Engineering</td><td colspan="3">Geomatics Engineering</td></tr>
<tr><td colspan="3">x</td><td colspan="2"></td><td colspan="2"></td><td colspan="3"></td></tr>
<tr><td>4</td><td>Course Coordinator</td><td colspan="10">Dr. R. Padmapriya</td></tr>
</table>

		L	T	P	C
CE0305	**Soil Mechanics**	**2**	**2**	**0**	**3**
	Prerequisite				
	Nil				

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
- Provide the description and classification of soil and analysis of stresses in soils under different loading conditions
- To develop an understanding of the principles of effective stress in saturated soils, and its application to one dimensional compression and consolidation
- 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
- Raju K.V.B. & Ravichandran P.T, *Mechanics of Soils*, Ayyappaa Publications, 2000
- Gopal Ranjan, Rao.A.S.R., *Basic and Applied Soil Mechanics*, Wiley Eastern Ltd., 2000
- Punmia B.C., *Soil Mechanics and Foundations*, Laxmi Publications Pvt. Ltd., 2000

REFERENCE BOOKS

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

<table>
<tr><td colspan="13" align="center">CE0305 Soil Mechanics (R)</td></tr>
<tr><td colspan="2">Course designed by</td><td colspan="11" align="center">Department of Civil Engineering</td></tr>
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<tr><td>4</td><td>Course Coordinator</td><td colspan="11" align="center">Dr. P.T.Ravichandran</td></tr>
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		L	T	P	C
CE0307	**Environmental Engineering I**	**3**	**0**	**0**	**3**
	Prerequisite				
	Nil				

PURPOSE
To learn the fundamental concepts in the field of water supply engineering and sanitary engineering.

INSTRUCTIONAL OBJECTIVES
- To know the basics, importance, and methods of water supply
- To study the various sources and properties of water
- To understand the various methods of conveyance of water
- To know the basics of sewage, types of sewers and sewer material
- To learn the features of various sewer appurtenances

INTRODUCTION - WATER SUPPLY
Environmental Engineering - Role of Environmental Engineer - Water supply - development of public water supply - need for protected water supplies - objectives of water supply systems - water supply scheme-quantity of water - estimating requirements - Design period - per capita consumption - fluctuations in demand pattern - population forecast - Arithmetic, Incremental, Geometric Methods.

SOURCES, QUALITY & STANDARDS OF WATER
Sources of water - surface and ground water sources - Quality of water - physical, chemical and biological aspects - analysis of water - water quality standards.

CONVEYANCE AND DISTRIBUTION SYSTEM
Intake structures - pipe materials - hydraulics of flow in pipes - laying, jointing, testing of pipes - pumping stations - selection of pumps - methods of distributing water - storage and distribution reservoirs - analysis of distribution system Hardy- cross method of balancing - equivalent pipes.

SANITATION
Sewage Characteristics - sewer sewage and sewerage -methods of collection - conservancy system, water carriage system - classification of sewerage systems - quantity of sanitary sewage - fluctuation in sewage flow - design of flow of sewage for separate, storm and combined sewers - full flow and partial flow conditions - design of separate sewers using Manning's formula.

SEWER MATERIALS, CONSTRUCTION AND APPURTENANCES
Materials for pipe sewers - construction - laying ,jointing, dewatering and testing - sewer appurtenances - traps - plumbing system of drainage - one pipe system and two pipe system of plumbing - sanitary fittings.

TEXT BOOKS
- Garg .S.K. *Environmental Engineering*, Vol. I & II, Khannan Publishers, New Delhi, 1994
- Paneerselvam R. *Environmental Engineering*, Vol. I & II, SPGS Publishers Chennai - 88

- Duggal.K.N., *Elements of Environmental Engineering*, S. Chand & Company Ltd., New Delhi, 2002

REFERENCE BOOKS
- *Manual on Water Supply and Treatment*, CPHEEO, Ministry of Urban Development, Government of India, New Delhi, 1999
- *Manual on Sewerage & Sewage Treatment*, CPHEEO, Ministry of Urban Development, Government of India, New Delhi, 1999.

CE0307 Environmental Engineering I (R)											
Course designed by	Department of Civil Engineering										
1 Student outcome	a	b	c	d	e	f	g	h	i	j	k
	x		x		x						
2 Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts(E)			Professional Subjects(P)			
									x		
3 Broad area (for 'P'category)	Structural Engineering		Geotechnical Engineering		Water Resources Engineering			Geomatics Engineering			
					x						
4 Course Coordinator	Mr. J. S. Sudarsan										

		L	T	P	C
CE0309A	**Hydraulic And Irrigation Structures** **(for students admitted in 2009-10 onwards)**	**3**	**0**	**0**	**3**
	Prerequisite				
	Nil				

PURPOSE
To get exposure of about water resources available on earth either natural or artificial with special importance to irrigation and study of irrigation structures which enables one to harness the water.

INSTRUCTIONAL OBJECTIVES
- To study the occurrence, movement and augmentation of surface water and ground water.
- To explore the importance of rivers and reservoirs.
- To know the basics, necessity, and types of irrigation.
- To know the importance, features and use of dams and other irrigation structures.

SURFACE WATER AND GROUND WATER HYDROLOGY
SURFACE WATER HYDROLOGY
Hydrologic cycle - Runoff- Infiltration - Rain simulators - Precipitation - Characteristics of precipitation - Rain-gauge network - Mean rainfall over a drainage basin - Characteristics of the drainage basin

GROUND WATER HYDROLOGY
Occurrence and movement of ground water- Permeability and Transmissibility- Specific yield - Specific retention - Specific capacity - Coefficient of storage- Infiltration wells and Infiltration galleries - Measurement of yield - Pumping test - Recuperation test – Thiem's equilibrium formula - Dupit equilibrium formula - Artificial recharge Methods - Open wells and tube wells - Types of tube wells

RIVERS AND RESERVOIRS
Rivers - types - characteristics - Indian rivers and their classification - Straight reaches - Bends - Meanders - Cutoff - Control and training of rivers - Objectives of river training - Classification of river training - Levees - Guide banks - Groynes - Artificial cutoffs - Pitched islands
Reservoirs - Definition - Types - Storage capacity of reservoir - Storage zones - Determining reservoir capacity for a given yield - Determining yield from a reservoir of a given capacity - Reservoir Losses -Reservoir sedimentation - Silt control

IRRIGATION
Definition - Crop period / Base period - Duty and Delta - Factors affecting duty - Crop season - Consumptive use - Effective rainfall - Estimation of consumptive use - Blanney Criddle method - Pan evaporation method - Soil moisture irrigation relationship - Canals - Alignment of canals - Channel Losses - Design of Channel - Regime Channel – Kennedy's Theory – Lacey's Theory - Distribution system

DAMS
Dams - Kinds of dams - Selection of the type of dam - Selection of dam site - Problems in dam construction - Gravity dam - Forces acting on a gravity dam - Modes of failure and

criteria for structural stability - Foundation Treatment - Ogee Spillway - Construction of gravity dam - Functions and types of galleries in dams - Earthen dams - Types

IRRIGATION STRUCTURES
Description, uses, functional design principles and sketches of Tank Sluice, Tank Weir, Canal Head Regulator, Canal Cross Regulator, Canal Drop, Aqueduct, Syphon Aqueduct and Escape

TEXT BOOK
- Santhosh Kumar Garg, *Irrigation Engineering and Hydraulic Structures*, Khanna Publishers, 2000

REFERENCE BOOK
- Asawa G.L., *Irrigation Engineering*, New Age International Publishers, 1996

<table>
<tr><td colspan="12" align="center">CE0309A - Hydraulic And Irrigation Structures (R)</td></tr>
<tr><td colspan="2">Course designed by</td><td colspan="10" align="center">Department of Civil Engineering</td></tr>
<tr><td rowspan="2">1</td><td rowspan="2">Student outcome</td><td>a</td><td>b</td><td>c</td><td>d</td><td>e</td><td>f</td><td>g</td><td>h</td><td>i</td><td>j</td><td>k</td></tr>
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<tr><td>4</td><td>Course Coordinator</td><td colspan="10" align="center">Dr. Deeptha Thattai</td></tr>
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		L	T	P	C
PD0301A	**Personality Development V**	**2**	**0**	**0**	**2**
	Prerequisite				
	Nil				

PURPOSE
To enhance holistic development of students and improve their employability skills

INSTRUCTIONAL OBJECTIVES
To improve aptitude, problem solving skills and reasoning ability of the student.
To help them qualify the written test of competitive exams, campus placements & PSUs.
To collectively solve problems in teams & group.
To adopt new techniques in solving problem.

QUANTITATIVE APTITUDE - 2
UNIT – I
Percentage - Profit Loss Discount

UNIT – II
Ratio, Proportion - Mixtures & Solutions

UNIT – III
Time & Work - Time, Speed & Distance

UNIT – IV
Set Theory - Geometry & Mensuration - Cubes

UNIT – V
Data Sufficiency - Data Interpretation - Reasoning (Logical & Analytical) - ii

REFERENCE:
- Abhijit Guha, Quantitative Aptitude for Competitive Examinations, Tata Mcgraw Hill, 3rd Edition
- Edgar Thrope, Test Of Reasoning For Competitive Examinations, Tata Mcgraw Hill, 4th Edition.
- http://fw.freshersworld.com/placementweek/papers.asp

<table>
<tr><th colspan="12">PD0301A- Personality Development V (R)</th></tr>
<tr><td colspan="2">Course designed by</td><td colspan="10">Career Development Center</td></tr>
<tr><td rowspan="2">1</td><td rowspan="2">Student outcome</td><td>a</td><td>b</td><td>c</td><td>d</td><td>e</td><td>f</td><td>g</td><td>h</td><td>i</td><td>j</td><td>k</td></tr>
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<tr><td>4</td><td>Course Coordinator</td><td colspan="10">Career Development Center</td></tr>
</table>

		L	T	P	C
CE0311	**Soil Mechanics Laboratory**	0	0	4	2
	Prerequisite				
	CE0305				

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

INSTRUCTIONAL OBJECTIVES
- Familiarize the students to do the experiments as per the guidelines of BIS
- To provide the knowledge on the use of experimental results pertaining to foundation problems

LIST OF EXPERIMENTS
- Water content determination (Oven drying method)
- Grain size distribution - Sieve analysis
- Determination of Specific gravity by Pycnometer and density bottle method
- Determination of Liquid and Plastic limit (Casagrande method)
- Determination of Shrinkage limit of soil
- Determination of moisture-density relationship (Standard Proctor's)
- Determination of Permeability by Constant and Variable head method
- Determination of in-situ density by sand replacement and core cutter method
- Determination of Relative density - Sand
- Unconfined compression test for fine grained soils
- California Bearing Ratio (CBR) Test
- Triaxial Compression Test
- Direct shear test

REFERENCE
Laboratory Manual

CE0311 Soil Mechanics Laboratory (R)											
Course designed by		Department of Civil Engineering									
1	Student outcome	a	b	c	d	e	f	g	h	i	j	k
		x	**x**									
2	Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts(E)		Professional Subjects(P)	
									x
3	Broad area (for 'P'category)	Structural Engineering		Geotechnical Engineering		Water Resources Engineering		Geomatics Engineering	
				x					
4	Course Coordinator	Dr. P.T.Ravichandran								

		L	T	P	C
CE0313A	**Hydraulic Engineering Laboratory and Irrigation Camp (for students admitted in 2009-10 onwards)**	0	0	4	2
	Prerequisite				
	CE0205, CE0206				

PURPOSE
To get exposure about the function of various hydraulic equipments.

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

LIST OF EXPERIMENTS
- Measurement of Flow using Venturimeter.
- Measurement of Flow using Orificemeter.
- Determination of Friction Factor of the Pipe Material.
- Losses due to Sudden Contraction and Sudden Enlargement of the Pipe.
- Measurement of Flow through Orifice.
- Measurement of Flow thorough Mouthpiece.
- Measurement of Flow through Notch.
- Determination of Metacentric Height.
- Performance Test on Centrifugal Pump.
- Performance Test on Reciprocating Pump.
- Performance Test on Pelton Wheel.
- Performance Test on Francis Turbine.

REFERENCE
Laboratory Manual

IRRIGATION CAMP

PURPOSE
To physically inspect various irrigation structures and features studied under CE0309A HYDRAULIC AND IRRIGATION STRUCTURES – DESIGN AND DRAWING and form a clear idea of their utilities and layout.

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

- Visiting a site rich with irrigation system featuring canal networks, dams, cross drainage works, regulators etc.
- Students are expected to inspect them in detail, take photographs and prepare a brief note on each of the features photographed.
- At the end of the camp, a camp report shall be submitted highlighting the activities of the camp, group wise.

- The camp report submitted by student groups shall be evaluated and internal marks awarded.
- Attending the camp and submitting the camp report are mandatory for completion of the course CE0313A.

<table>
<tr><td colspan="13" align="center">CE0313A – Hydraulic Engineering Laboratory and Irrigation Camp (R)</td></tr>
<tr><td colspan="2" align="center">Course designed by</td><td colspan="11" align="center">Department of Civil Engineering</td></tr>
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<tr><td>4</td><td>Course Coordinator</td><td colspan="11" align="center">Mr. R. Sathyanathan</td></tr>
</table>

		L	T	P	C
CE0315	**Industrial Training I (Training to be undergone after IV semester**	**0**	**0**	**2**	**1**
	Prerequisite				
	Nil				

PURPOSE
To provide hands-on experience at site where civil engineering projects are executed.

INSTRUCTIONAL OBJECTIVES
- To enable the students to gather a first hand experience on site

INDUSTRIAL TRAINING I
- Students have to undergo two – week practical training in Civil 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.

	CE0315 Industrial Training I (Training to be undergone after IV semester) (R)										
	Course designed by	Department of Civil Engineering									
1	Student outcome	a	b	c	d	e	f	g	h	i	j	k
		x		**x**		**x**	**x**	**x**				
2	Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts(E)		Professional Subjects(P)				
										x		
3	Broad area (for 'P'category)	Structural Engineering		Geotechnical Engineering		Water Resources Engineering		Geomatics Engineering				
		x		**x**		**x**		**x**				
4	Course Coordinator	Class in-charge										

		L	T	P	C
CE0302	**Structural Analysis II**	2	2	0	3
	Prerequisite				
	CE0201, CE0202, CE0301				

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
- Preparation of influence line diagrams for indeterminate structures
- Analysis of arches and suspension cables
- Plastic theory and its application in analysis of indeterminate structures
- 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
- Pandit.G.S.,Gupta.S.P., *Structural Analysis- A Matrix approach*, Tata McGraw-Hill Publishing Company Ltd, New Delhi.1994
- Bhavikatti.S.S, *Structural Analysis*, Vol.1andVol.2, Vikas Publishing House Pvt.Ltd.,1999
- Vaidhyanathan.R and Perumal.P, *Comprehensive Structural Analysis*, Volume I and II, Lakshmi Publications (P) Ltd.New Delhi.2004

REFERENCE BOOKS

- Sterling Kinney.J., *Indeterminate Structural Analysis*, Narosa Publishing House.1987
- Jr. William Weaver and James .M.Gere, *Matrix Analysis of Framed Structures*, CBS Publishers and Distributors, Delhi, 1995
- Rajasekaran S. and Sankarasubramanian .G., *Computational Structural Mechanics*, Prentice Hall of India, 2001
- Manickaselvam.V.K, *Elementary Matrix Analysis of Structures*, Khanna Publishers, New Delhi, 1994
- Thadani.B.N., Desai.J.P., *Structural Mechanics*, Weinall Book Corporation, 1998

CE0302 STRUCTURAL ANALYSIS II (R)											
Course designed by	Department of Civil Engineering										
1 Student outcome	a	b	c	d	e	f	g	h	i	j	k
	x				x						x
2 Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts(E)			Professional Subjects(P)			
									x		
3 Broad area (for 'P'category)	Structural Engineering		Geotechnical Engineering		Water Resources Engineering			Geomatics Engineering			
	x										
4 Course Coordinator	Prof. G. Augustine Maniraj Pandian										

		L	T	P	C
CE0304	**Structural Design III**	**3**	**0**	**0**	**3**
	Prerequisite				
	CE0204, CE0303				

PURPOSE
To bring about an exposure to advanced topics in structural design comprising of RCC retaining walls, water tanks, yield line theory, long span steel girders, gantry girders and light gauge steel sections.

INSTRUCTIONAL OBJECTIVES
- To design RCC cantilever and counterfort retaining walls
- To design different type of water tanks including underground and overhead tanks
- To create an awareness on yield line theory of slabs
- To design flat slab, staircase and prestressed concrete structures

RCC RETAINING WALLS
Design of cantilever and counter-fort retaining walls.

RCC WATER TANKS
Design of rectangular and circular water tanks- Underground and overhead- Intze type tanks- design of staging - Shaft type and conventional types.

YIELD LINE THEORY
Yield line theory of slabs - collapse loads for rectangular, circular, and triangular slabs.

FLAT-SLABS
Design of flat slab type of construction- direct design method as per BIS code - - use of design aids (SP16)

PRESTRESSED CONCRETE STRUCTURES
Basic concepts - Principle of prestressing methods - materials required - stress and strength concept - load balancing concept - losses of prestress - Simple cable profile - analysis of sections subjected to flexure - End block- detailing only.

TEXT BOOKS
- Punmia, B.C., Ashok Kumar Jain, Arun Kumar Jain, *Reinforced Concrete Structures*, Laxmi Publications, New Delhi, 1988
- Jain. A. K., *Reinforced Concrete Structures*, Nem Chand & Brothers, Roorkee, 2002

REFERENCE BOOKS
- *Code of practice for Plain and Reinforced Concrete IS456-2000*, BIS, New Delhi
- *Design Aids for Reinforced Concrete to IS 456*, Special Publication (SP16), BIS New Delhi,1980
- Purushothaman, P., *Reinforced Concrete Structural Elements*, Tata MacGraw Hill Publishing Company Limited, New Delhi,1984.

CE0304 Structural Design III (R)											
Course designed by	Department of Civil Engineering										
1	Student outcome	a	b	c	d	e	f	g	h	i	j	k
		x		x		x			x	x	x	x

2	Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts(E)		Professional Subjects(P)			
								x			

3	Broad area (for 'P'category)	Structural Engineering		Geotechnical Engineering		Water Resources Engineering		Geomatics Engineering			
		x									

4	Course Coordinator	Dr. R. Padmapriya									

		L	T	P	C
CE0306	**Foundation Engineering**	**2**	**2**	**0**	**3**
	Prerequisite				
	CE0305				

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
- Provide the students with a basic understanding of the essential steps involved in a geotechnical site investigation
- 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
- 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
- Punmia,B.C., *Soil Mechanics and Foundations*, Laxmi Publications Pvt Ltd., 2000
- Venkatramaiah.C., *Geotechnical Engineering*, New Age International Publishers, 1995

REFERENCE BOOKS
- Joseph E.Bowles, *Foundation Analysis and Design*, McGrawHill Publishing Co., 1986

- Peck,R.B., Hanson and Thornburn, *Foundation Engineerng*, Wiley Eastern Ltd., 1974
- Tomlinson,M.J., *Foundation Engineering*, Wiley Eastern Ltd., 1980

	CE0306 FOUNDATION ENGINEERING (R)										
	Course designed by	Department of Civil Engineering									
1	Student outcome	a	b	c	d	e	f	g	h	i	j	k
		x				x						x
2	Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts(E)			Professional Subjects(P)			
										x		
3	Broad area (for 'P'category)	Structural Engineering		Geotechnical Engineering		Water Resources Engineering			Geomatics Engineering			
				x								
4	Course Coordinator	Dr. P.T.Ravichandran										

		L	T	P	C
CE0308	**Environmental Engineering II**	3	0	0	3
	Prerequisite				
	CE0307				

PURPOSE

To familiarize about the importance and methods of water treatment and sewage treatment with special attention to design and drawing.

INSTRUCTIONAL OBJECTIVES

- To learn the objectives and methods of water treatment and to study the features and function of different water treatment units
- To learn the objectives and methods of sewage treatment and to study the features and function of different primary treatment units
- To study the features and function of different secondary treatment units
- To learn the objectives and methods of sewage disposal
- To learn the objectives and methods of sludge treatment

WATER TREATMENT

Definition of unit process and unit operations - objectives of water treatment - methods & sequence of treatment of water - typical flow sheet treating hard groundwater turbid surface water - aeration , coagulation, flocculation filtration and disinfection - principles functions of design - sedimentation - flocculation- filter units - miscellaneous methods -iron and manganese removal - deflouridation and demineralization.

SEWAGE TREATMENT

Primary treatment - objectives - screening - grit chamber and primary sedimentation tanks design.

SECONDARY TREATMENT

Principles, functions and design - activated sludge unit and trickling filter - septic tank - Imhoff tank -sludge digestion tank - oxidation pond.

SEWAGE DISPOSAL AND SLUDGE TREATMENT

Sewage Disposal - Dilution - self purification of running streams - oxygen sag curve land disposal - sewage farming - deep well injection - soil dispersion system.

SLUDGE MANAGEMENT AND SOLID WASTE

Objectives of sludge treatment - properties and characteristics of sludge - sludge digestion - thickening - dewatering - conditioning - drying beds - biogas recovery. Collection and disposal in rural and urban contexts, management of long-term ill effects.

TEXT BOOKS

- Garg .S.K. *Environmental Engineering*, Vol. I & II, Khanna Publishers, New Delhi, 1994
- Paneerselvam R. Environmental Engineering, Vol. I & II, SPGS Publishers Chennai - 88
- Duggal.K.N., *Elements of Environmental Engineering*, S. Chand & Company Ltd., New Delhi, 2002.

REFERENCE BOOKS

- *Manual on Water Supply and Treatment*, CPHEEO, Ministry of Urban Development, Government of India, New Delhi, 1999
- *Manual on Sewerage & Sewage Treatment*, CPHEEO, Ministry of Urban Development, Government of India, New Delhi, 1999.

CE0308 Environmental Engineering II (R)											
Course designed by	Department of Civil Engineering										
1 Student outcome	a	b	c	d	e	f	g	h	i	j	k
	x		x		x						
2 Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts(E)			Professional Subjects(P)			
								x			
3 Broad area (for 'P'category)	Structural Engineering		Geotechnical Engineering		Water Resources Engineering			Geomatics Engineering			
					x						
4 Course Coordinator	Mr. J. S. Sudarsan										

		L	T	P	C
CE0314	**Irrigation Structures - Design and Drawing**	**2**	**0**	**2**	**3**
	Prerequisite				
	CE0309A				

PURPOSE
To get exposure about the design and drawing of irrigation structures.

INSTRUCTIONAL OBJECTIVES
- To know the importance, location, components and types of irrigation structures
- To learn the procedure to design the irrigation structures
- To get hand-on experience in drawing of irrigation structures

LIST OF EXERCISES
IRRIGATION STRUCTURES
Importance, Location, Components and Types are to be dealt. Designs are to be worked out and Detailed Drawing is to be drawn for the following Irrigation Structures.
- Tank Sluice
- Tank Weir
- Canal Head Regulator
- Canal Cross Regulator
- Canal Drop
- Aqueduct
- Syphon Aqueduct
- Escape

TEXT BOOKS
- Sathyanarayana Murthy.C., *Design of Minor Irrigation and Canal Structures*, Wiley Eastern Limited, 2002
- Santhosh Kumar Garg, *Irrigation Engineering*, 2000
- Agor.R., *Irrigation Engineering*, 2000

REFERENCE BOOKS
- Ellis, Manual of Irrigation

<table>
<tr><th colspan="13">CE0314 Irrigation Structures - Design and Drawing (R)</th></tr>
<tr><td colspan="2">Course designed by</td><td colspan="11">Department of Civil Engineering</td></tr>
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<tr><td>4</td><td>Course Coordinator</td><td colspan="11">Mr. G. Baskar</td></tr>
</table>

		L	T	P	C
PD0302A	**Personality Development VI**	**2**	**1**	**0**	**2**
	Prerequisite				
	Nil				

PURPOSE

To enhance holistic development of students and improve their employability skills

INSTRUCTIONAL OBJECTIVES

- Understand the importance of verbal communication in the workplace
- Understand the significance of oral presentations, and when they may be used.
- Practice verbal communication by making a technical presentation to the class
- Understand the fundamental of listening and how one can present in a group discussion
- Prepare or update resume according to the tips presented in class.

COMMUNICATION SKILLS

UNIT – I

Self Introduction

UNIT – II

Tech talk / Area of Interest / Extempore

UNIT – III

Curriculum Vitae

UNIT – IV

Mock Interview

UNIT – V

Group Discussion / Case Study

REFERENCE:

- M. Ashraf Rizvi, Effective Technical Communication, Tata MC.Graw Hill, 2005
- S P Dhanavel, English and Communication Skills for students of Science and Engineering, Orient Black swan, 2009.

PD0302A Personality Development VI (R)											
Course designed by		Career Development Center									
1	Student outcome	a	b	c	d	e	f	g	h	i	j	k
					x		x	x		x		
2	Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts(E)		Professional Subjects(P)				
		x										
3	Broad area (for 'P'category)	Structural Engineering		Geotechnical Engineering		Water Resources Engineering		Geomatics Engineering				
4	Course Coordinator	Career Development Center										

		L	T	P	C
CE0310A	**Comprehension II**	0	2	0	1
	Prerequisite				
	Nil				

PURPOSE

To provide a compete picture of civil engineering 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 is achieved so that students are well prepared to face job interviews and subjects related competitive examinations.

INSTRUCTIONAL OBJECTIVES

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

COMPREHENSION

Review of the following topics of civil engineering:

- Basics of Engineering Mechanics, Mechanics of Solids, Strength of Materials and Structural Analysis
- Overview of Design of Concrete and Masonry structures
- Overview on Geotechnical Engineering
- Overview of Elements of Water resources Engineering, Irrigation and Hydraulic Structures
- Overview on Environmental Engineering

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)

<table>
<tr><td colspan="12" align="center">CE0310A COMPREHENSION II (R)</td></tr>
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<tr><td>4</td><td>Course Coordinator</td><td colspan="10" align="center">Dr. R. Padmapriya, Mr. K. Gunasekaran</td></tr>
</table>

		L	T	P	C
CE0312	**Environmental Engineering Laboratory**	**0**	**0**	**4**	**2**
	Prerequisite				
	CE0307, CE0308				

PURPOSE

To get exposure about water and sewage analysis.

INSTRUCTIONAL OBJECTIVES

- To analyse water and sewage volumetrically and using certain equipments
- To learn to prepare reagents for each experiment
- To get hand-on experience in the operation of equipments like pH meter, TDS meter, turbidity meter, etc.
- To study to take observations after each titration
- To study to do calculations and interpret the results obtained using IS specification for drinking water and waste water(IS 10500-1963 and IS 2490). curves.

LIST OF EXPERIMENTS

- Measurement of pH
- Measurement of Total Dissolved salts
- Measurement of Conductivity
- Estimation of Alkalinity
- Estimation of Hardness by EDTA method
- Estimation of Residual Chlorine
- Estimation of Optimum Coagulant Dose by Jar Test
- Estimation of Ammonia Nitrogen
- Estimation of Sulphate
- Estimation of Chlorides
- Estimation of D.O. by Wrinkler's methods
- Estimation of Suspended, Settleable, Volatile and fixed solids
- BOD test for water and waste water
- COD test for water and waste water
- Determination of Turbidity by using Nephlometer

REFERENCE

Laboratory Manual

CE0312 Environmental Engineering Laboratory (R)										
Course designed by		Department of Civil Engineering									
1	Student outcome	a	b	c	d	e	f	g	h	i	j	k
		x		**x**		**x**						
2	Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts(E)		Professional Subjects(P)	
								x	
3	Broad area (for 'P'category)	Structural Engineering		Geotechnical Engineering		Water Resources Engineering		Geomatics Engineering	
						x			
4	Course Coordinator	Mr. J. S. Sudarsan										

		L	T	P	C
CE0403	Transportation Engineering	3	0	0	3
	Prerequisite				
	Nil				

PURPOSE
To study in details about roads, railways airways and waterways.

INSTRUCTIONAL OBJECTIVES
* To know about highway planning and geometric design of roads
* To know about highway drainage and maintenance
* To study railway track construction and operation
* To know about the fundamentals of airways
* To know about the fundamentals of harbour and looks

HIGHWAY PLANNING AND ALIGNMENT
Highway Development in India, Macadam's method of road construction, Highway Authority of India, Central Road Research Institute - Requirements of ideal alignment. Factors controlling Highway alignment - Engineering Surveys for alignment - classification and cross section of urban rural roads Highway cross sectional elements - Right of way - carriage way, camber, Krebs, shoulders and Footpaths.

GEOMETRIC DESIGN OF HIGHWAYS
Design of horizontal alignments - Super elevation, Widening of Pavements on horizontal curves transition Curves, Vertical alignments - Rolling, limiting, exceptional and minimum Gradients, summit and Valley Curves - Sight Distance - Types of sight distances.

HIGHWAY DRAINAGE AND MAINTENANCE
Importance of highway drainage, Surface Drainage, Subsurface drainage - Drainage of slopes and erosion control - Road construction in water logged areas, Pavement failures - Traffic engineering - Traffic operations - Design of intersections.

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 AND HARBOURS

Airport Planning, components of Airport, site selection, Runway Orientation, design of runway, Geometric design and correction for gradients, airport zoning.

Definition of terms - harbours, ports, Docks, Tides and waves, Requirements of harbours, Classification - site investigation for satellite ports - Terminal facilities - Mooring accessories Navigational aids. Piers, Breakwaters, Wharves, Jetties, Quays, Fenders.

TEXT BOOKS

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

REFERENCE BOOK

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

CE0403 Transportation Engineering (R)											
Course designed by	Department of Civil Engineering										
1	Student outcome	a	b	c	d	e	f	g	h	i	j	k
		x		x		x			x			x
2	Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts(E)		Professional Subjects(P)				
										x		
3	Broad area (for 'P'category)	Structural Engineering		Geotechnical Engineering		Water Resources Engineering		Geomatics Engineering				
										x		
4	Course Coordinator	Mr. L. Krishnaraj										

		L	T	P	C
CE0407	**Earthquake Resistant and Special Structures**	3	0	0	3
	Prerequisite				
	CE0302				

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

* To develop systematically from basic principles of structural dynamics the characteristic of dynamic behaviour of the structure, namely, response spectrum
* To expose important aspects of various theories of cause of earthquake and measurement of its effects on the structure as loads
* To impart knowledge about materials and structural systems for structures subject to earthquake
* To introduce basic principles of design and detailing for ductility
* 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

* Short course on *Seismic design of reinforced concrete buildings*, CEP, IIT, Kanpur, Dec.1995

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

REFERENCE BOOKS

- Paulay.T and Priestly. M.N.J., *A seismic Design of Reinforced Concrete and Masonry Building*, John Wiley and Sons, 1991
- JaiKrishna, A.R.Chandrasekaran and BrijeshChandra, *Elements of Earthquake Engineering*, 2nd Edition, South Asian Publishers, Pvt. Ltd.
- Course Notes on *Structural Design for Dynamic Loads*, SRM Engineering College, Dec2002
- Lecture notes on *Health Monitoring of Structures- A Proactive Strategy*, ISTE sponsored course held at SRM Engineering College, Jan,2003
- *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.

CE0407 Earthquake Resistant and Special Structures (R)											
Course designed by	Department of Civil Engineering										
1 Student outcome	a	b	c	d	e	f	g	h	i	j	k
	x					x		x	x	x	x
2 Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts(E)		Professional Subjects(P)				
							x				
3 Broad area (for 'P'category)	Structural Engineering		Geotechnical Engineering		Water Resources Engineering		Geomatics Engineering				
	x										
4 Course Coordinator	Dr. S. Elavenil										

		L	T	P	C
MA0461	**Probability and Statistics**	**3**	**0**	**0**	**3**
	Prerequisite				
	Nil				

PURPOSE
To develop a thorough understanding of the methods of probability and statistics which are used to model engineering problems.

INSTRUCTIONAL OBJECTIVES

At the end of the semester, the student will be able:

* To apply the basic rules and theorems of probability to solve engineering problems.

* To appropriately choose, define and/or derive probability distributions such as the Binomial, Poisson and Normal etc to model and solve engineering problems.

* To learn how to formulate and test hypotheses about means, variances and proportions and to draw conclusions based on the results of statistical tests.

* To understand how regression analysis can be used to develop an equation that estimates how two variables are related.

* To understand the fundamentals of quality control and the methods used to control systems and processes.

PROBABILITY AND RANDOM VARIABLES
Sample space, Random experiments and random variables, Concept of probability, Conditional probability, Addition and multiplication laws, Baye's theorem - One dimensional Random Variables- Expectation, Variance, Covariance, and Moments.

THEORETICAL DISTRIBUTIONS
Discrete: Binomial, Poisson, Geometric, Negative Binomial; Continuous: Exponential and Normal Distributions, their properties and applications to industrial problems.

TESTING OF HYPOTHESIS
Introduction – Large sample tests based on normal distribution - Test for single mean, difference between means, proportion, difference between proportion, Small sample tests based on t, F distributions- Test for single mean, difference between means, standard deviation, difference between standard deviation. Chi-square test for goodness of fit, independence of attributes.

CORRELATION, REGRESSION AND ANALYSIS OF VARIANCE
Pearson's Correlation coefficient- Spearman's Rank correlation coefficient Regression Concepts – Regression lines – Multiple correlation and regression. Analysis of Variance- One-way classification and two way classification.

STATISTICAL QUALITY CONTROL
Introduction – Process control – control charts for variables - X and R, X and s charts control charts for attributes:
p chart, np chart, c chart and their applications in process control.

TEXT BOOKS

- S.C. Gupta and V.K. Kapoor, Fundamentals of Mathematical Statistics, 9th extensively revised edition, Sultan Chand & Sons, 1999.
- Ross. S., "A first Course in Probability", Fifth Edition, Pearson Education, Delhi 2002.
- Johnson. R. A., "Miller & Freund's Probability and Statistics for Engineers", Sixth Edition, Pearson Education, Delhi, 2000.
- Walpole, R. E., Myers, R. H. Myers R. S. L. and Ye. K, "Probability and Statistics for Engineers and Scientists", Seventh Edition, Pearsons Education, Delhi, 2002.
- Lipschutz. S and Schiller. J, "Schaum's outlines - Introduction to Probability and Statistics", McGraw-Hill, New Delhi, 1998.
- Veerarajan T., Probability, Statistics and Random Processes, Tata McGraw Hill,1st Reprint 2004.
- Larsen and Marx, An Introduction to Mathematical Statistics and its Applications, 4th edition, Prentice-Hall, 2006.
- Probability and Statistics for Engineers and Scientists, by R. E. Walpole, R. H. Myers, S. L. Myers and K. Ye, Eighth Edition.
- Anthony J. Hayter, *Probability and Statistics for Engineers*, 2nd Edition

MA0460 Probability and Statistics (R)										
Course designed by	Department of Mathematics									
1 Student outcome	a	b	c	d	e	f	g	h	i	j	k
	x										
2 Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts(E)		Professional Subjects(P)				
			x								
3 Broad area (for 'P'category)	Structural Engineering		Geotechnical Engineering		Water Resources Engineering		Geomatics Engineering				
4 Course Coordinator	Mr. A. D. Chandrasekaran										

		L	T	P	C
CE0409A	**Project Work Phase I** **(for students admitted in 2008-09 onwards)**	**0**	**0**	**2**	**1**
	Prerequisite				
	Nil				

PURPOSE

To simulate real life situations related to civil 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 project will cover all the aspects (to the extent possible) like investigation, planning, designing, detailing and estimating of a civil 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.

CE0409A Project Work Phase I (R)												
Course designed by		Department of Civil Engineering										
1	Student outcome	a	b	c	d	e	f	g	h	i	j	k
		x	x	x	x	x	x	x	x	x	x	x
2	Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts(E)		Professional Subjects(P)				
										x		
3	Broad area (for 'P'category)	Structural Engineering		Geotechnical Engineering		Water Resources Engineering		Geomatics Engineering				
		x		x		x		x				
4	Course Coordinator	Dr. P. T. Ravichandran										

			L	T	P	C
CE0411	**Estimating, Costing and Professional Practice** (for students admitted in 2008-09 onwards)		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
- To study estimation of buildings including R.C.C. members.
- To study the estimation of roads covering culverts and bridges.
- To study rate analysis.
- To impart hands-on experience in reading architectural and structural drawings, setting out on ground and estimation of material and labour
- To bring about an exposure to field problems associated with roads/bridge marking and estimation of roadwork quantities.
- Hands on experience on the use of software like STAAD.Pro, Primavera, MS Excel and Build Superfast.

EXERCISE

ESTIMATION COSTING AND FIELD PRACTICE
- Buildings
- Studying architectural drawings in conjunction with structural drawings and specifications.
- Preparation of centerline diagrams and lay out of foundations
- Marking on ground
- Estimation of quantities stage wise, i.e., foundation-plinth level-lintel level etc
- Estimation of labor required stage wise
- Estimation of earthwork and other roadwork quantities
- Carry out rate analysis and costing for different stages of work
- Prepare bills of quantities as required for tendering

COMPUTER APPLICATION IN STRUCTURAL ENGINEERING
- Staad.Pro software- Creation of geometry- load computation and assignment- Analysis for static load- interpretation of output

COMPUTER APPLICATION IN CONSTRUCTION MANAGEMENT
- Building estimation using MS Excel.
- Introduction to estimation softwares like Build Superfast.
- Introduction to construction planning software - PRIMAVERA-MS-Project

TENDERING AND CONTRACTS
- Basic concepts of tendering and types of contracts

TEXT BOOKS

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

REFERENCE BOOKS

- Birdie.G.S., *A Text Book on Estimating and Costing*, Dhanpat Rai and Sons, New Delhi, 2000
- RangwalaS.C., *Elements of Estimating and Costing*, Charotar Publishing House, Anand, 1987
- Rangwala.S.C., *Valuation of Real Properties*, Charotar Publishing House,Anand, 1984
- Jagannathan G, *Getting More at Less Cost*, - The Value Engineering Way, Tata McGraw Hill, New Delhi, 1992
- Lecture notes on *Development of Real Estate Business*- Department of Civil Engineering, S.R.M. Engineering College, 2002

CE0411 ESTIMATING, COSTING AND PROFESSIONAL PRACTICE (R)											
Course designed by	Department of Civil Engineering										
1 Student outcome	a	b	c	d	e	f	g	h	i	j	k
	x	x		x	x				x		x
2 Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts(E)			Professional Subjects(P)			
									x		
3 Broad area (for 'P'category)	Structural Engineering		Geotechnical Engineering		Water Resources Engineering			Geomatics Engineering			
	x										
4 Course Coordinator	Mr. K. Gunasekaran										

		L	T	P	C
CE0413	**Industrial Training II (Training to be undergone after VI semester)**	0	0	2	1
	Prerequisite				
	Nil				

PURPOSE
To provide hands-on experience at site where civil engineering projects are executed.

INSTRUCTIONAL OBJECTIVES
- To enable the students to gather a first hand experience on site

INDUSTRIAL TRAINING II
Students have to undergo two - week practical training in Civil 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.

CE0413 Industrial Training II (Training to be undergone after VI semester) (R)										
	Course designed by	Department of Civil Engineering									
1	Student outcome	a	b	c	d	e	f	g	h	i	j	k
		x		**x**			**x**	**x**	**x**			
2	Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts(E)		Professional Subjects(P)			
								x			
3	Broad area (for 'P'category)	Structural Engineering		Geotechnical Engineering		Water Resources Engineering		Geomatics Engineering			
		x		**x**		**x**		**x**			
4	Course Coordinator	Class in-charge									

		L	T	P	C
CE0402	**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
- To introduce a concepts of projects formulation
- To impart the idea about planning and scheduling of activities
- To introduce the concepts of resource planning and allocation and control
- 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- resure 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

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

REFERENCE BOOKS

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

CE 0402 CONSTRUCTION PLANNING AND MANAGEMENT (R)											
Course designed by	Department of Civil Engineering										
1 Student outcome	a	b	c	d	e	f	g	h	i	j	k
	x				x						x
2 Category	General (G)			Basic Sciences (B)			Engineering Sciences and Technical Arts(E)			Professional Subjects(P)	
										x	
3 Broad area (for 'P'category)	Structural Engineering			Geotechnical Engineering			Water Resources Engineering			Geomatics Engineering	
										x	
4 Course Coordinator	J. Rajprasad										

		L	T	P	C
CE0404A	**Project Work Phase II** **(for students admitted in 2008-09 onwards)**	**0**	**0**	**16**	**8**
	Prerequisite				
	Nil				

PURPOSE
To simulate real life situations related to civil 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 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

<table>
<tr><td colspan="12" align="center">CE0404A Project Work Phase II (R)</td></tr>
<tr><td colspan="2" align="center">Course designed by</td><td colspan="10" align="center">Department of Civil Engineering</td></tr>
<tr><td rowspan="2">1</td><td rowspan="2">Student outcome</td><td>a</td><td>b</td><td>c</td><td>d</td><td>e</td><td>f</td><td>g</td><td>h</td><td>i</td><td>j</td><td>k</td></tr>
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<tr><td rowspan="2">3</td><td rowspan="2">Broad area (for 'P'category)</td><td colspan="3" align="center">Structural Engineering</td><td colspan="3" align="center">Geotechnical Engineering</td><td colspan="3" align="center">Water Resources Engineering</td><td colspan="2" align="center">Geomatics Engineering</td></tr>
<tr><td colspan="3" align="center">x</td><td colspan="3" align="center">x</td><td colspan="3" align="center">x</td><td colspan="2" align="center">x</td></tr>
<tr><td>4</td><td align="center">Course Coordinator</td><td colspan="11" align="center">Dr. P. T. Ravichandran</td></tr>
</table>

		L	T	P	C
CE0406	**Comprehensive Viva**	0	0	2	1
	Prerequisite				
	Nil				

PURPOSE

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

INSTRUCTIONAL OBJECTIVES

* To provide overview of all civil engineering topics covered in the syllabus given below
* To assess the overall knowledge level of civil engineering standards and guide them to take corrective measures where deficiencies are detected

COMPREHENSIVE VIVA

Review of the following topics of civil engineering:

* Properties and Characteristics of various engineering materials
* Basics of Applied Mechanics and Strength of Materials
* Elementary analysis of determinate and indeterminate structures
* Various classical methods in analysis of structures
* Matrix methods of analysis of structures
* Overview of Design of Masonry, RCC and Steel Structures
* Overview on Fluid Mechanics and Machinery
* Overview of Elements of Irrigation and Hydraulic Structures
* Overview on Surveying
* Overview on Water Supply and Sewerage
* Overview of Transportation Engineering covering Roads, Railway, Docks and Airport Engineering
* Overview of Aspects of Geotechnical Engineering

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

CE0406 Comprehensive Viva (R)											
Course designed by		Department of Civil Engineering									
1	Student outcome	a	b	c	d	e	f	g	h	i	j	k
		x				**x**		**x**			**x**	**x**
2	Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts(E)			Professional Subjects(P)			
										x		
3	Broad area (for 'P'category)	Structural Engineering		Geotechnical Engineering		Water Resources Engineering			Geomatics Engineering			
		x		**x**		**x**			**x**			
4	Course Coordinator	Dr.R.Padmapriya,K.Gomathi										

A. Structural Engineering

		L	T	P	C
CE-EST1	**Computer Analysis of Structures**	3	0	0	3
	Prerequisite				
	CE0201, CE0202, CE0301, CE0302				

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

INSTRUCTIONAL OBJECTIVES
- To introduce fundamentals of matrix analysis - Principle of superposition and to formulate flexibility and stiffness matrices of spring systems and elements
- To apply energy concepts to develop nodal load vectors
- To analyse a structure by stiffness and flexibility methods
- To analyse and design a structure using computer software packages
- 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

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

REFERENCE BOOKS

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

CE-EST1 COMPUTER ANALYSIS OF STRUCTURES (SE)											
Course designed by	Department of Civil Engineering										
1 Student outcome	a	b	c	d	e	f	g	h	i	j	k
	x				x						x
2 Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts(E)			Professional Subjects(P)			
									x		
3 Broad area (for 'P'category)	Structural Engineering		Geotechnical Engineering		Water Resources Engineering			Geomatics Engineering			
	x										
4 Course Coordinator	Dr.K.S.Satyanarayanan										

		L	T	P	C
CE-EST2	**Computer Aided Design of Structures**	3	0	0	3
	Prerequisite				
	CE0201 /CE0202 /CE0301 / CE0302 **CE0204 / CE0303 / CE0304**				

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

INSTRUCTIONAL OBJECTIVES
- To know about graphic primitives
- To impart knowledge about optimization and design principles
- To introduce finite element method and to apply for simple problems
- To train in use of standard software packages for analysis
- 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
- Krishnamoorthy C.S. and Rajeev .S, *Computer Aided Design*, - Narosa Publishing House, New Delhi 1991
- Rajasekaran S., *Finite Element Analysis*, - A.H. Wheelers Publishing Co. Ltd., 1993
- S.S.Rao, *The Finite Element Method in Engineering*, Fourth Edition, Elsevier,2006

REFERENCE BOOKS

- Grover M.P. and Zimmers E.W.Jr. CAD/CAM, *Computer Aided Design and Manufacturing*, - Prentice Hall of India Ltd., 1996
- Harrison H.B. *Structural Analysis and Design*, Parts I and II - Pergamon Press, Oxford, 1970
- Rao, S.S. *Optimization Theory and Applications* - Wiley Eastern Ltd. New Delhi 1977
- AUTOCAD Manual, 2000
- REDDY, *Finite Element Methods*, II Edn. - McGraw Hill Co., 1993

CE-EST2 COMPUTER AIDED DESIGN OF STRUCTURES (SE)											
Course designed by	Department of Civil Engineering										
1 Student outcome	a	b	c	d	e	f	g	h	i	j	k
	x		**x**		**x**						**x**
2 Category	General (G)			Basic Sciences (B)			Engineering Sciences and Technical Arts(E)		Professional Subjects(P)		
										x	
3 Broad area (for 'P'category)	Structural Engineering			Geotechnical Engineering			Water Resources Engineering		Geomatics Engineering		
	x										
4 Course Coordinator	Dr.K.S.Satyanarayanan										

		L	T	P	C
CE-EST3	**Tall Buildings**	**3**	**0**	**0**	**3**
	Prerequisite				
	CE0201 /CE0202 /CE0301 / CE0302 CE0204 / CE0303 / CE0304				

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

INSTRUCTIONAL OBJECTIVES
- To introduce various aspects of planning of Tall Buildings
- To know about different types of loads
- To introduce various structural systems for medium rise buildings with their behaviour and analysis
- To introduce various structural systems for high rise buildings with their behaviour and analysis
- 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
- Schuller.W.G. *High Rise Building Structures*, John Wiley & Sons, 1977

- Smith.B.S and Coull. A, *Tall Building structures- Analysis and Design* John Wiley & Sons, 1991
- Taranath. B.S. , *Structural Analysis and Design of Tall Buildings*, Mc Graw Hill co., 1988

REFERENCE BOOKS
- Lynn.S.Beedle, *Advances in Tall Buildings*, CBS Publishers and Distributers, New Delhi,1986
- Lin.T.Y. and Stotes Burry.D, *Structural Concepts and Systems for Architects and Engineers*, John Wiley & Sons, 1988
- 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.
- Lecture Notes on, *Tall Buildings* - Short term Course Organised by Civil Engineering Dept., SRM Engineering College, Kattankulathur. June 2002

EC-EST3 TALL BUILDINGS (SE)											
Course designed by	Department of Civil Engineering										
1 Student outcome	a	b	c	d	e	f	g	h	i	j	k
	x				x						x
2 Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts(E)			Professional Subjects(P)			
									x		
3 Broad area (for 'P'category)	Structural Engineering		Geotechnical Engineering		Water Resources Engineering			Geomatics Engineering			
	x										
4 Course Coordinator	Dr.K.S.Satyanarayanan										

		L	T	P	C
CE-EST4	**Storage and Industrial Structures**	**3**	**0**	**0**	**3**
	Prerequisite				
	CE0201 /CE0202 /CE0301 / CE0302 **CE0204 / CE0303 / CE0304**				

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

INSTRUCTIONAL OBJECTIVES
- Planning and layout play a very important role in industrial structures and they are important
- Types of industrial building, lighting and ventilation in each cases are dealt with here
- Design of steel gable frame with knee joint, beam column, base plate and anchor bolt are dealt with here
- Design of RC silos, bunkers, chimneys and cooling tower are dealt with here
- 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
- P. Dayaratnam, *Design of Concrete Structure*, S. Chand and Co.,- New Delhi, 1999
- Ramchandra, *Design of Steel Structures*, Vol . I & II Standard Book House, New Delhi, 1996
- Krishna Raju, *Advanced Concrete Structures*, McGraw Hill, New Delhi, 2000

REFERENCE BOOKS
- Edwin H. Gaylord, Charles N. Gaylord . Japes R. Stallmeyer, *Steel Structures*, McGraw Hill, NewDelhi, 1995
- S.K. Duggal, *Design of Steel Structures*, McGraw Hill, New Delhi, Second Edition, 1996
- S. Arya and J.L. Ajmani, *Design of Steel Structures*, New Chand and Bros, Roorkee

- Lothers, *Structural Design in Steel*, Prentice Hall, 1986
- Koncz.T., *Manual of precast construction*, Vol. I , II, and III, Bauverlag, GMBH, 1971
- Murashew. V., Sigalov. E., and Bailov. V., *Design of reinforced concrete structures*, Mr. Publishers, 1968
- CBRI, *Building materials and Components*, India, 1990.

<table>
<tr><td colspan="13" align="center">CE-EST4 STORAGE AND INDUSTRIAL STRUCTURES (SE)</td></tr>
</table>

	Course designed by	Department of Civil Engineering										
1	Student outcome	a	b	c	d	e	f	g	h	i	j	k
		x		x		x			x		x	
2	Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts(E)		Professional Subjects(P)				
									x			
3	Broad area (for 'P'category)	Structural Engineering		Geotechnical Engineering		Water Resources Engineering		Geomatics Engineering				
		x										
4	Course Coordinator	Prof. G. Augustine Maniraj Pandian										

		L	T	P	C
CE-EST5A	**Prestressed Concrete Structures**	3	0	0	3
	Prerequisite				
	CE0201 /CE0202 /CE0301 / CE0302 CE0204 / CE0303 / CE0304				

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

INSTRUCTIONAL OBJECTIVES
• Prestressing methods, principles and concepts are essential for the basic concept of the subject
• Analysis of prestress and the resultant stresses using different concepts is dealt here
• Determination of losses in concrete & Anchorage zone stresses in end block can be brought out using IS method
• Determination of shear strength and ultimate shear resistance capacity as per IS code is dealt
• Design of prestresses concrete section, stresses at transfer, service load, limit state of collapse in flexure and shear is dealt here
• 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
• Krishna Raju. N, *Prestressed Concrete* 4th edition Tata McGraw Hill Company, New Delhi - 1998

- N.C. Sinha and S.K.Roy, *Fundamentals of prestressed Concrete*, S. Chand and Co., 1985
- N.Rajagopalan, *Prestressed Concrete, Narosa Publishing House*, New Delhi-2002

REFERENCE BOOKS

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

CE-EST5A - Prestressed Concrete Structures (SE)										
Course designed by	Department of Civil Engineering									
1 Student outcome	a	b	c	d	e	f	g	h	i	j	k
	x		x		x			x	x	x	
2 Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts(E)		Professional Subjects(P)				
								x			
3 Broad area (for 'P'category)	Structural Engineering		Geotechnical Engineering		Water Resources Engineering		Geomatics Engineering				
	x										
4 Course Coordinator	Dr. S. Elavenil										

		L	T	P	C
CE-EST6	**Advanced Structural Design**	**3**	**0**	**0**	**3**
	Prerequisite				
	CE0201 /CE0202 /CE0301 / CE0302 CE0204 / CE0303 / CE0304				

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

- To study the limit state design methodology as applicable to continuous beams
- To understand the behaviour of grid floors, to carry out their design and to study principles of steel space frames
- To study approximate analysis methods of medium rise framed building
- To get exposed to the design of small span bridges and design principles of steel bridges
- 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 loadsdesign 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

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

- Krishnaraju, N., *Design of Bridges*, CBS Publishers and Distributors, Delhi, 1986

REFERENCE BOOKS

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

<table>
<tr><td colspan="12" align="center">CE-EST6 Advanced Structural Design (SE)</td></tr>
<tr><td colspan="2">Course designed by</td><td colspan="10" align="center">Department of Civil Engineering</td></tr>
<tr><td rowspan="2">1</td><td rowspan="2">Student outcome</td><td>a</td><td>b</td><td>c</td><td>d</td><td>e</td><td>k</td><td>g</td><td>h</td><td>i</td><td>j</td><td>k</td></tr>
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<tr><td rowspan="2">2</td><td rowspan="2">Category</td><td colspan="3" align="center">General (G)</td><td colspan="2" align="center">Basic Sciences (B)</td><td colspan="3" align="center">Engineering Sciences and Technical Arts(E)</td><td colspan="2" align="center">Professional Subjects(P)</td></tr>
<tr><td colspan="3"></td><td colspan="2"></td><td colspan="3"></td><td colspan="2" align="center">x</td></tr>
<tr><td rowspan="2">3</td><td rowspan="2">Broad area (for 'P'category)</td><td colspan="3" align="center">Structural Engineering</td><td colspan="2" align="center">Geotechnical Engineering</td><td colspan="3" align="center">Water Resources Engineering</td><td colspan="2" align="center">Geomatics Engineering</td></tr>
<tr><td colspan="3" align="center">x</td><td colspan="2"></td><td colspan="3"></td><td colspan="2"></td></tr>
<tr><td>4</td><td>Course Coordinator</td><td colspan="10" align="center">Dr. R. Padmapriya</td></tr>
</table>

B. Geotechnical Engineering

		L	T	P	C
CE-EGT1	**Ground Improvement Techniques**	**3**	**0**	**0**	**3**
	Prerequisite				
	CE0305, CE0306				

PURPOSE

To develop an understanding of the ground improvement techniques and use of new materials and its behaviour for ground improvement techniques.

INSTRUCTIONAL OBJECTIVES

*   To develop an awareness of problematic soils and selection of ground improvement techniques based on soil conditions
*   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

*   Koerner.R.M., *Construction and Geotechnical Methods in Foundation Engineering*, McGraw Hill Publishing Company, New york, 1984
*   Purusothamaraj.P., *Ground Improvement Techniques*, Laxmi Publication (P) Ltd., New Delhi, 2000

REFERENCE BOOKS

*   Moseley. M.P., *Ground Improvement*, Blackie Academic and Professional, Chapman and Hall, Glassgow, 1993
*   Manfred R.Hausmann, *Engineering Principles of Ground Modification*, McGraw Hill Publishing Company, New york, 1990

- John, N.W.M., *Geotextiles*, John Blackies and Sons Ltd., London, 1987

CE-EGT1 GROUND IMPROVEMENT TECHNIQUES (SE)												
Course designed by		Department of Civil Engineering										
1	Student outcome	a	b	c	d	e	f	g	h	i	j	k
		x				x						x
2	Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts(E)			Professional Subjects(P)			
										x		
3	Broad area (for 'P'category)	Structural Engineering		Geotechnical Engineering		Water Resources Engineering			Geomatics Engineering			
				x								
4	Course Coordinator	Dr. P.T.Ravichandran										

		L	T	P	C
CE-EGT2	**Introduction to Soil Dynamics and Machine Foundation**	3	0	0	3
	Prerequisite				
	CE0305, CE0306				

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
- Familiarize the student to learn wave and wave propagation and dynamic properties of soils
- Familiarize the student with the procedure used for machine foundation design
- 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 nonuniform 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
- Prakash.S., and Puri,V.K., *Foundation for Machines*, McGraw Hill Publishing Company, Newyork, 1988
- Srinivasulu.P. & Vaidanathan.C., *Hand book on Machine Foundations*, McGraw Hill Publishing Company, New york, 1986

REFERENCE BOOKS
- F.E.Richard.R.D., Woods & J.R.Hall, *Vibrations of Soils and Foundations*, Prentice Hall, 1962
- *IS Code of Practice for Design and Construction of Machine Foundations*, IS-2974 (Part I to IV), 1987.

CE-EGT2 - Introduction to Soil Dynamics and Machine Foundation (SE)											

	Course designed by	Department of Civil Engineering										
1	Student outcome	a	b	c	d	e	f	g	h	i	j	k
		x				x						x
2	Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts(E)		Professional Subjects(P)				
										x		
3	Broad area (for 'P'category)	Structural Engineering		Geotechnical Engineering		Water Resources Engineering		Geomatics Engineering				
				x								
4	Course Coordinator	Dr. P.T.Ravichandran										

		L	T	P	C
CE-EGT3	**Environmental Geo Technology**	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
* To gain an advanced understanding of the role of geotechniques in the design of waste management system
* 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
* Koerner.R.M., *Construction and Geotechnical Methods in Foundation Engineering*, McGraw Hill Publishing Company, New york, 1996
* Fried,J.J., *Ground water Pollution*, Elsevier, 1993
* Daniel,D.E., *Geotechnical Practice for Waste Disposal*, Chapman and Hall, London, 1993
* Wentz,C.A., Hazardous, *Waste Management*, McGraw Hill Publishing Company, Singapore, 1989.

CE-EGT3 Environmental Geo Technology (SE)											
Course designed by	Department of Civil Engineering										
1 Student outcome	a	b	c	d	e	f	g	h	i	j	k
	x				x						x
2 Category	General (G)			Basic Sciences (B)			Engineering Sciences and Technical Arts(E)			Professional Subjects(P)	
										x	
3 Broad area (for 'P'category)	Structural Engineering			Geotechnical Engineering			Water Resources Engineering			Geomatics Engineering	
				x							
4 Course Coordinator	Dr. P.T.Ravichandran										

		L	T	P	C
CE-EGT4	**Structures on Expansive Soil**	**3**	**0**	**0**	**3**
	Prerequisite				
	CE0305, CE0306				

PURPOSE
To get exposure about various aspects of structures especially constructed on expansive soil.

INSTRUCTIONAL OBJECTIVES
* To know the occurrence and distribution of expansive soil
* To study the properties of expansive soil
* To understand various methods of prediction of heave
* To study the design procedure for foundation
* 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
* Chenn. F.R., *Foundation on Expansive Soils* - Elsevier, 1973
* Parcher. J.V. & R.E. Means, *Soil Mechanics and Foundations*, Columbus, 1968
* Boominathan. S., *Lecture Notes on Structures on Expansive Soil*, 1990, College of Engineering, Guindy, Anna University, Chennai
* Park, R. and Paulay, T., *Reinforced Concrete Structures*, John Wiley & Sons, Inc., New York, 1981
* Purushothaman, P., *Reinforced Concrete Structural Elements*, Tata MacGraw Hill Publishing Company Limited, New Delhi, 1984
* Neville, A.M., *Properties of Concrete*, Pitman Publishing Co, London, 1973.

CE-EGT4 STRUCTURES ON EXPANSIVE SOIL (SE)											
Course designed by		Department of Civil Engineering									
1	Student outcome	a	b	c	d	e	f	g	h	i	j	k
		x				x						x

2	Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts(E)		Professional Subjects(P)	
								x	

3	Broad area (for 'P'category)	Structural Engineering		Geotechnical Engineering		Water Resources Engineering		Geomatics Engineering	
				x					

4	Course Coordinator	Dr. P.T.Ravichandran

C. Material Science

		L	T	P	C
CE-EMS1	Concrete Technology	3	0	0	3
	Prerequisite				
	Nil				

PURPOSE
To get exposed to behavioural aspects in concrete making and special concretes.

INSTRUCTIONAL OBJECTIVES
- To develop systematic knowledge of concrete constituents
- To familiarize with the fundamentals of concrete
- Principles involved for high performance concrete
- To understand the basic concepts of special concretes
- 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 sandmechanical properties - strength-crushing value-abrasion value-impact value. Sieve analysis-fineness modulusgrading 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 elasticitypermeability -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- finishingcuring- different types of curing. Cold weather concrete-hot weather concrete-prepacked concrete- form work for concrete- Guniting- short-creting.

TEXT BOOKS
- M.S.Shetty, *Concrete Technology*, S. Chand and Company Ltd., Delhi, 1988
- Neville,A.M., *Properties of Concrete*, Longman Scientific & Technical, England, 2000
- SanthaKumar.A.R, *Concrete Technology*, Oxford University Press, New Delhi, 2007

REFERNCE BOOKS
- Rixon, M.R., *Chemical Admixtures for Concrete*, John Wiley & Sons, 1977
- Krishnaraju.N., *Design of Concrete Mixes*, Sehgal Educational Consultants & Publishers Pvt. Ltd., Faridabad, 2002
- IS: 10262, *Recommended guidelines for Concrete Mix Design*, 1982
- Gambhir, *Concrete Technology*, 1995
- Varchney. R.S., *Concrete Technology*, Oxford and IBH Publishers, 1982

<table>
<tr><td colspan="12" align="center">CE-EMS1 Concrete Technology (SE)</td></tr>
<tr><td>Course designed by</td><td colspan="11" align="center">Department of Civil Engineering</td></tr>
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<tr><td>4</td><td>Course Coordinator</td><td colspan="11" align="center">Dr.M.Lakshmipathy</td></tr>
</table>

D. Water Resources Engineering

		L	T	P	C
CE-EWR1	**Groundwater Engineering**	3	0	0	3
	Prerequisite				
	CE0309A				

PURPOSE
To understand the basic, principles and application of ground water engineering.

INSTRUCTIONAL OBJECTIVES
- To understand the sources of ground water, aquifers, water occurrence in different types of rocks
- To understand the ground water potential theory, movement of ground water
- To study the various types of wells, construction, maintenance, etc.
- To study the evaluation of aquifer parameter
- 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
- Todd D.K. *Groundwater Hydrology*, John Wiley and Sons, 1987

- Raghunath H.M. *Groundwater*, Wiley Eastern Ltd., 1986.

REFERNCE BOOK
- V.V.N. Murthy, *Land and Water Management Engineering.* 1985. Kalyani Publishers, New Delhi

<table>
<tr><td colspan="13" align="center">CE-EWR1 Groundwater Engineering (SE)</td></tr>
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<tr><td>4</td><td>Course Coordinator</td><td colspan="11" align="center">Mr. R. Sathyanathan</td></tr>
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		L	T	P	C
CE-EWR2	**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
- To know the basics and features of coastal waters and coastal ecosystems
- To study classification, characteristics, and theories of waves, tides and currents
- To learn about coastal processes and manmade structures
- To study the environmental impacts in coastal zone with seawater intrusion
- 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.

UNIT 5 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
- Garrison, T., *Oceanography*, Wadsworth Publications, 1996
- Sorenson, R. M., *Coastal Zone Engineering*, Chapman & Hall, 1997

- Todd, D. K., *Groundwater Hydrology*, John Wiley & Sons, 1980
- *UNESCO Resources for CZM, Internet*

CE-EWR2 Coastal Zone Management (SE)											
Course designed by		Department of Civil Engineering									
1 Student outcome		a	b	c	d	e	f	g	h	i	j	k
		x							x	x	x	x
2 Category		General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts(E)		Professional Subjects(P)				
								x				
3 Broad area (for 'P'category)		Structural Engineering		Geotechnical Engineering		Water Resources Engineering		Geomatics Engineering				
						x						
4 Course Coordinator		Dr. Deeptha Thattai										

		L	T	P	C
CE-EWR3	**Advances in Irrigation Engineering**	3	0	0	3
	Prerequisite				
	CE0309A				

PURPOSE
To learn about the irrigation engineering aspects and to obtain knowledge about operation and management of irrigation water.

INSTRUCTIONAL OBJECTIVES
- To know the basics of irrigation
- To study the relationship between soil, plant and water
- To learn about importance, location and function various conveyance and distribution systems
- To study the problems and remedial measures of drainage and salinity
- 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
- Asawa G.L., *Irrigation Engineering*, New Age International Publishers, 1996
- Asawa G.L., *Irrigation and Water Resources Engineering*, New Age International Publishers, 2007

REFERENCE BOOK
- Santhosh Kumar Garg, *Irrigation Engineering*, Khanna Publications, Delhi,2000

CE-EWR3 Advances in Irrigation Engineering (SE)												
Course designed by		Department of Civil Engineering										
1	Student outcome	a	b	c	d	e	f	g	h	i	j	k
		x		**x**		**x**			**x**			**x**
2	Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts(E)			Professional Subjects(P)			
										x		
3	Broad area (for 'P'category)	Structural Engineering		Geotechnical Engineering		Water Resources Engineering			Geomatics Engineering			
						x						
4	Course Coordinator	Mr. G. Baskar										

		L	T	P	C
CE-EWR4	**Hydrology**	**3**	**0**	**0**	**3**
	Prerequisite				
	Nil				

PURPOSE

To get exposure in the filed of hydrology.

INSTRUCTIONAL OBJECTIVES
* To know the basic concepts in hydrology
* To study the features of precipitation, evaporation and infiltration
* To learn basics, estimation, and modeling of runoff
* To understand estimation, forecasting and control of flood
* 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 - φ 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
* Linsley.R.L.,et.al., Kholer.M.A., Paulhus.J.L.H., Hydrology for Engineers, McGraw Hill International Book Company, 1982
* Raghunath.H.M., Hydrology : Principles, Analysis and Design, New Age Publications, 2006
* Ian Watson and Alister D.Burnett, Hydrology - An Environmental Approach, Lewis Publishers, 1995

CE-EWR4 Hydrology (SE)											
Course designed by		Department of Civil Engineering									
1	Student outcome	a	b	c	d	e	f	g	h	i	j	k
		x	x	x		x			x	x	x	x

2	Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts(E)		Professional Subjects(P)	
								x	

3	Broad area (for 'P'category)	Structural Engineering		Geotechnical Engineering		Water Resources Engineering		Geomatics Engineering	
						x			

4	Course Coordinator	**Ms. T. Deepa**

		L	T	P	C
CE – 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.
4. Creager and Justin. " Hydro Electric Handbook", John Wiley & Sons New York.

E. Construction Management

		L	T	P	C
CE-ECN1	**Planning, Estimating, Contracts and Valuation**	**3**	**0**	**0**	**3**
	Prerequisite				
	CE0411				

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
* To study the functional planning of buildings as per standards
* To study the estimate types and terms involved in estimation
* To study the important specifications necessary for the works in buildings
* To study the concepts of tenders and contracts
* To study the concepts of tenders and contracts

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
- *Estimating and Costing in Civil Engineering* - B.N.Dutta, S.Dutta & Company, Lucknow
- *Estimating, Costing and Specification in Civil Engineering* - M. Chakraborti, 21 b, Bhabananda road, Kolkatta-26

REFERENCE BOOKS
- *Civil Engineering Estimating & Costing* - V.N. Vazirani, S.P. Chandola, Khanna publishers, Delhi
- *How best to plan & build your home* - Debjani Raychaudhuri Dutt, Pustak mahal, Delhi
- *Elements of Estimating and Costing* - S.C.Rangwala, Charotar Publishing House, (W.RLY) India
- Lecture notes on *Development of Real Estate Business* Department of Civil Engineering, SRM Engineering College, 2002.

<table>
<tr><th colspan="12">CE-ECN1 PLANNING, ESTIMATING, CONTRACTS AND VALUATION (SE)</th></tr>
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		L	T	P	C
CE-ECN2	**Advanced Construction Techniques**	**3**	**0**	**0**	**3**
	Prerequisite				
	CE0209				

PURPOSE
To bring about a complete understanding of advanced construction techniques in sub structure super structure and repair construction.

INSTRUCTIONAL OBJECTIVES
* To study the substructure construction techniques like box jacking, sheet piling etc.
* To create awareness on superstructure construction elements like slipform techniques, launching techniques erection procedures etc associated with tall, large span and off shore structures
* To study the elements of repair construction using mudjacking etc.

SUB STRUCTURE CONSTRUCTION
Box Jacking -pipe jacking - Under water cons1ructlon of diaphragm walls and Basement Tunneling techniques. piling techniques - driving well and caisson -sinking cofferdam -cable anchoring and grouting - driving diaphragm walls sheet piles - laying operations for built up offshore system - shoring for deep cutting - large reservoir construction with membranes and earth system - well points - dewatering and stand by plant equipment for underground open excavation - Trenchless Technology.

SUPER STRUCTURE CONSTRUCTION-TALL STRUCTURES
Techniques of construction for continuous concreting operation in tall buildings of various shapes and varying sections launching techniques -Slipform techniques- suspended form work -.erection techniques of tall structures, large span structures - launching techniques for heavy decks -in situ prestressing in high rise structures, aerial transporting handling erecting lightweight components on tall structures - erection of lattice towers and rigging of transmission line structures -construction sequence In cooling towers silos, chimney, sky scrapers.

SUPER STRUCTURE 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.

SUPER STRUCTURE 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 and shallow profile pipeline laying - protecting sheet plies, screw anchors - sub grade water proofing under pinning advanced techniques and sequence in demolition and dismantling.

TEXT BOOKS
* Jerry Irvine, "Advanced Construction Techniques" CA Rockers, 1984

REFERENCE BOOKS

- Robertwade Brown, "Practical Foundation Engineering Hand Book", McGraw Hill Publications, 1995
- Patrick Powers .J, "Construction Dewatering: New Methods and Applications" John Wiley & Sons, 1992.

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<tr><th colspan="2">CE-ECN2 - Advanced Construction Techniques (SE)</th><th colspan="11"></th></tr>
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	CE-ECN2 - Advanced Construction Techniques (SE)											
	Course designed by	Department of Civil Engineering										
1	Student outcome	a	b	c	d	e	f	g	h	i	j	k
		x				x						x
2	Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts(E)			Professional Subjects(P)			
											x	
3	Broad area (for 'P'category)	Structural Engineering		Geotechnical Engineering		Water Resources Engineering			Geomatics Engineering			
		x										
4	Course Coordinator	Dr. M. Lakshmipathy										

F. GIS and Remote Sensing

		L	T	P	C
CE-EGIS1A	**GEOGRAPHICAL INFORMATION SYSTEM**	3	0	0	3
	Prerequisite				
	CE0208				

PURPOSE
To appreciate the basic concepts, scope and application of the powerful tool of GIS.

INSTRUCTIONAL OBJECTIVES
- To understand the GIS, background, development and components of GIS
- To study the how to data capturing for GIS techniques and data bank management
- To study the analysis of various spatial and non-spatial data in GIS
- To study the generation DEM and making model
- 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
- Jeffrey Star and John Estes, *Geographical Information System - An Introduction*, Prentice Hall, 1990
- Chestern, *Geo Informational Systems - Application of GIS and Related Spatial Information Technologies*, ASTER Publication Co., 1992
- M.Anji reddy, *Remote sensing and Geographical information system*, B.S Publications, 2006

REFERENCE BOOKS

- Agarwal C.S., *Remote Sensing*, Wheeler Publishing, 2000
- Burrough,P.A., *Principles of GIS for Land Resources Assessment*, Oxford Publication, 1980
- Robert Laurini, *Fundamental of Spatial Information Systems*, CPPS Publications, 1996

CE-EGIS1A- GEOGRAPHICAL INFORMATION SYSTEM (SE)												
Course designed by		Department of Civil Engineering										
1	Student outcome	a	b	c	d	e	f	g	h	i	j	k
		x	x		x	x						x
2	Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts(E)			Professional Subjects(P)			
										x		
3	Broad area (for 'P'category)	Structural Engineering		Geotechnical Engineering		Water Resources Engineering			Geomatics Engineering			
										x		
4	Course Coordinator	Dr. M. Nagarajan										

		L	T	P	C
CE-EEG1	**Rock Mechanics**	3	0	0	3
	Prerequisite				
	CE0203				

PURPOSE
To understand the basics, application of rock mechanics.

INSTRUCTIONAL OBJECTIVES
To understand the properties of rocks
- To study the various types of strength of rocks
- To study stress-strain relation of rocks
- To understand the what is grouting, system, testing
- 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
- Goodman.P.E., *Introduction of Rock Mechanics*, John Wiley and Sons, 1989
- Verma.B.P., *Rock Mechanics for Engineers*, Khanna Publication, 1997.

REFERENCE BOOKS
- Brow.E.T., *Rock Characterisation*, "Testing and Monitoring", Pergman Press, 1981
- Hock and Bray.J., *Rock Slate Engineering*, "Institute of Mining and Metallurgy", 1981
- Stillburg, *Professional User Handbook for Rock Bolting*, Tran Tech Publications, 1989

CE EEG1 ROCK MECHANICS (SE)											
Course designed by	Department of Civil Engineering										
1 Student outcome	a	b	c	d	e	f	g	h	i	j	k
	x	x		x	x			x		x	x

2	Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts(E)		Professional Subjects(P)	
								x	

3	Broad area (for 'P'category)	Structural Engineering		Geotechnical Engineering		Water Resources Engineering		Geomatics Engineering	
				x					

4	Course Coordinator	Dr. R. Annadurai

G. Transportation Engineering

		L	T	P	C
CE-ET1	**Traffic Engineering and Management**	**3**	**0**	**0**	**3**
	Prerequisite				
	Nil				

PURPOSE
To study in details about Traffic Engineering and Management.

INSTRUCTIONAL OBJECTIVES
- To know the characteristics of traffic elements
- To know the traffic control measures
- To study about the driver and pedestrian behaviour
- 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
- Kadiyali L.R., *Traffic Engineering and Transportation Planning*, 1989
- Justo and Khanna, *Highway Engineering 2000*

REFERENCE BOOKS

- Hobbs F.D. and Richardson P.R., *Traffic Engineering* Vol I & II Pergamon Press, London, 1967
- S.P. Bindra, *A course in Highway Engineering*, Dhanpat Rai & Sons, Delhi 1988
- Sharma, *Principles and Practice of Highway Engineering*, 1999
- Vazirani and Chandola, *Transportation Engineering*, Vol I, 2000.

CE-ET1 TRAFFIC ENGINEERING AND MANAGEMENT (SE)											
Course designed by	Department of Civil Engineering										
1 Student outcome	a	b	c	d	e	f	g	h	i	j	k
	x	x	x			x	x		x	x	x
2 Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts(E)			Professional Subjects(P)			
									x		
3 Broad area (for 'P'category)	Structural Engineering		Geotechnical Engineering		Water Resources Engineering			Geomatics Engineering			
			x								
4 Course Coordinator	D.Arulprakash										

		L	T	P	C
CE-ET2	**Pavement Engineering**	3	0	0	3
	Prerequisite				
	CE0305, CE0306				

PURPOSE
To develop an understanding of the design, evaluation and maintenance of road pavements.

INSTRUCTIONAL OBJECTIVES
- To provide an introduction to the types of pavement and factors affecting pavement stability
- Familiarize the student with the procedure used for pavement designs
- 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
- S.K.Khanna and E.G.Justo, *Highway Engineering*, Nemchand Brothers, Rookee, 1987
- S.K.Sharma, *Principles, Practice and Design of Highway Engineering* - S.Chand & Co. Ltd., New Delhi, 1985

REFERENCE BOOKS
- Kadiyali,L.R., *Principles and Practice of Highway Engineering*, Khanna Tech. Publications, New Delhi, 2000
- *Guidelines for the Design of Flexible Pavements*, IRC :37-1984, The Indian Road Congress, New Delhi, 1984
- *Guidelines for the Design of Rigid Pavements for Highways*, IRC:58-1988, The Indian Road Congress, New Delhi, 1988

CE-ET2 PAVEMENT ENGINEERING (SE)											
Course designed by	Department of Civil Engineering										
1 Student outcome	a	b	c	d	e	f	g	h	i	j	k
	x	x			x	x	x			x	x
2 Category	General (G)			Basic Sciences (B)			Engineering Sciences and Technical Arts(E)			Professional Subjects(P)	
										x	
3 Broad area (for 'P'category)	Structural Engineering			Geotechnical Engineering			Water Resources Engineering			Geomatics Engineering	
				x							
4 Course Coordinator	D.Arulprakash										

H. Environmental Engineering

		L	T	P	C
CE-EENV1	**Air Pollution And Management**	3	0	0	3
	Prerequisite				
	Nil				

PURPOSE
To study sources, dispersion, effects, and control air pollution.

INSTRUCTIONAL OBJECTIVES
- To know the various sources of air pollution and their effect on human beings, materials and vegetation
- To learn about dispersion of air pollutant
- To study processes, approaches, and devices used to control air pollution
- To familiarize with control of gaseous pollutant
- 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.

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

- Rao M.N., and Rao H. V. N., *Air Pollution Control*, Tata-McGraw-Hill, New Delhi, 1996

REFERENCES

- W.L.Heumann, *Industrial Air Pollution Control Systems*, McGraw-Hill, New Yark, 1997
- Mahajan S.P., *Pollution Control in Process Industries*, Tata McGraw-Hill Publishing Company, New Delhi, 1991
- Peavy S.W., Rowe D.R. and Tchobanoglous G. *Environmental Engineering*, McGraw Hill, New Delhi, 1985
- Garg, S.K., *Environmental Engineering*, Vol. II, Khanna Publishers, New Delhi
- Mahajan, S.P., *Pollution Control in Process Industries*, Tata McGraw-Hill, New Delhi, 1991

CE-EENV1 - Air Pollution And Management (SE)											
Course designed by	Department of Civil Engineering										
1 Student outcome	a	b	c	d	e	f	g	h	i	j	k
	x		x			x		x			
2 Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts(E)			Professional Subjects(P)			
									x		
3 Broad area (for 'P'category)	Structural Engineering		Geotechnical Engineering		Water Resources Engineering			Geomatics Engineering			
					x						
4 Course Coordinator	Mr. J. S. Sudarsan										

		L	T	P	C
CE-EENV2	**Environmental Health Engineering**	3	0	0	3
	Prerequisite				
	Nil				

PURPOSE
To get exposure in the field of environmental health engineering.

INSTRUCTIONAL OBJECTIVES
- To know the characteristic, collection, conveyance, disposal of refuse
- To study the aspects of health full housing like ventilation and air conditioning
- To learn about characteristics, transmission, and control of diseases
- To obtain knowledge on milk sanitation
- 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
- Park J.E. and Park K., *Text Book of Presenting and Social Medicine*, M/s Banarsidos - Bhanot, Jalapur, 1980
- Salvato, *Environmental Sanitation*, John Wiley and Sons, New York 1982

REFERENCES BOOKS
- P.F Cuniff, *Environmental Noise Pollution*, John Wiley and Sons, New York 1987
- Garg, S.K. *Environmental Engineering*, Khanna Publication 2000
- Duggal K.N., *Elements of Environmental Engineering*, "S. Chand & Company Ltd. 2002

CE-EENV2 - Environmental Health Engineering (SE)										
Course designed by	Department of Civil Engineering									

1	Student outcome	a	b	c	d	e	f	g	h	i	j	k
		x		x			x		x			

2	Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts(E)		Professional Subjects(P)	
								x	

3	Broad area (for 'P'category)	Structural Engineering		Geotechnical Engineering		Water Resources Engineering		Geomatics Engineering	
						x			

4	Course Coordinator	Mr. J. S. Sudarsan

		L	T	P	C
CE-EENV3	**Environmental Impact Studies**	**3**	**0**	**0**	**3**
	Prerequisite				
	Nil				

PURPOSE
To get exposure in the field of environmental impact studies.

INSTRUCTIONAL OBJECTIVES
- To know the objectives, capability, and limitations of environmental impact assessment
- To learn methodologies and legal aspects of environmental impact assessment
- To study socio economic impact assessment
- To obtain knowledge in impact of air quality and noise impact
- 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
- Canter.R.L, *Environmental Impact Assessment*, McGraw Hill, New Delhi, 1996
- Shukla,S.K., Srivastava.P.R., *Concepts in Environmental Impact Analysis*, Common Wealth Publishers, New Delhi, 1992

REFERENCES BOOKS

- Barathwal.R.R., *EIA*, New age International publishers
- John G. Rau and David C. Hooten (Ed), *EIA Handbook,* McGraw Hill Book Company, 1990
- Judith Petts, *Handbook of Environment IA.* Vol I and II Backwell Science, 1999
- *Environmental Assessment Source book*, Vol. I, II & III ,The World Bank, Washington, D.C, 1991

<table>
<tr><td colspan="13" align="center">CE-EENV3 - Environmental Impact Studies (SE)</td></tr>
<tr><td colspan="2" align="center">Course designed by</td><td colspan="11" align="center">Department of Civil Engineering</td></tr>
<tr><td rowspan="2">1</td><td rowspan="2">Student outcome</td><td>a</td><td>b</td><td>c</td><td>d</td><td>e</td><td>f</td><td colspan="2">g</td><td>h</td><td>i</td><td>j</td><td>k</td></tr>
</table>

		a	b	c	d	e	f	g	h	i	j	k
1	Student outcome	**x**		**x**			**x**		**x**			

2	Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts(E)		Professional Subjects(P)	
								x	

3	Broad area (for 'P'category)	Structural Engineering		Geotechnical Engineering		Water Resources Engineering		Geomatics Engineering	
						x			

4	Course Coordinator	Mr. J. S. Sudarsan

		L	T	P	C
CE-EENV4	**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
- M.N.Rao & A.K.Dutta, *Wastewater Treatment*, Oxford - IBH Publication, 1995
- W .W. Eckenfelder Jr., *Industrial Water Pollution Control*, McGraw-Hill Book Company, New Delhi, 2000

REFERENCES
- T.T.Shen, *Industrial Pollution Prevention*, Springer, 1999
- R.L.Stephenson and J.B.Blackburn, Jr., *Industrial Wastewater Systems Hand book*, Lewis Publisher, New Yark, 1998
- H.M.Freeman, *Industrial Pollution Prevention Hand Book*, McGraw-Hill Inc., New Delhi, 1995
- Bishop, P.L., *Pollution Prevention: Fundamental & Practice*, McGraw-Hill, 2000

CE-EENV4- Industrial Waste Management (SE)										
Course designed by	Department of Civil Engineering									

1	Student outcome	a	b	c	d	e	f	g	h	i	j	k
		x		x			x					

2	Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts(E)		Professional Subjects(P)	
								x	

3	Broad area (for 'P'category)	Structural Engineering		Geotechnical Engineering		Water Resources Engineering		Geomatics Engineering	
						x			

4	Course Coordinator	Mr. J. S. Sudarsan

		L	T	P	C
CE-EENV5	**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
- George Tchobanoglous et.al., *Integrated Solid Waste Management*, McGraw-Hill Publishers, 1993.
- B.Bilitewski, G.HardHe, K.Marek, A.Weissbach, and H.Boeddicker, *Waste Management*, Springer, 1994 .

REFERENCES
- *Manual on Municipal Solid Waste Management*, CPHEEO, Ministry of Urban Development, Government of India, New Delhi, 2000
- R.E.Landreth and P.A.Rebers, *Municipal Solid Wastes - problems and Solutions*, Lewis Publishers, 1997
- Bhide A.D. and Sundaresan, B.B., *Solid Waste Management in Developing Countries*, INSDOC, 1993.

CE-EENV5- Municipal Solid Waste Management (SE)											
Course designed by		Department of Civil Engineering									
1 Student outcome		a	b	c	d	e	f	g	h	i	j	k
		x		x			x		x			

2	Category	General (G)		Basic Sciences (B)		Engineering Sciences and Technical Arts(E)		Professional Subjects(P)	
									x

3	Broad area (for 'P'category)	Structural Engineering		Geotechnical Engineering		Water Resources Engineering		Geomatics Engineering	
						x			

4	Course Coordinator	Mr. J. S. Sudarsan