SRM UNIVERSITY
(Under section 3 of UGC Act 1956)

B.Tech. (Full Time) - Civil Engineering
Curriculum & Syllabus
2013 – 2014

Volume – I

(all courses except open electives)

FACULTY OF ENGINEERING AND TECHNOLOGY
SRM UNIVERSITY
SRM NAGAR, KATTANKULATHUR – 603 203

STUDENT OUTCOMES

The curriculum and syllabus for B.Tech programs (2013) conform to outcome based teaching learning process. In general, **ELEVEN STUDENT OUTCOMES** (a-k) have been identified and the curriculum and syllabus have been structured in such a way that each of the courses meets one or more of these outcomes. Student outcomes describe what students are expected to know and be able to do by the time of graduation. These relate to the skills, knowledge, and behaviors that students acquire as they progress through the program. Further each course in the program spells out clear instructional objectives which are mapped to the student outcomes.

The student outcomes are:

(a) an ability to apply knowledge of mathematics, science, and engineering
(b) an ability to design and conduct experiments, as well as to analyze and interpret data
(c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
(d) an ability to function on multidisciplinary teams
(e) an ability to identify, formulate, and solve engineering problems
(f) an understanding of professional and ethical responsibility
(g) an ability to communicate effectively
(h) the broad education necessary to understand the impact of engineering solutions in global, economic, environmental, and societal context
(i) a recognition of the need for, and an ability to engage in life-long learning
(j) a knowledge of contemporary issues
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

B.Tech. Civil Engineering

Curriculum – 2013
(Applicable for students admitted from the academic year 2013-14 onwards)

SEMESTER I						
Course Code	**Category**	**Course Name**	**L**	**T**	**P**	**C**
LE1001	G	ENGLISH	1	2	0	2
PD1001	G	SOFT SKILLS I	1	0	1	1
MA1001	B	CALCULUS AND SOLID GEOMETRY	3	2	0	4
PY1001	B	PHYSICS	3	0	0	3
PY1002	B	PHYSICS LAB	0	0	2	1
CY1003	B	PRINCIPLES OF ENVIRONMENTAL SCIENCE	2	0	0	2
Courses from Table I						
Student shall register for minimum 20 credits in I semester and minimum 20 credits in II semester. However student shall have registered for all the courses enlisted under Semester I and II as well the courses in Table I by the time the registration process is complete in II semester. Keeping this in mind student shall register for the courses in I and II semesters.						

Legend:
L - Number of lecture hours per week
T - Number of tutorial hours per week
P - Number of practical hours per week
C - Number of credits for the course

Category of courses:
G - General
B - Basic Sciences
E - Engineering Sciences and Technical Arts
P - Professional Subjects

SEMESTER II						
Course Code	**Category**	**Course Name**	**L**	**T**	**P**	**C**
LE1002	G	VALUE EDUCATION	1	0	0	1
PD1002	G	SOFT SKILLS II	1	0	1	1
MA1002	B	ADVANCED CALCULUS AND COMPLEX ANALYSIS	3	2	0	4
PY1003	B	MATERIAL SCIENCE	2	0	2	3
CY1001	B	CHEMISTRY	3	0	0	3
CY1002	B	CHEMISTRY LAB	0	0	2	1
CE1001	E	BASIC CIVIL ENGINEERING	2	0	0	2
CE1002	P	ELEMENTS OF BUILDING MATERIAL SCIENCE	2	0	0	2
AR1001	P	PRINCIPLES OF ARCHITECTURE	2	0	0	2
Courses from Table I						
Student shall register for minimum 20 credits in I semester and minimum 20 credits in II semester. However student shall have registered for all the courses enlisted under Semester I and II as well the courses in Table I by the time the registration process is complete in II semester. Keeping this in mind student shall register for the courses in I and II semesters.						

Table I

COURSES WHICH CAN BE REGISTERED FOR EITHER IN I OR II SEMESTER

SEMESTER I / II						
Course Code	**Category**	**Course Name**	**L**	**T**	**P**	**C**
CS1001	G	PROGRAMMING USING MATLAB	1	0	2	2
BT1001	B	BIOLOGY FOR ENGINEERS	2	0	0	2
ME1001	E	BASIC MECHANICAL ENGINEERING	2	0	0	2
EE1001	E	BASIC ELECTRICAL ENGINEERING	2	0	0	2
EC1001	E	BASIC ELECTRONICS ENGINEERING	2	0	0	2
ME1004	E	WORKSHOP PRACTICE	0	0	3	2
ME1005	E	ENGINEERING GRAPHICS	1	0	4	3
NC1001/NS1001/ SP1001/YG1001	G	*NCC/NSS/NSO/YOGA	0	0	1	1

*NCC-National Cadet Corps
NSS-National Service Scheme
NSO-National Sports Organization (India)

SEMESTER III						
Course Code	**Category**	**Course Name**	**L**	**T**	**P**	**C**
LE1003/ LE1004/ LE1005/ LE1006/ LE1007	G	GERMAN LANGUAGE PHASE I / FRENCH LANGUAGE PHASE I/JAPANESE LANGUAGE PHASE I /KOREAN LANGUAGE PHASE I /CHINESE LANGUAGE PHASE I	2	0	0	2
PD1003	G	APTITUDE I	1	0	1	1
MA1013	B	FOURIER SERIES, PARTIAL DIFFERENTIAL EQUATIONS AND ITS APPLICATIONS	4	0	0	4
CE1003	B	ENGINEERING GEOLOGY	3	0	0	3
CE1004	P	MECHANICS OF SOLIDS	2	2	0	3
CE1005/CE1012	P	STRENGTH OF MATERIALS LAB / CONCRETE LABORATORY	0	0	4	2
CE1006	P	FLUID MECHANICS	3	0	0	3
CE1007	P	CONSTRUCTION TECHNOLOGY	3	0	0	3
CE1008	P	ENGINEERING SURVEYING	3	0	0	3
CE1009	P	SURVEYING LAB	0	0	4	2
TOTAL			**21**	**2**	**9**	**26**
Total Contact Hours			**32**			

SEMESTER IV						
Course Code	**Category**	**Course Name**	**L**	**T**	**P**	**C**
LE1008/ LE1009/ LE1010/ LE1011/	G	GERMAN LANGUAGE PHASE II /FRENCH LANGUAGE PHASE II/JAPANESE LANGUAGE	2	0	0	2

LE1012		PHASE II / KOREAN LANGUAGE PHASE II /CHINESE LANGUAGE PHASE II				
PD1004	G	APTITUDE II	1	0	1	1
MA1004	B	NUMERICAL METHODS	4	0	0	4
CE1010	P	STRENGTH OF MATERIALS	3	2	0	4
CE1011	P	STRUCTURAL DESIGN (MASONRY& RCC)	2	2	0	3
CE1012/ CE1005	P	CONCRETE LABORATORY/ STRENGTH OF MATERIALS LAB	0	0	4	2
CE1013	P	APPLIED HYDRAULIC ENGINEERING	3	0	0	3
CE1014	P	GEOMATICS SURVEYING LAB AND SURVEY CAMP	0	0	4	2
CE1015	P	CIVIL ENGINEERING DESIGN PROJECT	0	0	2	1
	P	DEP. ELECTIVE I (FROM GROUP A)	3	0	0	3
TOTAL			**18**	**4**	**11**	**25**
Total Contact Hours			**33**			

SEMESTER V						
Course Code	**Category**	**Course Name**	**L**	**T**	**P**	**C**
PD1005	G	APTITUDE III	1	0	1	1
MA1005	B	PROBABILITY AND STATISTICS	4	0	0	4
CE1016	P	STRUCTURAL DESIGN - STEEL	2	2	0	3
CE1017	P	STRUCTURAL ANALYSIS	3	2	0	4
CE1018	P	GEOTECHNICAL ENGINEERING-1	2	2	0	3

CE1019	P	GEOTECHNICAL ENGINEERING LAB	0	0	4	2
CE1020	P	HYDRAULIC AND IRRIGATION STRUCTURES DESIGN	3	0	0	3
CE1021	P	HYDRAULIC ENGINEERING LAB	0	0	4	2
CE1047	P	INDUSTRIAL TRAINING I (Training to be undergone after IV semester)	0	0	1	1
	P	DEP. ELECTIVE -II (FROM GROUP C)	3	0	0	3
		OPEN ELECTIVE I	3	0	0	3
TOTAL			**21**	**6**	**10**	**29**
Total Contact Hours			**37**			

SEMESTER VI						
Course Code	**Category**	**Course Name**	**L**	**T**	**P**	**C**
PD1006	G	APTITUDE IV	1	0	1	1
CE1022	P	COMPUTER AIDED STRUCTURAL ANALYSIS	3	2	0	4
CE1023	P	COMPUTER AIDED STRUCTURAL ANALYSIS AND TESTING LAB	0	0	2	1
CE1024	P	GEOTECHNICAL ENGINEERING-II	2	2	0	3
CE1025	P	WATER SUPPLY AND ENVIRONMENTAL ENGINEERING AND DESIGN	1	2	0	2
CE1026	P	ENVIRONMENTAL ENGG. LAB	0	0	2	1

CE1049	P	MINOR PROJECT	0	0	2	1
	P	DEP. ELECTIVE III (FROM GROUP B)	3	0	0	3
		OPEN ELECTIVE II	3	0	0	3
		OPEN ELECTIVE III	3	0	0	3
TOTAL			**16**	**6**	**7**	**22**
Total Contact Hours			**29**			

SEMESTER VII						
Course Code	**Category**	**Course Name**	**L**	**T**	**P**	**C**
CE1027	P	SANITARY ENGINEERING AND DESIGN	3	0	0	3
CE1028	P	TRANSPORTATION ENGINEERING	1	2	0	2
CE1029	P	QUANTITY SURVEYING AND VALUATION	1	2	0	2
CE1030	P	COMPUTER AIDED BUILDING DRAWING	0	0	4	2
CE1031	P	CONSTRUCTION MANAGEMENT PRINCIPLES FOR CIVIL ENGINEERS	1	1	1	2
CE1048	P	INDUSTRIAL TRAINING II (Training to be undergone after VI semester)	0	0	1	1
	P	DEP. ELECTIVE IV (FROM GROUP C)	3	0	0	3
	P	DEP. ELECTIVE V (FROM GROUP C)	3	0	0	3
TOTAL			**12**	**5**	**6**	**18**
Total Contact Hours			**23**			

SEMESTER VIII						
Course Code	**Category**	**Course Name**	**L**	**T**	**P**	**C**
CE1050	P	MAJOR PROJECT / PRACTICE SCHOOL	0	0	24	12
Total			**0**	**0**	**24**	**12**
Total Contact Hours			**24**			

DEPARTMENTAL ELECTIVES						
GROUP - A						
Course Code	**Category**	**Course Name**	**L**	**T**	**P**	**C**
CE1101	P	GEOMATICS SURVEYING	3	0	0	3
CE1102	P	PHOTOGRAMMETRY SURVEYING	3	0	0	3
CE1103	P	ELEMENTS OF CARTOGRAPHY	3	0	0	3
CE1104	P	GPS SURVEYING	3	0	0	3
		GROUP - B				
Course Code	**Category**	**Course Name**	**L**	**T**	**P**	**C**
CE1105	P	ADVANCED RCC DESIGN	3	0	0	3
CE1106	P	DESIGN OF SPECIAL STRUCTURES	3	0	0	3
CE1107	P	DESIGN OF INDUSTRIAL STRUCTURES	3	0	0	3
CE1108	P	DESIGN OF MULTISTORIED BUILDINGS	3	0	0	3
GROUP - C						
Course Code	**Category**	**Course Name**	**L**	**T**	**P**	**C**
STRUCTURAL ENGINEERING						
CE1109	P	COMPUTER ANALYSIS OF STRUCTURES	3	0	0	3
CE1110	P	COMPUTER AIDED DESIGN OF STRUCTURES	3	0	0	3
CE1111	P	TALL BUILDINGS	3	0	0	3
CE1112	P	STORAGE AND INDUSTRIAL STRUCTURES	3	0	0	3

CE1113	P	PRESTRESSED CONCRETE STRUCTURES	3	0	0	3
CE1114	P	ADVANCED STRUCTURAL DESIGN	3	0	0	3
CE1116	P	ANALYSIS AND DESIGN OF SANDWICH PANELS	3	0	0	3
CE1117	P	BRIDGE ENGINEERING	3	0	0	3
CE1118	P	FORENSIC CIVIL ENGINEERING	3	0	0	3
CE1119	P	DESIGN OF MACHINE FOUNDATION	3	0	0	3
CE1120	P	REPAIR AND REHABILITATION OF STRUCTURES	3	0	0	3
CE1121	P	DESIGN OF EARTHQUAKE RESISTANT STRUCTURES	3	0	0	3
ENVIRONMENTAL ENGINEERING						
CE1122	P	INDUSTRIAL POLLUTION PREVENTION AND CLEANER PRODUCTION	3	0	0	3
CE1123	P	GROUND WATER CONTAMINATION AND QUALITY MONITORING AND MODELLING	3	0	0	3
CE1124	P	AIR QUALITY MONITORING AND MODELLING	3	0	0	3
CE1125	P	ADVANCED WASTE WATER TREATMENT DESIGN	3	0	0	3
CE1126	P	DESIGN OF ENVIRONMENTAL ENGINEERING STRUCTURES	3	0	0	3
CE1127	P	NOISE POLLUTION CONTROL AND ITS CONTROL	3	0	0	3
CE1128	P	MARINE POLLUTION MONITORING AND MODELLING	3	0	0	3
CE1129	P	MASS TRANSFER IN AIR-WATER-SOIL INTERACTION	3	0	0	3
CE1130	P	INSTRUMENTAL MONITORING OF ENVIRONMENT AND MODELLING	3	0	0	3
CE1131	P	RS AND GIS FOR ENVIRONMENTAL ENGINEERING	3	0	0	3
CE1132	P	AIR POLLUTION CONTROL AND MANAGEMENT	3	0	0	3

CE1133	P	ENVIRONMENTAL HEALTH ENGINEERING	3	0	0	3
CE1134	P	ENVIRONMENTAL IMPACT ASSESSMENT	3	0	0	3
CE1135	P	INDUSTRIAL WASTE MANAGEMENT	3	0	0	3
CE1136	P	MUNICIPAL SOLID WASTE MANAGEMENT	3	0	0	3

CONSTRUCTION MANAGEMENT						
CE1137	P	ADVANCED CONSTRUCTION TECHNIQUES	3	0	0	3
CE1138	P	CONSTRUCTION RESOURCE PLANNING AND MANAGEMENT	3	0	0	3
CE1139	P	INTERDISCIPLINARY PROJECT MANAGEMENT	3	0	0	3
CE1140	P	CONSTRUCTION PLANNING AND ORIENTATION	3	0	0	3
CE1141	P	CONSTRUCTION MANAGEMENT SOFTWARE LAB	1	0	3	3
TRANSPORTATION ENGINEERING						
CE1142	P	URBAN PLANNING AND SUSTAINABLE DEVELOPMENT	3	0	0	3
CE1143	P	DESIGN AND CONSTRUCTION OF PAVEMENT	3	0	0	3
CE1144	P	RAILWAY TRANSPORTATION SYSTEM- MATERIAL AND DESIGN	3	0	0	3
WATER RESOURCES ENGINEERING						
CE1145	P	COASTAL ZONE MANAGEMENT	3	0	0	3
CE1146	P	GROUND WATER ENGINEERING	3	0	0	3
CE1147	P	HYDRAULIC MACHINERY	3	0	0	3
CE1148	P	HYDROLOGY	3	0	0	3
CE1149	P	IRRIGATION ENGINEERING	3	0	0	3
CE1150	P	WATER RESOURCES ENGINEERING	3	0	0	3
CE1151	P	HYDROPOWER ENGINEERING	3	0	0	3

GEOTECHNICAL ENGINEERING						
CE1152	P	ADVANCED GEOTECHNICAL ENGINEERING	3	0	0	3
CE1153	P	GROUND IMPROVEMENT TECHNIQUES	3	0	0	3
CE1154	P	STRUCTURES ON EXPANSIVE SOIL	3	0	0	3
CE1155	P	INTRODUCTION TO SOIL DYNAMICS AND MACHINE FOUNDATION	3	0	0	3
CE1156	P	ENVIRONMENTAL GEOTECHNOLOGY	3	0	0	3
GIS AND REMOTE SENSING						
CE1157	P	GEOGRAPHICAL INFORMATION SYSTEM	3	0	0	3
CE1158	P	REMOTE SENSING AND ITS APPLICATIONS	3	0	0	3
ENGINEERING GEOLOGY						
CE1159	P	ROCK MECHANICS	3	0	0	3

Summary of credits									
Category	**I&II**	**III**	**IV**	**V**	**VI**	**VII**	**VIII**	**Total**	**%**
G	8	3	3	1	1			16	9
B	23	7	4	4				38	21
E	13							13	7
P	4	16	18	21	15	18	12	104	58
Open Elective				3	6			9	5
Total	48	26	25	29	22	18	12	180	100

SEMESTER I

LE1001	**ENGLISH**	**L**	**T**	**P**	**C**
	Total Contact Hours-45	**1**	**2**	**0**	**2**
	Prerequisite				
	Nil				

PURPOSE

To help students achieve proficiency in English and develop their professional communication skills to meet the demand in the field of global communication to enable them to acquire placement anywhere with ease and confidence.

INSTRUCTIONAL OBJECTIVES

1.	To enable students improve their lexical, grammatical and communicative competence.
2.	To enhance their communicative skills in real life situations.
3.	To assist students understand the role of thinking in all forms of communication.
4.	To equip students with oral and appropriate written communication skills.
5.	To assist students with employability and job search skills.

UNIT I- INVENTIONS **(9 hours)**

1. Grammar and Vocabulary – Tense and Concord:
2. Listening and Speaking – Common errors in Pronunciation (Individual sounds); Process description (Describing the working of a machine, and the manufacturing process)
3. Writing – Interpretation of data (Flow chart, Bar chart)
4. Reading -- (Reading Comprehension -- Answering questions)

UNIT II- ECOLOGY **(9 hours)**

1. Grammar and Vocabulary – Error Analysis – Synonyms and Antonyms, Parallelisms
2. Listening and Speaking - Conducting Meetings
3. Writing – Notice, Agenda, Minutes , letters to the editor via email : Email etiquette
4. D Reading Comprehension – Summarizing and Note-making

UNIT III- SPACE **(9 hours)**

1. Grammar and Vocabulary – tense and concord; word formation
2. Listening and Speaking – Distinction between native and Indian English (Speeches by TED and Kalam) – accent, use of vocabulary and rendering;
3. Writing – Definitions and Essay writing
4. Reading Comprehension – Predicting the content

UNIT IV- CAREERS **(9 hours)**

1. Grammar and Vocabulary –Homonyms and Homophones
2. Listening and Speaking – – Group Discussion
3. Writing Applying for job, cover letter and resume
4. Reading, etymology (roots ; idioms and phrases), Appreciation of creative writing.

UNIT V- RESEARCH **(9 hours)**

1. Grammar and Vocabulary – Using technical terms, Analogies
2. Listening and Speaking -- Presentation techniques (Speech by the learner)
3. Writing – Project Proposal
4. Reading Comprehension -- Referencing Skills for Academic Report Writing (Research Methodology – Various methods of collecting data) Writing a report based on MLA Handbook

TEXTBOOK

1. Department of English and Foreign Languages. "*English for Engineers*", SRM University Publications, 2013.

REFERENCES

1. Dhanavel .S.P ,"*English and Communication Skills for Students of Science and Engineering*", Orient Blackswan Ltd., 2009.
2. Meenakshi Raman and Sangeetha Sharma. "*Technical Communication-Principles and Practice*", Oxford University Press, 2009.
3. Day .R.A, Scientific English: "*A Guide for Scientists and Other Professionals*", 2nd ed. Hyderabad: Universities Press, 2000.

LE1001 ENGLISH												
Course designed by		**Department of English and Foreign Languages**										
1.	Student Outcome	a	b	c	d	e	f	g	h	i	j	k
					x		x	x		x		
2.	Mapping of instructional objectives with student outcome							1-5				
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences and Technical Arts (E)				Professional Subjects (P)		
		X		--		--				--		
4.	Approval	23rd Meeting of Academic Council, May 2013										

PD1001	SOFT SKILLS-I	L	T	P	C
	Total Contact Hours - 30	1	0	1	1
	Prerequisite				
	Nil				

PURPOSE

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

INSTRUCTIONAL OBJECTIVES

1.	To develop inter personal skills and be an effective goal oriented team player.
2.	To develop professionals with idealistic, practical and moral values.
3.	To develop communication and problem solving skills.
4.	To re-engineer attitude and understand its influence on behavior.

UNIT I - SELF ANALYSIS **(4 hours)**

SWOT Analysis, Who am I, Attributes, Importance of Self Confidence, Self Esteem

UNIT II - ATTITUDE **(4 hours)**

Factors influencing Attitude, Challenges and lessons from Attitude.

Change Management

Exploring Challenges, Risking Comfort Zone, Managing Change

UNIT III - MOTIVATION **(6 hours)**

Factors of motivation, Self talk, Intrinsic & Extrinsic Motivators.

UNIT IV - GOAL SETTING **(6 hours)**

Wish List, SMART Goals, Blue print for success, Short Term, Long Term, Life Time Goals.

Time Management

Value of time, Diagnosing Time Management, Weekly Planner To do list, Prioritizing work.

UNIT V - CREATIVITY **(10 hours)**

Out of box thinking, Lateral Thinking

Presentation

ASSESSMENT

1. A practical and activity oriented course which has continuous assessment for 75 marks based on class room interaction, activities etc.
2. Presentation – 25 marks

TEXT BOOK

1. *"INSIGHT"*, Career Development Centre, SRM Publications, 2012.

REFERENCES

1. Covey Sean, "*Seven Habits of Highly Effective Teens"*, New York, Fireside Publishers, 1998.
2. Carnegie Dale," *How to win Friends and Influence People"*, New York: Simon & Schuster, 1998.
3. Thomas A .Harris, "*I am ok, You are ok"* , New York-Harper and Row, 1972.
4. Daniel Coleman, "*Emotional Intelligence"*, Bantam Book, 2006.

PD1001 - SOFT SKILLS-I												
Course designed by		Department of English and Foreign Languages										
1.	Student Outcome	a	b	c	d	e	f	g	h	i	j	k
					x		x	x		x		
2.	Mapping of instructional objectives with student outcome				1		2	3		4		
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences and Technical Arts (E)				Professional Subjects (P)		
		X		--		--				--		
4.	Approval	23rd Meeting of Academic Council, May 2013										

MA1001	CALCULUS AND SOLID GEOMETRY	L	T	P	C
		3	2	0	4
	Total Contact Hours-75				
	(Common to all Branches of Engineering except Bio group)				

PURPOSE

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

INSTRUCTIONAL OBJECTIVES

1.	To apply advanced matrix knowledge to Engineering problems.
2.	To equip themselves familiar with the functions of several variables.
3.	To familiarize with the applications of differential equations.
4.	To improve their ability in solving geometrical applications of differential calculus problems
5.	To expose to the concept of three dimensional analytical geometry.

UNIT I - MATRICES (15 hours)

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

UNIT II - FUNCTIONS OF SEVERAL VARIABLES (15 hours)

Function of two variables – Partial derivatives – Total differential – Taylor's expansion – Maxima and Minima – Constrained Maxima and Minima by Lagrangian Multiplier method – Jacobians – Euler's theorem for homogeneous function.

UNIT III - ORDINARY DIFFERENTIAL EQUATIONS (15 hours)

Linear equations of second order with constant and variable coefficients – Homogeneous equation of Euler type – Equations reducible to homogeneous form – Variation of parameter – Simultaneous first order with constant co-efficient.

UNIT IV - GEOMETRICAL APPLICATIONS OF DIFFERENTIAL CALCULUS (15 hours)

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

UNIT V - THREE DIMENSIONAL ANALYTICAL GEOMETRY (15 hours)

Equation of a sphere – Plane section of a sphere – Tangent Plane – Orthogonal Sphere - Equation of a cone – Right circular cone – Equation of a cylinder – Right circular cylinder.

TEXT BOOKS

1. Kreyszig.E, "*Advanced Engineering Mathematics*", John Wiley & Sons. Singapore, 10th edition, 2012.
2. Ganesan .K, Sundarammal Kesavan, Ganapathy Subramanian .K.S & Srinivasan .V, "*Engineering Mathematics*",Gamma publications, Revised Edition, 2013.

REFERENCES

1. Grewal .B.S, "*Higher Engineering Mathematics"*, Khanna Publications, 42nd Edition,2012.
2. Veerajan. T, "*Engineering Mathematics I*", Tata McGraw Hill Publishing Co, New Delhi, 5th edition, 2006.
3. Kandasamy P etal. "*Engineering Mathematics*", Vol.I (4th revised edition), Chand .S &Co., New Delhi, 2000.
4. Narayanan .S, Manicavachagom Pillay .T.K, Ramanaiah .G, "*Advanced Mathematics for Engineering students*", Volume I (2nd edition), S.Viswanathan Printers and Publishers, 1992.
5. Venkataraman .M.K., "*Engineering Mathematics*" – First Year (2nd edition), National Publishing Co., Chennai, 2000.

MA1001 CALCULUS AND SOLID GEOMETRY												
Course designed by		**Department of English and Foreign Languages**										
1.	Student Outcome	a	b	c	d	e	f	g	h	i	j	k
		x				x						
2.	Mapping of instructional objectives with student outcome	1-5				1-5						
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences and Technical Arts (E)				Professional Subjects (P)		
		--		X		--				--		
4.	Approval	23rd Meeting of Academic Council, May 2013										

PY1001	PHYSICS	L	T	P	C
	Total Contact Hours-45	3	0	0	3
	Prerequisite				
	Nil				

PURPOSE

The purpose of this course is to provide an understanding of physical concepts and underlying various engineering and technological applications. In addition, the course is expected to develop scientific temperament and analytical skill in students, to enable them logically tackle complex engineering problems in their chosen area of application.

INSTRUCTIONAL OBJECTIVES

1.	To understand the general scientific concepts required for technology
2.	To apply the Physics concepts in solving engineering problems
3.	To educate scientifically the new developments in engineering and technology
4.	To emphasize the significance of Green technology through Physics principles

UNIT I – MECHANICAL PROPERTIES OF SOLIDS AND ACOUSTICS (9 hours)

Mechanical properties of solids: Stress-strain relationship – Hooke's law – Torsional Pendulum – Young's modulus by cantilever – Uniform and non-uniform bending –– Stress-strain diagram for various engineering materials – Ductile and brittle materials – Mechanical properties of Engineering materials (Tensile strength, Hardness, Fatigue, Impact strength, Creep) – Fracture – Types of fracture (Elementary ideas).

Acoustics: Intensity – Loudness – Absorption coefficient and its determination – Reverberation – Reverberation time – Factors affecting acoustics of buildings and their remedies – Sources and impacts of noise – Sound level meter – Strategies on controlling noise pollution – Ultrasonic waves and properties – Methods of Ultrasonic production (Magnetostriction and Piezoelectric) – Applications of Ultrasonics in Engineering and medicine.

UNIT II – ELECTROMAGNETIC WAVES, CIRCUITS AND APPLICATIONS(9 hours)

Del operator – grad, div, curl and their physical significances - displacement current –Maxwell's equations (derivation) – Wave equation for electromagnetic waves – Propagation in free space – Poynting theorem – Characteristic of Transverse electric and magnetic waves – Skin depth – Rectangular and circular

waveguides – High powered vacuum-based cavity magnetrons – Applications including radars, microwave oven and lighting systems.

UNIT III – LASERS AND FIBER OPTICS (9 hours)

Lasers: Characteristics of Lasers – Einstein's coefficients and their relations – Lasing action – Working principle and components of CO_2 Laser, Nd-YAG Laser, Semiconductor diode Laser, Excimer Laser and Free electron Laser – Applications in Remote sensing, holography and optical switching – Mechanism of Laser cooling and trapping.

Fiber Optics: Principle of Optical fiber – Acceptance angle and acceptance cone – Numerical aperture – V-number – Types of optical fibers (Material, Refractive index and mode) – Photonic crystal fibers – Fiber optic communication – Fiber optic sensors.

UNIT IV – QUANTUM MECHANICS AND CRYSTAL PHYSICS (9 hours)

Quantum mechanics: Inadequacies of Classical Mechanics – Duality nature of electromagnetic radiation – De Broglie hypothesis for matter waves – Heisenberg's uncertainty principle –Schrödinger's wave equation – Particle confinement in 1D box (Infinite Square well potential). **Crystal Physics:** Crystal directions – Planes and Miller indices – Symmetry elements – Quasi crystals – Diamond and HCP crystal structure – Packing factor – Reciprocal lattice – Diffraction of X-rays by crystal planes – Laue method and powder method – Imperfections in crystals.

UNIT V – GREEN ENERGY PHYSICS (9 hours)

Introduction to Green energy – **Solar energy:** Energy conversion by photovoltaic principle – Solar cells – **Wind energy:** Basic components and principle of wind energy conversion systems – **Ocean energy:** Wave energy – Wave energy conversion devices – Tidal energy – single and double basin tidal power plants – Ocean Thermal Electric Conversion (OTEC) – **Geothermal energy:** Geothermal sources (hydrothermal, geo-pressurized hot dry rocks, magma) – **Biomass:** Biomass and bio-fuels – bio-energies from wastages – **Fuel cells**: H_2O_2 – **Futuristic Energy:** Hydrogen – Methane Hydrates – Carbon capture and storage (CCS).

* One problem sheet consisting of 10 to 15 problems is to be prepared for each unit and discussed in the class.
* Few problems based on design considerations related to appropriate branches of engineering can be incorporated in each problem sheet.

TEXT BOOKS

1. Thiruvadigal .J. D, Ponnusamy .S, Sudha.D and Krishnamohan .M, "*Physics forTechnologists"*, Vibrant Publication, Chennai, 2013.
2. Dattu R.Joshi, "*Engineering Physics"*,Tata McGraw- Hill,New Delih,2010.

REFERENCES

1. Wole Soboyejo, "*Mechanical Properties of Engineered Materials*", Marcel Dekker Inc., 2003.
2. Frank Fahy, "*Foundations of Engineering Acoustics*", Elsevier Academic Press, 2005.
3. Alberto Sona, "*Lasers and their applications"*, Gordon and Breach Science Publishers Ltd., 1976.
4. David J. Griffiths, "*Introduction to electrodynamics*", 3rd ed., Prentice Hall, 1999.
5. Leonard. I. Schiff, "*Quantum Mechanics"*, Third Edition, Tata McGraw Hill, 2010.
6. Charles Kittel, "*Introduction to Solid State Physics*", Wiley India Pvt. Ltd, 7th ed., 2007.
7. Godfrey Boyle, "*Renewable Energy: Power sustainable future*", 2nd edition, Oxford University Press, UK, 2004.

PY1001 PHYSICS												
Course designed by		**Department of Physics and Nanotechnology**										
1.	Student Outcome	a	b	c	d	e	f	g	h	i	j	k
		X		X		X						X
2.	Mapping of instructional objectives with student outcome	1		4		2						3
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences and Technical Arts (E)				Professional Subjects (P)		
		--		X		--				--		
4.	Approval	23rd Meeting of Academic Council, May 2013										

PY1002	PHYSICS LABORATORY	L	T	P	C
	Total Contact Hours - 30	0	0	2	1
	Prerequisite				
	Nil				

PURPOSE

The purpose of this course is to develop scientific temper in experimental techniques and to reinforce the physics concepts among the engineering students

INSTRUCTIONAL OBJECTIVES

1.	To gain knowledge in the scientific methods and learn the process of measuring different Physical variables
2.	Develop the skills in arranging and handling different measuring instruments
3.	Get familiarized with experimental errors in various physical measurements and to plan / suggest on how the contributions could be made of the same order, so as to minimize the errors.

LIST OF EXPERIMENTS

1. Determination of Young's modulus of a given material – Uniform / Non-uniform bending methods.
2. Determination of Rigidity modulus of a given material – Torsion pendulum
3. Determination of dispersive power of a prism – Spectrometer
4. Determination of laser parameters – divergence and wavelength for a given laser source –laser grating/ Particle size determination using laser
5. Study of attenuation and propagation characteristics of optical fiber cable
6. Calibration of voltmeter / ammeter using potentiometer
7. Construction and study of IC regulation properties of a given power supply
8. Study of electrical characteristics of a solar cell
9. Mini Project – Concept based Demonstration

TEXT BOOKS

1. Thiruvadigal .J. D, Ponnusamy .S, Sudha.D and Krishnamohan .M, "*Physics for Technologists"*, Vibrant Publication, Chennai, 2013
2. Shukla .R.K and Anchal Srivastava, "*Practical Physics*", 1st Edition, New Age International (P) Ltd, New Delhi, 2006.

REFERENCES

1. Souires .G.L, "*Practical Physics:*", 4th Edition, Cambridge University, UK, 2001.
2. Chattopadhyay .D, Rakshit .P.C and Saha .B, "*An Advanced Course in Practical Physics*", 2nd ed., Books & Allied Ltd., Calcutta, 1990.

PY1002 PHYSICS LABORATORY												
Course designed by		Department of Physics and Nanotechnology										
1.	Student Outcome	a	b	c	d	e	f	g	h	i	j	k
		x	x			x						
2.	Mapping of instructional objectives with student outcome	1	3			2						
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences and Technical Arts (E)				Professional Subjects (P)		
		--		X		--				--		
4.	Approval	23rd Meeting of Academic Council, May 2013										

CY1003	PRINCIPLES OF ENVIRONMENTAL SCIENCE	L	T	P	C
	Total Contact Hours - 30	2	0	0	2
	Prerequisite				
	Nil				

PURPOSE

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

INSTRUCTIONAL OBJECTIVES

To enable the students

1.	To gain knowledge on the importance of environmental education and ecosystem.
2.	To acquire knowledge about environmental pollution- sources, effects and control measures of environmental pollution.
3.	To understand the treatment of wastewater and solid waste management.
4.	To acquire knowledge with respect to biodiversity, its threats and its conservation and appreciate the concept of interdependence.
5.	To be aware of the national and international concern for environment for protecting the environment

UNIT I - ENVIRONMENTAL EDUCATION AND ECOSYSTEMS (6 hours)

Environmental education: Definition and objective. Structure and function of an ecosystem – ecological succession –primary and secondary succession - ecological pyramids – pyramid of number, pyramid of energy and pyramid of biomass.

UNIT II - ENVIRONMENTAL POLLUTION (6 hours)

Environmental segments – structure and composition of atmosphere - Pollution – Air, water, soil , thermal and radiation – Effects – acid rain, ozone layer depletion and green house effect – control measures – determination of BOD, COD, TDS and trace metals.

UNIT III - WASTE MANAGEMENT (6 hours)

Waste water treatment (general) – primary, secondary and tertiary stages.
Solid waste management: sources and effects of municipal waste, bio medical waste - process of waste management.

UNIT IV - BIODIVERSITY AND ITS CONSERVATION (6 hours)

Introduction: definition - genetic, species and ecosystem diversity – bio diversity hot spots - values 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.

UNIT V - ENVIRONMENTAL PROTECTION (6 hours)

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

TEXT BOOKS

1. Kamaraj.P & Arthanareeswari.M, "*Environmental Science – Challenges and Changes"*, 4th Edition, Sudhandhira Publications, 2010.
2. Sharma.B.K. and Kaur, "*Environmental Chemistry",* Goel Publishing House, Meerut, 1994.

REFERENCES

1. De.A.K, "*Environmental Chemistry"*, New Age International, New Delhi, 1996.
2. Helen P Kavitha, "*Principles of Environmental Science*", Sci tech Publications, 2nd Edition, 2008.

CY1003 – PRINCIPLES OF ENVIRONMENTAL SCIENCE													
Course designed by		**Department of Chemistry**											
1.	Student Outcome	a	b	c	d	e	f	g	h	i	j	k	
				x		x	x		x	x	x		
2.	Mapping of instructional objectives with student outcome			5		2	4		1,3	3	2,5		
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences and Technical Arts (E)				Professional Subjects (P)			
		--		X		--				--			
4.	Approval	23rd Meeting of Academic Council, May 2013											

SEMESTER II

LE1002	**VALUE EDUCATION**	**L**	**T**	**P**	**C**
	Total Contact Hours- 15	**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

1.	To help individuals think about and reflect on different values.
2.	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
3.	To inspire individuals to choose their own personal, social, moral and spiritual values and be aware of practical methods for developing and deepening

UNIT I - INTRODUCTION (3 hours)

Definition, Relevance, Types of values, changing concepts of values

UNIT II - INDIVIDUAL AND GROUP BEHAVIOUR (3 hours)

Personal values – Self – Strengths (self-confidence, self-assessment, self-reliance, self-discipline, determination, self-restraint, contentment, humility, sympathy and compassion, gratitude, forgiveness) Weaknesses (Influences -- Peer pressure, familial and societal expectations, media)

UNIT III - SOCIETIES IN PROGRESS (3 hours)

Definition of society; Units of society; Communities – ancient and modern – Agents of change – Sense of survival, security, desire for comfort and ease sense of belonging, social consciousness and responsibility

UNIT IV - ENGINEERING ETHICS (3 hours)

Definition - Societies for engineers – Code of Ethics – Ethical Issues involved in cross border research -- Ethical and Unethical practices – case studies – situational decision making

UNIT V - SPIRITUAL VALUES **(3 hours)**

What is religion? -- Role of religion – Misinterpretation of religion – moral policing – Consequences -- Religion as spiritual quest – Aesthetics and religion

TEXT BOOK

1. Department of English and Foreign Languages SRM University, "*Rhythm of Life",* SRM Publications, 2013.

REFERENCE

1. Values (Collection of Essays). Published by: Sri Ramakrishna Math, Chennai-4. 1996.

LE1002 VALUE EDUCATION												
Course designed by		**Department of English and Foreign Languages**										
1.	Student Outcome	a	b	c	d	e	f	g	h	i	j	k
							x			x	x	
2.	Mapping of instructional objectives with student outcome						1-3			1-3		
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences and Technical Arts (E)				Professional Subjects (P)		
		X		--		--				--		
4.	Approval	23rd Meeting of Academic Council, May 2013										

PD1002	**SOFT SKILLS-II**	**L**	**T**	**P**	**C**
	Total Contact Hours - 30	**1**	**0**	**1**	**1**
	Prerequisite				
	Nil				

PURPOSE

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

INSTRUCTIONAL OBJECTIVES

1.	To develop inter personal skills and be an effective goal oriented team player.
2.	To develop professionals with idealistic, practical and moral values.
3.	To develop communication and problem solving skills.
4.	To re-engineer attitude and understand its influence on behavior.

UNIT I - INTERPERSONAL SKILLS **(6 hours)**

Understanding the relationship between Leadership Networking & Team work, Realizing Ones Skills in Leadership, Networking & Team Work, and Assessing Interpersonal Skills Situation description of Interpersonal Skill.

Team Work

Necessity of Team Work Personally, Socially and Educationally

UNIT II - LEADERSHIP **(4 hours)**

Skills for a good Leader, Assessment of Leadership Skills

Change Management

Exploring Challenges, Risking Comfort Zone, Managing Change

UNIT III - STRESS MANAGEMENT **(6 hours)**

Causes of Stress and its impact, how to manage & distress, Understanding the circle of control, Stress Busters.

Emotional Intelligence

What is Emotional Intelligence, emotional quotient why Emotional Intelligence matters, Emotion Scales. Managing Emotions.

UNIT IV - CONFLICT RESOLUTION **(4 hours)**

Conflicts in Human Relations – Reasons Case Studies, Approaches to conflict resolution.

UNIT V - DECISION MAKING **(10 hours)**

Importance and necessity of Decision Making, process of Decision Making, Practical way of Decision Making, Weighing Positives & Negatives.

Presentation

ASSESSMENT

1. A practical and activity oriented course which has a continuous assessment for 75 marks based on class room interaction, activities etc.,
2. Presentation - 25 marks

TEXT BOOK

1. INSIGHT, 2009. Career Development Centre, SRM Publications.

REFERENCES

1. Covey Sean, *Seven Habit of Highly Effective Teens*, New York, Fireside Publishers, 1998.
2. Carnegie Dale, *How to win Friends and Influence People*, New York: Simon & Schuster, 1998.
3. Thomas A .Harris, *I am ok, You are ok* , New York-Harper and Row, 1972
4. Daniel Coleman, *Emotional Intelligence*, Bantam Book, 2006

PD1002 - SOFT SKILLS-II												
Course designed by		**Career Development Centre**										
1.	Student Outcome	a	b	c	d	e	f	g	h	i	j	k
					X		X	X		X		
2.	Mapping of instructional objectives with student outcome				1		2	3		4		
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences and Technical Arts (E)				Professional Subjects (P)		
		X		--		--				--		
4.	Approval	23rd Meeting of Academic Council, May 2013										

	ADVANCED CALCULUS AND COMPLEX ANALYSIS	**L**	**T**	**P**	**C**
MA1002	Total Contact Hours -75	**3**	**2**	**0**	**4**
	(Common to all Branches of Engineering except Bio group)				

PURPOSE

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

INSTRUCTIONAL OBJECTIVES

1.	To have knowledge in multiple calculus
2.	To improve their ability in Vector calculus
3.	To equip themselves familiar with Laplace transform
4.	To expose to the concept of Analytical function
5.	To familiarize with Complex integration

UNIT I - MULTIPLE INTEGRALS (**15 hours)**

Double integration in Cartesian and polar coordinates – Change of order of integration – Area as a double integral – Triple integration in Cartesian coordinates – Conversion from Cartesian to polar – Volume as a Triple Integral.

UNIT II - VECTOR CALCULUS **(15 hours)**

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

UNIT III - LAPLACE TRANSFORMS **(15 hours)**

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.

UNIT IV - ANALYTIC FUNCTIONS **(15 hours)**

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.

UNIT V - COMPLEX INTEGRATION **(15 hours)**

Line integral – Cauchy's integral theorem (without proof) – Cauchy's integral formulae and its applications – Taylor's and Laurent's expansions (statements only) – Singularities – Poles and Residues – Cauchy's residue theorem – Contour integration – Unit circle and semi circular contour.

TEXT BOOKS

1. Kreyszig.E, "*Advanced Engineering Mathematics*", 10th edition, John Wiley & Sons. Singapore, 2012.
2. Ganesan .K, Sundarammal Kesavan, Ganapathy Subramanian .K.S & Srinivasan .V, "*Engineering Mathematics*", Gamma publications, Revised Edition, 2013.

REFERENCES

1. Grewal .B.S, "*Higher Engg Maths*", Khanna Publications, 42nd Edition, 2012.
2. Veerajan .T, "*Engineering Mathematics I*", Tata McGraw Hill Publishing Co., New Delhi, 5th edition, 2006.

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

MA1002 ADVANCED CALCULUS AND COMPLEX ANALYSIS												
Course designed by		Department of Mathematics										
1.	Student Outcome	a	b	c	d	e	f	g	h	i	j	k
		X				X						
2.	Mapping of instructional objectives with student outcome	1-5				1-5						
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences and Technical Arts (E)				Professional Subjects (P)		
		X		--		--				--		
4.	Approval	23rd Meeting of Academic Council, May 2013										

PY1003	MATERIALS SCIENCE	L	T	P	C
	Total Contact Hours - 60	2	0	2	3
	Prerequisite				
	Nil				

PURPOSE

The course introduces several advanced concepts and topics in the rapidly evolving field of material science. Students are expected to develop comprehension of the subject and to gain scientific understanding regarding the choice and manipulation of materials for desired engineering applications.

INSTRUCTIONAL OBJECTIVES

1.	To acquire basic understanding of advanced materials, their functions and properties for technological applications
2.	To emphasize the significance of materials selection in the design process
3.	To understand the principal classes of bio-materials and their functionalities in modern medical science
4.	To get familiarize with the new concepts of Nano Science and Technology
5.	To educate the students in the basics of instrumentation, measurement, data acquisition, interpretation and analysis

UNIT I – ELECTRONIC AND PHOTONIC MATERIALS (6 hours)

Electronic Materials: 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

Superconducting Materials: Normal and High temperature superconductivity – Applications.

Photonic Materials: LED – LCD – Photo conducting materials – Photo detectors – Photonic crystals and applications – Elementary ideas of Non-linear optical materials and their applications.

UNIT II – MAGNETIC AND DIELECTRIC MATERIALS (6 hours)

Magnetic Materials: Classification of magnetic materials based on spin – Hard and soft magnetic materials – Ferrites, garnets and magnetoplumbites – Magnetic bubbles and their applications – Magnetic thin films – Spintronics and devices (Giant magneto resistance, Tunnel magneto resistance and Colossal magneto resistance).

Dielectric Materials: Polarization mechanisms in dielectrics – Frequency and temperature dependence of polarization mechanism – Dielectric loss – Dielectric waveguide and dielectric resonator antenna – Piezoelectric, pyroelectric and ferroelectric materials and their applications.

UNIT III – MODERN ENGINEERING AND BIOMATERIALS (6 hours)

Modern Engineering Materials: Smart materials – Shape memory alloys – Chromic materials (Thermo, Photo and Electro) – Rheological fluids – Metallic glasses – Advanced ceramics – Composites.

Bio-materials: Classification of bio-materials (based on tissue response) – Comparison of properties of some common biomaterials – Metallic implant materials (stainless steel, cobalt-based and titanium-based alloys) – Polymeric implant materials (Polyamides, polypropylene, Acrylic resins and Hydrogels) – Tissue replacement implants – Soft and hard tissue replacements – Skin implants – Tissue engineering – Biomaterials for organ replacement (Bone substitutes) – Biosensor.

UNIT IV – INTRODUCTION TO NANOSCIENCE AND NANOTECHNOLOGY (6 hours)

Basic concepts of Nanoscience and Nanotechnology – Quantum wire – Quantum well – Quantum dot – fullerenes – Graphene – Carbon nanotubes – Material processing by chemical vapor deposition and physical vapor deposition – Principle of SEM, TEM, AFM, Scanning near-field optical microscopy (SNOM) – Scanning ion-conducting microscopy (SCIM) – Potential uses of nanomaterials in

electronics, robotics, computers, sensors, sports equipment, mobile electronic devices, vehicles and transportation – Medical applications of nanomaterials.

UNIT V – MATERIALS CHARACTERIZATION (6 hours)

X-ray diffraction, Neutron diffraction and Electron diffraction– X-ray fluorescence spectroscopy – Fourier transform Infrared spectroscopy (FTIR) – Ultraviolet and visible spectroscopy (UV-Vis) – Thermogravimetric Analysis (TGA) – Differential Thermal Analysis (DTA) – Differential Scanning Calorimetry (DSC).

PRACTICAL EXPERIMENTS (30 hours)

1. Determination of resistivity and band gap for a semiconductor material – Four probe method / Post-office box
2. Determination of Hall coefficient for a semiconducting material
3. To study V-I characteristics of a light dependent resistor (LDR)
4. Determination of energy loss in a magnetic material – B-H curve
5. Determination of paramagnetic susceptibility – Quincke's method
6. Determination of dielectric constant for a given material
7. Calculation of lattice cell parameters – X-ray diffraction
8. Measurement of glucose concentration – Electrochemical sensor
9. Visit to Advanced Material Characterization Laboratory (Optional)

TEXT BOOKS

1. Thiruvadiga .J.D, Ponnusamy .S, Sudha.D and Krishnamohan .M, "*Materials Sciences"*, Vibrant Publication, Chennai, 2013.
2. Rajendran.V, "*Materials Science*",Tata McGraw- Hill,New Delhi,2011.

REFERENCES

1. Rolf E. Hummel, "*Electronic Properties of Materials"*, 4th ed., Springer, New York, 2011.
2. Dennis W. Prather, "*Photonic Crystals: Theory, Applications, and Fabrication"*, John Wiley & Sons, Hoboken, 2009.
3. James R. Janesick, "*Scientific Charge-Coupled Devices",* Published by SPIE - The International Society for Optical Engineering, Bellingham, Washington, 2001.
4. David M. Pozar, "*Microwave Engineering*", 3rd ed., John Wiley & Sons, 2005.
5. Silver .F and Dillion .D, "*Biocompatibility: Interactions of Biological and Implantable Materials*", VCH Publishers, New York, 1989.
6. Severial Dumitriu, "*Polymeric Biomaterials*" Marcel Dekker Inc, CRC Press, Canada 2001.

7. Cao .G, "*Nanostructures and Nanomaterials: Synthesis, Properties and Applications*", Imperial College Press, 2004.
8. Pradeep .T, "*A Text Book of Nanoscience and Nanotechnology*", Tata McGraw Hill, New Delhi, 2012.
9. Sam Zhang, "*Materials Characterization Techniques*", CRC Press, 2008.

PY1003 MATERIALS SCIENCE												
Course designed by		Department of Physics and Nanotechnology										
1.	Student Outcome	a	b	c	d	e	f	g	h	i	j	k
		x	x		x	x						x
2.	Mapping of instructional objectives with student outcome	1	5		4	2						3
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences and Technical Arts (E)				Professional Subjects (P)		
		--		X		--				--		
4.	Approval	23rd Meeting of Academic Council, May 2013										

CY1001	CHEMISTRY	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite				
	Nil				

PURPOSE

To enable the students to acquire knowledge in the principles of chemistry for engineering applications

INSTRUCTIONAL OBJECTIVES

1.	The quality of water and its treatment methods for domestic and industrial applications.
2.	The classification of polymers, different types of polymerizations, preparation, properties and applications of important polymers and FRPs.
3.	The phase rule and its application to one and two component systems.
4.	The principle, types and mechanism of corrosion and protective coatings.
5.	The classification and selection of lubricants and their applications.
6.	The basic principles, instrumentation and applications of analytical techniques

UNIT I - WATER TREATMENT (9 hours)

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

UNIT II - POLYMERS AND REINFORCED PLASTICS (9 hours)

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, elasticity and crystallinity -Preparation and properties of important resins: Polyethylene, PVC, PMMA, Polyester, Teflon, Bakelite and Epoxy resins - compounding of plastics - moulding methods - injection, extrusion, compression and calendaring - reinforced plastics - FRP – Carbon and Glass- applications.

UNIT III - PHASE EQUILIBRIA, LUBRICANTS AND ADHESIVES (9 hours)

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; compound formation, Zn-Mg.

Lubricants: Classification –solid, semi solid, liquid, emulsion- properties – selection of lubricants for different purposes, Adhesives: classification-natural, synthetic, inorganic- Adhesive action - applications.

UNIT IV - CORROSION AND ITS CONTROL (9 hours)

Corrosion: Basic concepts - mechanism of chemical, electrochemical corrosion - Pilling Bedworth rule – Types of Electrochemical corrosion - galvanic corrosion - differential aeration corrosion - pitting corrosion - stress corrosion – Measurement of corrosion (wt. loss method only) - factors influencing corrosion. Corrosion control: Cathodic protection - sacrificial anodic method - corrosion inhibitors. Protective coatings: surface preparation for metallic coatings - electro plating (copper plating) and electroless plating (Nickel plating) - chemical conversion coatings - anodizing, phosphating & chromate coating.

UNIT V - INSTRUMENTAL METHODS OF ANALYSIS (9 hours)

Basic principles, instrumentation and applications of potentiometry, UV - visible spectroscopy, infrared spectroscopy, atomic absorption spectroscopy and flame photometry .

TEXT BOOKS

1. Kamaraj.P & Arthanareeswari. M, "*Applied Chemistry", 9th Edition*, Sudhandhira Publications, 2012.
2. Dara .S.S, *"A Text book of Engineering Chemistry"*, 10th Edition, S.Chand & Company Ltd., New Delhi, 2003.

REFERENCES

1. Jain.P.C and Monika Jain, "*Engineering Chemistry*", Danpat Rai publishing company (P) Ltd, New Delhi, 2010.
2. Helen P .Kavitha, "*Engineering Chemistry – I", Scitech* Publications, 2nd edition, 2008.

CY1001 CHEMISTRY												
Course designed by		**Department of Chemistry**										
1.	Student Outcome	a	b	c	d	e	f	g	h	i	j	k
		X	X	X		X						X
2.	Mapping of instructional objectives with student outcome	1-6	1,5	3		2						4
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences and Technical Arts (E)				Professional Subjects (P)		
		--		X		--				--		
4.	Approval	23rd Meeting of Academic Council, May 2013										

	CHEMISTRY LABORATORY	**L**	**T**	**P**	**C**
CY1002	Total Contact Hours - 30	**0**	**0**	**2**	**1**
	Prerequisite				
	Nil				
PURPOSE					
To apply the concepts of chemistry and develop analytical skills for applications in engineering.					
INSTRUCTIONAL OBJECTIVES					
1.	To enable the students to understand the basic concepts involved in the analyses.				

LIST OF EXPERIMENTS

- Preparation of standard solutions
- Estimation of total, permanent and temporary hardness by EDTA method

- Conductometric titration - determination of strength of an acid
- Estimation of iron by potentiometry.
- 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 (Demonstration)
- Estimation of Copper in ore
- Estimation of nickel in steel
- Determination of total alkalinity and acidity of a water sample
- Determination of rate of corrosion by weight loss method.

REFERENCES

1. Kamaraj & Arthanareeswari, Sudhandhira Publications "*Practical Chemistry*" (work book) , 2011.
2. Helen P. Kavitha "*Chemistry Laboratory Manual*", Scitech Publications, 2008.

CY1002 CHEMISTRY LABORATORY												
Course designed by		**Department of Chemistry**										
1.	Student Outcome	a	b	c	d	e	f	g	h	i	j	k
		x	x									x
2.	Mapping of instructional objectives with student outcome	1	1									1
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences and Technical Arts (E)				Professional Subjects (P)		
		--		X		--				--		
4.	Approval	23rd Meeting of Academic Council, May 2013										

CE1001	**BASIC CIVIL ENGINEERING**	**L**	**T**	**P**	**C**
	Total Contact Hours - 30	**2**	**0**	**0**	**2**
	Prerequisite				
	Nil				

PURPOSE

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

INSTRUCTIONAL OBJECTIVES

1.	To know about different materials and their properties
2.	To know about engineering aspects related to buildings
3.	To know about importance of surveying and the transportation systems
4.	To get exposed to the rudiments of engineering related to dams, water supply, and sewage disposal

UNIT I - BUILDING MATERILAS (6hours)

Introduction – Civil Engineering – Materials: Bricks – composition – classifications – properties –uses. Stone – classification of rocks – quarrying – dressing – properties –uses. Timber - properties –uses –ply wood. Cement – grades –types – properties –uses. Steel – types – mild steel – medium steel – hard steel – properties – uses – market forms. Concrete – grade designation – properties – uses.

UNIT II - MATERIAL PROPERTIES (6hours)

Stress – strain – types – Hook's law – three moduli of elasticity – poisons ratio – relationship – factor of safety. Centroid - center of gravity – problems in symmetrical sections only (I, T and channel sections). Moment of inertia, parallel, perpendicular axis theorems and radius of gyration (definitions only).

UNIT III - BUILDING COMPONENTS (6hours)

Building – selection of site – classification – components. Foundations –functions – classifications – bearing capacity. Flooring – requirements – selection – types – cement concrete marble – terrazzo floorings. Roof – types and requirements.

UNIT IV - SURVEYING AND TRANSPORTATION (6hours)

Surveying – objectives – classification – principles of survey. Transportation – classification – cross section and components of road – classification of roads. Railway – cross section and components of permanent way –functions. Water way – docks and harbor – classifications – components. Bridge – components of bridge.

UNIT V - WATER SUPPLY AND SEWAGE DISPOSAL (6hours)

Dams – purpose – selection of site – types –gravity dam (cross section only). Water supply – objective – quantity of water – sources – standards of drinking water – distribution system. Sewage – classification – technical terms – septic tank – components and functions.

TEXT BOOKS

1. Raju .K.V.B, Ravichandran .P.T, "*Basics of Civil Engineering"*, Ayyappa Publications, Chennai, 2012.
2. Rangwala .S.C," *Engineering Material"s*, Charotar Publishing House, Anand, 2012.

REFERENCES

1. Ramesh Babu, "*Civil Engineering",* VRB Publishers, Chennai, 2000.
2. National Building Code of India, Part V, "*Building Materials"*, 2005
3. Surendra Singh, "*Building Materials"*, Vikas Publishing Company, New Delhi, 1996.

CE1001 - BASIC CIVIL ENGINEERING												
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.	Mapping of instructional objectives with student outcome	1-4				1-4						2-4
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences and Technical Arts (E)				Professional Subjects (P)		
		--		--		X				--		
4.	Approval	23rd Meeting of Academic Council, May 2013										

	ELEMENTS OF BUILDING MATERIAL SCIENCE	L	T	P	C
CE1002	Total Contact Hours - 30	**2**	**0**	**0**	**2**
	Prerequisite				
	Nil				

PURPOSE

To develop knowledge of conventional and new materials of construction.

INSTRUCTIONAL OBJECTIVES

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

UNIT I - BASIC LOAD BEARING MATERIALS (6hours)

Conventional Materials: Stones: classification of rocks – quarrying – dressing – properties –uses of stones – tests for stones. Bricks: composition – manufacture – four operations – classification – qualities – uses – test for bricks. Timber: classification of trees – structure of tree – methods – wood product – uses.

UNIT II - ADVANCED LOAD BEARING MATERIALS (6hours)

Cement: Introduction – ingredients – manufacture – dry and wet process – types of cement – properties – uses – tests for cement. Mortar: functions – requirements – types – properties – uses – tests on mortar. Steel: introduction – types – properties – uses – market forms. Concrete: Ingredients – functions – w/c ratio – grades – admixtures – test on concrete – properties – uses. RCC: Characteristics – elements - advantages – disadvantages.

UNIT III - SPECIAL CONSTRUCTION MATERIALS (6hours)

Prestressed concrete – types – properties – uses – merits and demerits. Ferro cement – advantages – uses. Fibre reinforced concrete – types of fibres – steel fibres – SFRC – properties – applications. Lightweight concrete – types. High density concrete, High strength concrete – advantages – applications, High performance concrete – properties.

UNIT IV - NON LOAD BEARING MATERIALS (6hours)

Paints: Functions – constituents – characteristics – selection – types of paints – defects. Varnishes: Elements – properties – types. Distempers: composition – properties. Asbestos: Properties – uses – asbestos cements products. Glass: Constituents – composition – classification – properties – market form – uses. Plastic: constituents – classification – properties – uses.

UNIT V - RECENT CONSTRUCTION MATERIALS (6hours)

Reactive powder concrete – properties, Geopolymer concrete – advantages, Blended cement concrete – use of mineral admixtures – properties, Self health monitoring concrete, Bacterial concrete, Roller compacted concrete - uses, Self compacting concrete – properties – advantages, Ready mixed concrete – advantages.

TEXT BOOKS

1. Raju .K.V.B, Annadurai .R and PRavichandran.P.T, "*Construction Materials",* Ayyappaa Publications, Chennai, 2012.
2. Varghese .P.C, "*Building Materials"*, Prentice Hall India,2005.

REFERENCES

1. Rangwala .S.C, "*Engineering Materials"*, Charotor Publishing House, New Delhi, 2012.
2. 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.
4. Gurucharan Singh, "*Building Construction and Materials"*, Standard Book House, Delhi, 1988.
5. Shetty .M.S, "*Concrete Technology"*, S.Chand and Company, New Delhi, 2010.
6. *"Lecture Notes on Special Concretes, Special Concrete*," Department of Civil Engineering, SRM Engineering College, Kattankulathur 2007.

CE1002 - ELEMENTS OF BUILDING MATERIAL SCIENCE												
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.	Mapping of instructional objectives with student outcome	1,2,3				1,2,3						2, 3
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences andTechnical Arts (E)				Professional Subjects (P)		
		--		--		--				X		
4.	Broad area	Structural Engineering		Geotechnical Engineering		Water Resources Engineering				Geomatics Engineering		
		X		--		--				--		
5.	Approval	23rd meeting of academic council , May, 2013										

AR1001	**PRINCIPLES OF ARCHITECTURE**	**L**	**T**	**P**	**C**
	Total contact hours - 30	**2**	**0**	**0**	**2**
	Prerequisite				
	Nil				

PURPOSE

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

INSTRUCTIONAL OBJECTIVES

1.	To create awareness about design criteria, building bye laws, development control rules & zoning regulations. Introduction to the basic architectural principles & imparting knowledge about building
2.	To introduce the basic architectural principles in functional planning
3.	To impart knowledge about building services .

UNIT I - PLANNING ASPECTS & REGULATIONS (10 hours)

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.

UNIT II - ARCHITECTURAL PRINCIPLES (10 hours)

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

UNIT III - BUILDING SERVICES (10 hours)

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

TEXT BOOKS

1. Francis .D.K Ching- "*Architecture: Form Space & Order"* Van Nastrand Reinhold, 1996.
2. Vaidyanathan .G, Kulasekaran .I, Sathishkumar .G, "*Building planning & construction companion"*, Edifice Institute of Building services publication, 2002.

REFERENCES

1. Joseph De chiara & John Callendar – "*Time saver standards for building types"*, III Edition - Mc Graw Hill, 1990.
2. National Building Code, "*Bureau of Indian Standars"*, New Delhi, 2005.

<table>
<tr><th colspan="13">AR1001 PRINCIPLES OF ARCHITECTURE</th></tr>
<tr><td colspan="2">Course designed by</td><td colspan="11">Department of Architecture</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>
<tr><td>X</td><td></td><td></td><td></td><td>X</td><td></td><td></td><td>X</td><td></td><td></td><td></td></tr>
<tr><td>2.</td><td>Mapping of instructional objectives with student outcome</td><td>1-3</td><td></td><td></td><td></td><td>1-3</td><td></td><td></td><td>1-3</td><td></td><td></td><td></td></tr>
<tr><td rowspan="2">3.</td><td rowspan="2">Category</td><td colspan="2">General (G)</td><td colspan="2">Basic Sciences(B)</td><td colspan="4">Engineering Sciences and Technical Arts (E)</td><td colspan="3">Professional Subjects (P)</td></tr>
<tr><td colspan="2">--</td><td colspan="2">--</td><td colspan="4">--</td><td colspan="3">X</td></tr>
<tr><td>4.</td><td>Approval</td><td colspan="11">23rd Meeting of Academic Council, May 2013</td></tr>
</table>

COURSES FROM TABLE I
(TO BE TAKEN EITHER IN I OR II SEMESTER)

CS1001	**PROGRAMMING USING MATLAB**	**L**	**T**	**P**	**C**
	Total Contact Hours - 45	**1**	**0**	**2**	**2**
	Prerequisite				
	Nil				

PURPOSE

This Lab Course will enable the students to understand the fundamentals and programming knowledge in MATLAB.

INSTRUCTIONAL OBJECTIVES

1.	To learn the MATLAB environment and its programming fundamentals
2.	Ability to write Programs using commands and functions
3.	Able to handle polynomials, and use 2D Graphic commands

LIST OF EXPERIMENTS

1. Practicing MATLAB environment with simple exercises to familiarize Command Window, History, Workspace, Current Directory, Figure window, Edit window, Shortcuts, Help files.
2. Data types, Constants and Variables, Character constants, operators, Assignment statements.
3. Control Structures: For loops, While, If control structures, Switch, Break, Continue statements.
4. Input-Output functions, Reading and Storing Data.
5. Vectors and Matrices, commands to operate on vectors and matrices, matrix Manipulations.
6. Arithmetic operations on Matrices, Relational operations on Matrices, Logical operations on Matrices.
7. Polynomial Evaluation, Roots of Polynomial, Arithmetic operations on Polynomials.
8. Graphics: 2D plots, Printing labels, Grid & Axes box, Text in plot, Bar and Pie chart.

TEXT BOOK

1. Bansal .R.K, Goel .A.K, Sharma .M.K, "*MATLAB and its Applications in Engineering*", Pearson Education, 2012.

REFERENCES

1. Amos Gilat, *"MATLAB-An Introduction with Applications"*, Wiley India.
2. Stephen J.Chapman, *"Programming in MATLAB for Engineers"*, Cengage Learning, 2011.

CS1001 PROGRAMMING USING MATLAB												
Course designed by		**Department of Computer Science and Engineering**										
1.	Student Outcome	a	b	c	d	e	f	g	h	i	j	k
		X	X									X
2.	Mapping of instructional objectives with student outcome	2,3	1-3									1
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences and Technical Arts (E)				Professional Subjects (P)		
		X		--		--				--		
4.	Approval	23rd Meeting of Academic Council, May 2013										

BT1001	BIOLOGY FOR ENGINEERS	L	T	P	C
	Total Contact Hours - 30	**2**	**0**	**0**	**2**
	Prerequisite				
	Nil				

PURPOSE

The purpose of this course is to provide a basic understanding of biological mechanisms of living organisms from the perspective of engineers. In addition, the course is expected to encourage engineering students to think about solving biological problems with engineering tools.

INSTRUCTIONAL OBJECTIVES

1.	To familiarize the students with the basic organization of organisms and subsequent building to a living being.
2.	To impart an understanding about the machinery of the cell functions that is ultimately responsible for various daily activities.
3.	To provide knowledge about biological problems that require engineering expertise to solve them.

UNIT I - BASIC CELL BIOLOGY **(6 hours)**

Introduction: Methods of Science-Living Organisms: Cells and Cell theory Cell Structure and Function, Genetic information, protein synthesis, and protein structure, Cell metabolism-Homoeostasis- Cell growth, reproduction, and differentiation.

UNIT II - BIOCHEMISTRY AND MOLECULAR ASPECTS OF LIFE (5 hours)

Biological Diversity --Chemistry of life: chemical bonds--Biochemistry and Human biology--Protein synthesis—Stem cells and Tissue engineering.

UNIT III - ENZYMES AND INDUSTRIAL APPLICATIONS (5 hours)

Enzymes: Biological catalysts, Proteases, Carbonic anhydrase, Restriction enzymes, and Nucleoside monophosphate kinases—Photosynthesis

UNIT IV - MECHANOCHEMISTRY (7 hours)

Molecular Machines/Motors—Cytoskeleton—Bioremediation—Biosensors

UNIT V - NERVOUS SYSTEM, IMMUNE SYSTEM, AND CELL SIGNALING (7 hours)

Nervous system--Immune system- General principles of cell signaling

TEXT BOOK

1. ThyagaRajan .S, Selvamurugan .N, Rajesh .M.P, Nazeer .R.A, Richard W. Thilagaraj, Barathi .S, and Jaganathan .M.K, "*Biology for Engineers*," Tata McGraw-Hill, New Delhi, 2012.

REFERENCES

1. Jeremy M. Berg, John L. Tymoczko and Lubert Stryer, "*Biochemistry*," W.H. Freeman and Co. Ltd., 6th Ed., 2006.
2. Robert Weaver, "*Molecular Biology*," MCGraw-Hill, 5th Edition, 2012.
3. Jon Cooper, "*Biosensors A Practical Approach*" Bellwether Books**, 2**004.
4. Martin Alexander, "*Biodegradation and Bioremediation,"* Academic Press, 1994.
5. Kenneth Murphy, "*Janeway's Immunobiology*," Garland Science; 8th edition, 2011.
6. Eric R. Kandel, James H. Schwartz, Thomas M. Jessell, "P*rinciples of Neural Science"*, McGraw-Hill, 5th Edition, 2012.

BT1001 BIOLOGY FOR ENGINEERS												
Course designed by		Department of Biotechnology										
1.	Student Outcome	a	b	c	d	e	f	g	h	i	j	k
		X			X						X	
2.	Mapping of instructional objectives with student outcome	1			2						3	
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences and Technical Arts (E)				Professional Subjects (P)		
		X		--		--				--		
4.	Approval	23rd Meeting of Academic Council, May 2013										

ME1001	BASIC MECHANICAL ENGINEERING	L	T	P	C
	Total Contact Hours - 30	2	0	0	2
	Prerequisite				
	Nil				

PURPOSE

To familiarize the students with the basics of Mechanical Engineering.

INSTRUCTIONAL OBJECTIVES

1.	To familiarize with the basic machine elements
2.	To familiarize with the Sources of Energy and Power Generation
3.	To familiarize with the various manufacturing processes

UNIT I – MACHINE ELEMENTS– I (5 hours)

Springs: Helical and leaf springs – Springs in series and parallel. **Cams:** Types of cams and followers – Cam profile.

UNIT II - MACHINE ELEMENTS– II (5 hours)

Power Transmission: Gears (terminology, spur, helical and bevel gears, gear trains). Belt drives (types). Chain drives. Simple Problems.

UNIT III - ENERGY (10 hours)

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

UNIT IV - MANUFACTURING PROCESSES - I (5 hours)

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 cutting – Brazing and soldering.

UNIT V - MANUFACTURING PROCESSES– II (5 hours)

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:

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

REFERENCES:

1. Hajra Choudhary .S.K and HajraChoudhary .A. K, "*Elements of Workshop Technology", Vols. I & II*, Indian Book Distributing Company Calcutta, 2007.
2. Nag .P.K, "*Power Plant Engineering"*, Tata McGraw-Hill, New Delhi, 2008.
3. Rattan .S.S, "*Theory of Machines"*, Tata McGraw-Hill, New Delhi, 2010.

<table>
<tr><th colspan="13">BT1001 BIOLOGY FOR ENGINEERS</th></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>
<tr><td>X</td><td></td><td></td><td></td><td>X</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>2.</td><td>Mapping of instructional objectives with student outcome</td><td>1-3</td><td></td><td></td><td></td><td>1-3</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td rowspan="2">3.</td><td rowspan="2">Category</td><td colspan="2">General (G)</td><td colspan="3">Basic Sciences(B)</td><td colspan="4">Engineering Sciences and Technical Arts (E)</td><td colspan="2">Professional Subjects (P)</td></tr>
<tr><td colspan="2">--</td><td colspan="3">--</td><td colspan="4">X</td><td colspan="2">--</td></tr>
<tr><td>4.</td><td>Approval</td><td colspan="11">23rd Meeting of Academic Council, May 2013</td></tr>
</table>

EE1001	BASIC ELECTRICAL ENGINEERING	L	T	P	C
	Total Contact Hours - 30	2	0	0	2
	Prerequisite				
	Nil				

PURPOSE

This course provides comprehensive idea about circuit analysis, working principles of machines and common measuring instruments.

INSTRUCTIONAL OBJECTIVES

1.	Understand the basic concepts of magnetic circuits, AC & DC circuits.
2.	Explain the working principle, construction, applications of DC & AC machines and measuring instruments.
3.	Gain knowledge about the fundamentals of wiring and earthing

UNIT I – FUNDAMENTALS OF DC CIRCUITS (6 hours)

Introduction to DC and AC circuits, Active and passive two terminal elements, Ohms law, Voltage-Current relations for resistor, inductor, capacitor , Kirchhoff's laws, Mesh analysis, Nodal analysis, Ideal sources –equivalent resistor, current division, voltage division

UNIT II – MAGNETIC CIRCUITS (6 hours)

Introduction to magnetic circuits-Simple magnetic circuits-Faraday's laws, induced emfs and inductances

UNIT III – AC CIRCUITS (6 hours)

Sinusoids, Generation of AC, Average and RMS values, Form and peak factors, concept of phasor representation, J operator. Analysis of R-L, R-C, R-L-C circuits. Introduction to three phase systems - types of connections, relationship between line and phase values.

UNIT IV – ELECTRICAL MACHINES & MEASURING INSTRUMENTS (6 hours)

Working principle, construction and applications of DC machines and AC machines (1 - phase transformers, single phase induction motors: split phase, capacitor start and capacitor start & run motors). Basic principles and classification of instruments -Moving coil and moving iron instruments.

UNIT V – ELECTRICAL SAFETY, WIRING &INTRODUCTION TO POWER SYSTEM (6 hours)

Safety measures in electrical system- types of wiring- wiring accessories-staircase, fluorescent lamps & corridor wiring- Basic principles of earthing-Types of earthing- Simple layout of generation, transmission & distribution of power.

TEXT BOOK

1. Dash .S.S,Subramani .C,Vijayakumar .K, "*BasicElectrical Engineering*", First edition,Vijay Nicole Imprints Pvt.Ltd,2013.

REFERENCES

1. Smarajt Ghosh, "*Fundamentals of Electrical & Electronics Engineering*", Second edition, PHI Learning, 2007.
2. Metha .V.K, Rohit Metha, "*Basic Electrical Engineering*", Fifth edition, S.Chand & Co, 2012.
3. Kothari D. P and Nagrath IJ, "*Basic Electrical Engineering*", Second edition, Tata McGraw - Hill, 2009.
4. Bhattacharya .S.K, "*Basic Electrical and Electronics Engineering"*, First edition, Pearson Education, 2011.

EE1001 - BASIC ELECTRICAL ENGINEERING												
Course designed by		**Department of Electrical and Electronics Engineering**										
1.	Student Outcome	a	b	c	d	e	f	g	h	i	j	k
		X				X						
2.	Mapping of instructional objectives with student outcome	1-3				1						
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences and Technical Arts (E)				Professional Subjects (P)		
		--		--		X				--		
4.	Approval	23rd Meeting of Academic Council, May 2013										

EC1001	**BASIC ELECTRONICS ENGINEERING**	**L**	**T**	**P**	**C**
	Total Contact Hours – 30	**2**	**0**	**0**	**2**
	Prerequisite				
	Nil				

PURPOSE

This course provides comprehensive idea about working principle, operation and characteristics of electronic devices, transducers, Digital Electronics and Communication Systems.

INSTRUCTIONAL OBJECTIVES	
At the end of the course students will be able to gain knowledge about the	
1.	Fundamentals of electronic components, devices, transducers
2.	Principles of digital electronics
3.	Principles of various communication systems

UNIT I - ELECTRONIC COMPONENTS (4 hours)

Passive components – resistors, capacitors & inductors (properties, common types, I-V relationship and uses).

UNIT II - SEMICONDUCTOR DEVICES (7 hours)

Semiconductor Devices - Overview of Semiconductors - basic principle, operation and characteristics of PN diode, zener diode, BJT, JFET, optoelectronic devices (LDR, photodiode, phototransistor, solar cell, optocouplers)

UNIT III - TRANSDUCERS (5 hours)

Transducers - Instrumentation – general aspects, classification of transducers, basic requirements of transducers, passive transducers - strain gauge, thermistor, Hall-Effect transducer, LVDT, and active transducers – piezoelectric and thermocouple.

UNIT IV - DIGITAL ELECTRONICS (7 hours)

Number systems – binary codes - logic gates - Boolean algebra, laws & theorems - simplification of Boolean expression - implementation of Boolean expressions using logic gates - standard forms of Boolean expression.

UNIT V - COMMUNICATION SYSTEMS (7 hours)

Block diagram of a basic communication system – frequency spectrum - need for modulation - methods of modulation - principles of AM, FM, pulse analog and pulse digital modulation – AM / FM transmitters & receivers (block diagram description only)

TEXT BOOKS

1. Thyagarajan .T, SendurChelvi .K.P, Rangaswamy .T.R, *"Engineering Basics: Electrical, Electronics and Computer Engineering"*, New Age International, Third Edition, 2007.
2. Somanathan Nair .B, Deepa .S.R, "*Basic Electronics",* I.K. International Pvt. Ltd., 2009.

REFERENCES

1. Thomas L. Floyd, *"Electronic Devices",* Pearson Education, 9th Edition, 2011.
2. Rajput .R.K, *"Basic Electrical and Electronics Engineering"*, Laxmi Publications, First Edition, 2007.

EC1001 BASIC ELECTRONICS ENGINEERING												
Course designed by		Department of Electronics and Communication Engineering										
1.	Student Outcome	a	b	c	d	e	f	g	h	i	j	k
		x				x						
2.	Mapping of instructional objectives with student outcome	1-3				1						
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences and Technical Arts (E)				Professional Subjects (P)		
		--		--		X				--		
4.	Approval	23rd Meeting of Academic Council, May 2013										

ME1004	WORKSHOP PRACTICE	L	T	P	C
	Total contact hours - 45	0	0	3	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

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

UNIT I - FITTING **(9 hours)**

Tools & Equipments – Practice in filing.
Making Vee Joints, Square, Dovetail joints and Key making - plumbing.
Mini project – Assembly of simple I.C. engines.

UNIT II - CARPENTRY **(9 hours)**

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

UNIT III - SHEET METAL **(9 hours)**

Tools and equipments– practice.
Making rectangular tray, hopper, scoop, etc.
Mini project - Fabrication of a small cabinet, dust bin, etc.

UNIT IV - WELDING **(9 hours)**

Tools and equipments -
Arc welding of butt joint, Lap joint, Tee fillet.
Demonstration of gas welding, TIG & MIG welding.

UNIT V - SMITHY **(9 hours)**

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

TEXT BOOKS:

1. Gopal .T.V, Kumar .T, and Murali .G, "*A first course on workshop practice – Theory, Practice and Work Book"*, Suma Publications, Chennai, 2005.

REFERENCE BOOKS:

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

ME1004 WORKSHOP PRACTICE												
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.	Mapping of instructional objectives with student outcome		1,2	1,2				1,2				
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences and Technical Arts (E)				Professional Subjects (P)		
		--		--		X				--		
4.	Approval	23rd Meeting of Academic Council, May 2013										

ME1005	ENGINEERING GRAPHICS	L	T	P	C
	Total Contact Hours - 75	1	0	4	3
	Prerequisite				
	Nil				

First Angle Projection is to be followed - Practice with Computer Aided Drafting tools

PURPOSE

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

INSTRUCTIONAL OBJECTIVES

1.	To familiarize with the construction of geometrical figures
2.	To familiarize with the projection of 1D, 2D and 3D elements
3.	To familiarize with the sectioning of solids and development of surfaces
4.	To familiarize with the Preparation and interpretation of building drawing

UNIT I - FUNDAMENTALS OF ENGINEERING GRAPHICS (2 hours)

Lettering – Two dimensional geometrical constructions – Conics – Representation of three-dimensional objects – Principles of projections – Standard codes – Projection of points.

UNIT II - PROJECTION OF LINES AND SOLIDS (4 hours)

Projection of straight lines – Projection of planes - Projection of solids – Auxiliary projections.

UNIT III - SECTIONS AND DEVELOPMENTS (3 hours)

Sections of solids and development of surfaces.

UNIT IV - PICTORIAL PROJECTIONS (4 hours)

Conversion of Projections: Orthographic projection – Isometric projection of regular solids and combination of solids.

UNIT V - BUILDING DRAWING (2 hours)

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) with electrical wiring diagram.

PRACTICAL (60 hours)

TEXT BOOKS

1. Venugopal .K and Prabhu Raja .V, "*Engineering Graphics"*, Eighth Edition (Revised), New Age International Publishers, Chennai, 2007.
2. Natarajan .K.V, "*A Text Book of Engineering Graphics"*, 21st Edition, Dhanalakshmi Publishers, Chennai, 2012.
3. Jeyapoovan .T, "*Engineering Drawing and Graphics using AutoCAD"*, Vikas Publishing House Pvt. Ltd., New Delhi, 2010.

REFERENCE BOOKS

1. Bethune .J.D, "*Engineering Graphics with AutoCAD 2013*", PHI Learning Private Limited, Delhi, 2013.
2. Bhatt .N.D, "*Elementary Engineering Drawing (First Angle Projection)"*, Charotar Publishing Co., Anand, 1999.
3. Narayanan .K. L and Kannaiah .P, "*Engineering Graphics"*, Scitech Publications, Chennai, 1999.
4. Shah .M. B and Rana .B. C, "*Engineering Drawing"*, Pearson Education (Singapore) Pvt. Ltd., New Delhi, 2005.

ME1005 ENGINEERING GRAPHICS												
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.	Mapping of instructional objectives with student outcome		1-4	1-4				1-4				
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences and Technical Arts (E)				Professional Subjects (P)		
		--		--		X				--		
4.	Approval	23rd Meeting of Academic Council, May 2013										

NC1001/ NS1001/ SP1001/ YG1001	**NATIONAL CADET CORPS (NCC)/ NATIONAL SERVICE SCHEME (NSS)/ NATIONAL SPORTS ORGANIZATION (NSO) / YOGA**	**L**	**T**	**P**	**C**
	Total Contact Hours – 15 (minimum, but may vary depending on the course)	**0**	**0**	**1**	**1**
	Prerequisite				
	Nil				
PURPOSE					
To imbibe in the minds of students the concepts and benefits of NCC/NSS/NSO/YOGA and make them practice the same					

INSTRUCTIONAL OBJECTIVES	
1.	To enable the students to gain knowledge about NCC/NSS/NSO/YOGA and put the same into practice

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. Grading shall be done based on punctuality, regularity in attending the parades and the extent of active involvement.

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.

Grading shall be done by the faculty member handling the course based on punctuality, regularity in attending the classes and the extent of active involvement.

NATIONAL SPORTS ORGANIZATION (NSO)

Each student must select one of the following games/sports events and practice for one hour per week. An attendance of 75% is compulsory to earn the credits specified in the curriculum. Grading shall be done by the faculty member handling the course based on punctuality, regularity in attending the classes and the extent of active involvement.

List of games/sports:

Basket Ball, Football, Volley Ball, Ball Badminton, Cricket, Throw-ball, Track events

Field events or any other game with the approval of faculty member.

YOGA

Benefits of Agnai Meditation -Meditation - Agnai, Asanas, Kiriyas, Bandas, Muthras

Benefits of santhi Meditation - Meditation Santhi Physical Exercises (I & II)

Lecture & Practice - Kayakalpa Yoga Asanas, Kiriyas, Bandas, Muthras

Analysis of Thought - Meditation Santhi Physical Exercises III & IV

Benefits of Thuriyam - Meditation Thuriyam Kayakalpa Asanas, Kiriyas, Bandas, Muthras

Attitude - Meditation Thuriyam Kayakalpa Asanas, Kiriyas, Bandas, Muthras

Importance of Arutkappy & Blessings - Meditation Thuriyam Kayakalpa Asanas, Kiriyas, Bandas, Muthras

Benefits of Blessings - Meditation Santhi Kayakalpa Asanas, Kiriyas, Bandas, Muthras

Assessment

An attendance of 75% is compulsory to earn the credits specified in the curriculum. Grading shall be done by the faculty member handling the course based on punctuality, regularity in attending the classes and the extent of active involvement.

TEXT BOOKS

1. Yogiraj Vethathiri Maharishi, "*Yoga for Modern Age*", Vethathiri Publishers, 1989.
2. Vethathiri Maharishi .T, "*Simplified Physical Exercises*", Vethathiri Publishers, 1987.

ME1005 ENGINEERING GRAPHICS												
NC1001/ NS1001/ SP1001/ YG1001		**NATIONAL CADET CORPS (NCC)/ NATIONAL SERVICE SCHEME (NSS)/ NATIONAL SPORTS ORGANIZATION (NSO)/YOGA**										
Course designed by		**NCC/NSS/NSO/YOGA PRACTICIONERS**										
1.	Student Outcome	a	b	c	d	e	f	g	h	i	j	k
2.	Mapping of instructional objectives with student outcome				x					x		
3.	Category	General (G)		Basic Sciences (B)		Engineering Sciences andTechnical Arts (E)				Professional Subjects (P)		
		X		--		--				--		
4.	Approval	23rd Meeting of Academic Council, May 2013										

SEMESTER III

LE1003	**GERMAN LANGUAGE PHASE I**	**L**	**T**	**P**	**C**
	Total Contact Hours – 30	**2**	**0**	**0**	**2**
	Prerequisite				
	Nil				

PURPOSE

Germany offers infinite opportunities for students of engineering for higher studies, research and employment in Germany. B.Tech Students are offered German Language during their second year. Knowledge of the language will be helpful for the students to adjust themselves when they go for higher studies.

INSTRUCTIONAL OBJECTIVES

1.	To introduce the language, phonetics and the special characters in German language
2.	To introduce German culture & traditions to the students.
3.	By the end of Phase – I, the students will be able to introduce themselves and initiate a conversation..
4.	We endeavor to develop the ability among the students to read and understand small texts written in German
5.	To enable the students to elementary conversational skills.

UNIT I (**6 hours)**

Wichtige Sprachhandlungen: Phonetics – Sich begrüßen - Sich und andere vorstellen formell / informell - Zahlen von 1 bis 1 Milliarde - verstehen & sprechen **Grammatik:** regelmäßige Verben im Präsens - "sein" und haben im Präsens - Personalpronomen im Nominativ

UNIT II **(6 hours)**

Wichtige Sprachhandlungen Telefon Nummern verstehen und sprechen Uhrzeiten verstehen und sagen Verneinung "nicht und kein" (formell und informell) **Grammatik** : Wortstellung – Aussagesatz – W-Frage und Satzfrage (Ja/Nein Frage) Nomen buchstabieren und notieren bestimmter und unbestimmter Artikel und Negativartikel im Nom. & Akkusativ

UNIT III **(6 hours)**

Wichtige Sprachhandlungen Tageszeiten verstehen und über Termine sprechen -Verabredungen verstehen - Aufgaben im Haushalt verstehen **Grammatik** Personalpronomen im Akkusativ und Dativ - W-Fragen "wie, wer, wohin,wo, was usw.- Genitiv bei Personennamen - Modalverben im Präsens "können, müssen, möchten"

UNIT IV **(6 hours)**

Wichtige Sprachhandlungen Sich austauschen, was man kann, muss – Bezeichnungen Lebensmittel – Mengenangaben verstehen – Preise verstehen und Einkaufzettel schreiben

Grammatik Wortstellung in Sätzen mit Modalverben – Konnektor "und" – "noch"-kein-------mehr – "wie viel, wie viele, wie alt, wie lange" –Possessivartikel im Nominativ.

UNIT V **(6 hours)**

Wichtige Sprachhandlungen Freizeitanzeigen verstehen – Hobbys und Sportarten Anzeigen für Freizeitpartner schreiben bzw. darauf antworten – Vorlieben und Abneigungen ausdrucken

Grammatik Verben mit Vokalwechsel im Präsens – Modalverben im Präsens " dürfen, wollen und mögen - "haben und sein" im Präteritum – regelmäßige Verben im Perfekt – Konnektoren "denn, oder, aber

TEXT BOOK

1. Studio d A1. Deutsch als Fremdsprache with CD.(Kursbuch und Sprach training).

REFERENCES

1. German for Dummies
2. Schulz Griesbach

<table>
<tr><th colspan="13">LE1003 GERMAN LANGUAGE PHASE I</th></tr>
<tr><td colspan="2">Course designed by</td><td colspan="11">Department of English and Foreign Languages</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>2.</td><td>Mapping of instructional objectives with student outcome</td><td></td><td></td><td></td><td></td><td></td><td></td><td>1-5</td><td></td><td></td><td></td><td></td></tr>
<tr><td rowspan="2">3.</td><td rowspan="2">Category</td><td colspan="2">General (G)</td><td colspan="2">Basic Sciences(B)</td><td colspan="3">Engineering Sciences and Technical Arts (E)</td><td colspan="3">Professional Subjects (P)</td></tr>
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<tr><td>4.</td><td>Approval</td><td colspan="11">23rd Meeting of Academic Council, May 2013</td></tr>
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UNIT I **(6 hours)**

1. Grammar and Vocabulary: Usage of the French verb "se presenter", a verb of self- introduction and how to greet a person- "saluer"
2. Listening and Speaking – The authentic sounds of the letters of the French alphabet and the accents that play a vital role in the pronunciation of the words.
3. Writing – correct spellings of French scientific and technical vocabulary.
4. Reading -- Reading of the text and comprehension – answering questions.

UNIT II **(6 hours)**

1. Grammar and Vocabulary – Definite articles , "prepositions de lieu" subject pron ouns
2. Listening and Speaking – pronunciation of words like Isabelle, presentez and la liaison – vous etes, vous appelez and role play of introducing each other – group activity
3. Writing – particulars in filling an enrollment / registration form
4. Reading Comprehension – reading a text of a famous scientist and answering questions.

UNIT III **(6 hours)**

1. Grammar and Vocabulary – verb of possession "avoir' and 1st group verbs "er", possessive adjectives and pronouns of insistence- moi, lui..and numbers from 0 to 20
2. Listening and Speaking –nasal sounds of the words like feminine, ceinture , parfum and how to ask simple questions on one's name, age, nationality, address mail id and telephone number.
3. Writing –conjugations of first group verbs and paragraph writing on self – introduction and introducing a third person.
4. Reading Comprehension – reading a text that speaks of one's profile and answering questions

UNIT IV **(6 hours)**

1. Grammar and Vocabulary –negative sentences, numbers from 20 to 69, verb "aimer"and seasons of the year and leisure activities.
2. Listening and Speaking – To express one's likes and dislikes and to talk of one's pastime activities (sports activities), je fais du ping-pong and nasal sounds of words – janvier, champagne
3. Writing- conjugations of the irregular verbs – faire and savoir and their usage. Paragraph writing on one's leisure activity- (passé temps favori)
4. Reading- a text on seasons and leisure activities – answering questions.

UNIT V **(6 hours)**

1. Grammar and Vocabulary – les verbes de direction- to ask one's way and to give directions, verbes- pouvoir and vouloir and 2nd group verbs , a droite, la premiere a gauche and vocabulary relating to accommodation.
2. Listening and Speaking – to read and understand the metro map and hence to give one directions – dialogue between two people.
3. Writing –paragraph writing describing the accommodation using the different prepositions like en face de, derriere- to locate .
4. Reading Comprehension -- a text / a dialogue between two on location and directions- ou est la poste/ la pharmacie, la bibliotheque?.....

TEXT BOOK

1. Tech French

REFERENCES

1. French for Dummies.
2. French made easy-Goyal publishers
3. Panorama

LE1004 FRENCH LANGUAGE PHASE I												
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.	Mapping of instructional objectives with student outcome							1-5				
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences and Technical Arts (E)				Professional Subjects (P)		
		X		--		--				--		
4.	Approval	23rd Meeting of Academic Council, May 2013										

LE1005	JAPANESE LANGUAGE PHASE I	L	T	P	C
	Total Contact Hours- 30	**2**	**0**	**0**	**2**
	Prerequisite				
	Nil				
PURPOSE					
To enable students achieve a basic exposure on Japan, Japanese language and culture. To acquire basic conversational skill in the language.					

INSTRUCTIONAL OBJECTIVES	
1.	To help students learn the Japanese scripts viz. hiragana and a few basic kanji.
2.	To make the students acquire basic conversational skill.
3.	To enable students to know about Japan and Japanese culture.
4.	To create an advantageous situation for the students to have better opportunity for employability by companies who have association with Japan.

UNIT I **(8 hours)**

1. Introduction to Japanese language. Hiragana Chart 1 - vowels and consonants and related vocabulary.
2. Self introduction
3. Grammar – usage of particles wa, no, mo and ka and exercises
4. Numbers (1-100)
5. Kanji – introduction and basic kanjis – naka, ue, shita, kawa and yama
6. Greetings, seasons, days of the week and months of the year
7. Conversation – audio
8. Japan – Land and culture

UNIT II **(8 hours)**

1. Hiragana Chart 1 (contd.) and related vocabulary
2. Grammar – usage of kore, sore, are, kono, sono, ano, arimasu and imasu. Particles – ni (location) and ga. Donata and dare.
3. Numbers (up to 99,999)
4. Kanji – numbers (1-10, 100, 1000, 10,000 and yen)
5. Family relationships and colours.
6. Conversation – audio
7. Festivals of Japan

UNIT III **(5 hours)**

Hiragana Charts 2&3, double consonants, vowel elongation and related vocabulary

Lesson 3

Grammar - particles ni (time), kara, made and ne. Koko, soko, asoko and doko.

Time expressions (today, tomorrow, yesterday, day before, day after)

Kanji – person, man, woman, child, tree and book

Directions – north, south, east and west

UNIT IV **(5 hours)**

Grammar - directions,-kochira, sochira, achira and dochira. Associated vocabulary (mae, ushiro, ue, shita, tonari, soba, etc.)
Conversation – audio
Japanese art and culture like ikebana, origami, etc.

UNIT V **(4hours)**

Kanji – hidari, migi, kuchi
Japanese sports and martial arts

TEXT BOOK

1. First lessons in Japanese, ALC Japan

REFERENCES

1. Japanese for dummies. Wiley publishing co. Inc., USA.
2. Kana workbook, Japan foundation

LE1005 JAPANESE LANGUAGE PHASE I												
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.	Mapping of instructional objectives with student outcome							1-4				
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences and Technical Arts (E)				Professional Subjects (P)		
		X		--		--				--		
4.	Approval	23rd Meeting of Academic Council, May 2013										

LE1006	**KOREAN LANGUAGE PHASE I**	**L**	**T**	**P**	**C**
	Total Contact Hours-30	**2**	**0**	**0**	**2**
	Prerequisite				
	Nil				

PURPOSE

To enable students achieve a basic exposure on Korea, Korean language and culture. To acquire basic conversational skill in the language.

INSTRUCTIONAL OBJECTIVES	
1.	To help students learn the scripts.
2.	To make the students acquire basic conversational skill.
3.	To enable students to know about Korean culture.
4.	To create an advantageous situation for the students to have better opportunity for employability by companies who have association with Korea.

UNIT I **(6 hours)**

Lesson 1 < Introduction to Korean Language >, Lesson2 < Consonants and Vowels >, <Basic Conversation, Vocabularies and Listening >

UNIT II **(10 hours)**

Lesson 3 < Usage of "To be" >, Lesson 4 < Informal form of "to be" >, Lesson 5 <Informal interrogative form of "to be" >, Lesson 6 < To be, to have, to stay >, < Basic Conversation, Vocabularies and Listening >

UNIT III **(10 hours)**

Lesson 7 < Interrogative practice and Negation >, < Basic Conversation, Vocabularies and Listening >

UNIT IV **(4 hours)**

Lesson 8 < Korean Culture and Business Etiquette >, < Basic Conversation, Vocabularies and Listening

TEXT BOOK

1. Korean Through English 1 (Basic Korean Grammar and Conversation).

REFERENCES

1. Bharati Korean (Intermediate Korean Grammar).
2. Hand-outs.
3. Various visual mediums such Movie CD, Audio CD.
4. Collection of vocabularies for engineering field.

LE1006 KOREAN LANGUAGE PHASE I												
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.	Mapping of instructional objectives with student outcome							1-4				
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences and Technical Arts (E)				Professional Subjects (P)		
		X		--		--				--		
4.	Approval	23rd Meeting of Academic Council, May 2013										

LE1007	CHINESE LANGUAGE PHASE I	L	T	P	C
	Total contact hours- 30	2	0	0	2
	Prerequisite				
	NIL				

PURPOSE

To enable students achieve a basic exposure on China, Chinese language and culture. To acquire basic conversational skill in the language.

INSTRUCTIONAL OBJECTIVES

1.	To help students learn the Chinese scripts.
2.	To make the students acquire basic conversational skill.
3.	To enable students to know about China and Chinese culture.
4.	To create an advantageous situation for the students to have better opportunity for employability by companies who have association with china.

UNIT I

Introduction of Chinese Language

UNIT II

Phonetics and Notes on pronunciation

a) 21 Initials:

b p m f d t n l g k h j q x z c s zh ch sh r

b) 37 Finals:

a	o	e	i	u	ü
ai	ou	ei	ia	ua	üe

an	ong	en	ian	uai	üan
ang	eng	iang	uan	ün	
ao	er	iao	uang		
	ie	uei(ui)			
	in	uen(un)			
	ing	ueng			
	iong	uo			
	iou(iu)				

c) The combination of Initials and Finals - Pinyin

UNIT III

Introduction of Syllables and tones

a) syllable=initial+final+tone
b) There are four tones in Chinese: the high-and-level tone, the rising tone, the falling-and-rising tone, and the falling tone. And the markers of the different tones.

UNIT IV

A. Tones practice

B. the Strokes of Characters

1. Introduction of Chinese Characters
2. The eight basic strokes of characters

UNIT V

1. Learn to read and write the Characters:

八(eight) 不(not) 马(horse) 米(rice) 木(wood).

2. **classes are organized according to several Mini-dialogues.**

TEXT BOOK

1. A New Chinese Course 1- Beijing Language and Culture University Press.

REFERENCES

1. New Practical Chinese Reader Textbook (1) – Beijing Language and Culture University Press.
2. 40 Lessons For Basic Chinese Course I – Shanghai Translation Press.
3. My Chinese Classroom - East China Normal University Press.

LE1007 CHINESE LANGUAGE PHASE I												
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.	Mapping of instructional objectives with student outcome							1-4				
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences and Technical Arts (E)				Professional Subjects (P)		
		X		--		--				--		
4.	Approval	23rd Meeting of Academic Council, May 2013										

PD1003	APTITUDE-I	L	T	P	C
	Total Contact Hours - 30	1	0	1	1
	Prerequisite				
	Nil				

PURPOSE

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

INSTRUCTIONAL OBJECTIVES

1.	To improve aptitude, problem solving skills and reasoning ability of the student.
2.	To collectively solve problems in teams & group.

UNIT I – NUMBERS **(6 hours)**

Types and Properties of Numbers, LCM, GCD, Fractions and decimals, Surds

UNIT II - ARITHMETIC – I **(6 hours)**

Percentages, Profit & Loss, Simple Interest & Compound Interest, , Clocks & calendars

UNIT III - ALGEBRA - I **(6 hours)**

Logarithms, Problems on ages

UNIT IV - MODERN MATHEMATICS - I **(6 hours)**

Permutations, Combinations, Probability

UNIT V - REASONING **(6 hours)**

Logical Reasoning, Analytical Reasoning

ASSESSMENT

1. Objective type – Paper based / Online – Time based test.

REFERENCE

1. Agarwal.R.S , *"Quantitative Aptitude for Competitive Examinations",* S.Chand Limited 2011.
2. Abhijit Guha*, "Quantitative Aptitude for Competitive Examinations",* Tata McGraw Hill, 3rd Edition*,* 2011.
3. Edgar Thrope, *"Test Of Reasoning for Competitive Examinations",* Tata McGraw Hill, 4th Edition, 2012.
4. Other material related to quantitative aptitude.

PD1003 – APTITUDE-I												
Course designed by		**Career Development centre**										
1.	Student Outcome	a	b	c	d	e	f	g	h	i	j	k
		x			x							
2.	Mapping of instructional objectives with student outcome	1			2							
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences and Technical Arts (E)				Professional Subjects (P)		
		X		--		--				--		
4.	Approval	23rd Meeting of Academic Council, May 2013										

MA1013	**FOURIER SERIES, PARTIAL DIFFERENTIAL EQUATIONS & ITS APPLICATIONS**	**L**	**T**	**P**	**C**
	Total Contact Hours = 60 hours	**4**	**0**	**0**	**4**
	(Common to Auto, Aero, Mech, Nano, Civil & Chemical)				

PURPOSE:

To inculcate the problem solving ability in the minds of students so as to apply the theoretical knowledge to the respective branches of Engineering.

INSTRUCTIONAL OBJECTIVES:	
1.	To know to formulate and solve partial differential equations
2.	To have thorough knowledge in Fourier series
3.	To learn to solve boundary value problems
4.	To be familiar with applications of PDE in two dimensional heat equation
5.	To gain good knowledge in the application of Fourier transform

UNIT I - PARTIAL DIFFERENTIAL EQUATIONS (12 hours)

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.

UNIT II - FOURIER SERIES (12 hours)

Dirichlet's conditions - General Fourier series - Half range sine and cosine series- Parseval's identity - Harmonic analysis.

UNIT III - BOUNDARY VALUE PROBLEMS (12 hours)

Classification of second order linear partial differential equations - Solutions of one-dimensional wave equation - one-dimensional heat equation

UNIT IV - TWO DIMENSIONAL HEAT EQUATION (12 hours)

Steady state solution of two-dimensional heat equation - Fourier series solutions in Cartesian coordinates & Polar coordinates.

UNIT V - FOURIER TRANSFORMS (12 hours)

Statement of Fourier integral theorem (without proof) - Fourier transform pairs - Fourier Sine and Cosine transforms - Properties - Transforms of simple functions - Convolution theorem - Parseval's identity.

TEXT BOOKS

1. Kreyszig.E, Advanced Engineering Mathematics, 10th edition, John Wiley & Sons. Singapore,2012.
2. Grewal .B, S, Higher Engineering Mathematics, 42nd edition, Khanna Publishers, New Delhi, 2012.

REFERENCES

1. Sivaramakrishna Das .P and Vijayakumari.C, *"A text book of Engineering Mathematics-III"*,Viji's Academy,2010
2. Kandasamy .P, etal, "*Engineering Mathematics"*, Vol. II & Vol. III (4th revised edition), S.Chand & Co., New Delhi, 2000.
3. Narayanan .S., Manickavachagom Pillay .T and Ramanaiah .G, "*Advanced Mathematics for Engineering students, Volume II & III (2nd edition)",* S,Viswanathan Printers and Publishers, 1992.
4. Venkataraman .M.K, "*Engineering Mathematics - Vol.III - A & B (13th edition*)", National Publishing Co., Chennai, 1998.
5. Sankara Rao, "*Introduction to Partial Differential Equations*", 2nd Edition, PHI Learning Pvt. Ltd., 2006.

MA 1013 - FOURIER SERIES, PDE & ITS APPLICATIONS												
Course designed by		**Department of Mathematics**										
1.	Student Outcome	a	b	c	d	e	f	g	h	i	j	k
		x				x						
2.	Mapping of instructional objectives with student outcome	1-5				1-5						
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences and Technical Arts (E)				Professional Subjects (P)		
		--		X		--				--		
4.	Approval	23rd Meeting of Academic Council, May 2013										

CE1003	**ENGINEERING GEOLOGY**	**L**	**T**	**P**	**C**
	Total Contact Hours – 45	**3**	**0**	**0**	**3**
	Prerequisite				

PURPOSE

To understand the basics and application of engineering geology technology

INSTRUCTIONAL OBJECTIVES

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

UNIT I - GENERAL GEOLOGY **(9 hours)**

Earth structure- Lithosphere- Internal structure of the earth- Composition - Scope of Geology in Engineering - Geological Agencies - External Agencies - Weathering, Wind, River, Sea, Landslide - Internal Agencies - Earthquake, Plate Tectonics, Ground Water.

UNIT II - MINERALS OF THE EARTH'S CRUST **(9 hours)**

Rock Forming Minerals - Physical Properties of Minerals – Quartz group, Feldspar group, Mica - Calcite - Clay Minerals and its importance , Indian resource of Coal and Petroleum.

UNIT III - ROCKS OF THE EARTH'S CRUST **(9 hours)**

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.

UNIT IV - STRUCTURAL FEATURES OF ROCKS **(9 hours)**

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

UNIT V - GEOLOGY FOR ENGINEERING PROJECTS **(9 hours)**

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

TEXT BOOKS

1. Garg .S.K, "*Physical and Engineering Geology",* Khanna Publication, New Delhi, 1999 .
2. Parbin Singh, "*Engineering and General Geology"*, Katson Publication House, 2010 .

REFERENCES

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

CE1003 ENGINEERING GEOLOGY												
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.	Mapping of instructional objectives with student outcome	1-5			1-5	1-5			1-5			1-5
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences and Technical Arts (E)				Professional Subjects (P)		
		--		X		--				--		
4.	Approval	23rd Meeting of Academic Council, May 2013										

CE1004	MECHANICS OF SOLIDS	L	T	P	C
	Total Contact Hours - 60	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

1.	Resolution of forces and to comprehend free body diagrams; determination of stresses and strains
2.	To analyse the state of stress (two and three dimensional) and evaluate the principal stresses and principal planes by analytical and graphical treatment
3.	Determination of centre of gravity for plane areas and solids; determination of the moment of inertia of plane areas and mass moment of area of solids.
4.	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
5.	To analyse and determine the internal forces in pin jointed plane trusses by various methods

UNIT I - BASICS OF MECHANICS, STRESS, STRAIN AND DEFORMATION OF SOLIDS (15 hours)

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.

UNIT II - ANALYSIS OF STATE OF STRESS (10 hours)

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

State Of Stress In Three Dimensions : Spherical and deviatric components of stress tensor - determination of Principal stresses and Principal planes -

UNIT III - CENTRE OF GRAVITY AND MOMENT OF INERTIA (10 hours)

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.

UNIT IV - BENDING OF BEAMS AND TORSION OF SHAFTS (15 hours)

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.

UNIT V - ANALYSIS OF STATICALLY DETERMINATE PLANE TRUSSES(10hours)

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.

TEXT BOOKS

1. Punmia.B.C, Ashok Kumar Jain, Arun Kumar Jain, "*Mechanics of Materials"*, Laxmi Publications (P) Ltd., 2003.
2. Timoshenko.S.P and Gere.J.M, "*Mechanics of Materials"*, A&C, Black 2 Ed. 1990.

REFERENCES

1. Rajput .R. K, "*Strength of Materials: Mechanics of Solids",* Edition 4, S. Chand Limited, New Delhi, 2007.
2. Ramamrutham .S, Narayan .R, "*Strength Of Material"s*, Dhanpat Rai Publishing Company (P) Limited, 2008.
3. Rajasekaran .S," *Engineering Mechanics : Statics And Dynamics"*, 3E, Vikas Publishing House Pvt Limited, 2009.
4. Beer and Johnson, "*Mechanics for Engineers, Statics and Dynamics"*, Mc Graw Hill Book Company, 1987

CE1004 MECHANICS OF SOLIDS												
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.	Mapping of instructional objectives with student outcome	1-5				1-5						2
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences and Technical Arts (E)				Professional Subjects (P)		
		--		--		--				X		
4.	Approval	23rd Meeting of Academic Council, May 2013										

CE1005	STRENGTH OF MATERIALS LABORATORY	L	T	P	C
	Total Contact Hours - 60	0	0	4	2
	Prerequisite				
	Nil				

PURPOSE

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

INSTRUCTIONAL OBJECTIVES

1.	Learn the properties of different materials like steel, concrete, brick.
2.	Study the behaviour of different structural elements by conduct of different tests like tension.

LIST OF EXPERIMENTS

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

TEXT BOOKS

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

REFERENCES

1. Laboratory Manual
2. Rajput.R.K, "*Strength of Materials"*, S.Chand and Company Ltd., New Delhi, 2004 .

CE1005 STRENGTH OF MATERIALS LABORATORY												
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.	Mapping of instructional objectives with student outcome	1,2	1,2									1,2
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences and Technical Arts (E)					Professional Subjects(P)	
											X	
4.	Broad Area	Structural Engineering		Geotechnical Engineering		Water Resources Engineering					Geomatics Engineering	
		X		--		--					--	
5.	Approval	23rd Meeting of Academic Council, May 2013										

CE1012	CONCRETE LABORATORY	L	T	P	C
	Total Contact Hours - 60	**0**	**0**	**4**	**2**
	Prerequisite				
	Nil				

PURPOSE

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

INSTRUCTIONAL OBJECTIVES

1.	To do tests on cement as per IS codes of practice
2.	To do tests on fine and coarse aggregates according to IS codes of Practice
3.	To do tests on fresh and hardened concrete as per 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**
  - Size distribution of particles
  - Specific gravity/void Ratio
  - Bulking of sand
  - Uniformity Co-efficient and fineness modulus
- **TESTS ON CEMENT MORTAR**
  - **Retentivity Test – Flow Test – compressive strength**
- **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 – NDT – rebound hammer – UPV test – rate of water absorption test

REFERENCES

1. Laboratory Manual.

CE1012 CONCRETE LABORATORY												
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.	Mapping of instructional objectives with student outcome	1-3	1-3									1-3
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences and Technical Arts (E)					Professional Subjects(P)	
											X	
4.	Broad Area	Structural Engineering		Geotechnical Engineering		Water Resources Engineering					Geomatics Engineering	
		X		--		--					--	
5.	Approval	23rd Meeting of Academic Council, May 2013										

CE1006	FLUID MECHANICS	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite				
	Nil				

PURPOSE

The purpose of this course is to learn fundamental concepts in the field of fluid mechanics.

INSTRUCTIONAL OBJECTIVES

1.	To learn the importance, application and inter-relationship of various properties of fluid like mass density, viscosity, and surface tension.
2.	To determine the forces on plane and curved surfaces in a fluid at rest and the concepts of buoyancy and metacentre.
3.	To study the properties of a moving fluid like velocity and acceleration, and the forces on fluid through the continuity equation, Euler's and Bernoulli's equations.
4.	To study laminar and turbulent flow in pipes, major and minor losses in pipes.
5.	To study the fundamentals of dimensional analysis and model studies.

UNIT I – FLUID PROPERTIES (6 hours)

Importance and application of fluid mechanics – Fluid properties – Density – Viscosity - Surface Tension - Capillarity - Vapor Pressure - Compressibility and Bulk Modulus.

UNIT II – FLUID STATICS (9 hours)

Pascal' law – Law of Hydrostatics – Forces on plane and curved surfaces – Buoyancy – Metacenter – Stability of floating and submerged bodies.

UNIT III – FLUID KINEMATICS AND FLUID DYNAMICS (11 hours)

Velocity and Acceleration – Classification of flows – Continuity equation – Stream, Streak and Pathline – Potential function and Stream Function – Flow net analysis - Control volume – Euler and Bernoulli's equation – Free and forced vortex motion.

UNIT IV – FLOW THROUGH PIPES (10 hours)

Definition of boundary layer – Laminar and turbulent flows – Reynold's experiment – Darcy-Weisbach equation – Moody diagram – Friction factor – Major and Minor losses – HGL and TEL - Pipes in series and parallel – Equivalent pipe - Pipe network.

UNIT V – DIMENSIONAL AND MODEL ANALYSIS (9 hours)

Units and Dimensions – Dimensional homogeneity – Rayleigh's method – Buckingham's Pi theorem – Hydraulic similitude – Model studies.

TEXT BOOKS

1. Modi .P.N and.Seth .S.M, *"Hydraulics and Fluid Mechanics"*, Standard Book House, 2001.
2. Rajput .R.K, *"Fluid Mechanics and Hydraulic Machines"*, S.Chand and Company Ltd.,2005.

REFERENCES

1. Bansal .R.K, *"Fluid Mechanics and Hydraulic Machines"*, Laxmi Publications, Ninth Edition, 2010.
2. Kumar .K.L, *"Engineering Fluid Mechanics"*, Eurasia Publishing House, 2002.

CE1006 FLUID MECHANICS												
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.	Mapping of instructional objectives with student outcome	1-5				2-4						4-5
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences and Technical Arts (E)					Professional Subjects(P)	
											X	
4.	Broad Area	Structural Engineering		Geotechnical Engineering		Water Resources Engineering					Geomatics Engineering	
		--		--		X					--	
5.	Approval	23rd Meeting of Academic Council, May 2013										

CE1007	CONSTRUCTION TECHNOLOGY	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite				
	Nil				

PURPOSE

It is aimed to develop a thorough understanding of the basics of building components and its construction.

INSTRUCTIONAL OBJECTIVES

1.	To build an awareness about the type of masonry, floors, and roofs
2.	To understand types of doors and stairs and its uses
3.	To know about the supporting structures and building amenities.

UNIT I - GENERAL (9 hours)

Principles of Planning - Planning Regulations and Byelaws – Housing Analysis- Role and Uses of Computers in Planing- Orientation of Building – Functional Requirements of a Building- Types of Plans.

UNIT II - MASONRY (9 hours)

Masonry - Stone Masonry - Rubble and Ashlar Masonry - Brick Masonry - Bond - Types of bonds - English and Flemish bond - Composite masonry – Stone masonry-Concrete Masonry- Reinforced masonry- Types of walls-Types of Partition walls.

UNIT III - FLOORS AND ROOFS (9 hours)

Floors - Types of floor - Details of concrete and Terrazzo floors - Roofs - Types of Roofs - Flat roofs – Sloping roofs - Shell Roofs - Roof coverings-AC sheets-GI sheets- Lintels -Classification of lintels- Arches -Classification of arches- Types of weathering courses- Damp proofing-Methods of damp proofing.

UNIT IV - STAIRS AND SUPPORTING STRUCTURE (9 hours)

Staircase - Types of staircase - Types of doors and windows - Wooden and metallic door frames-Ventilators - Fixtures and fastening for doors and windows - Shoring-Types-Underpinning-Types-Scaffolding- Components-Types-Form work-From work for columns,beam,stairs, walls.

UNIT V - BUILDING AMENITIES **(9 hours)**

Thermal insulation- Heat transference - Insulating material - Method of application - Ventilation - Requirements - Types of ventilation - Air conditioning - Fire proof construction methods-Fire alarms- Principles of acoustical design of building- Sound insulation-materials and methods.

TEXT BOOKS

1. Varghese .P.C," *Building Construction"*, Prentice Hall India, 2007.
2. Arora and Bindra .S.P, "*Building Construction, Planning Techniques and Method of Construction"*, Dhampatrai sons, New Delhi, 2008.
3. Punmia B.K., Ashok Kumar Jain, Arn Kumar Jain, "*Building Construction"*, Laxmi Publications Pvt. Ltd., New Delhi, 2008.

REFERENCES

1. *National Building Code,* Bureau of Indian Standards, New Delhi, 2005.
2. Chudley. R, *Construction Technology*, ELBS Publishers, 2007.
3. Gurucharan Singh, "*Building Construction and Materials"*, Standard Book House, Delhi, 2008.

CE1007 CONSTRUCTION TECHNOLOGY												
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.	Mapping of instructional objectives with student outcome	1-3			1-3							1-3
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences and Technical Arts (E)					Professional Subjects(P)	
											X	
4.	Broad Area	Structural Engineering		Geotechnical Engineering		Water Resources Engineering					Geomatics Engineering	
		--		--		X					--	
5.	Approval	23rd Meeting of Academic Council, May 2013										

CE1008	ENGINEERING SURVEYING	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite				
	Nil				

PURPOSE

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

INSTRUCTIONAL OBJECTIVES

1.	To measure the land area by chaining, compass and plane table.
2.	To measure the elevation of points using dumpy level.
3.	To measure the height and distance by theodolite.
4.	To know about the application of tacheometric surveying.
5.	To know about the curves, contouring and setting out works for construction purposes.

UNIT I - CHAIN, COMPASS AND PLANE TABLE SURVEYING (12 hours)

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 SURVEYING : Plane table instruments and accessories – merits and demerits – methods – Radiation- Intersection – Resection – Traversing.

UNIT II – LEVELLING (8 hours)

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 .

UNIT III - THEODOLITE SURVEYING (8 hours)

Theodolite – Vernier and Microptic – Description and uses - Temporary and Permanent adjustments of vernier transit – Horizontal angles – Heights and Distances –Traversing – Closing error and distribution-Trigonometric levelling.

UNIT IV - TACHEOMETRIC SURVEYING (8 hours)

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.

UNIT V - ENGINEERING SURVEYS (9 hours)

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- Contours- Contouring – Methods – Characteristics and uses of contours – Plotting – Calculation of areas and volumes.

TEXT BOOKS

1. Kanetkar .T.P,"*Surveying and Levelling*," Vols. I and II, United Book Corporation, Pune, 2007.
2. Punmia .B.C,"*Surveying*," Vols. I and II, Laxmi Publications,2006.
3. Chandra .A.M, "*Plane Surveying* and *Higher Surveying"*, New Age International (P) Limited, Publishers, Chennai, 2002.

REFERENCES

1. Bannister .A and Raymond.S, "*Surveying*, ELBS", Eighth edition, 2002.
2. James M. Anderson and Edward M. Mikhail, "*Introduction to Surveying",* McGraw Hill Book Company, Third Edition, 2001.
3. Clark.D, "*Plane and Geodetic Surveying"*, Vols. I and II, C.B.S. Publishers and Distributors, Delhi, Seventh Edition, 2002.
4. Arora .K.P, "*Surveying"*, Volume 3, Standard Book House, 2000.

<table>
<tr><th colspan="13">CE1007 CONSTRUCTION TECHNOLOGY</th></tr>
<tr><td colspan="2">Course designed by</td><td colspan="11">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">4.</td><td rowspan="2">Broad Area</td><td colspan="2">Structural Engineering</td><td colspan="2">Geotechnical Engineering</td><td colspan="4">Water Resources Engineering</td><td colspan="2">Geomatics Engineering</td></tr>
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<tr><td>5.</td><td>Approval</td><td colspan="11">23rd Meeting of Academic Council, May 2013</td></tr>
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CE1009	SURVEYING LAB	L	T	P	C
	Total Contact Hours - 60	0	0	4	2
	Prerequisite				
	Nil				

PURPOSE

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

INSTRUCTIONAL OBJECTIVES

1.	To study the practical experiments in chaining, compass, plane table.
2.	To study the practical application of levelling and theodolite.
3.	To give experience in handling surveying equipments and help in Civil Engineering career.

LIST OF EXPERIMENTS

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

REFERENCE

1. Laboratory Manual.

CE1009 SURVEYING LAB												
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.	Mapping of instructional objectives with student outcome	1,2,3	1,2,3					1,2,3			1,2,3	
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences and Technical Arts (E)					Professional Subjects(P)	
											X	
4.	Broad Area	Structural Engineering		Geotechnical Engineering		Water Resources Engineering					Geomatics Engineering	
		--		--		--					X	
5.	Approval	23rd Meeting of Academic Council, May 2013										

SEMESTER IV

LE1008	**GERMAN LANGUAGE PHASE II**	**L**	**T**	**P**	**C**
	Total Contact Hours- 30	**2**	**0**	**0**	**2**
	Prerequisite				
	LE1003-German Language Phase I				

PURPOSE

Familiarity in German language will be helpful for the students in preparing their resumes in German. Proficiency in the language will be an added asset for the students to have an edge in the present day highly competitive and global job market.

INSTRUCTIONAL OBJECTIVES

1.	To enable the students to speak and understand about most of the activities in the day to day life.
2.	The students will be able to narrate their experiences in Past Tense.
3.	The students will be able to understand and communicate even with German Nationals.
4.	By the end of Phase – II the students will have a reasonable level of conversational skills.

UNIT I **(6 hours)**

Wichtige Sprachhandlungen: Zimmersuche, Möbel

Grammatik: Verben mit trennbaren Vorsilben im Präsens und Perfekt. Verben mit trennbaren Vorsilben und Modalverben imPräsens. Verben mit untrennbaren Vorsilben im Perfekt. Unregelmäßige und gemischte Verben im Perfekt.

UNIT II **(6 hours)**

Wichtige Sprachhandlungen: Kleidung ,Farben , Materialien.

Grammatik : formelle Imperativsätze mit "Sie" informelle Imperativsätze Vorschläge mit "wir" – "sollen/wollen wir"—Soll ich? Modalpartikeln "doch" "mal" "doch mal.

UNIT III **(6 hours)**

Wichtige Sprachhandlungen : Sehenswürdigkeite (Prater, Brandenburger Tör,Kolossium, Eifeltürm)

Grammatik : Ortsangaben mit Akk. und Dativ "alle","man" Indefinitepronomen "etwas", "nichts",

UNIT IV **(6 hours)**

Wichtige Sprachhandlungen : Wegbeschreibung/ Einladung interkulturelle Erfahrung.

Grammatik : Verwendung von Präsens für zukünftigen Zeitpunkt.

UNIT V **(6 hours)**

Wichtige Sprachhandlungen: Essen und Trinken im Restaurant , Partyvorbereitung und Feier

Grammatik: Nomen aus Adjektiven nach "etwas"und "nichts" Nomen aus dem Infinitiv von Verben, zusammegesetzte Nomen und ihre Artikel. Adjektive im Nom. und Akk. nach unbestimmten Artikel, Negativartikel und Possessivartikel.

TEXT BOOK

1. Studio d A1. Deutsch als Fremdsprache with CD.(Kursbuch und Sprachtraining).

REFERENCES

1. German for Dummies
2. Schulz Griesbach

<table>
<tr><th colspan="13">LE01008 GERMAN LANGUAGE PHASE II</th></tr>
<tr><td colspan="2">Course designed by</td><td colspan="11">Department of English and Foreign Languages</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>Approval</td><td colspan="11">23rd Meeting of Academic Council, May 2013</td></tr>
</table>

LE1009	**FRENCH LANGUAGE PHASE II**	**L**	**T**	**P**	**C**
	Total Contact Hours- 30	**2**	**0**	**0**	**2**
	Prerequisite				
	LE1004- French Language Phase I				

PURPOSE

To enable the students communicate effectively with any French speaker and have a competitive edge in the international market.

INSTRUCTIONAL OBJECTIVES

1.	To enable students access information on the internet
2.	To receive and send e mails
3.	To assist students in gaining a certain level of proficiency to enable them to give the level 1 exam conducted by Alliance Française de Madras.
4.	To enhance their lexical and technical competence.

UNIT I **(6 hours)**

1. Grammar and Vocabulary: The second group verbs: Finir, rougir, grossir, grandir . "Les preposition de temps": à, en, le, de 7h à 8h, jusqu' à, vers.
2. Listening and Speaking – the semi- vowels: Voilà, pollutant. Writing –the days of the week. Months, technical subjects, time, "les spécialités scientifiques et l' année universitaire, paragraph writing about time table.
3. Reading -- Reading of the text and comprehension – answering questions

UNIT II **(6 hours)**

Grammar and Vocabulary – The adjectives, the nationality, feminine & masculine noun forms "les métiers scientifiques".

Listening and Speaking – Vowels: soirée, année, près de, très.

Writing – Countries name, nationality, "les métiers scientifiques", numbers from: 69 to infitive and some measures of unit.

Reading Comprehension – reading a text.

UNIT III **(6 hours)**

Grammar and Vocabulary – near future, The demonstrative adjectives, Express the aim by using the verb, Listening and Speaking –"La liaison interdite – en haut". Writing – some scientific terms, French expressions to accept an invitation. Sentence framing. Reading Comprehension – reading a text.

UNIT IV **(6 hours)**

Grammar and Vocabulary –the verbs: manger, boire , the partitive articles
Listening and Speaking – "le 'e' caduc Writing- the food, the ingredients, fruits, vegetables, expression of quantity, paragraph writing about food habits. Reading – reading a text.

UNIT V **(6 hours)**

Grammar and Vocabulary – " les prepositions de lieu": au à la, à l', chez, the reflexives verbs, verbs to nouns. Listening and Speaking – "le 'e' sans accents ne se prononce pas. C'est un "e" caduc. Ex: quatre, octobre. " les sons (s) et (z)- salut , besoin. Writing –paragraph writing about one's everyday life, French culture. Reading Comprehension -- reading a text or a song.....

TEXT BOOK

1. Tech French

REFERENCES

1. French for Dummies.
2. French made easy: Goyal publishers.
3. Panorama.

LE1009 FRENCH LANGUAGE PHASE II												
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.	Mapping of instructional objectives with student outcome							1-4				
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences and Technical Arts (E)				Professional Subjects (P)		
		X		--		--				--		
4.	Approval	23rd Meeting of Academic Council, May 2013										

LE1010	JAPANESE LANGUAGE PHASE II	L	T	P	C
	Total Contact Hours- 30	2	0	0	2
	Prerequisite				
	LE1005- Japanese Language Phase I				
PURPOSE					
To enable students to learn a little advanced grammar in order to improve their conversational ability in Japanese.					

INSTRUCTIONAL OBJECTIVES	
1.	To help students learn Katakana script (used to write foreign words)
2.	To improve their conversational skill.
3.	To enable students to know about Japan and Japanese culture.
4.	To improve their employability by companies who are associated with Japan.

UNIT I **(8 hours)**

Introduction to Verbs; Ikimasu, okimasu, nemasu, tabemasu etc.
Grammar – usage of particles de, o, to, ga(but) and exercises
Common daily expressions and profession.
Katakana script and related vocabulary.
Religious beliefs, Japanese housing and living style.
Conversation – audio

UNIT II **(8 hours)**

Grammar :Verbs –Past tense, negative - ~mashita, ~masen deshita..
i-ending and na-ending adjectives - introduction
Food and transport (vocabulary)
Japanese food, transport and Japanese tea ceremony.
Kanji Seven elements of nature (Days of the week)
Conversation – audio

UNIT III **(6 hours)**

Grammar - ~masen ka, mashou
Adjectives (present/past – affirmative and negative)
Conversation – audio

UNIT IV **(4 hours)**

Grammar – ~te form
Kanji – 4 directions
Parts of the body
Japanese political system and economy
Conversation – audio

UNIT V **(4 hours)**

Stationery, fruits and vegetables
Counters – general, people, floor and pairs

TEXT BOOK

1. First lessons in Japanese, ALC Japan

REFERENCES

1. Japanese for dummies. Wiley publishing co. Inc., USA.
2. Kana workbook, Japan foundation

LE1010 JAPANESE LANGUAGE PHASE II												
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.	Mapping of instructional objectives with student outcome							1-4				
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences and Technical Arts (E)				Professional Subjects (P)		
		X		--		--				--		
4.	Approval	23rd Meeting of Academic Council, May 2013										

LE1011	KOREAN LANGUAGE PHASE II	L	T	P	C
	Total Contact Hours-30	**2**	**0**	**0**	**2**
	Prerequisite				
	LE1006-Korean Language Phase I				

PURPOSE

To enable students achieve a basic exposure on Korea, Korean language and culture. To acquire basic conversational skill in the language.

INSTRUCTIONAL OBJECTIVES

1.	To help students learn the scripts.
2.	To make the students acquire basic conversational skill.
3.	To enable students to know about Korean culture.
4.	To create an advantageous situation for the students to have better opportunity for employability by companies who have association with Korea.

UNIT I **(9 hours)**

Lesson 1 <Review of Vowels and Consonants>, Lesson2 < Various Usages of "To be">, Lesson3 < Informal form of "to be"> <Basic Conversation, Vocabularies and Listening>

UNIT II (**9 hours)**

Lesson 4 < Informal interrogative form of "to be">, Lesson 5 < To be, to have, to stay>, Lesson 5 < Advanced Interrogative practice>, Lesson 6 < Types of Negation>, <Basic Conversation, Vocabularies and Listening>

UNIT III (**9 hours)**

Lesson 7 < Honorific forms of noun and verb2>, Lesson8 < Formal Declarative2>, Lesson 9 < Korean Business Etiquette>, <Basic Conversation, Vocabularies and Listening>

UNIT IV (**3 hours)**

Lesson 10 <Field Korean as an Engineer1>, <Field Korean as an Engineer2> <Basic Conversation, Vocabularies and Listening>

TEXT BOOK

1. Korean through English 2 (Basic Korean Grammar and Conversation)

REFERENCES

1. Bharati Korean (Intermediate Korean Grammar)
2. Hand-outs
3. Various visual media such Movie CD, Audio CD, and music
4. Collection of vocabularies for engineering field.

LE1011 KOREAN LANGUAGE PHASE II												
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.	Mapping of instructional objectives with student outcome							1-4				
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences and Technical Arts (E)				Professional Subjects (P)		
		X		--		--				--		
4.	Approval	23rd Meeting of Academic Council, May 2013										

LE1012	CHINESE LANGUAGE PHASE II	L	T	P	C
	Total Contact Hours-30	2	0	0	2
	Prerequisite				
	LE1007-Chinese Language Phase I				

PURPOSE

To enable students achieve a basic exposure on China, Chinese language and culture. To acquire basic conversational skill in the language.

INSTRUCTIONAL OBJECTIVES

1.	To help students learn the Chinese scripts.
2.	To make the students acquire basic conversational skill.
3.	To enable students to know about China and Chinese culture.
4.	To create an advantageous situation for the students to have better opportunity for employability by companies who have association with china.

UNIT I

A) Greetings
Questions and answers about names
Introducing oneself
Receiving a guest
Making corrections

New words: 你˧˥you˨˩ 好˧˥good 'well˨˩
工作˧˥work 'job˨˩人员˧˥personnel 'staff member˨˩ 请问˧˥May I ask…˨˩ 贵˧˥expensive 'valuable˨˩ 姓˧˥one's family name is ˨˩

B) Questions and answers about the number of people in a family
Expressing affirmation/negation
Questions and answers about the identity of a person same or not.

New words: 家˧˥family 'home˨˩ 有˧˥have˨˩ 几˧˥several˨˩
爸爸 (father˨˩ 妈妈 (mother) 哥哥 (elderly brother˨˩

UNIT II

A. About places
B. About numbers
C. if one knows a certain person
D. Expressing apology
E. Expressing affirmation/negation
F. Expressing thanks.

New Words:

客人⌒guest,visitor⌣这儿⌒here⌣中文⌒Chinese⌣ 对⌒right, correct⌣
学生⌒student⌣ 多⌒many, a lot⌣
Grammar: Sentences with a verbal predicate

UNIT III

Introducing people to each other
A. Exchanging amenities
B. Making/Negating conjectures
C. Questions and answers about nationality
Grammar: Sentences with an adjectival predicate

UNIT IV

A) About places to go
Indicating where to go and what to do
Referring to hearsay.
Saying good-bye
B) Making a request
Questions and answers about postcodes and telephone numbers
Reading dates postcodes and telephone numbers
Counting Renmibi
Grammar: Sentences with a subject-verb construction as its predicate
Sentences with a nominal predicate

UNIT V

A. Asking and answering if someone is free at a particular time
B. Making proposals
C. Questions about answers about time
D. Making an appointment
E. Telling the time
F. Making estimations

TEXT BOOK

1. A New Chinese Course 1- Beijing Language and Culture University Press

REFERENCES

1. New Practical Chinese Reader Textbook (1) – Beijing Language and Culture University Press.
2. 40 Lessons For Basic Chinese Course I – Shanghai Translation Press.
3. My Chinese Classroom - East China Normal University Press.

LE1012 CHINESE LANGUAGE PHASE II												
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.	Mapping of instructional objectives with student outcome							1-4				
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences and Technical Arts (E)				Professional Subjects (P)		
		X		--		--				--		
4.	Approval	23rd Meeting of Academic Council, May 2013										

PD1004	APTITUDE-II	L	T	P	C
	Prerequisite	1	0	1	1
	Nil				

PURPOSE

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

INSTRUCTIONAL OBJECTIVES

1. To improve verbal aptitude, vocabulary enhancement and reasoning ability of the student.

UNIT I **(6 hours)**

Critical Reasoning – Essay Writing

UNIT II **(6 hours)**

Synonyms – Antonyms - Odd Word - Idioms & Phrases

UNIT III **(6 hours)**

Word Analogy - Sentence Completion

UNIT IV **(6 hours)**

Spotting Errors - Error Correction - Sentence Correction

UNIT V **(6 hours)**

Sentence Anagram - Paragraph Anagram - Reading Comprehension

ASSESSMENT

1. Objective type – Paper based /Online – Time based test

TEXT BOOK:

1. Personality Development -Verbal Work Book, Career Development Centre, SRM Publications

REFERENCES

1. Green Sharon Weiner .M.A & Wolf Ira K.*Barron's New GRE*, *19th Edition*. Barron's Educational Series, Inc, 2011.
2. Lewis Norman, « *Word Power Made Easy* », Published by W.R.Goyal Pub, 2011.
3. Thorpe Edgar and Thorpe Showich, « *Objective English* ». Pearson Education 2012.
4. Murphy Raymond, « *Intermediate English Grammar* », (Second Edition), Cambridge University Press, 2012.

PD1004 - APTITUDE-II												
Course designed by		**Career Development Centre**										
1.	Student Outcome	a	b	c	d	e	f	g	h	i	j	k
								x				
2.	Mapping of instructional objectives with student outcome							1				
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences and Technical Arts (E)				Professional Subjects (P)		
		X		--		--				--		
4.	Approval	23rd Meeting of Academic Council, May 2013										

MA1004	NUMERICAL METHODS	L	T	P	C
	Total Contact Hours - 60	**4**	**0**	**0**	**4**
	(Common to Auto, Aero, Mech, Mechatronics, EEE, Civil , Chemical, ICE & EIE)				

PURPOSE

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

INSTRUCTIONAL OBJECTIVES

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

UNIT I - CURVE FITTING AND NUMERICAL SOLUTION OF EQUATIONS

(12 hours)

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.

UNIT II - FINITE DIFFERENCES AND INTERPOLATION (12 hours)

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

UNIT III - NUMERICAL DIFFERENTIATION AND INTEGRATION (12 hours)

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.

UNIT IV - NUMERICAL SOLUTIONS OF ORDINARY DIFFERENTIAL EQUATIONS (12 hours)

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.

UNIT V - NUMERICAL SOLUTIONS OF PARTIAL DIFFERENTIAL EQUATIONS (12 hours)

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 BOOKS

1. Grewal .B.S, "*Numerical Methods in engineering and science"*, Khanna Publishers, 42nd edition, 2012.
2. Sastry .S.S, "*Introductory Methods of Numerical Analysis",* 4th edition, 2005.

REFERENCES:

1. Dr. M.K. Venkataraman, *"Numerical Methods in Science and Engineering"*, National Publishing Co., 2005.
2. Balagurusamy .E, "*Computer Oriented Statistical and Numerical Methods"* – Tata McGraw Hill., 2000.
3. Jain .M.K, SRK Iyengar and Jain .R.L, "*Numerical Methods for Scientific and Engineering Computation"*, Wiley Eastern Ltd., 4th edition, 2003.
4. Jain .M.K, "*Numerical Solution of Differential Equations"*, 2nd edition (Reprint), 2002.
5. P.Kandasamy etal., "*Numerical Methods"*, S.Chand & Co., New Delhi, 2003.

MA1004 NUMERICAL METHODS												
Course designed by		**Department of Mathematics**										
1.	Student Outcome	a	b	c	d	e	f	g	h	i	j	k
		x				x						
2.	Mapping of instructional objectives with student outcome	1-5				1-5						
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences and Technical Arts (E)				Professional Subjects (P)		
		--		X		--				--		
4.	Approval	23rd Meeting of Academic Council, May 2013										

CE1010	**STRENGTH OF MATERIALS**	**L**	**T**	**P**	**C**
	Total Contact Hours - 75	**3**	**2**	**0**	**4**
	Prerequisite				
	CE1004				

PURPOSE

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

INSTRUCTIONAL OBJECTIVES

1.	To determine the deflections in beams by various methods like Macaulay's, Area Moment method and conjugate beam method
2.	To analyse the structural elements by energy concepts and find stresses and deflections
3.	To study Euler's, Rankine's and other theories of columns
4.	To study various theories of failure in designing the structural members
5.	To understand advanced concepts like unsymmetrical bending, stressed in curved bars and locating shear centre and stresses in thick cylinders

UNIT I - DEFLECTION OF BEAMS (20 hours)

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

UNIT II - ENERGY PRINCIPLES (20 hours)

Strain energy and Strain energy density - Strain energy in axial load, flexure, Shear and Torsion - Strain energy and complimentary energy - Castigliano's and Engessor's Energy 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.

UNIT III - COLUMNS (10 hours)

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.

UNIT IV - THEORIES OF FAILURE (10 hours)

Maximum Principal stress theory - Maximum shear stress theory - Strain energy theory - Distortion energy theory - Principal strain theory - application in analysis of stress .

UNIT V - SPECIAL TOPICS (15 hours)

Unsymmetrical bending of Beams of Symmetrical and Unsymmetrical Sections - Box Sections and its importance Curved bars - Winkler Bach formula - Shear Centre-simple problems only Thin Cylinders and spherical Shells - Deformation of thin Shells - Stresses at a point in thin shells. Thick cylinders – analysis for stresses – compound cylinders

TEXT BOOKS

1. Punmia .B.C, Ashok Kumar Jain, Arun Kumar Jain, "*Mechanics of Materials"*, Laxmi Publications (P) Ltd., 2003
2. Timoshenko.S.P. and Gere.J.M, "*Mechanics of Materials"*, A&C, Black 2 Ed. 1990.

REFERENCES

1. Rajput .R. K,"*Strength of Materials: Mechanics of Solids",* Edition 4, S. Chand Limited, 2007, New Delhi.
2. Ramamrutham .S, Narayan .R, "*Strength Of Materials"*, Dhanpat Rai Publishing Company (P) Limited, 2008.
3. Khurmi .R.S, "*Strength Of Material",* 23rd" edition, S. Chand Limited, 2007, New Delhi.
4. Beer and Johnson , Mechanics for Engineers, "*Statics and Dynamics"*, Mc Graw Hill.
5. Fred B. Seely, James Ohrea Smith, "*Advanced Mechanics of Materials"*, Wiley, 1955.

CE1010 STRENGTH OF MATERIALS												
Course designed by		**Department of Civil Engineering**										
1.	Student outcome	a	b	c	d	e	f	g	h	i	j	k
		x				x						
2.	Mapping of instructional objectives with student outcome	1-5				1-5						
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences andTechnical Arts (E)				Professional Subjects (P)		
		--		--		--				X		
4.	Broad area	Structural Engineering		Geotechnical Engineering		Water Resources Engineering				Geomatics Engineering		
		X		--		--				--		
5.	Approval	23rd meeting of academic council , May, 2013										

CE1012	**CONCRETE LABORATORY**	**L**	**T**	**P**	**C**
	Total Contact Hours - 60	**0**	**0**	**4**	**2**
	Prerequisite				
	Nil				

PURPOSE

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

INSTRUCTIONAL OBJECTIVES

1.	To do tests on cement as per IS codes of practice
2.	To do tests on fine and coarse aggregates according to IS codes of Practice
3.	To do tests on fresh and hardened concrete as per 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**
  - Size distribution of particles
  - Specific gravity/void Ratio
  - Bulking of sand
  - Uniformity Co-efficient and fineness modulus
- **TESTS ON CEMENT MORTAR**
  - **Retentivity Test – Flow Test – compressive strength**
- **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 – NDT – rebound hammer – UPV test – rate of water absorption test

REFERENCES

1. Laboratory Manual

CE1012 CONCRETE LABORATORY												
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.	Mapping of instructional objectives with student outcome	1-3	1-3									1-3
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences andTechnical Arts (E)				Professional Subjects (P)		
		--		--		--				X		
4.	Broad area	Structural Engineering		Geotechnical Engineering		Water Resources Engineering				Geomatics Engineering		
		X		--		--				--		
5.	Approval	23rd meeting of academic council , May, 2013										

CE1005	STRENGTH OF MATERIALS LABORATORY	L	T	P	C
	Total Contact Hours - 60	0	0	4	2
	Prerequisite				
	Nil				

PURPOSE

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

INSTRUCTIONAL OBJECTIVES

1.	Learn the properties of different materials like steel, concrete, brick.
2.	Study the behaviour of different structural elements by conduct of different tests like tension.

LIST OF EXPERIMENTS

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

TEXT BOOK

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

REFERENCES

1. Laboratory Manual
2. Rajput.R.K., "*Strength of Materials"*, S.Chand and Company Ltd., New Delhi, 2004.

CE1005 STRENGTH OF MATERIALS LABORATORY												
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.	Mapping of instructional objectives with student outcome	1,2	1, 2									1,2
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences andTechnical Arts (E)				Professional Subjects (P)		
		--		--		--				X		
4.	Broad area	Structural Engineering		Geotechnical Engineering		Water Resources Engineering				Geomatics Engineering		
		X		--		--				--		
5.	Approval	23rd meeting of academic council , May, 2013										

CE1011	STRUCTURAL DESIGN (MASONRY AND RCC)	L	T	P	C
	Total Contact Hours - 60	2	2	0	3
	Prerequisite				
	CE1004				

PURPOSE

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

INSTRUCTIONAL OBJECTIVES

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

UNIT I- MASONRY **(10 hours)**

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.

UNIT II - MIX DESIGN AND BEHAVIOUR OF RCC SECTIONS (12 hours)

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 Behaviour of RCC beams / slabs in flexure, shear - General codal recommendations for limit state method Limit state method of design of one-way slabs and two-way slabs – continuous slabs – reinforcement detailing

UNIT III - LIMIT STATE METHOD OF DESIGN OF BEAMS AND SLABS (15 hours)

Transfer of load from slab to beam - Limit state method of design of Singly reinforced beams, doubly reinforced beams, Flanged beams (T and L beams) – Design for torsion

Design of Staircases -Use of Design Aids(SP16) - Use of SP34 - reinforcement detailing

UNIT IV - LIMIT STATE METHOD OF DESIGN FOR COLUMNS (8 hours)

Limit state method of design of short and long columns – effective length – braced-unbraced columns- Uni-axial and biaxial bending using interaction curve (SP16)- shear in columns- ductile detaining of columns-Extension of design of columns to piles - Use of SP34- reinforcement detailing at beam-column joints

UNIT V - LIMIT STATE METHOD OF DESIGN FOR FOUNDATIONS (15 hours)

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

TEXT BOOKS

1. Varghese .P.C, "*Limit State Design Of Reinforced Concrete",* 2Nd Ed*,* PHI Learning Pvt. Ltd., 2004.
2. Unnikrishna Pillai .S and Deavadas Menon, "*Reinforced Concrete Design*," Tata MacGraw Hill Publishing Company Limited, Second Edition, New Delhi, 2003.
3. Krishnaraju .R, Pranesh .R.N, "*Design of Reinforced concrete IS : 456-2000"*, New age International Publication (P) Ltd., New Delhi, 2003.

REFERENCES

1. Gambhir .M.L, "*Design of Reinforced Concrete Structures",* Prentice Hall of India, Pvt. Ltd., New Delhi, 2008.
2. *"Code of Practice for Plain and Reinforced Concrete*", BIS, New Delhi, IS456-2000.
3. *"Recommended guidelines for Concrete Mix Design",* BIS, New Delhi, IS 10262 1982.
4. *"Design Aids for Reinforced Concrete to IS 456"*, Special Publication (SP16), BIS New Delhi,1980.
5. *"Code of Practice for Structural use of Unreinforced Masonry*," BIS, New Delhi, IS1905-1987.
6. *"Code of practice for Earthquake Resistant Design and Construction"of Buildings* IS4326-1976, BIS, New Delhi.
7. *"Ductile Detailing of Reinforced Concrete Structures Subjected to Seismic Forces – Code of Practice"*-IS3920:1993, BIS, New Delhi.

CE1011 STRUCTURAL DESIGN (MASONRY AND RCC)												
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.	Mapping of instructional objectives with student outcome	1-5		1-5		1-5						
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences andTechnical Arts (E)				Professional Subjects (P)		
		--		--		--				X		
4.	Broad area	Structural Engineering		Geotechnical Engineering		Water Resources Engineering				Geomatics Engineering		
		X		--		--				--		
5.	Approval	23rd meeting of academic council , May, 2013										

CE1013	APPLIED HYDRAULIC ENGINEERING	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite				
	FLUID MECHANICS				

PURPOSE

The purpose of this course is 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	
1.	To study the measurement of pressure of fluid in pipes using various devices like manometers, mechanical gauges.
2.	To study the measurement of velocity and discharge using weirs, notches, venturimeter etc.
3.	To study open channel flow through Chezy's, Manning's, Kutter's formulae; economical channel sections, hydraulic jump; introduction to irregular flows.
4.	To understand the components, function, and uses of centrifugal and reciprocating pumps.
5.	To understand the components, function, and uses of Pelton wheel, Kaplan and Francis turbines.

UNIT I – PRESSURE MEASUREMENT (6 hours)

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

UNIT II – FLOW MEASUREMENT (10 hours)

Velocity - Pitot tube - Current meter - Floats - Discharge - Venturimeter - Orificemeter - Rotameter – Notches/Weirs - Rectangular, Triangular, Trapezoidal, Stepped - Effect on Discharge due to error in head measurement - Broad crested, Narrow crested and Ogee weir.

UNIT III – OPEN CHANNEL FLOW (11 hours)

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

UNIT IV – PUMPS (9 hours)

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

UNIT V – TURBINES **(9 hours)**

Components of Hydro Electric Power Plant - Classification of Turbine - 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

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

REFERENCES

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

CE1013 APPLIED HYDRAULIC ENGINEERING												
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.	Mapping of instructional objectives with student outcome	1-5	1-5	1-5								1-5
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences andTechnical Arts (E)				Professional Subjects (P)		
		--		--		--				X		
4.	Broad area	Structural Engineering		Geotechnical Engineering		Water Resources Engineering				Geomatics Engineering		
		--		--		X				--		
5.	Approval	23rd meeting of academic council , May, 2013										

CE1014	**GEOMATICS SURVEYING LAB AND SURVEY CAMP**	**L**	**T**	**P**	**C**
	Total Contact Hours- 60	**0**	**0**	**4**	**2**
	Prerequisite				
	Should have studied CE1008, CE1009				

PURPOSE

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

INSTRUCTIONAL OBJECTIVES

1.	To conduct experiments related to finding height and distances by tacheometric surveying.
2.	To conduct setting out of simple curve for construction of road purposes.
3.	To study about the use of stereoscope for 3-D viewing
4.	To study the co-ordinate measurements by GPS and traversing by Total station.

LIST OF EXPERIMENTS

1. Tacheometric Sureying
(i) Constants of Tacheometer
(ii) Stadia Tacheometry
(iii) Tangential Tacheometry
(iv) Subtense bar method
2. Setting out simple circular curve
(i) Single Theodolite Method
(ii) Double Theodolite Method
3. Contouring
4. Setting out works(Marking foundation in the field)
5. GPS Surveying - Co-ordinate Measurements
6. Total Station Surveying - Measurements of Distances and angles, Slope distances, Height, Traversing, setting out, etc.
7. Use of Stereoscope for 3-D Viewing
8. Height determination from a Stereo pair using the Parallax bar

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, GPS and total station can be adopted to get wide experience in the camp.

LIST OF EXPERIMENTS

1. Triangulation
2. Total Station
3. Contouring
4. GPS
5. Road survey (LS and CS)

REFERENCE

1. Laboratory Manual

CE1014 GEOMATICS SURVEYING LAB AND SURVEY CAMP												
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.	Mapping of instructional objectives with student outcome	1-4	1-4					1-4			1-4	
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences andTechnical Arts (E)				Professional Subjects (P)		
		--		--		--				X		
4.	Broad area	Structural Engineering		Geotechnical Engineering		Water Resources Engineering				Geomatics Engineering		
		--		--		--				X		
5.	Approval	23rd meeting of academic council , May, 2013										

CE1015	CIVIL ENGINEERING DESIGN PROJECT	L	T	P	C
	Total Contact Hours - 30	0	0	2	1
	Prerequisite				

PURPOSE

To carry out a thematic design project in one of the specializations of civil engineering

INSTRUCTIONAL OBJECTIVES

1. To carry out a project which will make the students aware of the different facets of civil engineering

The students will carry out a design project in one of the following civil engineering areas but not restricted to them:

- Structural Engineering
- Geotechnical Engineering
- Water Resources Engineering
- Geomatics Engineering
- Construction management
- Transportation engineering

The projects may work have scope as outlined below but not restricted to the same:

Structural Engineering

Preparing a structural lay out from architectural drawings

Calculation loads Design of representative structural elements like slab, beam, columns, foundation etc.

Carrying out testing in Strength of materials / concrete / structural labs

Learning any software and solving a problem using that.

Geotechnical Engineering

Collection of samples of soil and identification of their types

Collection of literature on types of foundation

Presentation of soil improvement techniques

Learning any software and solving a problem using that.

Water Resources And Environmental Engineering

Carrying out population survey and working out water requirement. Preparation of a schematic diagram of water / wastewater treatment plants Assessment of quality of water / sewage by experiments Design of dock gates

Learning any software and solving a problem using that. Geomatics Engineering and Surveying

Preparing central line diagram of buildings and laying out at site Establishment of reduced levels of important points in an area Preparing the layout of a small area by means of compass / theodelite surveying Preparing LS / CS of an alignment
Learning any software and solving a problem using that. Construction management
Preparation of functional drawings for an occupancy Estimation of building components (using MS Excel) Preparation of work schedule using bar charts Preparation of paper on modern construction techniques **Learning any software and solving a problem using that.**

Transportation engineering
Carrying out objective oriented traffic survey Carrying out surveys on bus routes – stopping time, ticketing time etc. Carrying out testing of highway making materials Preparation of schematic intersection layouts, grade separators etc.

Learning any software and solving a problem using that.
Student groups will be formed (6 in a group) and a faculty member will be allocated to guide them. There will be two reviews . First review will not carry any marks but the project topic will be finalized in it. II review will take place towards the end of the semester and the students will submit a project report
Assessment:
Continuous assessment : 50 marks (For regularity, systematic progress, extent of work and quality of work – to be awarded by the guide)
Project Report : 20 marks (to be awarded by the II review committee)
Final viva: 30 marks (be awarded by the II review committee)

<table>
<tr><th colspan="13">CE1015 CIVIL ENGINEERING DESIGN PROJECT</th></tr>
<tr><th colspan="2">Course designed by</th><th colspan="11">Department of Civil Engineering</th></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>
<tr><td>x</td><td>x</td><td>x</td><td>x</td><td>x</td><td>x</td><td>x</td><td>x</td><td>x</td><td>x</td><td>x</td></tr>
<tr><td>2.</td><td>Mapping of instructional objectives with student outcome</td><td></td><td></td><td></td><td></td><td>1</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td rowspan="2">3.</td><td rowspan="2">Category</td><td colspan="2">General (G)</td><td colspan="2">Basic Sciences(B)</td><td colspan="4">Engineering Sciences andTechnical Arts (E)</td><td colspan="3">Professional Subjects (P)</td></tr>
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<tr><td rowspan="2">4.</td><td rowspan="2">Broad area</td><td colspan="2">Structural Engineering</td><td colspan="2">Geotechnical Engineering</td><td colspan="4">Water Resources Engineering</td><td colspan="3">Geomatics Engineering</td></tr>
<tr><td colspan="2">X</td><td colspan="2">X</td><td colspan="4">X</td><td colspan="3">X</td></tr>
<tr><td>5.</td><td>Approval</td><td colspan="11">23rd meeting of academic council , May, 2013</td></tr>
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SEMESTER V

PD1005	**APTITUDE-III**	**L**	**T**	**P**	**C**
	Total Contact Hours - 30	**1**	**0**	**1**	**1**
	Prerequisite				
	Nil				

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

INSTRUCTIONAL OBJECTIVES	
1.	Understand the importance of effective communication in the workplace.
2.	Enhance presentation skills – Technical or general in nature.
3.	Improve employability scope through Mock GD, Interview

UNIT I **(6 hours)**
Video Profile

UNIT II **(6 hours)**
Tech Talk / Area of Interest / Extempore / Company Profile

UNIT III **(6 hours)**
Curriculum Vitae

UNIT IV **(6 hours)**
Mock Interview

UNIT V **(6 hours)**
Group Discussion / Case Study

ASSESSMENT
1. Objective type – Paper based / Online – Time based test.
2. 50% marks based on test, 50 % based on Continuous Communication assessment.

REFERENCES

1. Bovee Courtland and Throill John, "*Business Communication Essential",* : A skills-Based Approach to Vital Business English. Pearson Education Inc., 2011.
2. Dhanavel .S.P, "*English & Communication Skills for Students of Science and Engineering"*. Orient Black Swan, 2009.
3. Rizvi M. Ashraf "*Effective Technical Communication"*, Tata McGraw-Hill Publishing Company Limited, 2006.

PD1005 – APTITUDE-III												
Course designed by		**Career Development Centre**										
1.	Student Outcome	a	b	c	d	e	f	g	h	i	j	k
						x				x		x
2.	Mapping of instructional objectives with student outcome					1,2,3				1,2		2,3
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences and Technical Arts (E)				Professional Subjects (P)		
		X		--		--				--		
4.	Approval	23rd Meeting of Academic Council, May 2013										

MA 1005	PROBABILITY AND STATISTICS	4	0	0	4
	Total contact hours = 60 hours				
	(Common to Auto, Aero, Mech, Mectr, Civil , Chemical, ICE & EIE)				

PURPOSE

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

INSTRUCTIONAL OBJECTIVES

1.	To apply the basic rules and theorems of probability theory such as Baye's Theorem, to determine probabilities that help to solve engineering problems and to determine the expectation and variance of a random variable from its distribution.
2.	To appropriately choose, define and/or derive probability distributions such as the Binomial, Poisson and Normal etc to model and solve engineering problems.
3.	To learn how to formulate and test hypotheses about means, variances and proportions and to draw conclusions based on the results of statistical tests.
4.	To understand how regression analysis can be used to develop an equation that estimates how two variables are related and how the analysis of variance procedure can be used to determine if means of more than two populations are equal.
5.	To understand the fundamentals of quality control and the methods used to control systems and processes.

UNIT I - PROBABILITY AND RANDOM VARIABLES (12 hours)

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.

UNIT II - THEORETICAL DISTRIBUTIONS (12 hours)

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

UNIT III – TESTING OF HYPOTHESIS (12 hours)

Introduction – Large sample tests based on normal distribution - Test for single mean, difference between means, proportion, difference between proportions - Small sample tests based on t, F distributions- Test for single mean, difference between means, standard deviation, difference between standard deviation - Chisquare test for goodness of fit - Independence of attributes.

UNIT IV - CORRELATION, REGRESSION AND ANALYSIS OF VARIANCE (12 hours)

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.

UNIT V - STATISTICAL QUALITY CONTROL (12 hours)

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

1. Gupta .S.C and Kapoor .V.K, "*Fundamentals of Mathematical Statistics"*, 11th extensively revised edition, Sultan Chand & Sons, 2007.
2. Veerarajan .T, Probability, "*Statistics and Random Processes"*, Tata McGraw Hill,3rd edition, 2008.

REFERENCES

1. Ross. S, "*A first Course in Probability*", Fifth Edition, Pearson Education, Delhi 2002.
2. Johnson .R.A., "*Miller & Freund's Probability and Statistics for Engineers*", Sixth Edition, Pearson Education, Delhi, 2000.

3. Walpole .R. E, Myers, Myers .R. S. L. and Ye. K, "*Probability and Statistics for Engineers and Scientists*", Seventh Edition, Pearsons Education, Delhi, 2002.
4. Lipschutz. S and Schiller. J, "*Schaum's outlines - Introduction to Probability and Statistics*", McGraw-Hill, New Delhi, 1998.

MA 1005 PROBABILITY AND STATISTICS												
Course designed by		Department of Mathematics										
1.	Student Outcome	a	b	c	d	e	f	g	h	i	j	k
		x				x						
2.	Mapping of instructional objectives with student outcome	1-5				1-5						
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences and Technical Arts (E)				Professional Subjects (P)		
		X		--		--				--		
4.	Approval	23rd Meeting of Academic Council, May 2013										

CE1016	STRUCTURAL DESIGN - STEEL	L	T	P	C
	Total Contact Hours - 60	2	2	0	3
	Prerequisite				
	CE1004				

PURPOSE

To develop knowledge in designing structural elements made of steel

INSTRUCTIONAL OBJECTIVES

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

UNIT I- INTRODUCTION **(15 hours)**

Type of steel Structures - Properties of Indian standard rolled steel sections- limit state method of design – partial safety factor- general codal requirements-

JOINTS - Bolted and welded connections - modes of failure of joints - permissible stresses for various types of bolts and welds – pin connections- lap and butt joints – truss joint – angle seat connections – stiffened and unstiffened seat connection - moment resistant connections –beam to beam connections- beam and column splices

UNIT II - TENSION AND COMPRESSION MEMBERS (10 hours)

Design of simple and built up members subjected to tension- tension splices- compression member- design of simple and built up compression members with lacing and battens - design of slab base and gusseted base.

UNIT III - BEAMS (15 hours)

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 Gantry Girder

UNIT IV - ROOF TRUSSES (10 hours)

Types of roof trusses for different spans- Estimation of dead, live and wind loads - Design of purlins - Use of SP 38 - Use of Rolled steel sections and pipes for roof trusses

UNIT V - LIGHT GAUGE SECTIONS (15 hours)

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

TEXT BOOKS

1. Subramanian .N, "*Design of Steel Structures"*, Oxford University Press, New Delhi, 2008.
2. Ramchandra .S, Virendra Ghelot, "*Design of Steel of Structures"*, Volume 1, Scientific Publishers, 2009, New Delhi
3. Duggal .S.K, "*Limit State Design of Steel Structures"*, Tata McGraw Hill Publishing Company, New Delhi, 1st Edn., 2010.

REFERENCES

1. Ramamrutham .S. & Narayanan .R, "*Design of Steel Structures"*, Dhanpat Rai & Sons, Delhi 1997.
2. Vazirani .V.N and Ratwani .M.M, "*Steel Structures"*, Khanna Publications New Delhi, 1992.

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

CE1016 STRUCTURAL DESIGN STEEL												
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.	Mapping of instructional objectives with student outcome	1-5				1-5						
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences andTechnical Arts (E)				Professional Subjects (P)		
		--		--		--				X		
4.	Broad area	Structural Engineering		Geotechnical Engineering		Water Resources Engineering				Geomatics Engineering		
		X		--		--				--		
5.	Approval	23rd meeting of academic council , May, 2013										

CE1017	**STRUCTURAL ANALYSIS**	**L**	**T**	**P**	**C**
	Total Contact Hours - 75	**3**	**2**	**0**	**4**
	Prerequisite				
	CE1004, CE1017				

PURPOSE

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

INSTRUCTIONAL OBJECTIVES

1.	Preparation of influence line diagrams for statically determinate structures.
2.	Rolling loads on simply supported beams- uniformly distributed loads and system of wheel loads
3.	Analysis of indeterminate structures (beams, frames and trusses) for internal forces, deflections etc.
4.	Classical methods - slope deflection method - use in analysing indeterminate beams and plane frames with and without sway
5.	Moment distribution method - Iterative method often used in analysing indeterminate structures

UNIT I - INFLUENCE LINE FOR STATICALLY DETERMINATE STRUCTURES

(10 hours)

Influence line for Statically Determinate Beams for Bending moment and Shear force - Muller Breslau's Principles - Influence lines for forces in members for Statically determinate trusses -Parallel chord truss- Reversal of stresses-Focal length.

UNIT II - ROLLING LOADS (10 hours)

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.

UNIT III STATICALLY INDETERMINATE STRUCTURES (20 hours)

Static and Kinematic indeterminacy - Two and three dimensional Pin jointed and rigid jointed structures.

Analysis of beams – propped- fixed and continuous beams - Shear force and B.M Diagrams Theorem of Three Moments application of Macaulay's method – area moment method

Indeterminate Trusses - Energy method - application to analysis of indeterminate pin jointed Plane trusses - lack of fit - temperature effects.

UNIT VI - SLOPE DEFLECTION METHOD (15 hours)

Analysis of Continuous beams and Rigid plane frames with and without sway.

UNIT V - MOMENT DISTRIBUTION METHOD (20 hours)

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

TEXT BOOKS

1. Menon, D., "*Structural Analysis",* Alpha Science International, Limited, 2008.
2. Punmia, B.C., Ashok Kumar Jain, Arun Kumar Jain, "*Theory of Structures"*, Laxmi Publications, New Delhi, 12th Edition, 2004.

REFERENCES

1. Bhavikatti .S.S., "*Structural Analysis Vol-1",* E-3, Vikas Publishing House Pvt Limited, 2009.
2. Vaidyanathan .R, **"***Comprehensive Structural Analysis", Volume 1***,** Laxmi Publications, New Delhi, 2005.

3. Pandit .G.S, "*Theory Of Structures",* Vol-I, McGraw-Hill Education (India) Pvt Limited, 1999.
4. Wang .C.K, "*Statically Indeterminate Structures",* McGraw Hill International Book Company, 1984.
5. Harry H.West., "*Analysis of Structures"*, John Wiley &Sons.1980.
6. Charles Head Norris, John Benson Wilbur, Senol Utku, "*Elementry Structural Analysis"*, 3rd Edn. McGraw Hill International Editions, Structures Series, 1987.
7. Timoshenko .S.P & Young .D.H, "*Theory of Structures"*, 2 Edn. McGraw Hill Book Company, International Ed. 1965.

CE1017 STRUCTURAL ANALYSIS												
Course designed by		**Department of Civil Engineering**										
1.	Student outcome	a	b	c	d	e	f	g	h	i	j	k
		x				x						
2.	Mapping of instructional objectives with student outcome	1-5				1-5						
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences andTechnical Arts (E)				Professional Subjects (P)		
		--		--		--				X		
4.	Broad area	Structural Engineering		Geotechnical Engineering		Water Resources Engineering				Geomatics Engineering		
		X		--		--				--		
5.	Approval	23rd meeting of academic council , May, 2013										

CE1018	**GEOTECHNICAL ENGINEERING - I**	**L**	**T**	**P**	**C**
	Total contact hours - 60	**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 supports and a primary building material.

INSTRUCTIONAL OBJECTIVES

1.	Provide the description, classification and to know about properties of soil.
2.	Familiarize the students an understanding of permeability and seepage of soils
3.	To know about the consolidation and compaction effect on soil in lab and field.
4.	To develop an understanding of the principles of effective stress in saturated soils, and its application to various soil condition and to know the shear strength of the soils.

UNIT I - INTRODUCTION (12 hours)

Definition of soil and soil mechanics – Formation of soil – types of soil – Three phase system of soil and their relationships – Specific gravity – Definition – Determination – Field density - sand replacement and core cutter method.

UNIT II - INDEX PROPERTIES (12 hours)

Classification of soil – Grain size analysis – Stoke's law and hydrometer analysis – Consistency of soils – Atterberg's limit - Liquid limit, Plastic limit and Shrinkage limit – Determination - plasticity index, liquidity index , consistency index , shrinkage ratio, flow index and toughness index – Classification of coarse grained and fine grained soil as per BIS.

UNIT III - PERMEABILITY AND SEEPAGE (12 hours)

Permeability –Definition – Assumption - one dimensional flow through soil – Darcy's law – Limitations - Discharge velocity and seepage velocity – factors affecting the permeability – permeability determination - lab and field methods – permeability in stratified soil deposits – Introduction of flow net and its properties - application of flow net.

UNIT IV - COMPACTION AND CONSOLIDATION (12 hours)

Compaction – field and lab methods – Proctor's test – factors affecting the compaction – California Bearing Ratio (CBR) test – effect of compaction in soil properties – Consolidation – Terzaghi's theory of one dimensional consolidation - partial differential equation (no analytical solution) – Lab method - coefficient of consolidation – Determination - $\sqrt{t}$ and log t methods.

UNIT V - STRESS DISTRIBUTION AND SHEAR STRENGTH (12 hours)

Introduction – stresses in soil – concept of effective and neutral stresses – stress distribution in soil media – Boussinesq and Westergrads analysis – Point load , Uniformly distributed load , line load – rectangular load - pressure bulb – Newmark's chart – Introduction. Shear strength – shear strength of cohesive and cohesion less soils – Mohr coulomb's theory –Direct shear, Triaxial, unconfined shear strength – Lab and field vane shear test - factors affecting the shear strength.

Tutorial 15 Hrs.

TEXT BOOKS

1. Raju .K.V.B .and Ravichandran .P.T, "*Mechanics of Soils"*, Ayyappaa Publications, 2000.
2. Punmia .B.C, "*Soil Mechanics and Foundations"*, Laxmi Publications Pvt. Ltd., 2005.
3. Gopal Ranjan and Rao .A.S.R, "*Basic and Applied Soil Mechanics"*, New age international(p) Ltd.,2007.

REFERENCES

1. Terzaghi .K and Peck .R.B, "*Soil Mechanics in Engineering Practice"*, John Wiley Ltd., 1996.
2. Lambe .T.W, Whitman, "*Soil Mechanics"*, John Wiley Ltd., 1979.
3. Arora .K.R, "*Soil Mechanics and Foundation Engineering"*, Standard Publication Distributors , 2011.

CE1018 GEO TECHNICAL ENGINEERING I												
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.	Mapping of instructional objectives with student outcome	1-4				1-4						3,4
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences andTechnical Arts (E)				Professional Subjects (P)		
		--		--		--				X		
4.	Broad area	Structural Engineering		Geotechnical Engineering		Water Resources Engineering				Geomatics Engineering		
		--		X		--				--		
5.	Approval	23rd meeting of academic council , May, 2013										

CE1019	**GEOTECHNICAL ENGINEERING LAB**	**L**	**T**	**P**	**C**
	Total contact hours - 60	**0**	**0**	**4**	**2**
	Prerequisite				
	Nil				

PURPOSE

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

INSTRUCTIONAL OBJECTIVES

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

LIST OF EXPERIMENTS **(60 hours)**

- 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

1. Laboratory Manual

<table>
<tr><th colspan="13">CE1019 GEOTECHNICAL ENGINEERING LAB</th></tr>
<tr><th colspan="2">Course designed by</th><th colspan="11">Department of Civil Engineering</th></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>2.</td><td>Mapping of instructional objectives with student outcome</td><td>1,2</td><td>1, 2</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>1,2</td></tr>
<tr><td rowspan="2">3.</td><td rowspan="2">Category</td><td colspan="2">General (G)</td><td colspan="2">Basic Sciences(B)</td><td colspan="3">Engineering Sciences andTechnical Arts (E)</td><td colspan="3">Professional Subjects (P)</td></tr>
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<tr><td rowspan="2">4.</td><td rowspan="2">Broad area</td><td colspan="2">Structural Engineering</td><td colspan="2">Geotechnical Engineering</td><td colspan="3">Water Resources Engineering</td><td colspan="3">Geomatics Engineering</td></tr>
<tr><td colspan="2">--</td><td colspan="2">X</td><td colspan="3">--</td><td colspan="3">--</td></tr>
<tr><td>5.</td><td>Approval</td><td colspan="11">23rd meeting of academic council , May, 2013</td></tr>
</table>

	HYDRAULIC AND IRRIGATION STRUCTURES DESIGN	L	T	P	C
CE1020	Total Contact Hours – 45	**3**	**0**	**0**	**3**
	Prerequisite				
	Nil				

PURPOSE

The purpose of this course is to receive the knowledge on design in the field of hydraulic engineering through studying the various hydraulic and irrigation structures.

INSTRUCTIONAL OBJECTIVES

1.	To learn about the hydrologic cycle, precipitation and rain-gauge network design.
2.	To study the seepage under structures through Bligh's theory, Lane's theory, and Khosla's theory; types of dams and the hydraulic design of dams.
3.	To know about the types of reservoir and the methods to design reservoir capacity.
4.	To understand the features of canal alignment and canal design capacity.
5.	To study the features of canal regulator, canal fall, canal escape, aqueduct, super-passage, and canal siphon.

UNIT I – NETWORK DESIGN (6 hours)

Hydrologic cycle - Precipitation - Types - Rain gauge - Types – Average depth of precipitation - Estimation of missing precipitation records – PMP – Rain-gauge network –Optimum raingauge network design.

UNIT II – DIVERSION AND IMPOUNDING STRUCTURES (10 hours)

Theories of seepage – Bligh's creep theory – Lane's weighted creep theory – Khosla's theory – Design of apron - Simple design problems on weirs and barrages – Gravity dams – Earth dams – Spillways – Factors affecting location and type of dams – Forces on a dam – Hydraulic design of dams.

UNIT III – RESERVOIR PLANNING AND MANAGEMENT (10 hours)

Reservoir - Types - Storage capacity of reservoir - Storage zones - Designing reservoir capacity - Flow duration curves – Mass curves of Inflow and outflow - Reservoir Losses - Reservoir sedimentation - Silt control – Design of flood-levees and flood walls.

UNIT IV – IRRIGATION CANALS (9 hours)

Irrigation – Advantages and disadvantages - Alignment of canals – Canal distribution system - Design capacity of an irrigation canal – Canal losses – Canal regulation.

UNIT V – CANAL REGULATION AND TRANSMISSION STRUCTURES (10 hours)

Canal regulators – Canal falls – Canal Escapes – Metering flumes – Cross-drainage works – Aqueduct – Syphon aqueduct – Super-passage –Canal siphon – Types and Selection.

TEXT BOOKS

1. Modi .P.N, *'Irrigation, Water Resources and Water Power Engineering"*, Standard Book House, New Delhi, 2008.
2. Santosh Kumar Garg, *"Irrigation Engineering and Hydraulic Structures"*, Khanna Publishers, Delhi, 2007.

REFERENCES

1. Raghunath .H.M, *"Hydrology"*, New Age International Publishers, New Delhi, 2007.
2. Asawa .G.L, *"Irrigation and Water Resources Engineering"*, New Age International Publishers, New Delhi, 2005.
3. Sharma .R.K, *"Irrigation Engineering and Hydraulic Structures"*, Oxford and IBH Publishing Company, New Delhi, 2002.

CE1020 HYDRAULIC AND IRRIGATION STRUCTURES DESIGN												
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.	Mapping of instructional objectives with student outcome	1-5	1	1-4		1-4			1-4			
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences andTechnical Arts (E)				Professional Subjects (P)		
		--		--		--				X		
4.	Broad area	Structural Engineering		Geotechnical Engineering		Water Resources Engineering				Geomatics Engineering		
		--		--		X				--		
5.	Approval	23rd meeting of academic council , May, 2013										

CE1021	HYDRAULIC ENGINEERING LABORATORY	L	T	P	C
	Total Contact Hours – 45	0	0	4	2
	Prerequisite				
	Nil				

PURPOSE

The purpose of this course is to get exposure about the function of various hydraulic equipments.

INSTRUCTIONAL OBJECTIVES	
1.	To learn the working principle, components, functions of orificemeter and venturimeter.
2.	To determine the losses in pipes.
3.	To study the flow through orifices, mouthpieces and notches.
4.	To study the performance of centrifugal and reciprocating pumps.
5.	To study the performance of Pelton wheel and Francis turbines.

LIST OF EXPERIMENTS

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

REFERENCE

1. Laboratory Manual

CE1021 HYDRAULIC ENGINEERING LABORATORY												
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.	Mapping of instructional objectives with student outcome	1-5	1-5									1-5
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences andTechnical Arts (E)				Professional Subjects (P)		
		--		--		--				X		
4.	Broad area	Structural Engineering		Geotechnical Engineering		Water Resources Engineering				Geomatics Engineering		
		--		--		X				--		
5.	Approval	23rd meeting of academic council , May, 2013										

CE1047	**INDUSTRIAL TRAINING I (Training to be undergone after IV semester)**	**0**	**0**	**1**	**1**
	2 week practical training in industry				
	Prerequisite				
	Nil				

PURPOSE

To provide practical exposure in Civil Engineering related organizations.

INSTRUCTIONAL OBJECTIVES

1.	Students have to undergo two – week practical training in Civil Engineering related organizations so that they become aware of the practical applications of theoretical concepts studied in the class rooms.

Students have to undergo two-week practical training in Civil Engineering related organizations of their choice but with the approval of the department. At the end of the training student will submit a report as per the prescribed format to the department.

Assessment process

This course is mandatory and a student has to pass the course to become eligible for the award of degree. The student shall make a presentation before a committee constituted by the department which will assess the student based on the report submitted and the presentation made. Marks will be awarded out of 100 and appropriate grades assigned as per the regulations.

CE1047 INDUSTRIAL TRAINING I												
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.	Mapping of instructional objectives with student outcome				1	1	1	1	1	1	1	1
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences and Technical Arts (E)				Professional Subjects (P)		
		--		--		--				X		
4.	Approval	23rd Meeting of Academic Council, May 2013										

SEMESTER VI

PD1006	APTITUDE-IV	L	T	P	C
	Total Contact Hours - 30	1	0	1	1
	Prerequisite				
	Nil				

PURPOSE	
To enhance holistic development of students and improve their employability skills.	
INSTRUCTIONAL OBJECTIVES	
1.	To improve aptitude, problem solving skills and reasoning ability of the student.
2.	To collectively solve problems in teams & group.

UNIT I - ARITHMETIC – II **(6 hours)**
Ratios & Proportions, Averages, Mixtures & Solutions.

UNIT II - ARITHMETIC – III **(6 hours)**
Time, Speed & Distance, Time & Work.

UNIT III - ALGEBRA – II **(6 hours)**
Quadratic Equations, Linear equations & inequalities.

UNIT IV – GEOMETRY **(6 hours)**
2D Geometry, Trigonometry, Mensuration.

UNIT V – MODERN MATHEMATICS – II **(6 hours)**
Sets & Functions, Sequences & Series, Data Interpretation, Data Sufficiency.

ASSESSMENT
1. Objective type – Paper based / Online – Time based test.

REFERENCES

1. Agarwal .R.S – *Quantitative Aptitude for Competitive Examinations,* S Chand Limited 2011
2. Abhijit Guha*, Quantitative Aptitude for Competitive Examinations,* Tata Mcgraw Hill, 3rd Edition
3. Edgar Thrope*, Test Of Reasoning For Competitive Examinations,* Tata Mcgraw Hill, 4th Edition
4. *Other material related to quantitative aptitude*

PD1006 - APTITUDE-IV												
Course designed by		**Career Development Centre**										
1.	Student Outcome	a	b	c	d	e	f	g	h	i	j	k
		X			X							
2.	Mapping of instructional objectives with student outcome	1			2							
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences and Technical Arts (E)				Professional Subjects (P)		
		X		--		--				--		
4.	Approval	23rd Meeting of Academic Council, May 2013										

CE1022	COMPUTER AIDED STRUCTURAL ANALYSIS	L	T	P	C
	Total Contact Hours - 75	3	2	0	4
	Prerequisite				
	CE1017				

PURPOSE

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

INSTRUCTIONAL OBJECTIVES

1.	Preparation of influence line diagrams for continuous beams and propped cantilevers
2.	Analysis of arches and suspension cables
3.	Plastic theory and its application in analysis of indeterminate structures
4.	Matrix methods of analysis - Flexibility method
5.	Matrix methods of analysis - stiffness method and to exposure structural analysis software packages

UNIT I - INFLUENCE LINES-STATICALLY INDETERMINATE STRUCTURES (10 hours)

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 – propped cantilevers - Qualitative influence lines for Horizontal thrust, reactions and moments for portal frames.

UNIT II - ARCHES AND SUSPENSION CABLES (20 hours)

Analysis of Three Hinged and Two Hinged Arches - Parabolic and Circular-principles of analyzing Fixed Arches - Influence lines for Three and Two hinged arches for Horizontal thrust, Shear force and B.M. at any section – absolute maximum bending moment, axial thrust

Suspension bridges -Length of Cable, Maximum tension - Types of supports - Forces in Towers- two hinged and three hinged stiffening girders- influence line diagrams for bending moment

UNIT III - PLASTIC ANALYSIS OF STRUCTURES (10 hours)

Plastic moment of resistance - Plastic Modulus - Shape factor - Load factor - Plastic Hinge and mechanism - Analysis of indeterminate beams and frames-mechanism method - introduction to pushover analysis

UNIT IV - MATRIX STIFFNESS METHOD (20 hours)

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- STAAD.Pro, SAP, ETAPS, etc.

UNIT V - MATRIX FORCE METHOD- FLEXIBILITY METHOD (15 hours)

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

TEXT BOOKS

1. Menon .D, "*Advanced Structural Analysis",* Alpha Science" International, Limited, 2009
2. Pandit .G.S., Gupta .S.P, "*Structural Analysis, A Matrix Approach"*, 2nd Edition, Tata McGraw-Hill Education, 2010.

REFERENCES

1. Menon .D, "*Structural Analysis, Alpha Science*" International, Limited, 2008.
2. Pandit .G.S, Gupta .S.P, "*Structural Analysis, A Matrix Approach"*, 2nd Edition, Tata McGraw-Hill Education, 2010.
3. Punmia .B.C, Ashok Kumar Jain, Arun Kumar Jain, "*Theory of Structures"*, Laxmi Publications, New Delhi, 12th Edition, 2004.
4. Bhavikatti .S.S, "*Structural Analysis "Vol-2*, E-2, Vikas Publishing House Pvt Limited, 2009.
5. Vaidyanathan .R, Perumal .P, "*Comprehensive Structural Analysis, Volume II"*, Laxmi Publications, New Delhi, 2004.
6. Khurmi .R.S, "*Theory of Structures*," S. Chand and Company Ltd., New Delhi, 1994.
7. Sterling Kinney .J, "*Indeterminate Structural Analysis"*, Narosa Publishing House.1987.
8. Jr. William Weaver and James .M.Gere, "*Matrix Analysis of Framed Structures"*, CBS Publishers and Distributors, Delhi, 1995.
9. Rajasekaran .S and Sankarasubramanian .G., *Computational "Structural Mechanics"*, Prentice Hall of India, 2006.

CE1022 COMPUTER AIDED STRUCTURAL ANALYSIS												
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.	Mapping of instructional objectives with student outcome	1-5				1-5						4,5
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences andTechnical Arts (E)				Professional Subjects (P)		
		--		--		--				X		
4.	Broad area	Structural Engineering		Geotechnical Engineering		Water Resources Engineering				Geomatics Engineering		
		X		--		--				--		
5.	Approval	23rd meeting of academic council , May, 2013										

CE1023	COMPUTER AIDED STRUCTURAL ANALYSIS AND TESTING LAB	L	T	P	C
	Total Contact Hours - 30	0	0	2	1
	Prerequisite				
	CE1011, CE1016,CE1017				

PURPOSE

To expose students to the use of MS Excel and structural analysis software packages for solving civil engineering problems and provide hands on experience on testing of structural systems to understand their behavior.

INSTRUCTIONAL OBJECTIVES

1.	To use Ms Excel to solve problems like design of beams, matrix method of structural analysis
2.	To use STAAD. Pro and ETAPS to analyse and design structural systems
3.	To understand the behavior of RCC / steel beams under flexure, shear, torsion by carrying out appropriate tests .

LIST OF EXPERIMENTS

Computer lab

- Programming in MS Excel for the calculation of A_{st} for singly reinforced beams by LSM
- Solving matrix equation and finding member forces by stiffness method.
- Using STAAD.Pro analyse and design for following structures, including the dynamic analysis
  - o Plane steel frames
  - o 2D moment resistant RC frames
  - o 3D moment resistant RC frames

- Using SAP / ETAPS analyse and design for following structures, including the dynamic analysis
  - Plane steel frames
  - 2D moment resistant RC frames
  - 3D moment resistant RC frames

Structural Engineering Lab

- Testing of RCC beams under flexure
- Testing of RCC beams under shear
- Testing of RCC beams under torsion
- Testing of castellated steel beam
- Testing of frames for lateral loads
- Slab testing
- Model analysis using Muller Breslau principle

REFERENCES

1. Laboratory Manual

CE1023 COMPUTER AIDED STRUCTURAL ANALYSIS AND TESTING LAB												
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.	Mapping of instructional objectives with student outcome	1-3	1-3									1-3
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences andTechnical Arts (E)				Professional Subjects (P)		
		--		--		--				X		
4.	Broad area	Structural Engineering		Geotechnical Engineering		Water Resources Engineering				Geomatics Engineering		
		X		--		--				--		
5.	Approval	23rd meeting of academic council , May, 2013										

CE1024	**GEOTECHNICAL ENGINEERING - II**	**L**	**T**	**P**	**C**
	Total contact hours - 60	**2**	**2**	**0**	**3**
	Prerequisite				
	GEOTECHNICAL ENGINEERING - I				

PURPOSE

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

INSTRUCTIONAL OBJECTIVES	
1.	Familiarize the students with a basic understanding of the essential steps involved in a geotechnical site investigation.
2.	Introduce to the students, the principal types of foundations and the factors governing the choice of the most suitable type of foundation for a given solution.
3.	Familiarize the student with the procedures used for : a) bearing capacity estimation, b) load carrying capacity of pile, c) determining earth pressure and e) concept on stability of slope.

UNIT I - SOIL EXPLORATION AND SITE INVESTIGATION (12 hours)

Introduction – Planning and stages in sub-surface exploration – depth and spacing of exploration – Methods of exploration – Test pit – Trenches – Geophysical methods: Seismic refraction and Electrical resistivity method – Boring : Auger boring, Shell and Auger, Wash boring and Rotary drilling – Types of soil sample: disturbed and undisturbed soil samples – Features of sampler affecting soil disturbance – standard penetration test – static and dynamic cone penetration test – bore log report.

UNIT II - SHALLOW FOUNDATION AND BEARING CAPACITY (12 hours)

Introduction – Bearing capacity- definition – types of shear failure – Bearing capacity of shallow foundation on homogeneous deposits - Methods: Terzaghi's , Skempton's and BIS methods – Effect of water table on bearing capacity – Plate load test – Bearing capacity from in-situ tests - SPT, SCPT and plate load test – methods of improving bearing capacity of soil.

UNIT III - FOOTING, RAFT AND SETTLEMENT OF FOUNDATION (12 hours)

Types of foundation – contact pressure distribution below isolated footing – types and proportioning of combined footing – types and application of mat foundation – floating foundation – Settlement: total and differential settlements – causes and methods of minimizing settlement.

UNIT IV -DEEP FOUNDATION (12 hours)

Types and function of pile – factors influencing the selection of pile - carrying capacity of single pile in cohesionless and cohesive soil – static formula – dynamic formulae (Engineering News and Hileys) – Capacity from in-situ tests (SPT and SCPT) – Negative skin friction – Carrying capacity of Pile group – Pile load test – Under-reamed piles – Introduction to well foundation and Diaphragm wall.

UNIT V - EARTH PRESSURE AND STABILITY OF SLOPES (12hours)

Earth pressure in soils: active and passive states – Lateral earth pressure Rankine's theory – stratified soil – Cullman's Graphical method –Slopes – Infinite and finite slopes – types of failure – causes of failure – Procedure for slip circle method and method of slices.

TEXT BOOKS

1. Bowles .J.E, "*Foundation analysis and design*", McGraw Hill, 2001.
2. Murthy .V.N.S, "*Textbook of Soil Mechanics and Foundation Engineering*", CBS Publishers and Distributors, New Delhi, 2009.

REFERENCES

1. Arora .K.R, "*Soil Mechanics and Foundation Engineering*", Standard Publishers and Distributors, New Delhi, 2011.
2. Punmia .B.C, "*Soil Mechanics and Foundations Engineering*", Laxmi Publications Pvt.Ltd. New Delhi, 2005.
3. Das .B.M, "*Principles of Foundation Engineering*" (Fifth edition), Thomson Books, 2010.

CE1024 GEOTECHNICAL ENGINEERING II												
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.	Mapping of instructional objectives with student outcome	1,2,3				1,2,3						2,3
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences andTechnical Arts (E)				Professional Subjects (P)		
		--		--		--				X		
4.	Broad area	Structural Engineering		Geotechnical Engineering		Water Resources Engineering				Geomatics Engineering		
		--		X		--				--		
5.	Approval	23rd meeting of academic council , May, 2013										

	WATER SUPPLY AND ENVIRONMENTAL ENGINEERING DESIGN	L	T	P	C
CE1025	Total Contact Hours - 45	1	2	0	2
	Prerequisite				
	Nil				

PURPOSE

To learn the fundamental concepts in the field of water supply and environmental engineering and design of water supply schemes and treatment units.

INSTRUCTIONAL OBJECTIVES

1.	To know the basics, importance, and methods of water supply.
2.	To study the various sources and properties of water.
3.	To understand the various methods of conveyance of water.
4.	To learn the objectives and methods of water treatment and to study the features and function of different water treatment units.
5.	To learn the importance of rain water harvesting and water pollution.

UNIT I - INTRODUCTION TO WATER SUPPLY (9 hours)

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.

UNIT II - SOURCES, QUALITY & STANDARDS OF WATER (7 hours)

Sources of water - surface and ground water sources – Quality of water - physical, chemical and biological aspects - analysis of water - water quality standards.

UNIT III - CONVEYANCE AND DISTRIBUTION SYSTEM (9 hours)

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 .

UNIT IV - WATER TREATMENT (11 hours)

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.

UNIT V - WATER MANAGEMENT (9 hours)

Sustainable Development-Rain Water harvesting-Methods-Water Pollution-Causes and effects- Role of regulatory bodies& Local bodies-CPCB-TWAD Board-CMWSSB etc-Water Act 1974-Case Studies related to Effective Water Management.

TEXT BOKS

1. Garg .S.K, "*Environmental Engineering*", Vol. I, Khannan Publishers, New Delhi, 2004.
2. Duggal .K.N, "*Elements of Environmental Engineering*", S. Chand & Company Ltd., New Delhi, 2002.

REFERENCES

1. Paneerselvam .R, "*Environmental Engineering*", Vol. I, SPGS Publishers Chennai – 88, 2006
2. *"Manual on Water Supply and Treatment*," CPHEEO, Ministry of Urban Development, Government of India, New Delhi, 2009.

CE1025 WATER SUPPLY AND ENVIRONMENTAL ENGINEERING DESIGN												
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.	Mapping of instructional objectives with student outcome	1-5		1-5		1-5						
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences andTechnical Arts (E)				Professional Subjects (P)		
		--		--		--				X		
4.	Broad area	Structural Engineering		Geotechnical Engineering		Water Resources Engineering				Geomatics Engineering		
		--		--		X				--		
5.	Approval	23rd meeting of academic council , May, 2013										

	ENVIRONMENTAL ENGINEERING LAB	L	T	P	C
CE1026	Total Contact Hours - 30	0	0	2	1
	Prerequisite				
	Should have studied CE1025				

PURPOSE

To get exposure about water and sewage analysis.

INSTRUCTIONAL OBJECTIVES

1.	To learn to prepare reagents for each experiment.
2.	To get hand-on experience in the operation of equipments like pH meter, TDS meter, turbidity meter, etc.
3.	To take observations after each titration.
4.	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

1. Measurement of pH
2. Measurement of Total Dissolved salts
3. Measurement of Conductivity
4. Estimation of Alkalinity
5. Estimation of Hardness by EDTA method
6. Estimation of Residual Chlorine.
7. Estimation of Optimum Coagulant Dose by Jar Test
8. Estimation of Sulphate
9. Estimation of Chlorides
10. Estimation of D.O. by Wrinkler's methods
11. Estimation of Suspended, Settleable, Volatile and fixed solids.
12. BOD test for water and waste water.
13. COD test for water and waste water.
14. Determination of Turbidity by using Nephlometer.
15 Water Microorganism Analysis.

Experimental analysis of water/wastewater samples taken from the nearest water bodies /sewage treatment plants to be done by the students and the report must be submitted in comparing with the Indian Standards

REFERENCES

1. IS10500 Indian Standards for Drinking Water.
2. IS2490 Indian Standards for Industrial and sewage effluent discharge.
3. Laboratory Manual.

CE1026 ENVIRONMENTAL ENGINEERING LAB												
Course designed by		**Department of Civil Engineering**										
1.	Student outcome	a	b	c	d	e	f	g	h	i	j	k
			X									
2.	Mapping of instructional objectives with student outcome		1-4									
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences andTechnical Arts (E)				Professional Subjects (P)		
		--		--		--				X		
4.	Broad area	Structural Engineering		Geotechnical Engineering		Water Resources Engineering				Geomatics Engineering		
		--		--		X				--		
5.	Approval	23rd meeting of academic council , May, 2013										

CE1049	MINOR PROJECT	L	T	P	C
	Total Contact Hours - 30	0	0	2	1
	Prerequisite				
	--				

PURPOSE

To carry out a design project in one of the specializations of civil engineering with substantial multidisciplinary component

INSTRUCTIONAL OBJECTIVES

1. To guide the students in such a way so that they carry out a work on a topic as a forerunner to the full fledged project work to be taken subsequently in VIII semester. The project work shall consist of substantial multidisciplinary component

The students will carry out a project in one of the following civil engineering areas but with substantial multidisciplinary component involving Architecture, Mechanical engg. Electrical engg., Biotechnology, Chemical engg., Computer science

- Structural Engineering
- Geotechnical Engineering
- Water Resources Engineering and environmental engg.
- Geomatics Engineering and surveying
- Construction management
- Transportation engineering

Student groups will be formed (6 in a group) and a faculty member will be allocated to guide them. There will be three reviews . First review will not carry any marks but the project topic will be finalized in it. Of remaining 2 reviews one will be carried out in the mid-semester and the last one by the end of semester.

Assessment:

Marks	Awarded by	Criteria
30	Guide	For regularity, systematic progress, extent of work and quality of w
20	Review committee during II review	Presentation, contents and viva
20	Review committee during III review	Quality of project report
10	Review committee during III review	Multidisciplinary component
20	Review committee during III review	Presentation, contents and viva

CE1049 MINOR PROJECT												
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.	Mapping of instructional objectives with student outcome						1					
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences andTechnical Arts (E)				Professional Subjects (P)		
		--		--		--				X		
4.	Broad area	Structural Engineering		Geotechnical Engineering		Water Resources Engineering				Geomatics Engineering		
		X		X		X				X		
5.	Approval	23rd meeting of academic council , May, 2013										

SEMESTER VII

CE1027	SANITARY ENGINEERING AND DESIGN	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite				
	Should have studied CE1025				

PURPOSE

To familiarize about the importance and methods of sewage treatment and solid waste with special attention to design and application.

INSTRUCTIONAL OBJECTIVES

1.	To know the basics of sewage, types of sewers and sewer material.
2.	To learn the features of various sewer appurtenances.
3.	To learn the objectives and methods of sewage treatment and to study the features and function of different primary treatment units.
4.	To study the features and function of different secondary treatment units.
5.	To learn the objectives and methods of sewage disposal and methods of solid waste and sludge management.

UNIT I – SANITATION (9 hours)

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.

UNIT II- SEWER MATERIALS, CONSTRUCTION AND APPURTENANCES (7 hours)

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.

UNIT III - SEWAGE TREATMENT (6 hours)

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

UNIT IV - SECONDARY TREATMENT (12 hours)

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

UNIT V - SEWAGE DISPOSAL, SLUDGE MANAGEMENT AND SOLID WASTE MANAGEMENT (11 hours)

Sewage Disposal – Dilution - self purification of running streams - oxygen sag curve land disposal - sewage farming - deep well injection - soil dispersion system. Objectives of sludge treatment - properties and characteristics of sludge - sludge digestion - thickening - dewatering - conditioning - drying beds - biogas recovery. solid waste -generation-collection-conveyance-disposal.

TEXT BOOKS

1. Garg .S.K "*Sewage Disposal & Air Pollution*," Khanna Publishers, New Delhi, 2004.
2. Duggal .K.N, "*Elements of Environmental Engineering"*, S. Chand & Company Ltd., New Delhi, 2002.

REFERENCES

1. Paneerselvam .R "*Environmental Engineering",* Vol. II, SPGS Publishers Chennai, 2006.
2. *"Manual on Sewerage & Sewage Treatment"*, CPHEEO, Ministry of Urban Development, Government of India, New Delhi, 2009.

CE1027 SANITARY ENGINEERING AND DESIGN												
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.	Mapping of instructional objectives with student outcome	1-5		1-5		1-5						
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences andTechnical Arts (E)				Professional Subjects (P)		
		--		--		--				X		
4.	Broad area	Structural Engineering		Geotechnical Engineering		Water Resources Engineering				Geomatics Engineering		
		--		--		X				--		
5.	Approval	23rd meeting of academic council , May, 2013										

CE1028	TRANSPORTATION ENGINEERING	L	T	P	C
	Total Contact Hours - 45	1	2	0	2
	Prerequisite				
	Nil				

PURPOSE

The purpose of this course is to provide a knowledge on highway planning,geometric design of highways,highway maintenance and public transportation.In addition, traffic flow and fundamentals of airports and harbours.

INSTRUCTIONAL OBJECTIVES

1.	To know about highway planning and geometric design of roads.
2.	To know about highway maintenance and public transportation systems.
3.	To know about the traffic planning and fundamentals of traffic operations.
4.	To know about the planning and basics of airports and harbours.

UNIT I - HIGHWAY PLANNING AND ALIGNMENT (9 hours)

Different modes of transportation – historical Development of road construction- Highway Development in India –Classification of roads-Road pattern – Highway planning in India- Highway alignment - Engineering Surveys for alignment – Highway project.

UNIT II - GEOMETRIC DESIGN OF HIGHWAYS (9 hours)

The highway crosses sectional elements- Sight Distance - Types of sight distances -Design of horizontal alignments - Super elevation, Widening of Pavements on horizontal curves- transition Curves- Design of Vertical alignments – Gradients- summit and Valley Curves.

UNIT III - HIGHWAY MAINTENANCE AND PUBLIC TRANSPORTATION (9 hours)

Importance of highway drainage - Surface Drainage- Subsurface drainage - Road construction in water logged areas– maintenance of various roads- History and present state of public transportation- role of public transportation in urban development- transit systems- route development.

UNIT IV - TRAFFIC ENGINEERING (9hours)

Traffic characteristics – traffic studies and analysis- traffic operation- traffic regulation- traffic control devices – design of intersection- design of parking facility- highway lighting- traffic planning- fundamentals of traffic flow.

UNIT V - AIRPORTS AND HARBOURS (9 hours)

Airport Planning-airport obstructions- runway design- airport capacity- terminal area- maintenance of airfield pavements. Harbours – history of water transportation – modern trends in water transportation- components of harbor – classification of harbours – site selection and planning oh harbours – navigational aid – ports and docks.

TEXT BOOKS

1. Khana .S.K, Justo .C.E.G – "*Highway Engineering*," Nemchand & Bros, Rookies. 2001.
2. Partha Chakroborty., Animesh Das., *Principles of Transportation Enginnering*, Prentice Hall of India, New Delhi, 2003.
3. Khanna .S. K, Arora .M,G Jain .S.S, " *Airport Planning And Design"* Nemchand and Bros,Roorkee, 2005.
4. Bindra .S.P. A "*Course in Docks and Harbors Engineering*", Dhanpat Rai and Sons, New Delhi, 2001.

REFERENCES

1. Kadiyali .L.R, "*Traffic Enginnering And Transport Planning"*, Khanna publishers, Delhi,2009.

CE1028 TRANSPORTATION ENGINEERING												
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.	Mapping of instructional objectives with student outcome	1-4				1-4						1-4
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences andTechnical Arts (E)				Professional Subjects (P)		
		--		--		--				X		
4.	Broad area	Structural Engineering		Geotechnical Engineering		Water Resources Engineering				Geomatics Engineering		
		--		--		X				--		
5.	Approval	23rd meeting of academic council , May, 2013										

CE1029	QUANTITY SURVEYING AND VALUATION	L	T	P	C
	Total Contact Hours - 45	1	2	0	2
	Prerequisite				
	Nil				

PURPOSE

To provide hands-on experience on estimation of RCC, steel, masonry buildings and roads and culverts and inculcate the fundamentals of valuation, contracts and tendering

INSTRUCTIONAL OBJECTIVES

1.	To understand the fundamentals of estimation and specification
2.	To provide exposure to rate analysis
3.	To provide hands on experience on estimation
4.	To study the fundamentals of valuation
5.	To carry out valuation by different methods.

UNIT I - INTRODUCTION TO ESTIMATES AND SPECIFICATIONS (9 hours)

General introduction to Quantity surveying – purpose of estimates. Types of estimates, various items to be included in estimates. Principles in selecting units of measurement for items, various units and modes of measurement for different trades, I.S. 1200, Specifications – purpose and basic principles of general and detailed specifications; detailed specifications for various items of work.

UNIT II - RATE ANALYSIS (9 hours)

Taking out quantity , Measurement and abstract sheets and recording. Centre line method. Analysis of rates, factors affecting the cost of materials, labour. Task work, schedule as basis of labour costs. Plants and equipment -hour costs based on total costs and outputs. Transports, octroi. Overhead charges, rates for various items of construction of civil engineering works. Standard schedule of rate, price escalation.

UNIT III - ESTIMATION OF CIVIL ENGINEERING WORKS (9 hours)

Reading and interpretation of architectural and structural drawings - Detailed estimate of masonry buildings, R.C.C works, Preparation of schedule for steel as reinforcement. Industrial sheds- steel trusses, columns, beams, Culverts, earthwork for canals. Roads – road materials for flexible and rigid pavements. Preparation of bills of quantities Approximate estimates, purpose, various methods used for buildings and other civil engineering works such as bridge, water supply, drainage, road- railway projects, school buildings,

UNIT IV - FUNDAMENTALS OF VALUATION (9 hours)

Principles of valuation, definition of value, price and cost. Attributes of value, Different types of values- Book value, salvage value, scrap value, replacement value, reproduction value, earning value, Market value, Potential value, Distress value, Speculation value, Sentimental value. Accommodation value. Essential characteristics of market value.Valuer and his duties, purpose of valuation and its function. Factors affecting the valuation of properties-tangible and intangible properties, Landed properties- free hold and leasehold properties, different types of lease.

UNIT V- METHODS OF VALUATION (9 hours)

Rental method of valuation. Form of rent, different types of rent, standard rent.Value of land, belting method of valuation, Valuation based on land and building- item wise, carpet area basis, unit basis, cubic content basis.Valuation from yield and from life, gross yield and net yield, outgoing, capitalized value, Year's purchases-Single rate and dual rate, reversion value of land, annuity-perpetual, whole life, deferred. Sinking fund.Depreciation, different methods of calculating depreciation – straight line method, declining balance method, sinking fund method, quantity survey method. Depreciated cost, Obsolescence.

TEXT BOOKS

1. Chakraborti .M," *Estimating Costing"*, Specification and Valuation in Civil Engineering, 2001.
2. Dutta .B.N, "*Estimating and Costing in Civil Engineering Theory and Practice*," 2000.
3. Birdie .G.S, "*A Text Book on Estimating and Costing"*, Dhanpat Rai and Sons, New Delhi, 2000.

REFERENCES

1. Jogleka .P.T, "*Practical Information for Quantity Surveyors"*, Mrs. Mandakini Joglekar, Pune,1990.
2. Rangwala .S.C.," *Elements of Estimating and Costing"*, Charotar Publishing House, Anand, 1987.
3. Rangwala .S.C,"*Valuation of Real Properties*", Charotar Publishing House,Anand, 1984.
4. Jagannathan .G, "*Getting More at Less Cost*", - The Value Engineering Way, Tata McGraw Hill, New Delhi, 1992.
5. Lecture notes on "*Development of Real Estate Business"*, Department of Civil Engineering, S.R.M. Engineering College, 2002.

CE1029 QUANTITY SURVEYING AND VALUATION												
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.	Mapping of instructional objectives with student outcome	1-3					4-5				4-5	4-5
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences andTechnical Arts (E)				Professional Subjects (P)		
		--		--		--				X		
4.	Broad area	Structural Engineering		Geotechnical Engineering		Water Resources Engineering				Geomatics Engineering		
		X		--		--				--		
5.	Approval	23rd meeting of academic council , May, 2013										

CE1030	COMPUTER AIDED BUILDING DRAWING	L	T	P	C
	Prerequisite	0	0	4	2
	Nil				

PURPOSE

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

INSTRUCTIONAL OBJECTIVES

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

LIST OF EXPERIMENTS (60 hours)

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

1. David S. Cohn, "*AtoCAD2000"*, Tata McGraw Hill, Publishing Company, New Delhi, 2000.
2. Yarwood, A., "*An Introduction to AutoCAD, 2000"*, Pearson Education Limited, England 2000.

REFERENCES

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

CE1030 COMPUTER AIDED BUILDING DRAWING												
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.	Mapping of instructional objectives with student outcome	1-2		1-2								1-2
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences andTechnical Arts (E)				Professional Subjects (P)		
		--		--		--				X		
4.	Broad area	Structural Engineering		Geotechnical Engineering		Water Resources Engineering				Geomatics Engineering		
		X		--		--				--		
5.	Approval	23rd meeting of academic council , May, 2013										

CE1031	**CONSTRUCTION MANAGEMENT PRINCIPLES FOR CIVIL ENGINEERS**	**1**	**1**	**1**	**2**
	Total Contact hours - 45				
	Prerequisite				
	CE1007				

PURPOSE

To learn the fundamental concepts of construction management principles in the field of construction engineering and management.

INSTRUCTIONAL OBJECTIVES	
1.	To know about the basics and importance of construction management and cash flow concepts.
2.	To study about the construction contract documents.
3.	To impart the idea about planning and scheduling of activities and scheduling softwares.
4.	To introduce the concepts of resource planning and allocation and control.
5.	To study about the Quality and safety in construction sites.

UNIT I - CONSTRUCTION PROJECT FORMULATION (9 hours)

Introduction to Construction Management - Project Organization – Construction Economics - Economic Decision Making - Time value of money - cash flow diagrams - Evaluation Alternatives - Effect of Inflation on cash flow - Evaluation of Public Projects.

UNIT II - CONSTRUCTION CONTRACT (9 hours)

Construction contract – contract document - classification of engineering contract - bidding process - CPWD contract conditions - FIDIC form contract agreement – subcontracting - earnest money deposit - security deposit - arbitration.

UNIT III - CONSTRUCTION PLANNING AND SCHEDULING (9 hours)

Introduction – types of project plans - work breakdown structure - planning techniques - bar charts - preparation of network diagram - critical path method - program evaluation and review technique - lab components: introduction to Microsoft projects and primavera - Preparation of schedule for a project by using Microsoft projects and primavera.

UNIT IV - RESOURCE MANAGEMENT (9 hours)

Basic concepts of resource management-class of labour - labour productivity - Classification construction equipment - selection of construction equipment - methods of calculating depreciation - replacement model - material management functions - inventory management -project cost management.

UNIT V - CONSTRUCTION QUALITY AND SAFETY MANAGEMENT (9 hours)

Construction quality - inspection,quality control and quality assurance - total quality management - quality gurus and their teachings - cost of quality - ISO standards - conquas - audit - evaluation of safety - accident causation theories - foundation of a major injury - health and safety act and regulations - cost of

accidents - role of safety personnel - causes of accidents -principles of safety - safety and health management system.

TEXT BOOKS

1 Kumar Neeraj Jha, "*construction project manage*ment", Dorling Kindersley, New Delhi.2013.
2 Sengupta .B, Guha .H, "*Construction management and planning*", tata Mcgraw Hill,New Delhi,2001.

REFERENCES

1 Sharma .S.C, "*Construction engineering and management*",Khanna Publishers,Delhi,2008.
2 Murugesan .G, "*Total quality management",*Laxmi Publications,Delhi,2013.
3 CADD Center manual, "*Project planning and management by using MS Project*",CADD Centre Training Services Pvt, 2010.
4 CADD center manual, "*Primavera Training Manual"*, CADD Centre Training Services Pvt, 2010.

CE1031 CONSTRUCTION MANAGEMENT PRINCIPLES FOR CIVIL ENGINEERS												
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.	Mapping of instructional objectives with student outcome	1-5			1-5	1-5						1-5
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences andTechnical Arts (E)				Professional Subjects (P)		
		--		--		--				X		
4.	Broad area	Structural Engineering		Geotechnical Engineering		Water Resources Engineering				Geomatics Engineering		
		--		--		X				--		
5.	Approval	23rd meeting of academic council , May, 2013										

	INDUSTRIAL TRAINING II (Training to be undergone after VI semester)	**L**	**T**	**P**	**C**
CE1048	2 week practical training in industry	**0**	**0**	**1**	**1**
	Prerequisite				
	Nil				
PURPOSE					
To provide practical exposure in Civil Engineering related organizations					

INSTRUCTIONAL OBJECTIVES	
1.	Students have to undergo two – week practical training in Civil Engineering related organizations so that they become aware of the practical applications of theoretical concepts studied in the class rooms.

Students have to undergo two-week practical training in Civil Engineering related organizations of their choice but with the approval of the department. At the end of the training student will submit a report as per the prescribed format to the department.

Assessment process

This course is mandatory and a student has to pass the course to become eligible for the award of degree. The student shall make a presentation before a committee constituted by the department which will assess the student based on the report submitted and the presentation made. Marks will be awarded out of 100 and appropriate grades assigned as per the regulations.

CE1048 INDUSTRIAL TRAINING II												
Course designed by		Department of Mathematics										
1.	Student Outcome	a	b	c	d	e	f	g	h	i	j	k
					x	x	x	x	x	x	x	
2.	Mapping of instructional objectives with student outcome				1	1	1	1	1	1	1	
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences and Technical Arts (E)				Professional Subjects (P)		
		--		--		--				X		
4.	Approval	23rd Meeting of Academic Council, May 2013										

SEMESTER VIII

CE1050	**MAJOR PROJECT / PRACTICE SCHOOL**	**L**	**T**	**P**	**C**
	Total Contact Hours - 360	**0**	**0**	**24**	**12**
	Prerequisite				
	--				

PURPOSE

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

INSTRUCTIONAL OBJECTIVES

1.	To guide the students such a way that the they 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.

MAJOR 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. The project shall be driven by realistic constraints like that related to economic, environmental, social, political, ethical, health & safety, manufacturability and sustainability. The outcomes to be attained by students by doing the project work shall be spelt out clearly. A project report is to be submitted on the topic which will be evaluated during the final review. Assessment procedure will be as spelt out in the regulations.

PRACTICE SCHOOL

Alternately, a student is encouraged to take an industrial project with civil engineering organizations or firms chosen by the institute. In such cases the student will stay with the firm and carry out the project. The project will be guided by the faculty member and the concerned officer in the industry. All the requirements spelt out under ' MAJOR PROJECT' above, shall be incorporated under this work also. However reviews will be conducted in the institute which the student shall attend.

CE1050 MAJOR PROJECT												
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.	Mapping of instructional objectives with student outcome	1	1	1	1	1	1	1	1	1	1	1
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences and Technical Arts (E)				Professional Subjects (P)		
		--		--		--				X		
4.	Approval	23rd Meeting of Academic Council, May 2013										

GROUP A ELECTIVES – CIVIL ENGINEERING

CE1101	GEOMATICS SURVEYING	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite				
	Nil				

PURPOSE

To learn the different aspects of Geomatics surveying and the advancement in the different types of Surveying. The course will enable the engineers to the new frontiers of science like Hydrographic surveying, EDM, Global Positioning System and Photogrammetry and Remote Sensing.

INSTRUCTIONAL OBJECTIVES

1.	To know the basics, importance, and methods of Triangulation and Trilateration.
2.	To study the various Hydrographic Surveying Techniques.
3.	To study the Advance Surveying Instruments like EDM Total Station and GPS
4.	To Study the Concept of Aerial Photo Interpretation.
5.	To learn the importance and different aspects of remote sensing.

UNIT I - TRIANGULATION AND TRILATERATION (8 hours)

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 leveling - Axis single corrections.

UNIT II - HYDROGRAPHIC SURVEYING (10 hours)

Shore line survey, River survey, Sounding-Gauges, Equipments-Sounding Rods and Lead Lines, Sounding Chain and lead, Sounding Machine, Fathometers, Signals, Sextants, Methods of sounding-Transit &stadia, Location by : range and time intervals, Range and one angle from shore, Range and one angle from Boat, Two angle from Shore, Two angle from Boat, Intersecting Ranges Cross rope, Plotting sounding-The Three point problem-Mechanical, Graphical Analytical methods.

UNIT III - EDM, TOTAL STATION, GPS SURVEYING (8 hours)

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 User segment- GPS Survey types-Kinematic and static survey techniques.

UNIT IV - PHOTOGRAMMETRY SURVEYING (10 hours)

Introduction , Photo theodolite, Terrestrial and Aerial photographs - vertical and oblique photographs - height determination contouring - photographic interpretations - stereoscopy – parallax Flight Planning- Photo Interpretation, Applications of aerial Photos.

UNIT V - REMOTE SENSING (9 hours)

Introduction – Historical Background - Electromagnetic Radiation (EMR) - Electromagnetic Spectrum -. Airborne Platforms – Platform, Sensors - Definition , Types- Parameter ,optical Remote Sensing , Microwave remote sensing Scanners - Radiometer - Radar .

TEXT BOOKS

1. Kanetkar .T.P, "*Surveying and Levelling*" Vols. I and II, United Book Corporation, Pune, 1994.
2. *"Surveying and leveling Part I"I*, Late T P Kanetkar and Prof. S V Kulkarni, Poona Vidya griha Prakashan,
3. Punmia .B.C, "*Surveying*, Vols". I and II, Laxmi Publications,1999.

REFERENCES

1. Chandra .A.M "*Plane Surveying and Higher Surveying"*, New Age International (P) Limited, Publishers, Chennai, 2002.
2. Agarwal .C.S, Garg .P.K, "*Remote Sensing"*, Wheekrs Publishing Co., 2000.
3. P.R.Wolf, "*Elements of Photogrammetry"*, Tata MaGrawHill Co., 1997.

4. Burnside .C.D, "*Electromagnetic Distance Measurement*," Beekman Publishers, 1971.
5. Anji Reddy .M, "*Remote sensing and Geographical information system*," B.S Publications, Leudr.D.R., "*Aerial Photographic Interpretation*," McGrawHill, 1959.
6. Arora .K.P, "*Surveying* ",Volume III, Standard Book House, 2000.

CE1101 GEOMATICS SURVEYING												
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.	Mapping of instructional objectives with student outcome	1, 2, 3, 4,5	2,3 ,4			2, 3, 4, 5						2, 3, 4, 5,
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences andTechnical Arts (E)				Professional Subjects (P)		
		--		--		--				X		
4.	Broad area	Structural Engineering		Geotechnical Engineering		Water Resources Engineering				Geomatics Engineering		
		--		--		--				X		
5.	Approval	23rd meeting of academic council , May, 2013										

	PHOTOGRAMMETRY SURVEYING	L	T	P	C
CE1102	Total contact hours 45	**3**	**0**	**0**	**3**
	Prerequisite NIL				

PURPOSE

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

INSTRUCTIONAL OBJECTIVES

1.	To understand the Photogrammetric techniques, concepts, components of Photogrammetry
2.	To approximate the photographic systems and how to obtain the photographs.
3.	To study the various platforms and photographs used in photogrammetry.
4.	To understand how to use measurements from the photographs.
5.	To study the application of photogrammetry in Civil Engineering.

UNIT I – INTRODUCTION (9hours)

Definition- history; Types -Terrestrial Photogrammetry - Phototheodolite – Ballistic cameras – oblique terrestrial photos, exposure station. Location ,camera axis and direction

UNIT II – AERIAL PHOTOGRAPHY (9hours)

Introduction, aerial photography geometric characteristics of arrival photography-scale-IFOV-GIFOV- area measurement- - GCP-.flight mission- planning and design. End lap, side lap- types of aerial photography advantages and disadvantages,

UNIT III – STEREOSCOPY (9hours)

Introduction-Stereovision-stereoscopy- vertical exaggeration, mosaics and its types Parallax bar-relief displacement- Measurement – Plotting instruments-Model

UNIT IV – DIGITAL PHOTOGRAMMETRY (9hours)

Introduction digital cameras, CCD, spectral.Sensitivity of CCD & Geometric problem of CCD, Line scanner, Drum Scanner. Sensor Characteristics, Scanner, Resolution Scanner Calibration, Digital Photogrammetric Instruments. Orthocomp, Planicomp.

UNIT V – PHOTOGRAMMETRY APPLICATIONS (9hours)

Planimetric planning and mapping – Generation of DEM, DTM, DSM, SRTM and its application, Town planning , Disaster application - construction of dam and Canal Alignment.

TEXT BOOKS

1. Thomas M .Lillesand, Ralph W., "*KieferRemote Sensing & Image Interpretation",* .2009.
2. Shiv N. Pandey , "*Principles and application of photogrammetry"*,.New Age International (p) Limited, India. 2008.

REFERENCES

1. Paul R. Wolf, "*Elements of photogrammetry",* McGraw Hill edition.2004.
2. James B Campbell , "*Introduction to Remote sensing",* Taylon&francis London 2004.

CE1102 PHOTOGRAMMETRY SURVEYING												
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.	Mapping of instructional objectives with student outcome	1-5		1-5		1-5					1-5	1-5
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences andTechnical Arts (E)					Professional Subjects (P)	
		--		--		--					X	
4.	Broad area	Structural Engineering		Geotechnical Engineering		Water Resources Engineering					Geomatics Engineering	
		--		--		--					X	
5.	Approval	23rd meeting of academic council , May, 2013										

CE1103	ELEMENTS OF CARTOGRAPHY	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite				
	Nil				

PURPOSE

To learn the fundamental concepts of Cartography and its advancements as Digital Cartography. The engineers will be enable to different aspects of Map Making, Generalization, Map Production and Map Reproduction.

INSTRUCTIONAL OBJECTIVES

1.	To know the basics, importance, and methods of Cartography.
2.	To study the various maps projection and co-ordinate systems.
3.	To study the different aspects of design in cartography.
4.	To learn the Generalization and designing aspects of cartography.
5.	To learn the different techniques of Map production and Reproduction

UNIT I - INTRODUCTION TO CARTOGRAPHY (8 hours)

Cartography, Definition, scope and content. Characteristics of Map. Categories of maps.. Methods of mapping, relief maps, thematic maps. Trends in Cartography.

UNIT II – PROJECTION AND COORDINATE SYSTEMS (9 hours)

Map projection, classification principles of construction of common projections, cylindrical, conical, azimuthal and globular projections. Properties & uses of

projection. The spheroid, map scale, and co-ordinate system. Plane co-ordinates in UTM system, projection used in Survey of India topographic sheets.

UNIT III - CATROGRAPHIC PROCESS (9hours)

Processing and generalizing geographic data, Design of color and pattern, typography and lettering the map. Storage formats

UNIT IV - DATA GENERALIZATION (9hours)

Simplification and Classification, computer assisted cartographic processes, symbolization, mapping with point, line and area symbols-Portraying the land surface form. Map Compilation-Analog and Digital Compilation.

UNIT V – MAP EXECUTION AND DISSEMINATION (10 hours)

Map production. Methods of few copies and many copies. Map reproduction: Form of Art Work-Construction Method-Output option- Digital cartography, , Geographic Information System

TEXT BOOKS

1. Cromley .R. G, "*Digital Cartography"*. Prentice-Hall of India, New Delhi, 1992.
2. Dent, B. D., "*Cartography – Thematic Map Design",*. 5th" Edition, W C B McGraw-Hill, Boston, 1999.
3. Rampal .K.K, "*Mapping and Compilation"*. Concept Publishing Co.,New Delhi, 1993.

REFERENCES

1. Muller, "*Advances in Cartography",* ISBN: 1851666036, Elsevier Science Publications
2. Anson .R.W and Ormeling .F.J, "*Basic Cartography for students and Technicians"*. Vol.., I, II and III Elsevier Applied Science publishers 2nd Edition, 1995.
3. Robinson .A. H, Morrison .J. L, Muehrcke .A. C, Kimerling .A. J. and Guptill, S. C., "*Elements of Cartography*." 6th Edition, John Wiley and Sons, 1995.

CE1103 ELEMENTS OF CARTOGRAPHY												
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.	Mapping of instructional objectives with student outcome	1 2 3 4 5		1 2 3 4 5		1 2 3 4 5						1 2 3 4 5
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences andTechnical Arts (E)				Professional Subjects (P)		
		--		--		--				X		
4.	Broad area	Structural Engineering		Geotechnical Engineering		Water Resources Engineering				Geomatics Engineering		
		--		--		--				X		
5.	Approval	23rd meeting of academic council , May, 2013										

CE1104	GPS SURVEYING	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite				
	Nil				

PURPOSE

This course introduces the fundamental and advanced concepts, and applications of Global Positioning System (GPS) to the undergraduate students of civil engineering.

INSTRUCTIONAL OBJECTIVES

1.	To understand the Earth's Geodetic and Reference system.
2.	To understand the concepts and components of GPS.
3.	To study the basic principles of GPS, its merits and demerits
4.	To understand the various errors and biases in GPS.
5.	To study the various application of GPS.

UNIT I - INTRODUCTION TO GEODESY (9hours)

Definitions and fundamentals of Geodesy, Earth Geoid and Ellipsoid of rotation, Reference surface, Geodetic systems, Indian Geodetic System, Coordinate systems.

UNIT II - FUNDAMENTALS OF GLOBAL POSITIONING SYSTEM (9hours)

History: NAVSTAR GPS, GLONASS, Indian Regional Navigational Satellite System (IRNSS) - Design objectives - Details of segments space, control and user - Advantages and current limitation.

UNIT III - GPS SIGNAL STRUCTURE (9hours)

GPS codes: C/A, P - GPS receiver: Structure of receivers and Types - Receiver selection - Principles of position fixing: Pseudo ranging - Types of ephemerides and Data formats.

UNIT IV - ERRORS AND ACCURACY (9hours)

Satellite dependent: Ephemeris errors - Satellite clock bias - Selective availability.Receiver dependent: Receiver clock bias - Cycle slip - Selective availability (SA).Observation medium dependent: Ionospheric errors - Tropospheric errors.Station dependent: Multipath - Station coordinates.Satellite geometry based measures: Geometry dependent (Dilution of Precision: DOP)

UNIT V - SURVEYING AND APPLICATIONS (9hours)

GPS Field Survey techniques: static surveying and kinematics surveying - DGPS Survey - Preparation of GPS surveys: Setting up an observation plan - Observation strategies - Network design. GPS Applications: Cadastral surveys - Remote Sensing and GIS - Military applications and Vehicle Tracking.

TEXT BOOKS

1. Akash Deep Sharma, "*Global Positioning System*", MD Publication Pvt. Ltd, New Delhi (India), 2008.
2. Hofmann Wellenhof, B., Lichtenegger, H. and Collins, J., "*Global Positioning System: Theory and Practice"*, Springer, Berlin (Germany), 1994.

REFERENCES

1. Bradford W. Parkinson, James J. Spiker Jr., "*Global Positioning System: Theory and Applications"*, Vol I and II, American Institute of Aeronautics and Astronautics: Washington (USA), 1996.
2. Gunter Seeber, "*Satellite Geodesy",* Walter de Gruyter, Berlin (Germany), 2003.
3. Anji Reddy .M, "*Textbook of Remote Sensing and Geographical Information System"*, BS Publications, Hydrabad (India), 2012.
4. 6SatheeshGopi, "*Global Positioning System - Principles and Applications*," Tata McGraw-Hill Publishing Company Limited, New Delhi (India), 2005.

CE1104 GPS SURVEYING												
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.	Mapping of instructional objectives with student outcome	1-5	1-5									1-5
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences andTechnical Arts (E)				Professional Subjects (P)		
		--		--		--				X		
4.	Broad area	Structural Engineering		Geotechnical Engineering		Water Resources Engineering				Geomatics Engineering		
		--		--		--				X		
5.	Approval	23rd meeting of academic council , May, 2013										

GROUP B ELECTIVES – CIVIL ENGINEERING

CE1105	ADVANCED RCC DESIGN	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite				
	CE1011				

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

1.	To design RCC cantilever and counterfort retaining walls
2.	To design different type of water tanks including underground and overhead tanks
3.	To create an awareness on yield line theory of slabs
4.	To design flat slab
5.	To analyse prestressed concrete sections and design of beams.

UNIT I - RCC RETAINING WALLS (12 hours)

Design of cantilever and counter-fort retaining walls.

UNIT II - RCC WATER TANKS (12 hours)

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

UNIT III - YIELD LINE THEORY **(6 hours)**

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

UNIT VI - FLAT-SLABS **(6 hours)**

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

UNIT V - PRESTRESSED CONCRETE STRUCTURES **(9 hours)**

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 – design of beams

TEXT BOOKS

1. Varghese .P.C, "*Advanced Reinforced Concrete Design"* , Pretince-Hall India, 2005.
2. Unnikrishna Pilla,. S and Deavadas Menon, "*Reinforced Concrete Design"*, Tata MacGraw Hill Publishing Company Limited, Second Edition, New Delhi, 2003.
3. Krishnaraju .R, Pranesh .R.N, "*Design of Reinforced concrete" IS : 456-2000*, New age International Publication (P) Ltd., New Delhi, 2007.

REFERENCES

1. Krishnaraju .R, "*Prestressed Concrete",* Tata McGraw-Hill Education, 2006, New Delhi
2. Punmia .B.C, Ashok Kumar Jain, Arun Kumar Jain, "*Limit State Design of Reinforced Concrete"*, Laxmi Publications, New Delhi, 2007.
3. Jain .A. K, "*Reinforced Concrete Structures"*, Nem Chand & Brothers, Roorkee, 2002.
4. Purushothaman .P, "*Reinforced Concrete Structural Elements"*, Tata MacGraw Hill Publishing Company Limited, New Delhi,1984.
5. *"Code of Practice for Plain and Reinforced Concrete"*, BIS, New Delhi, IS456-2000.
6. *"Design Aids for Reinforced Concrete to IS 456"*, Special Publication (SP16), BIS New Delhi,1980.
7. *"IS: 1343- 1980, IS Code Of Practice For Prestressed Concrete",* BIS, New Delhi, 1980.

CE1105 ADVANCED RCC DESIGN												
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.	Mapping of instructional objectives with student outcome	1-5		1-5		1-5						
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences andTechnical Arts (E)				Professional Subjects (P)		
		--		--		--				X		
4.	Broad area	Structural Engineering		Geotechnical Engineering		Water Resources Engineering				Geomatics Engineering		
		X		--		--				--		
5.	Approval	23rd meeting of academic council , May, 2013										

CE1106	DESIGN OF SPECIAL STRUCTURES	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite				
	CE1011				

PURPOSE

To bring about an exposure to special topics in structural design comprising of RC bridges, plate girders, waffle slabs, water tanks and earth retaining structures.

INSTRUCTIONAL OBJECTIVES

1.	To design RCC slab and girder bridges.
2.	To design welded plate girders.
3.	To design underground and overhead tanks.
4.	To design waffle slab.
5.	To design cantilever, counterfort retaining walls.

UNIT I - RCC BRIDGES (12 hours)

IRC loadings- IRC codes – design of slab culverts- effective width - design of girder bridges – Pigeaud curves - **Courban's theory- design of bridge girder**

UNIT II - PLATE GIRDERS (6 hours)

Necessity of plate girders- equivalent uniformly distributed load – design of welded plate giders – intermediate stiffeners – vertical and horizontal – bearing stiffeners

UNIT III - RCC WATER TANKS (12 hours)

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

UNIT VI - WAFFLE SLABS (GRID SLAB SYSTEM) (6 hours)

Necessity of column free space- foyers- workshops- design of two way waffle slabs- ribs-edge beams – long term and short term deflection.

UNIT V - RCC RETAINING WALLS (9 hours)

Design of cantilever and counter-fort retaining walls.

TEXT BOOKS

1. Varghese .P.C, "*Advanced Reinforced Cement Concrete"*, Pretince-Hall India, Second edition, 2006 .
2. Krishna Raju .N, "*Design of Bridges"*, Oxford & IBH Publishing Company Pvt. Ltd.,Fourth edition, 2010.
3. Unnikrishna Pillai .S and Deavadas Menon, "*Reinforced Concrete Design"*, Tata MacGraw Hill Publishing Company Limited, Second Edition, New Delhi, 2003.

REFERENCES

1. Krishnaraju .R, Pranesh .R.N," *Design of Reinforced concrete",* IS : 456-2000, New age International Publication (P) Ltd., New Delhi
2. Punmia .B.C., Ashok Kumar Jain, Arun Kumar Jain, "*Limit State Design of Reinforced Concrete"*, Laxmi Publications, New Delhi, 2007.
3. *"Code of Practice for Plain and Reinforced Concrete",* IS456-2000, BIS, New Delhi
4. *"Design Aids for Reinforced Concrete" to IS 456*, Special Publication (SP16), BIS New Delhi,1980.
5. IRC:112-2011, *"Code of Practice for Concrete Road Bridges"*, Indian Road Congress, New Delhi, 2011.
6. IRC:22-2010, "*Standard Specifications and Code of Practice for Road Bridges"*, Indian Road Congress, New Delhi, 2011.
7. *"Rules Specifying The Loads for Design of Super-Structure and Sub-Structure of Bridges and for Assessment of the Strength of Existing Bridges"*, Research Designs And Standards Organization, Lucknow, Second Reprint, 2008.

CE1106 DESIGN OF SPECIAL STRUCTURES												
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.	Mapping of instructional objectives with student outcome	1-5		1-5		1-5						
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences andTechnical Arts (E)				Professional Subjects (P)		
		--		--		--				X		
4.	Broad area	Structural Engineering		Geotechnical Engineering		Water Resources Engineering				Geomatics Engineering		
		X		--		--				--		
5.	Approval	23rd meeting of academic council , May, 2013										

CE1107	DESIGN OF INDUSTRIAL STRUCTURES	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite				
	CE1011				

PURPOSE

To exposure the students to the design of industrial structures like prestressed water tanks and pipes, shell structures, water storage structures, flat slab structures and basement structures.

INSTRUCTIONAL OBJECTIVES

1.	To design circular prestressed water tanks and high pressure pipes
2.	To design Intze type water tanks
3.	To design flat slab
4.	To design RCC cantilever and counterfort retaining walls
5.	To design industrial shed with shell roof

UNIT I - PRESTRESSED CONCRETE WATER TANKS AND PIPES (9 hours)

Design of prestressed water tanks- circular body – suspended bottom slab- prestressed pressure pipes

UNIT II - RCC INTZE TYPE WATER TANKS (9 hours)

Design of Intze type water tanks – staging- column – brace system- shaft type- circular raft- openings in shaft

UNIT III - FLAT-SLABS (6 hours)

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

UNIT IV - RETAINING WALLS **(10 hours)**

Design of cantilever and counterfort retaining walls- surcharge- water pressure

UNIT V - CYLINDRICAL SHELLS **(11 hours)**

Industrial sheds- column free space- advantages of shell roof over conventional roof – design of cylindrical shell roof- diaphragm – edge beams- detailing

TEXT BOOKS

1. Varghese .P.C, "*Advanced Reinforced Concrete Design"* , Pretince-Hall India, 2005.
2. Varghese .P.C, "*Design Of Concrete Shells And Folded Plates",* PHI learning Pvt. Ltd., 2010.
3. Unnikrishna Pillai .S and Deavadas Menon, "*Reinforced Concrete Design"*, Tata McGraw Hill Publishing Company Limited, New Delhi, 2003.

REFERENCES

1. Krishnaraju .R, Pranesh .R.N,"*Design of Reinforced concrete" IS : 456-2000*, New age International Publication (P) Ltd., New Delhi
2. Krishnaraju .R, "*Prestressed Concrete",* Tata McGraw-Hill Education, 2006, New Delhi.
3. Punmia .B.C, Ashok Kumar Jain, Arun Kumar Jain, "*Reinforced Concrete Structures"*, Laxmi Publications, New Delhi, 1988.
4. IS456:2000, "*Code of Practice for Plain and Reinforced Concrete"*, BIS, New Delhi
5. *"Design Aids for Reinforced Concrete" to IS 456*, Special Publication (SP16), BIS New Delhi,1980.
6. *IS: 1343- 1980, IS "Code Of Practice For Prestressed Concrete",* BIS, New Delhi, 1980.

<table>
<tr><th colspan="14">CE1107 DESIGN OF INDUSTRIAL STRUCTURES</th></tr>
<tr><th colspan="2">Course designed by</th><th colspan="12">Department of Civil Engineering</th></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>2.</td><td>Mapping of instructional objectives with student outcome</td><td>1-5</td><td></td><td>1-5</td><td></td><td>1-5</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
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<tr><td rowspan="2">4.</td><td rowspan="2">Broad area</td><td colspan="2">Structural Engineering</td><td colspan="2">Geotechnical Engineering</td><td colspan="4">Water Resources Engineering</td><td colspan="3">Geomatics Engineering</td></tr>
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<tr><td>5.</td><td>Approval</td><td colspan="12">23rd meeting of academic council , May, 2013</td></tr>
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CE1108	DESIGN OF MULTISTORIED BUILDINGS	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite				
	CE1011				

PURPOSE

To familiarize students with the structural design of multistoried buildings and connected structures like flat slab system, water tanks, basements.

INSTRUCTIONAL OBJECTIVES

1.	To understand the behavior of moment resistant frames, shear walls and wall – frame structures.
2.	To design flat slab system
3.	To design underground sumps and overhead tanks.
4.	To design retaining walls forming part of multistoried buildings.
5.	To understand the detailing requirements to ensure ductility.

UNIT I - BEHAVIOUR OF TALL STRUCTURAL SYSTEMS (12 hours)

Behavior under gravity and lateral loads- moment resistant frames-shear walls- wall frame systems- portal and cantilever methods of analysis – design of shear walls- analysis of wall frame systems using charts

UNIT II - FLAT-SLABS (9 hours)

Design of flat slab type of construction- direct design method as per BIS code - Design of edge beams- design of columns- use of design aids (SP16)

UNIT III - RCC WATER TANKS (9 hours)

Design of water tanks – underground sumps- with water table- overhead circular, rectangular, Intze type tanks – staging- column- brace type and shaft type- design of circular raft foundation.

UNIT IV - RETAINING WALLS (9 hours)

Design of cantilever and counterfort retaining walls in basements- surcharge- water pressure

UNIT V - DETAILING FOR DUCTILITY (6 hours)

Requirement of ductility in multistoried structures- ductile detailing of beams, columns, foundation – design of transverse reinforcement in columns and shear stirrups in beams- confining reinforcement-

TEXT BOOKS

1. Smith .B.S, Alex Coull, "*Tall Building Structures, Analysis and Design"*, John Wily & Sons. Inc., USA, 1991.
2. Varghese .P.C, "*Advanced Reinforced Concrete Design"* , Pretince-Hall India, 2005.
3. Unnikrishna Pillai .S and Deavadas Menon, "*Reinforced Concrete Design*", Tata McGraw Hill Publishing Company Limited, New Delhi, 2003.

REFERENCES

1. Krishnaraju .R, Pranesh .R.N, "*Design of Reinforced concrete" IS : 456-2000*, New age International Publication (P) Ltd., New Delhi, 2007.
2. Punmia .B.C, Ashok Kumar Jain, Arun Kumar Jain, "*Limit State Design of Reinforced Concrete"*, Laxmi Publications, New Delhi, 2007.
3. IS456:, "*Code of Practice for Plain and Reinforced Concrete"*, BIS, New Delhi, 2000.
4. *"Design Aids for Reinforced Concrete to" IS 456*, Special Publication (SP16), BIS New Delhi,1980.
5. IS13920:1993*, "Ductile Detailing Of Reinforced Concrete Structures Subjected To Seismic Forces - Code Of Practice",* BIS New Delhi, *2008.*

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<tr><th colspan="13">CE1108 DESIGN OF MULTISTORIED BUILDINGS</th></tr>
<tr><th colspan="2">Course designed by</th><th colspan="11">Department of Civil Engineering</th></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">Category</td><td colspan="2">General (G)</td><td colspan="2">Basic Sciences(B)</td><td colspan="4">Engineering Sciences andTechnical Arts (E)</td><td colspan="3">Professional Subjects (P)</td></tr>
<tr><td colspan="3">--</td><td colspan="3">--</td><td colspan="4">--</td><td colspan="3">X</td></tr>
<tr><td rowspan="2">4.</td><td rowspan="2">Broad area</td><td colspan="3">Structural Engineering</td><td colspan="3">Geotechnical Engineering</td><td colspan="4">Water Resources Engineering</td><td colspan="3">Geomatics Engineering</td></tr>
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<tr><td>5.</td><td>Approval</td><td colspan="11">23rd meeting of academic council , May, 2013</td></tr>
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GROUP C ELECTIVES – CIVIL ENGINEERING

CE1109	COMPUTER ANALYSIS OF STRUCTURES	L	T	P	C
	Total Contact Hours – 45	3	0	0	3
	Prerequisite				
	CE1004, CE1010, CE1017, CE1022				

PURPOSE

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

INSTRUCTIONAL OBJECTIVES

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

UNIT I – INTRODUCTION (9 hours)

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.

UNIT II – ENERGY CONCEPTS (5 hours)

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

UNIT III – FLEXIBILITY AND STIFFNESS METHODS (ELEMENT APPROACH) (15 hours)

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.

UNIT IV – COMPUTER APPLICATIONS (10 hours)

Analysis and Design of Pin-jointed and Rigid-jointed Framed Structures using STADD pro (2D and 3D), Introduction to SAP, ETABS, ABACUS.

UNIT V – INTRODUCTION TO FINITE ELEMENT METHOD (6 hours)

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

TEXT BOOKS

1. Krishnamoorthy .C.S, Rajeev .S, "*Computer Aided Design"*, Narosa Publishing House, New Delhi 1991.
2. Rajasekaran .S, Sankarrasubramanian .G, "*Computational Structural Mechanics"*, prentice-Hall of India Pvt, 2006.

REFERENCES

1. Beaufait .F.W "*Computer Methods of Structural Analysis"*, Prentice Hall, 1970.
2. Meek .J.L, "*Matrix Structural Analysis"*, McGraw Hill Kogakusha Ltd.,1971.
3. Harrision.H.B., "*Structural Analysis and Design"* Vol. II, Pergamon Press, 1991 & I.
4. Hinton .E, Owen.D.R.J, "*Finite Element Programming"*, Academic press, 1977.
5. Billy E.Gillet, "*Introduction to Operations Research"*, A Computer Oriented Algorithmic approach, Tata McGraw Hill Co., 1982.
6. Mcquire and Gallagher, R.H., "*Matrix Structural Analysis"*, John Wiley, 1979.
7. Rubinstein .M.F, "*Matrix Computer Analysis of Structures"*, Prentice Hall, 1966.

CE1109 COMPUTER ANALYSIS OF STRUCTURES												
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.	Mapping of instructional objectives with student outcome	1-5				1-5						1-5
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences andTechnical Arts (E)				Professional Subjects (P)		
		--		--		--				X		
4.	Broad area	Structural Engineering		Geotechnical Engineering		Water Resources Engineering				Geomatics Engineering		
		X		--		--				--		
5.	Approval	23rd meeting of academic council , May, 2013										

CE1110	COMPUTER AIDED DESIGN OF STRUCTURES	L	T	P	C
	Total Contact Hours – 45	3	0	0	3
	Prerequisite				
	CE1004, CE1010, CE1011, CE1016, CE1017				

PURPOSE

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

INSTRUCTIONAL OBJECTIVES

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

UNIT I – INTRODUCTION & COMPUTER GRAPHICS (9 hours)

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.

UNIT II – DESIGN & OPTIMIZATION (5 hours)

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.

UNIT III – INTRODUCTION TO FINITE ELEMENT ANALYSIS (15 hours)

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.

UNIT IV – ANALYSIS OF STRUCTURES BY FINITE ELEMENT METHOD (10 hours)

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

UNIT V – STRUCTURAL ENGINEERING PACKAGES (6 hours)

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

TEXT BOOKS

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

REFERENCES

1. Rao .S.S, "*The Finite Element Method in Engineering"*, Fourth Edition, Elsevier,2006.
2. Grover .M.P and Zimmers E.W.Jr. CAD/CAM, "*Computer Aided Design and Manufacturing"*, - Prentice Hall of India Ltd., 1996.
3. Harrison .H.B, "*Structural Analysis and Design"*, Parts I and II - Pergamon Press, Oxford, 1970.
4. Rao .S.S "*Optimization Theory and Applications"* - Wiley Eastern Ltd. New Delhi 1977.
5. AUTOCAD Manual, 2000.
6. REDDY, '*Finite Element Methods"*, II Edn. - McGraw Hill Co., 1993.

CE1110 COMPUTER AIDED DESIGN OF STRUCTURES												
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.	Mapping of instructional objectives with student outcome	1-5		1-5		1-5						1-5
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences andTechnical Arts (E)				Professional Subjects (P)		
		--		--		--				X		
4.	Broad area	Structural Engineering		Geotechnical Engineering		Water Resources Engineering				Geomatics Engineering		
		X		--		--				--		
5.	Approval	23rd meeting of academic council , May, 2013										

CE1111	TALL BUILDINGS	L	T	P	C
	Total Contact Hours – 45	3	0	0	3
	Prerequisite				
	CE1004, CE1010, CE1022, CE1011, CE1016				

PURPOSE

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

INSTRUCTIONAL OBJECTIVES

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

UNIT I – INTRODUCTION (10 hours)

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.

UNIT II – LOADS (8 hours)

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.

UNIT III – MEDIUM RISE BUILDINGS-BEHAVIOUR AND ANALYSIS (8 hours)

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

UNIT IV – HIGH RISE BUILDINGS-BEHAVIOUR AND ANALYSIS (10 hours)

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

UNIT V – ADVANCED TOPICS **(9 hours)**

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

TEXT BOOKS

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

REFERENCES

1. Schuller .W.G, "*High Rise Building Structures"*, John Wiley & Sons, 1977.
2. Lynn.S.Beedle, "*Advances in Tall Buildings"*, CBS Publishers and Distributers, New Delhi,1986.
3. Lin .T.Y and Stotes Burry .D, "*Structural Concepts and Systems for Architects and Engineers"*, John Wiley & Sons, 1988.
4. 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.
5. Lecture Notes on, "*Tall Buildings"* - Short term Course Organised by Civil Engineering Dept., SRM Engineering College, Kattankulathur. June 2002.

CE1111 TALL BUILDINGS												
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.	Mapping of instructional objectives with student outcome	1-5				1-5						1-5
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences andTechnical Arts (E)				Professional Subjects (P)		
		--		--		--				X		
4.	Broad area	Structural Engineering		Geotechnical Engineering		Water Resources Engineering				Geomatics Engineering		
		X		--		--				--		
5.	Approval	23rd meeting of academic council , May, 2013										

CE1112	STORAGE AND INDUSTRIAL STRUCTURES	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite				
	CE1011				

PURPOSE

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

INSTRUCTIONAL OBJECTIVES

1.	To understand the functional planning of industrial structures including lighting and ventilation
2.	To design of steel gable frame with knee joint, beam column, base plate and anchor bolt are dealt with here
3.	To design f RC silos, bunkers
4.	To design of RC cooling tower
5.	To understand general principles of prefabrication and functional requirements of precast concrete units and composite sections

UNIT I - INTRODUCTION AND FUNCTIONAL REQUIREMENTS (6 hours)

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.

UNIT II - DESIGN OF STEEL GABLE FRAME AND BEAM COLUMNS (9 hours)

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

UNIT III - DESIGN OF RC SILOS AND BUNKERS (12 hours)

Design of silos and bunkers.

UNIT IV - DESIGN OF RC CHIMNEYS AND COOLING TOWER (12 hours)

Design of chimneys and cooling tower.

UNIT V - PREFABRICATION (6 hours)

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

TEXT BOOKS

1. Subramanian .N, "*Design of Steel Structures"*, Oxford University Press, New Delhi, 2008.
2. Krishna Raju, "*Advanced Concrete Structures"*, McGraw Hill, New Delhi, 2000.
3. Varghese .P.C., "*Advanced Reinforced Cement Concrete"*, Pretince-Hall India, Second edition, 2006 .

REFERENCES

1. SP : 32 (S & T) – 1986, **"***Handbook On Functional Requirements Of Industrial Buildings (Lighting And Ventilation)",* BIS, 1986.
2. IS:8640- 1977, "*Recommendations for dimensional parameters for industrial building"*, BIS, 1977.
3. IS:3483-1965, "*Code of practice for noise reduction in industrial buildings"*, BIS, 1965 IS:1642- 1989, *Code of practice for fire safety of buildings (general): Details of construction,* BIS, 1989 .
4. IS:1644-1088, "*Code of practice for fire safety of buildings (general): Exit requirements and personal hazard"*, BIS, 1988.
5. Ramchandra .S., Virendra Ghelot, "*Design of Steel of Structures"*, Volume 1, Scientific Publishers, 2009, New Delhi
6. Duggal .S.K. "*Limit State Design of Steel Structures"*, Tata McGraw Hill Publishing Company, New Delhi, 1st Edn., 2010.
7. Edwin H. Gaylord, Charles N. Gaylord . Japes R. Stallmeyer, "*Steel Structures"*, McGraw Hill, NewDelhi, 1995.
8. Koncz .T, "*Manual of precast construction"*, Vol. I , II, and III, Bauverlag, GMBH, 1971.
9. Murashew .V, Sigalov .E and Bailov .V, "*Design of reinforced concrete structures"*, Mr. Publishers, 1968.
10. CBRI, "*Building materials and Components"*, India, 1990.

CE1112 STORAGE AND INDUSTRIAL STRUCTURES												
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.	Mapping of instructional objectives with student outcome	1-5		1-5		1-5						
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences andTechnical Arts (E)				Professional Subjects (P)		
		--		--		--				X		
4.	Broad area	Structural Engineering		Geotechnical Engineering		Water Resources Engineering				Geomatics Engineering		
		X		--		--				--		
5.	Approval	23rd meeting of academic council , May, 2013										

CE1113	PRESTRESSED CONCRETE STRUCTURES	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite				
	CE1011				

PURPOSE

To provide an exposure to the design of Prestressed Concrete Structures and Structural Elements.

INSTRUCTIONAL OBJECTIVES

1.	To introduce prestressing methods, principles and concepts
2.	To determine losses in prestress & anchorage zone stresses
3.	To compute shear strength and ultimate shear resistance capacity as per IS code
4.	To design of prestressed concrete beams, stresses at transfer, service load, limit state of collapse in flexure and shear
5.	To design prestressed concrete slabs.

UNIT I - INTRODUCTION AND ANALYSIS FOR STRESS (9 hours)

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.

UNIT II - LOSSES OF PRESTRESS AND ANCHORAGE ZONE STRESSES (9 hours)

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.

UNIT III - SHEAR STRENGTH (6 hours)

Behavior of prestressed concrete members under shear - Shear strength - principal stresses - Ultimate shear resistance - Indian Standard code provision.

UNIT IV - DESIGN OF PRESTRESSED CONCRETE BEAM (12 hours)

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)

UNIT V - DESIGN OF PRESTRESSED CONCRETE SLAB (9 hours)

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

TEXT BOOKS

1. Krishnaraju .R, "*Prestressed Concrete",* Tata McGraw-Hill Education, New Delhi, 2006.
2. Pandit .G.S, Gupta .S.P, "P*restressed Concrete"*, CBS Publishers & Distributors, 2008.
3. Rajagopalan .N, "*Prestressed Concrete",* Alpha Science International, Limited, 2005.

REFERENCES

1. Lin T.Y, Design of, "*Prestressed Concrete Structures"*, Asia Publishing House, Bombay 1995.
2. Guyon .V, "*Limit State Design of Prestressed Concrete"*, Vol.I & II Applied Science Publishers, London, 1992.
3. *IS: 1343- 1980, "IS Code Of Practice For Prestressed Concrete",* BIS, New Delhi, 1980.

CE1113 PRESTRESSED CONCRETE STRUCTURES												
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.	Mapping of instructional objectives with student outcome	1-5		1-5		1-5						
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences andTechnical Arts (E)				Professional Subjects (P)		
		--		--		--				X		
4.	Broad area	Structural Engineering		Geotechnical Engineering		Water Resources Engineering				Geomatics Engineering		
		X		--		--				--		
5.	Approval	23rd meeting of academic council , May, 2013										

CE1114	**ADVANCED STRUCTURAL DESIGN**	**L**	**T**	**P**	**C**
	Total Contact Hours - 45	**3**	**0**	**0**	**3**
	Prerequisite				
	CE1011				

PURPOSE

To bring about a thorough understanding of limit state design of continuous beams, design of grid floors and design of space frames, analysis of frames, design of bridges, shells and folded plates.

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

UNIT I - LIMIT ANALYSIS OF CONTINUOUS BEAMS (9 hours)

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).

UNIT II - GRID FLOORS AND SPACE FRAMES (9 hours)

Design of waffle slab and grid system as per IS456-2000 Steel Space frames-types-analysis and design principles

UNIT III - MEDIUM RISE FRAMED BUILDINGS (9 hours)

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

UNIT IV - DESIGN OF BRIDGES (9 hours)

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

UNIT V - SHELLS AND FOLDED PLATES (9 hours)

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

TEXT BOOKS

1. Krishna Raju," *Advanced Concrete Structures"*, McGraw Hill, New Delhi, 2000.
2. Varghese .P.C, "*Advanced Reinforced Cement Concrete"*, Pretince-Hall India, Second edition, 2006 .
3. Varghese .P.C, "*Design Of Concrete Shells And Folded Plates",* PHI learning Pvt. Ltd., 2010.

REFERENCES

1. Unnikrishna Pillai .S and Deavadas Menon, "*Reinforced Concrete Design"*, Tata MacGraw Hill Publishing Company Limited, Second Edition, New Delhi, 2003.
2. Ramaswamy .G.S, "*Design, Construction of Concrete Shell Roofs'*, CBS Publishers & Distributors, 2005.
3. Krishna Raju .N, "*Design of Bridges"*, Oxford & IBH Publishing Company Pvt. Ltd.,Fourth edition, 2010.
4. Johnson Victor .D, "*Essentials Of Bridge Engineering",* 6/E*,* Oxford & IBH Publishing Company Pvt. Ltd.,Fourth edition, 2007.
5. Ramaswamy .G.S, Eekhout .M, Suresh .G.R, "*Analysis, Design, and Construction of Steel Space Frames",* Thomas Telford, 2002.
6. Subramanian .N, "*Space Structures: Principles and Practice, Volume 1"*, Multi-Science Pub., 2006.
7. Krishnaraju .R, Pranesh .R.N, "*Design of Reinforced concrete" IS : 456-2000*, New age International Publication (P) Ltd., New Delhi
8. *"Design Aids for Reinforced Concrete" to IS 456*, Special Publication (SP16), BIS New Delhi, 1980.
9. *"Code of Practice for Plain and Reinforced Concrete"* IS456-2000, BIS, New Delhi
10. *"Design Aids for Reinforced Concrete" to IS 456*, Special Publication (SP16), BIS New Delhi,1980.
11. IRC:112-2011, *"Code of Practice for Concrete Road Bridges*" Indian Road Congress, New Delhi, 2011.
12. IRC:22-2010, "*Standard Specifications and Code of Practice for Road Bridges"*, Indian Road Congress, New Delhi, 2011.

CE1114 ADVANCED STRUCTURAL DESIGN												
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.	Mapping of instructional objectives with student outcome	1-5		1-5		1-5						
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences andTechnical Arts (E)				Professional Subjects (P)		
		--		--		--				X		
4.	Broad area	Structural Engineering		Geotechnical Engineering		Water Resources Engineering				Geomatics Engineering		
		X		--		--				--		
5.	Approval	23rd meeting of academic council , May, 2013										

CE1116	ANALYSIS AND DESIGN OF STRUCTURAL SANDWICH PANELS	L	T	P	C
	Total Contact Hours – 45	3	0	0	3
	Prerequisite				
	Nil				

PURPOSE

To introduce the basic principles related to the structural sandwich panels

INSTRUCTIONAL OBJECTIVES

1.	To learn about various standards for testing and procedures.
2.	To learn about methods of analysis of sandwich panels.
3.	To know about design methodologies of sandwich panels.

UNIT I – MATERIALS AND TESTING OF SANDWICH PANELS (9 hours)

Core materials – Skin Materials - Properties of materials - Testing of materials used in sandwich constructions.

UNIT II – ANALYSIS OF SANDWICH FLEXURAL ELEMENTS (10 hours)

Introduction – Sandwich beams – Analysis of Antiplane core and thin faces-faces of unequal thickness- cases of core with modulus of elasticity considerable-deflection- symmetrical load- unsymmetrical load including point load and udl

UNIT III – BUCKLING OF SANDWICH STRUTS (8 hours)

Sandwich struts – Buckling – Analysis of sandwich-beam and sandwich strut by strain energy method – Isotropic – Orthotropic sandwich struts by Ritz's method.

UNIT IV – SANDWICH PANELS UNDER BENDING AND BUCKLING (8 hours)

Differential equations of bending and buckling of isotropic sandwich panels - Wrinkling and other forms of local instability – Only Formulae for analysis.

UNIT V – DESIGN OF SANDWICH PANELS (10 hours)

Theory of sandwich panels – Simply supported edge – large deflection – Initial deformations – Design of sandwich beams, Struts and panels.

TEXT BOOK

1. David Randal and Steve Lee, "*The Polyurathanes Book*"-, JOHN WILEY, LTD, November, 2002.

REFERENCE

1. Howard G.Allen, "*Analysis and design of structural sandwich panels*" – First edition, PERGAMON PRESS, 1969.

<table>
<tr><th colspan="13">CE1116 ANALYSIS AND DESIGN OF STRUCTURAL SANDWICH PANELS</th></tr>
<tr><th colspan="2">Course designed by</th><th colspan="11">Department of Civil Engineering</th></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>2.</td><td>Mapping of instructional objectives with student outcome</td><td>2-3</td><td>1</td><td></td><td></td><td>2-3</td><td></td><td></td><td></td><td></td><td></td><td>2-3</td></tr>
<tr><td rowspan="2">3.</td><td rowspan="2">Category</td><td colspan="2">General (G)</td><td colspan="2">Basic Sciences(B)</td><td colspan="4">Engineering Sciences andTechnical Arts (E)</td><td colspan="3">Professional Subjects (P)</td></tr>
<tr><td colspan="3">--</td><td colspan="3">--</td><td colspan="4">--</td><td colspan="3">X</td></tr>
<tr><td rowspan="2">4.</td><td rowspan="2">Broad area</td><td colspan="3">Structural Engineering</td><td colspan="3">Geotechnical Engineering</td><td colspan="4">Water Resources Engineering</td><td colspan="3">Geomatics Engineering</td></tr>
<tr><td colspan="3">X</td><td colspan="3">--</td><td colspan="4">--</td><td colspan="3">--</td></tr>
<tr><td>5.</td><td>Approval</td><td colspan="11">23rd meeting of academic council , May, 2013</td></tr>
</table>

CE1117	BRIDGE ENGINEERING	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite				
	CE1011				

PURPOSE

To provide an exposure to the essential of bridge engineering with the focus on structural design

INSTRUCTIONAL OBJECTIVES

1.	To study essential of bridge engineering.
2.	To design RCC slab bridges.
3.	To design RCC girder bridges.
4.	To design prestressed concrete slab and girder bridges.
5.	To design bearings.

UNIT I - BRIDGE ENGINEERING (12 hours)

Types of bridges – suitability of different types of bridges for various spans – segmental bridges – continuous bridges- arch bridges- cable- suspended bridges - selection of bridge site – approaches- economical span of a typical bridge- Discharge and Linear water way calculations – scour depth - IRC formula IRC Specifications for Road Bridges, Standards live loads, other forces on bridges – general design considerations –

UNIT II - SLAB BRIDGES (6 hours)

Slab culverts- one way and two way slab bridges- Pigeaud curves - principles of design of skew bridges -

UNIT III - RCC GIRDER BRIDGES (12 hours)

RCC girder bridges- kerbs- diaphragms- Courbon's theory – maximum bending moment, shear- moving loads- design of cross section

UNIT VI - PRESTRESSED CONCRETE GIRDER BRIDGES (9 hours)

Advantages of presstressed concrete slab and girder bridges – suitable spans- design of slab and beam cross sections for given bending moment, shear– finding prestresing force, eccentricity (analysis of bridges need not be repeated)

UNIT V - DESIGN OF BEARINGS (6 hours)

Design of Neoprene bearings- design of steel rocker bearings

TEXT BOOKS

1. Johnson Victor .D, "*Essentials Of Bridge Engineering",* 6/E*,* Oxford & IBH Publishing Company Pvt. Ltd.,Fourth edition, 2007.
2. Krishna Raju .N, "*Design of Bridges"*, Oxford & IBH Publishing Company Pvt. Ltd.,Fourth edition, 2010.
3. Jagadeesh .T.R, Jayaram .M.A, "*Design Of Bridge Structures",* Prentice – Hall of India Pvt. Ltd., 2006.

REFERENCES

1. Ponnuswamy .S, "*Bridge Engineering, 2nd E, Tata McGraw Hill",* 2008.
2. IS : 456- 2006, "*Code of Practice for Plain and Reinforced Concrete",* BIS, New Delhi, 2008.
3. *IS: 1343- 1980, "IS Code Of Practice For Prestressed Concrete",* BIS, New Delhi, 1980.
4. IRC:112-2011," *Code of Practice for Concrete Road Bridges"*, Indian Road Congress, New Delhi, 2011.
5. IRC:22-2010, "*Standard Specifications and Code of Practice for Road Bridges"*, Indian Road Congress, New Delhi, 2011.
6. IRC:82 (Part 2) – Part IX- 1987, "*Standard Specifications And Code Of Practice For Road Bridges"*, *Elastomeric Bearings,* IRC, 1987.
7. IRC:82 (Part 1) – section IX – 1999, "*Standard Specifications And Code Of Practice For Road Bridges"*, Metallic Bearings, IRC, 1999.

<table>
<tr><th colspan="14">CE1117 BRIDGE ENGINEERING</th></tr>
<tr><td colspan="2">Course designed by</td><td colspan="12">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>
<tr><td>x</td><td></td><td>x</td><td></td><td>x</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>2.</td><td>Mapping of instructional objectives with student outcome</td><td>1-5</td><td></td><td>1-5</td><td></td><td>1-5</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td rowspan="2">3.</td><td rowspan="2">Category</td><td colspan="2">General (G)</td><td colspan="3">Basic Sciences(B)</td><td colspan="4">Engineering Sciences andTechnical Arts (E)</td><td colspan="2">Professional Subjects (P)</td></tr>
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<tr><td colspan="2">X</td><td colspan="3">--</td><td colspan="4">--</td><td colspan="2">--</td></tr>
<tr><td>5.</td><td>Approval</td><td colspan="12">23rd meeting of academic council , May, 2013</td></tr>
</table>

CE1118	FORENSIC CIVIL ENGINEERING	L	T	P	C
	Total Contact Hours – 45	3	0	0	3
	Prerequisite				
	Nil				

PURPOSE

To introduce the various aspects of investigation involved in Failure of structures

INSTRUCTIONAL OBJECTIVES

1.	To impart knowledge of various testing methods of Failed Structures.
2.	To learn about aspects of failures connected with various structural systems and materials.
3.	To impart knowledge about foundation failures.
4.	To know about strategic measures against failures.
5.	To gain insight into previous structural failures.

UNIT I – TESTING OF FAILURES (9 hours)

Various methods of testing of failed structures - Laser scanning, microscope, Radio graphic evaluation, Load Testing of shoring systems and repair technology.

UNIT II – STRUCTURAL FAILURES (12 hours)

Failure of construction materials steel, concrete - Joints by Bolt and weld. Failure of compression members and tension members by reversal of loads – Failure aspects of post tensioned concrete systems, space frame, plane frame, precast buildings, failure of bridges.

UNIT III – GEO TECHNICAL FAILURES (8 hours)

Soil liquefaction, failure of foundation systems – Causes and prevention.

UNIT IV – DESIGNING AGAINST FAILURE (6 hours)

Quality control – Material selection, workmanship, design and detailing.

UNIT V – CASE STUDIES AND PROFESSIONAL PRACTICE (10 hours)

Case Studies on famous failures – Reasons and lessons learnt – Aspects of professional practice.

REFERENCES

1. "*Forensic Engineering – 2012*", proceedings of sixth ASCE Conference of Forensic Engineering held in San Francisco, California, Oct 31- Nov 03, 2013.

CE1118 FORENSIC CIVIL ENGINEERING												
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.	Mapping of instructional objectives with student outcome	2	1			3,4,5						
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences andTechnical Arts (E)				Professional Subjects (P)		
		--		--		--				X		
4.	Broad area	Structural Engineering		Geotechnical Engineering		Water Resources Engineering				Geomatics Engineering		
		X		--		--				--		
5.	Approval	23rd meeting of academic council , May, 2013										

CE1119	DESIGN OF MACHINE FOUNDATION	L	T	P	C
	Total Contact Hours - 45	**3**	**0**	**0**	**3**
	Prerequisite				
	CE1011, CE1018				

PURPOSE

INSTRUCTIONAL OBJECTIVES

1.	To introduce fundamentals of free vibration
2.	To provide exposure to forced vibration and vibration isolation
3.	To design foundation for reciprocating machines
4.	To design foundation for hammers
5.	To design foundation for low frequency rotary machines

UNIT IV - FUNDAMENTALS OF FREE VIBRATION (9 hours)

Single degree of vibration – free vibration – D' Alembert principle- damping-vibration decay - Determination of forces due to free vibration- natural frequency - two degree freedom system – modal analysis for lumped mass modeling

UNIT IV - FUNDAMENTALS OF FORCED VIBRATION (9 hours)

Response to forced vibration – harmonic loading – single degree freedom system – vibration isolation – resonance- dynamic amplification factor- response spectrum – shock spectrum – 2 mass system – modal analysis

UNIT I - FOUNDATION FOR RECIPROCATING MACHINES (9 hours)

Unbalanced portion of periodic inertia forces – degrees of freedom – design data – machine & soil – static and dynamic design – design criteria – RCC foundation design – construction of machine foundation

UNIT II - FOUNDATION FOR HAMMERS (9 hours)

Types of foundation support- coefficient of restitution – design data- hammer – cushioning pad – soil parameters – design criteria- permissible stress – dimensions – mass- two mass system – vibration analysis- design and construction

UNIT III - FOUNDATION FOR ROTARY MACHINES (9 hours)

Low frequency rotary machines – typical foundation details – for pumps, motor generators, rolling mills – design data- soil parameters and machine data- design criteria- principles of design – loads- static and dynamic analysis- design and construction

TEXT BOOKS

1. Anil K.Chopra, "*Dynamics of structures" (Theory and Applications to Earthquake Engineering)*, 2nd Edition, Prentice Hall of India Private Limited. New Delhi, 2003.
2. Dayaratnam, P., "*Design of Reinforced Concrete Structures"*, M. Primlani, 1983.
3. Srinivasulu .P, Vaidyanathan .C.V, "*Handbook Of Machine Foundations",* McGraw-Hill, 1977.

REFERENCES

1. Shamsher Prakash, Vijay Kumar Puri, "*Foundations for machines: analysis and design",* Wiley, 1988.
2. IS 1893: 2001, (Part I) "*Criteria for Earthquake Resistant Design of Structures - Part 1 : General Provisions and Buildings",* BIS, 2002.
3. IS:2974-1982, Part 1, "*Code of practice for design and construction of machine foundations: Part 1 Foundation for reciprocating type machines"*, BIS, 1982.
4. IS:2974-1980, Part 2, "*Code of practice for design and construction of machine foundations: Part 2 Foundations for impact type machines" (hammer foundations)*, BIS, 1980.
5. IS:2974-1979, Part 4, "*Code of practice for design and construction of machine foundations: Part 4 Foundations for rotary type machines of low frequency"*, BIS, 1979.

CE1119 DESIGN OF MACHINE FOUNDATION												
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.	Mapping of instructional objectives with student outcome	1-5		1-5		1-5						
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences andTechnical Arts (E)				Professional Subjects (P)		
		--		--		--				X		
4.	Broad area	Structural Engineering		Geotechnical Engineering		Water Resources Engineering				Geomatics Engineering		
		X		--		--				--		
5.	Approval	23rd meeting of academic council , May, 2013										

	REPAIR AND REHABILITATION OF STRUCTURES	L	T	P	C
CE1120	Total Contact Hours - 45	3	0	0	3
	Prerequisite				
	CE1011				

PURPOSE

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

INSTRUCTIONAL OBJECTIVES

1.	To provide an overview of performance of concrete structures
2.	To assess the diagnosis of distress
3.	To assess the extent of distress
4.	To choose the appropriate material and its application
5.	To study strengthening and demolition of structural components

UNIT I - GENERAL ASPECTS (9 hours)

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

UNIT II - MAINTENANCE AND DIAGNOSIS OF FAILURE (9 hours)

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

UNIT III - DAMAGES AND THEIR REMEDIES (9 hours)

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

UNIT IV - MATERIALS AND TECHNIQUES OF REPAIR (9 hours)

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

UNIT V - STRENGTHENING AND DEMOLITION ASPECT (9 hours)

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

TEXT BOOKS

1. Shetty .M.S,"*Concrete, Technology, Theory and Practice"*, S.Chand and Company, New Delhi 2005.
2. Raiker .R.N, "*Learning from Failures, Deficiencies in Design, Construction and Service",* - R&D Centre (SDCPL), Raikar Bhavan, Bombay 1987.

REFERENCES

1. *"Repair & Rehabilitation"*, Compilation from The Indian Concrete Journal,– ACC – RCD Publication 2001.
2. *"Health Monitoring of Structures – A Proactive strategy* "–proceedings of the ISTE sponsored short course", organized by the Department of Civil Engineering, S.R.M.Engineering College, S.R.M.Nagar, January 2003.
3. Campbell-Allen, D, Harold Roper, "*Concrete Structures Materials Maintenance and Repair*"Longman Scientific and Technical UK 1991.
4. Allen .R.T, and Edwards .S.C, Shaw .D.N, "*Repair of Concrete Structures",*Chapman and Hall, 2005.

CE1120 REPAIR AND REHABILITATION OF STRUCTURES												
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.	Mapping of instructional objectives with student outcome	1-5		1-5		1-5						
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences andTechnical Arts (E)				Professional Subjects (P)		
		--		--		--				X		
4.	Broad area	Structural Engineering		Geotechnical Engineering		Water Resources Engineering				Geomatics Engineering		
		X		--		--				--		
5.	Approval	23rd meeting of academic council , May, 2013										

CE1121	DESIGN OF EARTHQUAKE RESISTANT STRUCTURES	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite				
	CE1011				

PURPOSE

To impart the knowledge about the fundamentals structural dynamics and their application to the design of earthquake resistant structures

INSTRUCTIONAL OBJECTIVES

1.	To understand the principles of vibration with regard to single degree of freedom system.
2.	To carry our dynamic analysis of moment resistant frames.
3.	To determine the design lateral forces by means of codal provisions.
4.	To introduce the concept of ductility and corresponding detailing.
5.	To expose the students to base isolation techniques earthquake induced damages.

UNIT I - SINGLE DEGREE OF FREEDOM SYSTEM (SDOF) (12 hours)

Systems with single degree of freedom - equation of motion - Analysis of free vibrations - Response to harmonic, impulsive, periodic and general dynamic loading - free and forced vibration – modeling of SDOF system under earthquake loads

UNIT II - MULTI-DEGREE OF FREEDOM SYSTEM (MDOF) (9hours)

Modeling of shear frames as 2 degree of freedom system- modal analysis – free vibration – and forced vibration with harmonic loading – determination of nodal forces from first principles

UNIT III - DESIGN SEISMIC FORCES (9 hours)

Codal provision for design - IS 1893-2002 – Response spectrum – determination of lateral forces – base shear – by response spectrum method for 2 storey moment resistant frame- calculation of drift Aspects in planning and layout - regular and irregular buildings- calculation of centre of mass and centre of rigidity for simple layouts- eccentricity and torsion

UNIT IV - DETAILING FOR DUCTILITY (6 hours)

Ductility - codal provision for detailing for earthquake resistance- IS 13920-1993 and IS1893:2002 Shear wall design and detailing.

UNIT V - SPECIAL TOPICS (9 hours)

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

TEXT BOOKS

1. Short course on "*Seismic design of reinforced concrete buildings"*, CEP, IIT, Kanpur, 2005.
2. Anil K.Chopra, "*Dynamics of structures (Theory and Applications to Earthquake Engineering)"*, 2nd Edition, Prentice Hall of India Private Limited. New Delhi, 2003.

REFERENCES

1. Short term course on "*Seismic Retrofit of Multistoreyed Reinforced concrete Buildings"*, National Programme on Earthquake Engineering Education (NPEEE), IIT, Madras, July, 2005.
2. Paulay.T and Priestly. M.N.J, "*Aseismic Design of Reinforced Concrete and Masonry Building"*, John Wiley and Sons, 1991.
3. Course Notes on "*Structural Design for Dynamic Loads"*, SRM Engineering College, Dec2002.
4. Lecture notes on "*Health Monitoring of Structures- A Proactive Strategy"*, ISTE sponsored course held at SRM Engineering College, Jan,2003.

5. *"Learning earthquake Design and Construction"*, Earthquake Tips 1 to 24, Authored by C.V.R. Murthy, IIT, Kanpur. eqtips@iitk.ac.in Web sites: www.nicee.org.
6. IS 1893: 2001, (Part I) "*Criteria for Earthquake Resistant Design of Structures - Part 1 :General Provisions and Buildings",* BIS, 2002.
7. IS 13920: 1993 ,"*Ductile detailing of reinforced concrete structures subjected to seismic forces - Code of practice"*, BIS, 2002.

CE1121 DESIGN OF EARTHQUAKE RESISTANT STRUCTURES												
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.	Mapping of instructional objectives with student outcome	1-5		1-5		1-5						
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences andTechnical Arts (E)				Professional Subjects (P)		
		--		--		--				X		
4.	Broad area	Structural Engineering		Geotechnical Engineering		Water Resources Engineering				Geomatics Engineering		
		X		--		--				--		
5.	Approval	23rd meeting of academic council , May, 2013										

CE1122	INDUSTRIAL POLLUTION PREVENTION AND CLEANER PRODUCTION	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite				
	Nil				

PURPOSE

To learn the fundamental concepts of pollution prevention and cleaner production.

INSTRUCTIONAL OBJECTIVES

1. To study about the industries in India related water usage and wastewater generation.
2. To study about the pollution prevention techniques.
3. To study about the environmental assessment.

UNIT I - INTRODUCTION **(9 hours)**

Industrial Activity and Environment – Industrialization and Sustainable Development – Indicators of Sustainability Strategies – Barriers to Sustainability – Industrial Ecology – Pollution Prevention (PP) and Cleaner Production (CP) in achieving Sustainability- Prevention versus Control of Industrial Pollution -

Environmental Policies and Regulations to encourage Pollution Prevention and Cleaner Production – Regulatory versus Market-based approaches

UNIT II - POLLUTION PREVENTION TECHNIQUES (9 hours)

Concept of Pollution Prevention and Cleaner Production - Definition – Importance - Historical Evolution - Benefits- Promotion - barriers – Role of Industry-Government and Institutions - Environmental Management Hierarchy – Source Reduction techniques – Process and Equipment Optimization- Reuse- Recover-Recycle- Raw material substitution -Internet information and Other PP and CP Resources

UNIT III - ANALYSIS OF POLLUTION (11 hours)

Pollution Prevention and Cleaner Production Project development and implementation – Overview of CP -Assessment steps and skills-Preparing the site- Information gathering- Flow diagram-Material balance, PP and CP Option generation- Technical and Environmental Feasibility analysis- Total Cost analysis - PP and CP Financing, Establishing a Program - Organizing a Program-Preparing a program plan - Measuring progress – Pollution Prevention and Cleaner Production Awareness Plan - Waste Audit- Environmental Statement.

UNIT IV - ENVIRONMENTAL ASSESSMENT (10 hours)

Life Cycle Assessment and Environmental Management Systems- Elements of LCA - Life Cycle Costing – Eco labeling – Designs for the Environment - International Environmental Standards- ISO 14001 - Environmental Audit.

UNIT V - CASE STUDIES (6 hours)

Industrial Applications of PP and CP- LCA, EMS and Environmental Audits.

TEXT BOOKS

1. Paul L. Bishop, "*Pollution Prevention: Fundamentals and Practice*", McGraw-Hill International, 2010.
2. James G. Mann and V.A. Liu, "*Industrial Water Reuse and Wastewater Minimization*", McGraw Hill, 2009.

REFERENCES

1. World Bank Group, "*Pollution Prevention and Abatement Handbook-Towards Cleaner Production*", World Bank and UNE, Washington D.C., 2008.
2. Freeman .H.M, "*Industrial Pollution Prevention Handbook*", McGraw Hill", 2005.

3. Prasad Moda C. Visvanathan and Mandar Parasnis, "*Cleaner Production Audit Environmental System Reviews*", No. 38, Asian Institute of Technology; Bangkok, 2005.

CE1122 INDUSTRIAL POLLUTION PREVENTION AND CLEANER PRODUCTION												
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.	Mapping of instructional objectives with student outcome	1-3		1-3		1-3						
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences andTechnical Arts (E)				Professional Subjects (P)		
		--		--		--				X		
4.	Broad area	Structural Engineering		Geotechnical Engineering		Water Resources Engineering				Geomatics Engineering		
		--		--		X				--		
5.	Approval	23rd meeting of academic council , May, 2013										

CE1123	GROUND WATER CONTAMINATION AND QUALITY MONITORING AND MODELLING	L	T	P	C
	Total Contact Hours – 45 hours	3	0	0	3
	Prerequisite				
	Nil				

PURPOSE

To develop a basic knowledge about the groundwater contamination and transport modeling and apply the same in the field application.

INSTRUCTIONAL OBJECTIVES

1.	To educate the students on the hydrologic cycles.
2.	To know about the development of ground water resources.
3.	To study about the constituents and its measurements.

UNIT I - GROUND WATER AND THE HYDROLOGIC CYCLES (10 hours)

Ground water and the hydrologic cycles - Ground water as a resource - Ground water contamination - Water quality standards - Sources of contamination - Land disposal of solid wastes - Sewage disposal on Land. Ground water and geologic processes. Physical properties and principles - Darcy's Law - Hydraulic Head and Fluid Potential - Piezometers and Nests. Hydraulic conductivity and permeability -

Homogeneity and Anisotropy - Porosity and voids Ratio - Unsaturated flow and the water table - Steady state flow and Transient flow - Compressibility and effective stress.

UNIT II - FLOW NET **(6 hours)**

Flow nets - Graphical construction - Flow nets by numerical simulation. Steady state Regional Ground Water flow - steady state hydrologic budgets - Fluctuations in ground water levels.

UNIT III - DEVELOPMENT OF GROUND WATER RESOURCES **(9 hours)**

Development of Ground Water resources - Exploration for Aquifers - the response of Ideal aquifers to pumping - Measurement of parameters - Laboratory tests - Piezometer test - Pumping tests - Estimation of saturated hydraulic conductivity - Numerical simulation for aquifer yield prediction - Artificial recharge and induced infiltration - Land subsidence - Sea water intrusion.

UNIT IV - CONSTITUENTS AND MEASUREMENT **(9 hours)**

Constituents - Chemical equilibrium - Association and Dissociation of dissolved species - effects of concentration gradients - Mineral dissolution and solubility - Oxidation and reduction Process - Ion exchange and Adsorption - Environmental isotopes - Field Measurement of Index parameters. Chemical Evolution: Hydro Chemical sequences and facies - graphical methods - Hydro chemical Facies - Ground water in carbonate terrain.

UNIT V – CONTAMINATION **(7 hours)**

Transport process - non-reactive constituents in homogeneous media and Heterogeneous media - Transport in Fracture media - Hydro chemical behavior of contaminants - Trace metals - Trace nonmetals - Nitrogen, organic substances - Measurement of parameters - Velocity - Dispersivity - chemical partitioning.

UNIT VI – MODELLING **(4 hours)**

Modelling Principles - MOC Modelling. Case studies

TEXT BOOKS

1. Randall J. Charbeneau, "*Ground water Hydraulics and Pollutant transport*" Prentice Hall, Upper Saddle River, 2003.

REFERENCES

1. Todd David Keith, "*Ground water Hydrology",* Second edition, John Wiley and Sons, New York, 2004.
2. Allen Freeze .R and John A. Cherry, "*Ground Water*", Prentice Hall, Inc., 2005.

CE1123 GROUND WATER CONTAMINATION AND QUALITY MONITORING AND MODELLING												
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.	Mapping of instructional objectives with student outcome	1-3		1-3		1-3						
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences andTechnical Arts (E)				Professional Subjects (P)		
		--		--		--				X		
4.	Broad area	Structural Engineering		Geotechnical Engineering		Water Resources Engineering				Geomatics Engineering		
		--		--		X				--		
5.	Approval	23rd meeting of academic council , May, 2013										

CE1124	AIR QUALITY MONITORING AND MODELLING	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite				
	Nil				

PURPOSE

To learn the fundamental concepts of Air quality monitoring and modelling in the field of environmental engineering.

INSTRUCTIONAL OBJECTIVES

1.	To know the basics and importance of Air Quality Standards
2.	To study the methods of modelling related to Air Pollution
3.	To Know the methods of controlling Air Pollution

UNIT I - INTRODUCTION (11 hours)

Concept of unpolluted air-Gaseous and vapour pollutants in atmosphere-Scales of air pollution- Primary & secondary pollutants-Ambient Air Quality-Monitoring for pollutants (SO_2- NO_2- O_3- PAN- Particulates- Hydrocarbons- PAH's) and their health effects. Stack monitoring for SOx – NOx -CO-CO_2-Hydrocarbons-Fluorides-Ammonia- VOCs-Effects of air pollution on vegetation, materials and structures. Stack monitoring for Industries-Trends of AAQ in Urban, Rural and Industrial areas.

UNIT II - STANDARDS AND MODELLING (11 hours)

Air quality criteria- National & International air emission standards and AAQ guidelines- Indoor air quality-averaging time-Air pollution system-Alternative control strategies-Elements of Meteorology-Solar radiation-Wind circulation-Lapse rate-Stability conditions-Wind velocity profiles-Maximum mixing depth-Wind rose-Turbulence -General characteristics of stack plumes- Heat island effect-Eddy diffusion model-Gaussian dispersion model.

UNIT III - ESTIMATION OF AIR QUALITY (8 hours)

GLC estimates for multiple sources using standard software (eg. EPA's ISC model) -Determination of effective stack height -Distribution & sources of Particulate matter- Hood duct design- Particulate collection mechanisms- Control systems and their design.

UNIT IV - VECHICLE EMISSIONS (7 hours)

Flue-gas desulfurization processes- Flue gas control methods for NOx - Emission standards for automobiles- Origin of exhaust emissions from gasoline- Diesel-CNG & LPG engines.

UNIT V - EMISSION ANALYSIS (8 hours)

Crankcase and evaporative emissions- Emission reduction by fuel changes-Emission reduction by engine design changes- Catalytic converters- Diesel engine emission.

TEXT BOOKS

1. Rao .M.N & Rao .H.V.N, "*Air Pollution*", Tata McGraw Hill,2006.

REFERENCES

1. Richard W. Boubel, Donald L. Fox, D. Bruce Turner & Arthur C. Stern, "*Fundamentals of Air Pollution, Hardcover*" , 2007.
2. Kenneth Wark, Cecil F. Warn "*Air pollution its origin and control*," 2007.

CE1124 AIR QUALITY MONITORING AND MODELLING												
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.	Mapping of instructional objectives with student outcome	1-3		1-3		1-3						
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences andTechnical Arts (E)				Professional Subjects (P)		
		--		--		--				X		
4.	Broad area	Structural Engineering		Geotechnical Engineering		Water Resources Engineering				Geomatics Engineering		
		--		--		X				--		
5.	Approval	23rd meeting of academic council , May, 2013										

CE1125	ADVANCED WASTE WATER TREATMENT	L	T	P	C
	Total Contact Hours – 45 hours	3	0	0	3
	Prerequisite				
	Nil				

PURPOSE

To Introduce students to the unit operations and process in advanced water and waste water treatment.

INSTRUCTIONAL OBJECTIVES

1.	To know the need for advanced wastewater treatment.
2.	To study the design approaches for physiochemical, biological processes for the removal of nitrogen and phosphorus
3.	To study the basic concepts and design of adsorption units.
4.	To learn about the membrane properties and membrane filter processes.
5.	To learn about the basics of ion exchange, design of ion exchange units, and chemical oxidation processes.

UNIT I - INTRODUCTION **(9 hours)**

Need for advanced waste water treatment-technologies used for advanced treatment-goals of advanced treatment-combination of unit operations and processes with treatment flow sheets- Effluent polishing.

UNIT II - NUTRIENTS REMOVAL (9 hours)

Nitrogen – sources, forms, nitrification and denitrification processes-phosphorous –sources, forms, chemical and biological methods of treatment-air stripping.

UNIT III - ADSORPTION (9 hours)

Adsorption processes – Adsorption equilibria – Adsorption isotherm – Adsorption kinetics – Influencing factors – Design of adsorption units.

UNIT IV - FILTRATION AND MEMBRANE PROCESS (9 hours)

Filtration processes – membrane filtration processes – reverse osmosis – membrane properties – ultra filtration – Electrodialysis – process design and applications.

UNIT V - ION EXCHANGE AND CHEMICAL OXIDATION (9 hours)

Exchange processes – exchange materials – exchange reactions – column design procedure – Application of ion–exchange in water and waste water treatments.Chemical oxidation – principles and theories of chemical oxidation – properties, generation and applications of oxygen, permanganate, chlorine dioxide, etc.

TEXT BOOKS

1. Weber .W.J, *"Physiochemical processes for water quality control"*, Wiley Interscience, 2002.

REFERENCES

1. Rich .L.G, "*Unit operations of sanitary engineers*", Wiley Topan, 2001.
2. Fair .G.M., "*Water and Waste water engineering Vol.I & II .John Wiley and Sons*", Newyork, 2005.
3. Metcalf & Eddy., "*Wastewater engineering Treatment and Reuse",* Tata McGraw Hill publications, 2003.

CE1125 ADVANCED WASTE WATER TREATMENT												
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.	Mapping of instructional objectives with student outcome	1-5		1-5		1-5						
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences andTechnical Arts (E)				Professional Subjects (P)		
		--		--		--				X		
4.	Broad area	Structural Engineering		Geotechnical Engineering		Water Resources Engineering				Geomatics Engineering		
		--		--		X				--		
5.	Approval	23rd meeting of academic council , May, 2013										

CE1126	DESIGN OF ENVIRONMENTAL ENGINEERING STRUCTURES	L	T	P	C
	Total Contact Hours – 45 hours	3	0	0	3
	Prerequisite				
	Nil				

PURPOSE

To learn the concepts of analysis and design of environmental engineering related structures.

INSTRUCTIONAL OBJECTIVES

1.	To know the concept of design of pipe lines for sewage.
2.	To know the concept of analysis and design of water tanks.
3.	To know the design of swimming pools, intakes, aeration tanks etc.
4.	To study about the repair and rehabilitation of structures.

UNIT I - DESIGN OF PIPES **(9 hours)**

Structural design of - Concrete - Prestressed Concrete - Steel - Castiron piping mains- sewerage tanks design – anchorage for pipes – massive outfalls – structural design and laying – hydrodynamic considerations-Advances in the manufacture of pipes.

UNIT II - ANALYSIS AND DESIGN OF WATER TANKS **(11 hours)**

Design of concrete roofing systems - Cylindrical - Spherical - Conical shapes using membrane theory and design of various types of folded plates for roofing

with concrete- IS Codes for the design of water retaining structures- Design of circular- rectangular- spherical and Intze type of tanks using concrete- Design of prestressed concrete cylindrical tanks – Economic analysis – introduction to computer aided design and packages.

UNIT III - DESIGN OF SPECIAL PURPOSE STRUCTURES (10 hours)

Underground reservoirs and swimming pools- Intake towers- Structural design including foundation of water retaining structures such as settling tanks- clarifloculators- aeration tanks etc – effect of earth pressure and uplift considerations – selection of materials of construction.

UNIT IV - REPAIR AND REHABILITATION OF STRUCTURES (8 hours)

Diagonising the cause and damage- identification of different types of structural and nonstructural cracks – repair and rehabilitation methods for Masonry-Concrete and Steel Structures.

UNIT V - ENVIRONMENTAL ENGINEERING STEEL STRUCTURES (7 hours)

Exposure on Steel- Lattice Structures used in water and sewerage works.

TEXT BOOKS

1. Dayaratnam, P., "*Reinforced Concrete*", Khanna Publishers, 2005.
2. Krishna Raju, "*Prestressed Concrete*", 2nd Edn,Tata McGraw-ill Publishing Co. 2008.

REFERENCES

1. Sinha .N.C and Roy .S.K, "*Reinforced Concrete*", S.Chand and Co. 2005.
2. Hulse .R and Mosley .W.H, "*Reinforced Concrete Design by Computer*", Macmillan Education Ltd., 2006.
3. Ramaswamy .G.S, "*Design and Construction of Concrete Shell Roofs",* CBS Publishers, 2006.
4. Green .J.K and Perkins .P.H, "*Concrete liquid retaining structures"*, Applied Science Publishers, 2001.

CE1126 DESIGN OF ENVIRONMENTAL ENGINEERING STRUCTURES												
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.	Mapping of instructional objectives with student outcome	1-4		1-4		1-4						
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences andTechnical Arts (E)				Professional Subjects (P)		
		--		--		--				X		
4.	Broad area	Structural Engineering		Geotechnical Engineering		Water Resources Engineering				Geomatics Engineering		
		--		--		X				--		
5.	Approval	23rd meeting of academic council , May, 2013										

CE1127	NOISE POLLUTION AND ITS CONTROL	L	T	P	C
	Total Contact Hours – 45 hours	3	0	0	3
	Prerequisite				
	Nil				

To learn the fundamental concepts in the field of Noise pollution and control.

INSTRUCTIONAL OBJECTIVES

1.	To know the basics, importance of noise pollution measurement.
2.	To study the various effects of noise pollution.
3.	To learn the importance of methods of control of noise.
4.	To study the various noise pollution regulations.

UNIT I - NOISE POLLUTION AND ITS MEASUREMENT (**9 hours)**

Sources of noise – Units and Measurements of Noise – Noise Power level, Intensity level, Pressure level – Relationship, Noise level meter – Weighted networks – Decibel addition – Octave Band – Noise spectrum – Equivalent Noise – Day and night time –Standards, Equations and Application.

UNIT II - CHARACTERIZATION OF NOISE POLLUTION AND ITS EFFECTS

(9 hours)

Characterization of Noise from Construction, Mining, Transportation and Industrial Activities, Airport Noise – General Control Measures – Effects of noise pollution – auditory effects, non-auditory effects.

UNIT III - CONTROL OF NOISE (**9 hours)**

Noise Menace – Noise and the Fetus – Prevention and Control of Noise Pollution – Control of noise at source, control of transmission, protection of exposed person - Control of other types of Noise Sound Absorbent – Noise Pollution Analyzer – Auditorium Designing – Anti Noise Device.

UNIT IV - PHYSICAL CONTROL OF NOISE (**9 hours)**

Designing out Noise – Industrial Noise Control – effects of noise on workers efficiency -Acoustic quieting - mechanical isolation technique, acoustical absorption, constrained layer damping – OSHA Noise standards – public education – other non-legislative measures.

UNIT V - NOISE POLLUTION REGULATIONS (**9 hours)**

Legislation Noise and the Administrative Function – Planning against Noise – Noise and the Law – The Rajasthan noise control Act 1963, Railway Act 1890 (Related to noise only), The Aircraft Act 1934 (Related to noise only), Factories Act 1948 (Related to noise only), The Environmental Protection Act 1986 – Noise pollution remedies.

TEXT BOOKS

1. Singal .S.P, "*Noise Pollution & Control Strategy*", Alpha Science International Publications, Oxford Press, 2005.
2. Singal .S.P, "*Noise Pollution & Control",* Narosa Publishing House, NewDelhi 2010.

REFERENCES

1. Agarwal .S.K, "*Noise Pollution".* APH Publications, NewDelhi, 2009.
2. Devi Prasad Tripathi, "*Noise Pollution"*, Tata McGraw Hill, NewDelhi 2006.

CE1127 NOISE POLLUTION AND ITS CONTROL												
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.	Mapping of instructional objectives with student outcome	1-3		1-3		1-3						
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences andTechnical Arts (E)				Professional Subjects (P)		
		--		--		--				X		
4.	Broad area	Structural Engineering		Geotechnical Engineering		Water Resources Engineering				Geomatics Engineering		
		--		--		X				--		
5.	Approval	23rd meeting of academic council , May, 2013										

CE1128	MARINE POLLUTION MONITORING AND MODELLING	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Nil				

PURPOSE

To learn the fundamental concepts in the field of marine pollution in environmental engineering.

INSTRUCTIONAL OBJECTIVES

1.	To know the basics, importance, and methods of Marine Pollution.
2.	To study the various Types of Marine Pollution
3.	To learn the importance of Methods of Monitoring Marine Pollution
4.	To Know the Methods of controlling Marine Pollution

UNIT I - OCEANOGRAPHY (9 hours)

General features of ocean – Conservation laws – Wave characteristics and theories – Sediment transport – Tides – Ocean Currents – Thermocline circulation – General circulation of ocean waters- Tsunamis- Storm surge – Principles of Marine geology

UNIT II - COASTAL ENVIRONMENT (9 hours)

Living resources – coral reefs- mangroves- seagrass- seaweeds- fishery potential – nonliving resources – manganese nodules- heavy minerals – Beaches- Estuaries- Lagoons – Shoreline changes

UNIT III - MARINE SURVEYING (9 hours)

Sea surveying planning and preparation – Oceanographic instrumentation – Hydrographic Surveying – Underwater surveying – Measurement of physical properties of ocean water – sea bed sampling

UNITIV - MARINE POLLUTION AND MONITORING (9 hours)

Physiochemical properties of sea water – Sources of marine pollution and impacts on coastal ecosystems- Oil pollution – oil spill detection- dispersion- impacts on adjacent area – Oil spill modeling- mitigation measures – Oil exploration and their effects – Marine outfalls – Impacts of Ports and Harbour on marine water quality – dredging – sea water classification – Physical modeling in Coastal Engineering – Ocean monitoring satellites.

UNIT V - MARINE POLLUTION CONTROL (9 hours)

National and International treaties- protocols in marine pollution – Exclusive Economic Zone – Sustainable development.

TEXT BOOK

1. Kennish .M.J, "*Pollution impacts on Marine Biotic Communities",* CRC press 2011.

REFERENCE

1. Newman .M.C, Roberts Jr. M.H., Male R.C. (Editors), "*Coastal and Estuarine Risk Assessment*", Lewis Publishers, 2002.
2. "*U.S. Army Corps of Engineers*", Shore Protection Manual, 2002.

CE1128 MARINE POLLUTION MONITORING AND MODELLING												
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.	Mapping of instructional objectives with student outcome	1-4		1-4		1-4						
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences andTechnical Arts (E)				Professional Subjects (P)		
		--		--		--				X		
4.	Broad area	Structural Engineering		Geotechnical Engineering		Water Resources Engineering				Geomatics Engineering		
		--		--		X				--		
5.	Approval	23rd meeting of academic council , May, 2013										

CE1129	**MASS TRANSFER IN AIR –WATER – SOIL INTERACTION**	**L**	**T**	**P**	**C**
	Total Contact Hours – 45 hours	**3**	**0**	**0**	**3**
	Prerequisite				
	Nil				

PURPOSE

To learn the fundamental concepts in the field of Mass Transfer in Air –Water-Soil Interaction in Environmental Engineering

INSTRUCTIONAL OBJECTIVES

1.	To know the basics, importance of Equilibrium of Earth
2.	To study the various Types of Techniques involved in Transport Mechanism
3.	To learn the various methods of analysing interrelation between earth, air and Water
4.	To understand the concept of exchange rate between air, water and earthen material.

UNIT I - EQUILIBRIUM AT ENVIRONMENTAL INTERFACE (9 hours)

Ideal solutions – Air-water equilibrium occurrences – Pure gases in contact with water-Pureliquid in contact with air-partition coefficient for the air – Water system – Earthern solid –Waste equilibrium occurrences – Pure solid and liquid chemicals in contact with water andearthern solids – Earthern solid – Air equilibrium occurrences – Water- liquid chemicalequilibrium occurrences – Thermal equilibrium at environmental interfaces.

UNIT II - TRANSPORT MECHANISMS (9 hours)

Diffusion and mass transfer – Molecular diffusion – Eddy diffusion – Mass transfer theories –Mass transfer coefficients – Binary mass transfer coefficients in two phases and tworesistance theory of interphase mass transfer turbulence in the environment – Fundamentalsof heat transfer – Analogy theories of momentum, heat and mass transfer.

UNIT III - EXCHANGE RATES BETWEEN AIR AND WATER (9 hours)

Desorption of gases and liquids from aerated basins and rivers – Completely mixed basin –Plug flow basin – Gas exchange rates between the atmosphere and the surface of rivers –Exchange of chemical across the air – Water interface of lakes and oceans.

UNIT IV - EXCHANGE RATES BETWEEN WATER & EARTHERN MATERIAL (9 hours)

Dissolution of chemicals on the bottom of flowing streams – Geometric forms – Stream bottommass transfer coefficients – Natural convection dissolution – The upsurge of chemicals fromthe sediment – Water interface of lakes – A Fikian analysis – Annual upsurge rate at sediment– Water interface – Mass transfer coefficients at the sediment – Water interface – Flux ofchemicals between sediment and the overlying seawater – Msovement of chemicals throughthe benthic boundary layer.

UNIT V - EXCHANGE RATES BETWEEN AIR AND SOIL (9 hours)

Turbulence above the air-soil interface –Richardson number – Chemical flux rates through thelower layer of the atmosphere – Thronthwaite – Holzman equation – Evaporation of liquidchemicals spilled on land – Chemical flux rates through the upper layer of earthern material.

TEXTBOOKS

1. Thibodeaux .L.J, "*Environmental Chemo dynamics: Movement Of Chemicals InAir, Water and Soil*", 2 Edition, Wiley - Interscience, 2006.

REFERENCES

1. Cusssler .E.L, "*Diffusion: Mass Transfer In Fluid Systems*", Cambridge University Press,2004.

CE1129 MASS TRANSFER IN AIR –WATER – SOIL INTERACTION												
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.	Mapping of instructional objectives with student outcome	1-4		1-4		1-4						
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences andTechnical Arts (E)				Professional Subjects (P)		
		--		--		--				X		
4.	Broad area	Structural Engineering		Geotechnical Engineering		Water Resources Engineering				Geomatics Engineering		
		--		--		X				--		
5.	Approval	23rd meeting of academic council , May, 2013										

CE1130	INSTRUMENTAL MONITORING OF ENVIRONMENT AND MODELLING	L	T	P	C
	Total Contact Hours – 45 hours	3	0	0	3
	Prerequisite				
	Nil				

PURPOSE

To learn the fundamental concepts in the field of Instrumental Monitoring of Environment and Modelling

INSTRUCTIONAL OBJECTIVES

1.	To know the basics, importance of Instrumental Monitoring
2.	To study the various Methods of Instrumental Monitoring
3.	To learn the importance **of** Various Equipments used for monitoring the Environment

UNIT I – INTRODUCTION **(9 hours)**

Instrumental methods – Selection of method – Precision and accuracy – Errors in measuring signals – Noise/signal ratio – Base line drift – Indicator tubes.

UNIT II - SPECTROSCOPIC METHODS (9 hours)

Electromagnetic radiation – Matter radiation interactions – Colorimetry and spectrophotometry, fluorimetry, nephelometry and turbidimetry, flame photometry – Atomic Absorption Spectrometry (AAS) – Atomic Emission Spectrometry (AES) – Inductively coupledplasma (ICP) – Direct Current Plasma (DCP) spectrometry. ICP – MS (Mass spectrometry).

UNIT III - CHROMATOGRAPHIC METHODS (9 hours)

Classical methods – Column – Paper – Thin Layer chromatography (TLC), Gas Chromatrography (GC), GC-MS – High performance liquid chromatography (HPLC) and Ionchromatrography (IC).

UNIT IV - ELECTRO AND RADIO ANALYTICAL METHODS (9 hours)

Conductometry, potentiometry, coulometry, amperometry polarography, Neutron ActivationAnalysis (NAA), X-ray Fluorescence (XRF) and X-ray Diffraction (XRD) methods.

UNIT V - CONTINUOUS MONITORING INSTRUMENTS (9 hours)

Non-dispersive infra-red (NDIR) analyzer for CO – Chemiluminescent analyzer for NOx –Fluorescent analyzer for SO_2 – Auto analyzer for water quality using flow injection analysis –Permeation devices.

TEXT BOOKS

1. Willard. H, Merritt .L, Dean .D.A and Settle .F.A, "*Instrumental Methods of Analysis*", 7th Edition, Words Worth, 2004.

REFERENCES

Ewing, *"Instrumental Methods of Chemical Analysis"*, 5th Edition., McGraw-Hill, 2005.

CE1130 INSTRUMENTAL MONITORING OF ENVIRONMENT AND MODELLING												
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.	Mapping of instructional objectives with student outcome	1-3		1-3		1-3						
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences andTechnical Arts (E)				Professional Subjects (P)		
		--		--		--				X		
4.	Broad area	Structural Engineering		Geotechnical Engineering		Water Resources Engineering				Geomatics Engineering		
		--		--		X				--		
5.	Approval	23rd meeting of academic council , May, 2013										

CE1131	**RS & GIS FOR ENVIRONMENTAL ENGINEERING**	**L**	**T**	**P**	**C**
	Total Contact Hours – 45 hours	**3**	**0**	**0**	**3**
	Prerequisite				
	Nil				

PURPOSE

To learn the fundamental concepts in the field of RS and GIS in environmental engineering.

INSTRUCTIONAL OBJECTIVES

1.	To know the basics, importance, and methods of RS and GIS
2.	To study the various types of techniques involved in RS and GIS
3.	To learn the importance of methods of analysing ground water quality by using GIS

UNIT I - REMOTE SENSING APPLICATION IN ENVIRONMENTAL ENGG.(9 hours)

Introduction – Environmental Satellites: GOES, NOAA, AVHRR, CZCR –Monitoring land, water, atmosphere and ocean using Remote Sensing data – Case studies.

UNIT II - SOIL DEGRADATION STUDY USING GIS AND REMOTE SENSING (9 hours)

Taxonomical classification of soils – soil survey Interpretation and mapping – Impact ofagricultural and Industrial activity on soil properties – Soil salinity / alkalinity, erosion studies –Application of GIS in assessing soil salinity, erosion productivity etc.,

UNIT III - GIS APPLICATION IN WATER QUALITY (9 hours)

Classification of water quality-Conceptualization of Hydrogeology- Aspects of Water Budget-Database creation and Water quality modeling using GIS. Database creation and maintaining water supply network – Case studies.

UNIT IV - GIS APPLICATION IN POLLUTION MONITORING AND MODELING (9 hours)

Aquifer – Vulnerability Intrinsic & Specific Vulnerability, DRASTIC, SINTACS MODELS, MODFLOW, MT3D, contaminant transport model

UNIT V - GIS APPLICATIONS IN AIR QUALITY MONITORING AND MODELING (9 hours)

Atmosphere: chemicals, Particulate matters present in the atmosphere, allowable limits –Remote Sensing technique to monitor atmosphere constituents, air pollution due to industrialactivity – monitoring & modeling using GIS.

TEXT BOOKS

1. Sabins .F, "*Remote Sensing Principles and Interpretation"*, W. H. Freeman and Company,2007.

REFERENCES

1. "*World in transition: The threat to Soils*" Annual Report of the Germon Advisory Council on Global change, Economical Verlag, 2004.
2. "*Ground Water vulnerability assessment: Predicting Relative Contamination PotentialUnder Conditions of Uncertainty*", National Academic Press, 2003.
3. Savigny. D. and Wijeyaratne .P., "*GIS for Health and Environment*", Stylus Publication, 2005.
4. Allaric Sample .V.,"*Remote Sensing and GIS for Eco System Management*". Island Press, 2006.

CE1131 RS & GIS FOR ENVIRONMENTAL ENGINEERING												
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.	Mapping of instructional objectives with student outcome	1-3		1-3		1-3						
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences andTechnical Arts (E)				Professional Subjects (P)		
		--		--		--				X		
4.	Broad area	Structural Engineering		Geotechnical Engineering		Water Resources Engineering				Geomatics Engineering		
		--		--		X				--		
5.	Approval	23rd meeting of academic council , May, 2013										

CE1132	**AIR POLLUTION CONTROL AND MANAGEMENT**	**L**	**T**	**P**	**C**
	Total Contact Hours – 45 hours	**3**	**0**	**0**	**3**
	Prerequisite				
	Nil				

PURPOSE	
To learn the concept of air pollution and its control measures.	
INSTRUCTIONAL OBJECTIVES	
1.	To know the concept of air pollution and various air pollutants.
2.	To study the control measures for air pollution management
3.	To study the air quality management.

UNIT I - INTRODUCTION **(9 hours)**

Air resource management system – Air quality management – Scales of air pollution problem – Sources and classification of pollutants and their effect on human health vegetation and property – Global implications of air pollution – Meteorology Fundamentals – Atmospheric stability – Micrometeorology – Atmospheric turbulence – Mechanical and thermal turbulence.

UNIT II - CONTROL OF PARTICULATE MATTERS **(9 hours)**

Settling chambers – Filters, gravitational, Centrifugal – multiple type cyclones-prediction of collection efficiency- pressure drop- wet collectors- Electrostatic Precipitation theory – ESP design – Operational Considerations – Process Control and Monitoring.

UNIT III - CONTROL OF GASEOUS MATTERS **(9 hours)**

Absorption – Principles – Description of equipment-packed and plate columns – Design and performance equations – Adsorption – Principal adsorbents – Equipment descriptions – Design and performance equations – Condensation – Design and performance equation – Incineration – Equipment description – Design and performance equations – Biological air pollution control technologies.

UNIT IV - EMERGING TRENDS **(9 hours)**

Process modification – Automobile air pollution and its control – Fuel modification – Mechanical particulate collectors – Entrainment separation – Internal combustion engines – Membrane process – Ultraviolet photolysis – High efficiency particulate air filters – Technical and economic feasibility of selected emerging technologies for air pollution control – Control of indoor air quality – Radio active pollution and its control.

UNIT V - AIR QUALITY MANAGEMENT **(9 hours)**

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

TEXT BOOKS

1. Anjaneyulu .D, "*Air Pollution and Control Technologies*", Allied Publishers, Mumbai, 2002.
2. Rao .M.N, and Rao .H. V. N, "*Air Pollution Control"*, Tata-McGraw-Hill, New Delhi, 2006.

REFERENCES

1. Rao .C.S, "*Environmental Pollution Control Engineering*", Wiley Eastern Ltd., New Delhi,2006.
2. Heumann .W.L, "*Industrial Air Pollution Control Systems"*, McGraw-Hill, New Yark, 2007.
3. Mahajan .S.P, "*Pollution Control in Process Industries"*, Tata McGraw-Hill Publishing Company, New Delhi, 2002.
4. Peavy .S.W, Rowe D.R. and Tchobanoglous G. "*Environmental Engineering*", McGraw Hill, New Delhi, 2001.
5. Garg .S.K, "*Environmental Engineering Vol. II*", Khanna Publishers, New Delhi, 2005.

CE1132 AIR POLLUTION CONTROL AND MANAGEMENT												
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.	Mapping of instructional objectives with student outcome	1-3		1-3		1-3						
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences andTechnical Arts (E)				Professional Subjects (P)		
		--		--		--				X		
4.	Broad area	Structural Engineering		Geotechnical Engineering		Water Resources Engineering				Geomatics Engineering		
		--		--		X				--		
5.	Approval	23rd meeting of academic council , May, 2013										

CE1133	**ENVIRONMENTAL HEALTH ENGINEERING**	**L**	**T**	**P**	**C**
	Total Contact Hours – 45 hours	**3**	**0**	**0**	**3**
	Prerequisite				
	Nil				

PURPOSE

To get exposure about health aspects in the field of environmental engineering.

INSTRUCTIONAL OBJECTIVES

1.	To know the characteristic, collection, conveyance, disposal of refuse.
2.	To study the aspects of health full housing like ventilation and air conditioning.
3.	To learn about characteristics, transmission, and control of diseases.
4.	To obtain knowledge on milk sanitation.
5.	To familiarize with sources, effects, prevention, and control of air and noise pollution.

UNIT I - REFUSE SANITATION (9 hours)

Refuse - definition & terms connected with it - quality and characteristics of refuse - collection, conveyance and disposal methods - waste recycling - biogas and gobar gas plants.

UNIT II - VENTILATION AND AIR CONDITIONING (9 hours)

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.

UNIT III - MALARIA INCIDENTAL TO ENGINEERING (9 hours)

Introduction - mosquito characteristics - transmission of diseases -engineering aspect of the problem - control measures.

UNIT IV - FOOD AND MILK SANITATION (9 hours)

Food borne diseases - bacterial treatment of kitchen utensils - bacteriological contents of milk sanitation - dairy barn sanitation - pasteuration methods - milk test.

UNIT V - AIR AND NOISE POLLUTION CONTROL (9 hours)

Pollutants and their sources - effects on human health, vegetation and climate - prevention and control of air pollution - air pollution control legislation - noise pollution - sources and effects - control measures.

TEXT BOOKS

1. Park .J.E and Park .K, "*Text Book of Presenting and Social Medicine*", M/s Banarsidos - Bhanot, Jalapur, 2010.

REFERENCES

1. Salvato, "*Environmental Sanitation",* John Wiley and Sons, New York 2002.
2. Cuniff .P.F, "*Environmental Noise Pollution*", John Wiley and Sons, New York 2002.
3. Garg .S.K "*Environmental Engineering*", Khanna Publication 2005.
4. Duggal .K.N, "*Elements of Environmental Engineering",* S. Chand & Company Ltd. 2002.

CE1133 ENVIRONMENTAL HEALTH ENGINEERING												
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.	Mapping of instructional objectives with student outcome	1-5		1-5		1-5						
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences andTechnical Arts (E)				Professional Subjects (P)		
		--		--		--				X		
4.	Broad area	Structural Engineering		Geotechnical Engineering		Water Resources Engineering				Geomatics Engineering		
		--		--		X				--		
5.	Approval	23rd meeting of academic council , May, 2013										

CE1134	ENVIRONMENTAL IMPACT ASSESSMENT	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite				
	Nil				

PURPOSE

To learn the fundamental concepts of Environmental Impact Assessment in the field of environmental engineering.

INSTRUCTIONAL OBJECTIVES

1.	To know about the basics and importance of Environmental Impact Assessment
2.	To study about the Environmental Impact Statement and methods of EIA.
3.	To know about the Environmental Management and Prediction Methods
4.	To study about the Environmental Management Plan
5.	The broad education necessary to understand the impact of engineering solutions in global, economic, environmental and social context

UNIT I - INTRODUCTION (**9hours)**

Impact of development projects under Civil Engineering on environment - Environmental Impact Assessment (EIA) - Environmental Impact Statement (EIS) – EIA capability and limitations –Legal provisions on EIA

UNIT II - METHODOLOGIES (**9hours)**

Methods of EIA –Check lists – Matrices – Networks – Cost-benefit analysis – Analysis of alternatives

UNIT III - PREDICTION AND ASSESSMENT (**9hours)**

Assessment of Impact on land, water and air, noise, social, cultural flora and fauna; Mathematical models; public participation – Rapid EIA

UNIT IV - ENVIRONMENTAL MANAGEMENT PLAN (**9hours)**

Plan for mitigation of adverse impact on environment – options for mitigation of impact on water, air and land, flora and fauna; Addressing the issues related to the Project Affected People – ISO 14000

UNIT V - CASE STUDIES (**9hours)**

EIA for infrastructure projects – Bridges – Stadium – Highways – Dams – Multi-storey Buildings – Water Supply and Drainage Projects – Waste water treatment plants.

TEXT BOOKS

1. Canter .R.L, "*Environmental Impact Assessment*", McGraw-Hill Inc., New Delhi, 2006.
2. Shukla .S.K. and Srivastava .P.R, "*Concepts in Environmental Impact Analysis*", Common Wealth Publishers, New Delhi, 2002.

REFERENCES

1. John G. Rau and David C Hooten (Ed)., "*Environmental Impact Analysis Handbook*",McGraw-Hill Book Company, 2000.
2. "*Environmental Assessment Source book*", Vol. I, II & III. The World Bank, Washington, D.C., 2001.
3. Judith Petts, "*Handbook of Environmental Impact Assessment Vol. I & II*", Blackwell Science, 2006.

CE1134 ENVIRONMENTAL IMPACT ASSESSMENT												
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.	Mapping of instructional objectives with student outcome	1-5		1-5		1-5						
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences andTechnical Arts (E)				Professional Subjects (P)		
		--		--		--				X		
4.	Broad area	Structural Engineering		Geotechnical Engineering		Water Resources Engineering				Geomatics Engineering		
		--		--		X				--		
5.	Approval	23rd meeting of academic council , May, 2013										

CE1135	INDUSTRIAL WASTE MANAGEMENT	L	T	P	C
	Total Contact Hours – 45 hours	3	0	0	3
	Prerequisite				
	Nil				

PURPOSE

This course makes the students knowledgeable in various pollution prevention methods employed in industries.

INSTRUCTIONAL OBJECTIVES

1.	To provide an introduction to industrial pollution prevention measures.
2.	To familiarize the methods of pollution prevention in industries, life cycle assessment of products and design for environment.
3.	To know about the hazardous waste and disposal.

UNIT I - INDUSTRIALIZATION (**9hours)**

Industrial activity and environment-industrialization and sustainable development-indicators of sustainability-sustainability strategies-Barriers to sustainability-Pollution prevention in achieving sustainability-Prevention Vs control of industrial pollution-Environment policies and Regulations to encourage pollution prevention-Types of industries and industrial pollution - Characteristics of industrial wastes - Population equivalent

UNIT II - WASTE WATER TREATMENT (**9hours)**

Sources, Characteristics, waste treatment flow sheets for selected industries such as Textiles, Tanneries, Dairy, Sugar, distilleries, Refineries, thermal power plants, Chemical Industry,Electroplating Industry - Wastewater reclamation concepts.

UNIT III - REGULATORY BOARDS (**9hours)**

Environment friendly chemical processes-Properties of environmental contaminants - Regulations for clean environment and implications for industries-International environmental standards-Environmental technology assessment.

UNIT IV - SOURCE REDUCTION TECHNIQUES (**9hours)**

Waste management Approach - Waste Audit - Volume and strength reduction - Material and process modifications - Recycle, reuse and byproduct recovery - Applications-residuals management-Economic recovery and recycling of wastes.

UNIT V - HAZARDOUS WASTE MANAGEMENT (**9hours)**

Hazardous wastes - Physico chemical treatment - solidification - incineration - Secured land fills-Industrial applications of pollution prevention, Life cycle assessment, and technology assessments.

TEXT BOOKS

1. James G. Mann and Y.A.Liu, "*Industrial Water Reuse and Waste Water Minimization*", McGraw Hill, 2009.
2. Eckenfelder .W.W, "*Industrial Water Pollution Control*", McGraw-Hill, 2009.

REFERENCES

1. Freeman H.M., "*Industrial Pollution Prevention Hand Book*", McGraw Hill, 2005.
2. Arceivala ,S.J., "*Wastewater Treatment for Pollution Control*", Tata McGraw-Hill, 2008.
3. Frank Woodard., "*Industrial waste treatment Handbook",* Butterworth Heinemann, New Delhi, 2010.
4. World Bank Group "*Pollution Prevention and Abatement Handbook - Towards Cleaner Production*", World Bank and UNEP, Washington D.C.2008.
5. Paul L. Bishop "*Pollution Prevention: - Fundamentals and Practice*", McGraw-Hill International, 2010.

CE1135 INDUSTRIAL WASTE MANAGEMENT												
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.	Mapping of instructional objectives with student outcome	1-3		1-3		1-3						
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences andTechnical Arts (E)				Professional Subjects (P)		
		--		--		--				X		
4.	Broad area	Structural Engineering		Geotechnical Engineering		Water Resources Engineering				Geomatics Engineering		
		--		--		X				--		
5.	Approval	23rd meeting of academic council , May, 2013										

CE1136	**MUNICIPAL SOLID WASTE MANAGEMENT**	**L**	**T**	**P**	**C**
	Total Contact Hours - 45	**3**	**0**	**0**	**3**
	Prerequisite				
	Nil				

PURPOSE

To learn the fundamental concepts of handling municipal solid waste generated around the globe.

INSTRUCTIONAL OBJECTIVES	
1.	To know the sources and types of solid waste.
2.	To learn the importance of methods of collection and selection of location for solid waste.
3.	To understand the various methods of disposal of solid waste

UNIT I - SOURCES AND TYPES OF MUNICIPAL SOLID WASTES (9 hours)

Sources and types of solid wastes - quantity – factors affecting generation of solid wastes; characteristics – methods of sampling and characterization- effects of improper disposal of solid wastes – public health effects- principle of solid waste management – social & economic aspects- public awareness- role of NGOs- legislation.

UINT II - ON-SITE STORAGE & PROCESSING (9 hours)

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.

UNIT III - COLLECTION AND TRANSFER (9 hours)

Methods of Collection – types of vehicles – manpower requirement – collection routes- transfer stations – selection of location- operation & maintenance- options under Indian conditions.

UNIT IV - OFF-SITE PROCESSING (9 hours)

Processing techniques and Equipment-Resource recovery from solid wastes – composting- incineration- Pyrolysis - options under Indian conditions.

UINT V – DISPOSAL OF SOLID WASTE (9 hours)

Dumping of solid waste- sanitary landfills – site selection- design and operation of sanitary landfills – Leachate collection & treatment

TEXT BOOKS

1. George Tchobanoglous et.al., "*Integrated Solid Waste Management*", McGraw-Hill Publishers, 2003.

REFERENCES

1. Bilitewski .B, HardHe .G, Marek .K, Weissbach.A, and Boeddicker .H, "*Waste Management*", Springer, 2004.
2. Manual on Municipal Solid Waste Management, "*CPHEEO"*, Ministry of Urban Development, Government of India, New Delhi, 2010.

3. Landreth .R.E and Rebers .P.A, "*Municipal Solid Wastes – problems and Solutions*", Lewis Publishers, 2002.
4. Bhide .A.D. and Sundaresan .B.B, "*Solid Waste Management in Developing Countries*", INSDOC, 2003.

CE1136 MUNICIPAL SOLID WASTE MANAGEMENT												
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.	Mapping of instructional objectives with student outcome	1-3		1-3		1-3						
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences andTechnical Arts (E)				Professional Subjects (P)		
		--		--		--				X		
4.	Broad area	Structural Engineering		Geotechnical Engineering		Water Resources Engineering				Geomatics Engineering		
		--		--		X				--		
5.	Approval	23rd meeting of academic council , May, 2013										

CE1137	ADVANCED CONSTRUCTION TECHNIQUES	L	T	P	C
	Total Contact hours - 45	3	0	0	3
	Prerequisite				
	CE1007				

PURPOSE

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

INSTRUCTIONAL OBJECTIVES

1.	To study the substructure construction techniques like box jacking, sheet piling etc.
2.	To create awareness on superstructure construction elements like slip form techniques, launching techniques erection procedures etc. associated with tall, large span and offshore structures
3.	Recent and advancement in construction techniques and methods in concreting
4.	To study the elements of repair construction etc.

UNIT I - SUB STRUCTURE CONSTRUCTION (9hours)

Box Jacking -pipe jacking - diaphragm walls types and methods - piling techniques - driving well and caisson – sheet piles – construction procedures and applications-cofferdam - methods -cable anchoring and grouting - laying operations for built up offshore system - shoring for deep cutting - well points - dewatering and stand by plant equipment for underground open excavation - Trenchless Technology.

UNIT II - TALL STRUCTURES CONSTRUCTION (9hours)

Techniques of construction for continuous concreting operation in tall buildings of various shapes and varying sections launching techniques -Slip form 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

UNIT III - LARGE SPAN STRUCTURES CONSTRUCTION (9hours)

Types of bridges and loading standards Bow string bridges, cable stayed bridges. Construction aspects and inspection and maintenance of bridges. Launching and pushing of box decks. Construction sequence and methods in domes and prestressed domes – various construction techniques of domes –methods-merits and demerits and space decks support structure for heavy equipment and conveyor and machinery in heavy industries.

UNIT IV – SPECIAL STRUCTURE CONSTRUCTION (9hours)

Erection of lattice towers and rigging of transmission line structures -construction procedures of cooling towers, silos, chimney, sky scrapers. Advanced construction techniques in offshore construction practice- Vacuum dewatering of concrete flooring – white topping –methods and application- erection of articulated structures, floating structures-methods

UNIT V – COMMON STRENGTHENING TECHNIQUES (9hours)

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 , crack stabilizing techniques ,advanced techniques. Explosives and its classification. Sequence in demolition and dismantling.

TEXT BOOKS

1. Roy Chudley, Roger Geeno ,"*Advanced Construction Technology*" Latest Edition, 2005.
2. Ponnuswamy .S,"*Bridge Engineering* "Second Edition, 2008.

REFERENCES

1. Sankar .S.K. And Saraswati .S, Construction Technology, Oxford University Press, New Delhi, 2008.
2. Gahlot .P.S & Sanjay Sharma ,"*Building repair and maintenance management*" , CBS Publications.2006.
3. Robertwade Brown, "*Practical Foundation Engineering Hand Book*", Mcgraw Hill Publications, 2005.
4. Patrick Powers .J, "*Construction Dewatering: New Methods And Applications*", John Wiley & Sons, 2002.
5. Micheal T.Kubal ,"*Construction Waterproofing Handbook*".

CE1137 ADVANCED CONSTRUCTION TECHNIQUES												
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.	Mapping of instructional objectives with student outcome	1-4				1-4						1-4
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences andTechnical Arts (E)				Professional Subjects (P)		
		--		--		--				X		
4.	Broad area	Structural Engineering		Geotechnical Engineering		Water Resources Engineering				Geomatics Engineering		
		--		--		X				--		
5.	Approval	23rd meeting of academic council , May, 2013										

CE1138	CONSTRUCTION RESOURCE PLANNING AND MANAGEMENT	L	T	P	C
	Total Contact Hours - 45	**3**	**0**	**0**	**3**
	Prerequisite				
	Nil				

PURPOSE

The purpose of this course is to provide an understanding of resource management concepts, developing the basic knowledge and skills in resource planning and management in the construction industry, assigning resources in construction organization and management, better understanding of conditions, opportunities and ways to put into practice the knowledge gained.

INSTRUCTIONAL OBJECTIVES	
1.	To study the concepts of construction resource planning, scheduling and to apply appropriate tools and techniques like allocation of resources as per requirement
2.	To know the methods of project estimation and obtain the knowledge of planning and preparing budgets for the construction projects.
3.	To know the materials and equipments used in construction projects and gain knowledge in proper utilization of procurement.
4.	To make aware of labour management and regulations for construction activities
5.	To create awareness on resource leveling and resource allocation

UNIT I - RESOURCE PLANNING (9 hours)

Introduction to resources-Types of resources, manpower, Equipment,Material, Money- Resource Planning- manpower, Equipment,Material, Money - Scheduling – Procurement management.

UNIT II - COST MANAGEMENT (9 hours)

Methods of Estimating project cost (An overview), classification of construction cost – planning resources unit rate, cost inflation, Escalation and Contingencies, Earned value budget – Project master budget – contractors cost control system

UNIT III - PROCUREMENT MANAGEMENT (9 hours)

Material: Time of purchase, quantity of material, sources, Transportation, Delivery and Distribution- control methods- Inventory basics, Inventory Planning –. EOQ. Equipment: Planning and selecting, Extension of Equipment, Types,Cost control Methods, Depreciation and Replacement.

UNIT IV - LABOUR MANAGEMENT (9 hours)

Labour Regulations: Social Security - welfare Legislation - Laws relating to Wages, Bonus and Industrial disputes. Labour Administration - Labour, Classes of Labour, Cost of Labour, Labour schedule, optimum use Labour, Insurance and Safety Regulations – Workmen's Compensation Act - other labour Laws.

UNIT V - RESOURCE ALLOCATION AND LEVELLING (9 hours)

Resource list - Resource Allocation - Resource Leveling and Smoothening – Importance of Project Schedeuling - Time-cost trade off - Value Management.

TEXT BOOKS

1. Chitkara .K.K, "*Construction Project Management*", McGraw Hill, 2012.
2. Sharma .S.C, "*Construction Engineering and Management*", Khanna Publishers, 2008.

REFERENCES

1. Senguptha .B, "*Construction Management and Planning*", Tata McGraw Hill, 2005.

CE1138 CONSTRUCTION RESOURCE PLANNING AND MANAGEMENT												
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.	Mapping of instructional objectives with student outcome	1-5				1-5		1-5				1-5
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences andTechnical Arts (E)				Professional Subjects (P)		
		--		--		--				X		
4.	Broad area	Structural Engineering		Geotechnical Engineering		Water Resources Engineering				Geomatics Engineering		
		--		--		X				--		
5.	Approval	23rd meeting of academic council , May, 2013										

CE1139	INTERDICIPLINARY PROJECT MANAGEMENT	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite				
	Nil				

PURPOSE

It is aimed to develop a thorough understanding of the functions of different teams working on a construction site.

INSTRUCTIONAL OBJECTIVES

1.	To study about the functions of Documentation and Record Keeping.
2.	To study about the functions of Electrical team in construction
3.	To study about the functions of the mechanical team in construction.
4.	To know about the conducting of meetings and negotiations

UNIT I - INTRODUCTION TO PROJECT MANAGEMENT (9hours)

Project management – Attributes, goals and objectives of construction projects – Management techniques for achieving goals – leadership, problem solving, record keeping, planning and scheduling, cost control, quality management, safety management, computerized record keeping – Roles ,responsibilities and authority of project participants(owner, architect, contractor, project manager).

UNIT II - DOCUMENTATION AND RECORD KEEPING (9hours)

Construction documents – Uses of construction documents – Submittals (shop drawings, material data, and samples) – requirements – uses. Types of reports maintained on site and their content – Cost document – Correspondence – Contractual requirement documentation.

UNIT III - ELECTRICAL SUPPLY FOR BUILDINGS (9hours)

Three phase generation and supply – Electricity distribution – Earthing systems and bonding – Consumer unit – Simple power and lighting circuits – Overload protection – Electric wiring – Testing completed installation – Industrial installations – Construction site electricity – Light sources, lamps and luminaries – Lighting controls – Day lighting – Telecommunication installation.

UNIT IV - MECHANICAL CONVEYORS IN BUILDING (9hours)

Planning lift installations – Electric lifts – Roping systems – Controls – Lift doors – Machine room and Equipment – Safety features – installation details – Paternoster lifts – Oil-hydraulic lifts – Estimating the number of lifts required – Firefighting lifts – Builders and electricians work – Escalators - Stair lifts.

UNIT V - MEETINGS AND NEGOTIATIONS (9hours)

Meeting and workshop sessions – Pre-construction planning and organizational meeting and people involved – Project meetings during the construction phase – Specialized meetings – Project close out meetings - Post project review and evaluation – Negotiations.

TEXT BOOKS

1. William R.Mincks and Hal Johnston, "*Construction jobsite management",* third edition, Delmar cengage learning, 2011.
2. David V. Chadderton, "*Building services engineering",* sixth edition, Cenveo publisher services, 2013.

REFERENCES

1. Fred Hall and Roger Greeno, "*Building services hand book in-corporating current building and construction regulations",* fifth edition, Elsevier publishing limited, 2009.
2. Suraj Singh, "*Civil engineering building practice",* CBS publishers and distributors, New Delhi, 2011.

CE1139 INTERDICIPLINARY PROJECT MANAGEMENT												
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.	Mapping of instructional objectives with student outcome	1-3				1-3						1-3
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences andTechnical Arts (E)				Professional Subjects (P)		
		--		--		--				X		
4.	Broad area	Structural Engineering		Geotechnical Engineering		Water Resources Engineering				Geomatics Engineering		
		--		--		X				--		
5.	Approval	23rd meeting of academic council , May, 2013										

CE1140	CONSTRUCTION PLANNING AND ORIENTATION	L	T	P	C
	Total Contact hours - 45	3	0	0	3
	Prerequisite				
	CE1007				

PURPOSE

To learn the fundamental concepts of planning and orientation of Residential buildings, Miscellaneous building , Tall buildings and smart buildings.

INSTRUCTIONAL OBJECTIVES

1.	To know about the orientation basics for Residential buildings, Miscellaneous building.
2.	To know about the orientation basics for Tall buildings and smart buildings

UNIT I - PLANNING FOR RESIDENTIAL BUILDINGS (9hours)

Introduction to building planning - Vastu shastra and architecture – Room planning – Living area – Drawing room – Dining room – Office room – Guest room – Recreation room – Entrance Foyer – Bed room – bathroom and water closets – Service area – Kitchen – Storage – Garage – hostels – hotels – motels – Guest house.

UNIT II - PLANNING FOR MISCELLANEOUS BUILDINGS (PART I) (9hours)

Educational buildings – academic administrative block – common academics – General amenities – library – hospitals – recreational buildings – sports – theater – multiplex – swimming pool - gymnasium – community centre – rural housing – religious buildings.

UNIT III - PLANNING FOR MISCELLANEOUS BUILDINGS (PART II) (9hours)

Office buildings – Merchandise buildings – stores – shopping centers – shopping malls – markets – Industrial buildings – buildings for record storage – museum and art galleries – railway stations – bus stations – television stations – radio stations – Municipal buildings.

UNIT IV - MULTI-STORIED AND TALL BUILDINGS (9hours)

Multi storied buildings – setting and orientation of multi storied buildings – work stations – tall buildings – structural system in tall buildings – fire safety– planning of tall structures –techniques involved in the construction of tall buildings – Earthquake resistance in tall buildings – intelligent tall buildings.

UNIT V - ECO FRIENDLY BUILDINGS (9hours)

Environment man relationship – environmental stress – environmental protection – green house effect – eco friendly buildings – sustainable buildings – green buildings – features of green buildings – green building materials – design of green buildings – rating system – solar passive architecture and building planning – rain water harvesting.

TEXT BOOKS

1. Deodhar .S.V, "*Building Science and Planning",* Anna publishers, 2011.

REFERENCES

1. Chew .M.Y.L and Michael chew yit Lin, "*Construction technology for tall buildings",* world publishers, 2009.
2. Jerry Yudelson,"*The green building revolution"*, Island press, 2010.
3. Abe Kruger and Carl Seville, "*Green building: principles and practices in residential construction",* Cengage learning, 2012.

CE1140 CONSTRUCTION PLANNING AND ORIENTATION												
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.	Mapping of instructional objectives with student outcome	1,2				1,2						1,2
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences andTechnical Arts (E)				Professional Subjects (P)		
		--		--		--				X		
4.	Broad area	Structural Engineering		Geotechnical Engineering		Water Resources Engineering				Geomatics Engineering		
		--		--		X				--		
5.	Approval	23rd meeting of academic council , May, 2013										

CE1141	CONSTRUCTION MANAGEMENT SOFTWARE LAB	L	T	P	C
	Total Contact hours - 60	1	0	3	3
	Prerequisite				
	CE1031				

PURPOSE

To bring an understanding about the use of computers for solving planning, scheduling and other related problems by applying MS Project and Primavera software.

INSTRUCTIONAL OBJECTIVES

1.	To learn using the computer management software applications
2.	To study the CPM and PERT models in the construction industry.
3.	To apply the concepts studied to planning, scheduling and other related problems.

LIST OF EXPERIMENTS

1. Draw a plan, elevation, section of residential building by using Auto Cad or Revit software and arriving quantities by using MS Excel.
2. Basic concepts of construction planning, scheduling, control and its uses in MS Project and Primavera.
3. Planning, scheduling and resource assigning in residential building by using MS Project.
4. Planning, scheduling and resource assigning in infrastructure by using MS Project.
5. Planning, scheduling and resource assigning in industrial buildings by using Primavera.
6. Planning, scheduling and resource assigning in the interior design of hotel management by using primavera.

REFERENCES

1. Feigenbaum.L, "*Construction Scheduling with Primavera Project Planner"*, Prentice Hall Inc., 1999.
2. *"Project planning and management: Primavera Reference guide"*, CADD Centre training services
3. Paul F. Aubin, "*Mastering Autodesk Revit Building"*, Cengage Learning, March 2006.
4. Robert M. Thomas, "*Advanced AutoCAD Release" 12*, ED 3, Wiley, John & Sons, Incorporated, 1993.
5. *"Project planning and management: MS Project specially for Civil professional"*, CADD Centre training services
6. Geprge Omura," *Introducing AutoCAD 2010 and AutoCAD LT 2010"*, Willey India Pvt. Ltd., 2010.

CE1141 CONSTRUCTION MANAGEMENT SOFTWARE LAB												
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.	Mapping of instructional objectives with student outcome	1-3	1-3									1-3
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences andTechnical Arts (E)				Professional Subjects (P)		
		--		--		--				X		
4.	Broad area	Structural Engineering		Geotechnical Engineering		Water Resources Engineering				Geomatics Engineering		
		--		--		X				--		
5.	Approval	23rd meeting of academic council , May, 2013										

	URBAN PLANNING AND SUSTAINABLE DEVELOPMENT	L	T	P	C
CE1142	Total Contact Hours - 45	3	0	0	3
	Prerequisite				
	Nil				

PURPOSE

The purpose of this course is to provide a knowledge on Urban planning and management. In addition, sustainable developments in urban and transport sector.

INSTRUCTIONAL OBJECTIVES

1.	To study about the urban planning and management.
2.	To study about the sustainable urban and transport principles
3.	To study about the urban region and the environment

UNIT I - URBAN PLANNING AND DEVELOPMENT (9hours)

Introduction-Definition of terms, Explanation of concepts, National policies and strategies on issues related to Urban development – Trends of Urbanization-Positive and Negative impacts of Urban development Principles of planning – Types and levels of Urban plans, Stages in the planning process.

UNIT II - DEVELOPMENT PLANS, FORMULATION & EVALUATION (9hours)

Scope and content of Regional Plan, Master Plan, Detailed Development Plan, Structure Plan, Sub Regional Plan, DCR planning and developments of industrial estates, SEZ, Development strategies, formulation and evaluation.

UNIT III - PLAN IMPLEMENTATION AND URBAN MANAGEMENT (9 hours)

Constraints for plan implementation – Industrial, Financial and Legal Constraints, Institutional Arrangements for Urban Development – Financing of Urban Developments - Decision Support System for Urban Management – Involvement of public, private, NGO, CBO & Beneficiaries.

UNIT IV - SUSTAINABLE URBAN AND TRANSPORT PRINCIPLES (9hours)

Urban Environmental Sustainability, Urban Sustainable Development, Methods and Tools for Sustainable Appraisal, Sustainable Transportation – Principles, indicators and its implications Environment and Resources- Economic Benefits of Sustainable Transportation

UNIT V - URBAN REGION AND ENVIRONMENT (9hours)

Sustainability Assessment, Future Scenarios, Shape of Urban Region, Managing the change, Integrated Planning, Sustainable Development- City Centre, Development Areas, Inner City Areas, Suburban Areas, Periurban and Country side, Economy and Society.

TEXT BOOKS

1. Goel .S.L Urban, *"Development and Management*", Deep and Deep publications, New Delhi,2002.

REFERENCES

1. CMDA, *"Second Master Plan for Chennai",* Chennai 2008.
2. Singh .V.B, "*Revitalized Urban Administration in I*ndia", Kalpaz publication, Delhi 2001.
3. Joe Ravetz, "*City Region 2020 – Integrated Planning for a Sustainable Environment"*, 2000.
4. Sustainable Transportation and TDM – Planning the balances, "*Economic, Social and Ecological objectives"*; Victoria Transport Policy Institute, 2007.

CE1142 URBAN PLANNING AND SUSTAINABLE DEVELOPMENT												
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.	Mapping of instructional objectives with student outcome			1-3	1-3				1-3			
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences andTechnical Arts (E)				Professional Subjects (P)		
		--		--		--				X		
4.	Broad area	Structural Engineering		Geotechnical Engineering		Water Resources Engineering				Geomatics Engineering		
		--		--		X				--		
5.	Approval	23rd meeting of academic council , May, 2013										

CE1143	**DESIGN AND CONSTRUCTION OF PAVEMENT**	**L**	**T**	**P**	**C**
	Total Contact Hours - 45	**3**	**0**	**0**	**3**
	Prerequisite				
	Nil				

PURPOSE

To develop an understanding of the analysis, design, Construction and evaluation of the road pavements.

INSTRUCTIONAL OBJECTIVES	
1.	To study about the pavement materials of flexible and rigid pavements
2.	To know about the pavement construction procedures and its equipments
3.	To analyze and design flexible and rigid pavements
4.	To study about the pavement evaluation and overlay design

UNIT I - PAVEMENT MATERIALS AND COMPONENTS (9hours)

Bitumen – types and grades – properties and testing of materials – Types of granular and bituminous mixes- polymer modified bitumen, Geosynthetics- Cement – grades – chemical composition – hydration of cement – testing – admixtures – fibers - properties and testing of pavement quality concrete

UNIT II - CONSTRUCTION PROCEDURES AND EQUIPMENTS (9hours)

Methods of construction and field control checks for various types of flexible pavement layers - methods of construction of Cement concrete pavements layers – joints - Excavators, graders, vibratory rollers, sensor pavers, computerized asphalt mix plant, plants and trucks for ready mix concrete, slip form paver – working principle, advantages and limitations

UNIT III - ANALYSIS AND DESIGN OF FLEXIBLE PAVEMENTS (9hours)

Stresses and deflections in homogeneous masses – Analysis of flexible pavement,Bossinesq's theory,Burmister's theory- Various approaches of flexible pavement design methods - empirical, Semi-empirical method - IRC design method.

UNIT IV - ANALYSIS AND DESIGN OF RIGID PAVEMENTS (9hours)

Stresses and deflections in rigid pavements – Westergaard's analysis, IRC design charts – wheel load stress, warping stress, frictional stress and combination of stresses – types of joints – Design of slab and joints – IRC method of design.

UNIT V - PAVEMENT EVALUATION AND STRENGTHENING (9hours)

Method of pavement evaluation - Distresses in flexible pavements and rigid pavements - Structural evaluation of flexible and rigid pavements - Evaluation by deflection measurements- design of overlays

TEXT BOOKS

1. Yoder .E.J and Witezak, "*Principles of Pavement Design"*, John Wiley and Sons, 2005.

REFERENCES

1. "*Standard Specifications and Code of Practice for Construction of Concre" Roads,* IRC15-2002.
2. "*Guidelines for the Design of flexible Pavements, Indian Road Congress"*, IRC 37-2001.
3. "*Guidelines for the Design of Plain Jointed Rigid Pavements for Highways, Indian Roads Congress"*, IRC 58-2002.
4. Peurify.R.L., "*Construction Planning, Equipment and Methods"*, McGraw Hill Publishers, New York, 2000.

CE1143 DESIGN AND CONSTRUCTION OF PAVEMENT												
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.	Mapping of instructional objectives with student outcome	1-4	1-4			1-4						1-4
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences andTechnical Arts (E)				Professional Subjects (P)		
		--		--		--				X		
4.	Broad area	Structural Engineering		Geotechnical Engineering		Water Resources Engineering				Geomatics Engineering		
		--		--		X				--		
5.	Approval	23rd meeting of academic council , May, 2013										

CE1144	RAILWAY TRANSPORTATION SYSTEM – MATERIAL AND DESIGN	L	T	P	C
	Total Contact Hours – 45	3	0	0	3
	Prerequisite				
	Nil				

PURPOSE

The purpose of this course is to provide a knowledge on components, geometric design, amenities and modern trends in the railway system.

INSTRUCTIONAL OBJECTIVES

1.	To know about railway components and geometric design.
2.	To know about the amenities of rail track
3.	To know about track maintenance and development of railways

UNIT I - INTRODUCTION TO RAILWAY (9 hours)

Role of railway in transportation- historical development of railways in India-classification in Indian railways-technical terms used in railway engineering-the permanent way-subgrade and embankments- ballast- sleepers.

UNIT II - COMPONENTS OF RAILWAY TRACK (9hours)

Rail- rail joints and welding of rails-track fittings and fastenings- coning of wheels - stresses in railway track- creep of rails-track alignment- surveying.

UNIT III - GEOMETRIC DESIGN (9hours)

Necessity of geometric design of railway track-gradient and grade compensation-speed of train-radius of curvature-superelevation-curves-realignment of curves by string line method- widening of gauge on curves.

UNIT IV - AMENITIES OF RAILWAY TRACK (9hours)

Points and crossing- track junctions-stations and yards-equipment in station yards- signaling and control systems-interlocking of signals-construction of track

UNIT V - MODERN TRENDS IN RAILWAYS (9hours)

Track drainage-conventional maintenance of track-modern methods track maintenance-underground railways and tunneling-safety in railways-modern development in railways.

TEXT BOOKS

1. Arora .S.P & Saxena .S.C*, "A Textbook of Railway Engineering",* Dhanpat Rai & Sons, 2005.

REFERENCES

1. Satish Chandra & Agarwal .M.M, *"Railway engineering"* Prabha&Co,Delhi, 2012.
2. Rangwala .S.C, revised by Rangwala .K.R & Rangwala .P.S, "*Railway Engineering*", Charotar Publishing House Pvt. Limited, 2012.

CE1144 RAILWAY TRANSPORTATION SYSTEM – MATERIAL AND DESIGN												
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.	Mapping of instructional objectives with student outcome		1-3								1-3	1-3
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences andTechnical Arts (E)				Professional Subjects (P)		
		--		--		--				X		
4.	Broad area	Structural Engineering		Geotechnical Engineering		Water Resources Engineering				Geomatics Engineering		
		--		--		X				--		
5.	Approval	23rd meeting of academic council , May, 2013										

CE1145	COASTAL ZONE MANAGEMENT	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite				
	Nil				

PURPOSE

The purpose of this course is to learn about the coastal features and to obtain knowledge about managing the coastal zone.

INSTRUCTIONAL OBJECTIVES

1.	To learn about estuaries, wetlands, lagoons, and of the uses of and stresses on the coastal zone.
2.	To study the classification, characteristics, and theories of waves, tides and currents.
3.	To learn about coastal erosion, sea level change, and coastal structures.
4.	To study sea water intrusion, desalination, and anthropogenic impacts on wetlands, mangroves and coral reefs.
5.	To learn about coastal zone management and the applications of remote sensing and geographical information systems in coastal zone management.

UNIT I - COASTAL FEATURES **(9 hours)**

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.

UNIT II - WAVES, TIDES AND CURRENTS (9 hours)

Waves – Classification and characteristics - Wave theories - Wave energy - Wave deformation - Breaking of waves - Wave forecasting - Tides – Classification – Harmonics - Currents - Classification of Currents.

UNIT III - COASTAL PROCESSES AND MANMADE STRUCTURES (9 hours)

Plate Tectonics and Coasts - Types of Coasts - Coastal Erosion - Causes, Effects and Protection - Sea Level Change - Coastal Structures – Soft and hard engineering structures - Wave Force on Structures.

UNIT IV - ENVIRONMENTAL IMPACTS IN COASTAL ZONE (9 hours)

Land Use in Coastal Zone - Seawater Intrusion - Desalination - Brackish Water Aquaculture and its Impact on Coastal Zone - Natural Hazards in Coastal Zone – Impacts on wetlands, mangroves and coral reefs.

UNIT V - COASTAL ZONE MANAGEMENT AND RS & GIS APPLICATIONS (9 hours)

Coastal Zone Management - Concepts and Development - Database for Coastal Zone Management - Remote Sensing Data for CZM - GIS - Concepts and Models Used in Coastal Zone - Case studies.

TEXT BOOKS

1. Garrison .T, *"Oceanography"*, Wadsworth Publications, 4th edition, 2002.
2. Sorenson .R. M, *"Coastal Zone Engineering"*, Chapman & Hall, 3rd edition, 2006.

REFERENCES

1. Internet resources – Wikipedia, UNESCO etc.

CE1145 COASTAL ZONE MANAGEMENT												
Course designed by		**Department of Civil Engineering**										
1.	Student outcome	a	b	c	d	e	f	g	h	i	j	k
		x							x			
2.	Mapping of instructional objectives with student outcome	1-5							3-5			
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences andTechnical Arts (E)				Professional Subjects (P)		
		--		--		--				X		
4.	Broad area	Structural Engineering		Geotechnical Engineering		Water Resources Engineering				Geomatics Engineering		
		--		--		X				--		
5.	Approval	23rd meeting of academic council , May, 2013										

CE1146	GROUND WATER ENGINEERING	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite				
	Nil				

PURPOSE

The purpose of this course is to understand the principles and application of ground water engineering.

INSTRUCTIONAL OBJECTIVES

1.	To understand the sources of ground water, aquifers, water occurrence in different types of rocks.
2.	To understand the ground water potential theory and movement of ground water through Theis' method and Jacob's method.
3.	To study about open well and tube well.
4.	To study the evaluation of aquifer parameters through pumping test, recuperation test and methods of ground water investigation.
5.	To study the ground water contamination and recharge methods.

UNIT I – GEOHYDROLOGY (6 hours)

Introduction - Water bearing formations - Geological formation of water supply - Subsurface distribution of water - Sources of groundwater - Types of aquifers - Aquifer parameters - Groundwater in different rocks.

UNIT II – GROUNDWATER MOVEMENT (10 hours)

Groundwater flow - Permeability - Transmissibility - Darcy's law – Governing equations of ground water flow – Steady state flow – Dupuit Forchheimer assumptions - Unsteady flow - Theis method - Jacob's method

UNIT III – WELLS AND EXPLORATION (9 hours)

Types of wells – Construction of open wells – Construction and boring of tube wells - Tube well types – Well development - Collector wells and Infiltration wells – Design of strainer tube well

UNIT IV – EVALUATION OF AQUIFER PARAMETERS (11 hours)

Introduction - Pumping test analysis - Recuperation test - Well characteristics - Well capacity - Hydraulics of open wells - Groundwater investigation - Geological methods - Geophysical methods - Remote sensing methods.

UNIT V – ENVIRONMENTAL GROUNDWATER (9 hours)

Groundwater development - Hydrological maps - Groundwater quality - Groundwater contamination - Seawater intrusion - Control measures - Groundwater recharge - Recharge methods - Groundwater modeling

TEXT BOOKS

1. Raghunath .H.M, *"Ground Water Hydrology"*, Wiley Eastern Ltd., Second reprint, 2000.

REFERENCES

1. David Keith Todd, Larry W.Mays, *"Groundwater Hydrology"*, John Wiley and Sons, 2004.
2. Murthy .V.V.N, *"Land and Water Management Engineering"*, Kalyani Publishers, New Delhi, 1994.

CE1146 GROUND WATER ENGINEERING												
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.	Mapping of instructional objectives with student outcome	1-5	2-4			2-4			3-5			3-5
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences andTechnical Arts (E)				Professional Subjects (P)		
		--		--		--				X		
4.	Broad area	Structural Engineering		Geotechnical Engineering		Water Resources Engineering				Geomatics Engineering		
		--		--		X				--		
5.	Approval	23rd meeting of academic council , May, 2013										

CE1147	HYDRAULIC MACHINERY	L	T	P	C
	Total Contact Hours – 45	3	0	0	3
	Prerequisite				
	Nil				

PURPOSE

The purpose of this course is to get exposure about the working principles, components, and functions of pumps and turbines.

INSTRUCTIONAL OBJECTIVES	
1.	To understand the force exerted by a jet on a fixed target, moving target, and by a jet on a series of curved vanes.
2.	To study the features of centrifugal pump, priming, cavitation, and multistage pumps.
3.	To learn the function of reciprocating pump, indicator diagram and air vessel.
4.	To know the features of Pelton turbine.
5.	To gain knowledge on Francis turbine and Kaplan turbine.

UNIT I – IMPACT OF JET ON VANES (9 hours)

Introduction to Impulse – momentum equation and its applications – Force exerted by a jet on a fixed target – Force exerted by a Jet on a moving target – Force exerted by a jet on a series of curved vanes – Problems.

UNIT II – CENTRIFUGAL PUMP (9 hours)

Definition of pump – classification – Centrifugal pump – Description and general principle of working – priming – Work done and efficiencies – Cavitation – Multistage pumps.

UNIT III – RECIPROCATING PUMP (9 hours)

Reciprocating pump - Component and Working – Discharge – Workdone – Coefficient of discharge – Slip - Indicator diagram - Effect of acceleration and friction - Air vessel.

UNIT IV – IMPULSE TURBINE (9 hours)

Pelton Wheel – Theory – Velocity triangle – Work done – Design parameters – Problems on Pelton Wheel.

UNIT V – REACTION TURBINE (9 hours)

Francis Turbine – Theory – Velocity triangle – Work done – Design parameters – Problems on Francis turbine - Kaplan turbine – Theory – Velocity triangle – Work done – Design parameters – Problems on Kaplan turbine.

TEXT BOOKS

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

REFERENCES

1. Bansal .R.K, *"Fluid Mechanics and Hydraulic Machines"*, Laxmi Publications 2005.

CE1147 HYDRAULIC MACHINERY												
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.	Mapping of instructional objectives with student outcome	1-5	2-4	2-5		1-5			3			2-5
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences andTechnical Arts (E)				Professional Subjects (P)		
		--		--		--				X		
4.	Broad area	Structural Engineering		Geotechnical Engineering		Water Resources Engineering				Geomatics Engineering		
		--		--		X				--		
5.	Approval	23rd meeting of academic council , May, 2013										

CE1148	HYDROLOGY	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite				
	Nil				

PURPOSE

The purpose of this course is to get exposure in the field of hydrology.

INSTRUCTIONAL OBJECTIVE

1.	To know the basic concepts in hydrology.
2.	To study the features of precipitation, rain gauge density, DAD curve, evaporation, transpiration and infiltration.
3.	To learn about runoff, estimation, modeling of runoff, and hydrograph.
4.	To understand estimation, forecasting, control of flood, and concept of Muskingum method.
5.	To familiarize with computer applications in hydrology using artificial neural network, fuzzy logic.

UNIT I – HYDROLOGY **(6 hours)**

Hydrology and Hydrologic cycle - World's water resources - India's water resources - Hydrologic budget - Hydrometeorology.

UNIT II – PRECIPITATION, EVAPORATION AND INFILTRATION (11 hours)

Precipitation - Types - Measurement – Rain gauge density - Estimation 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.

UNIT III – RUNOFF (10 hours)

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.

UNIT IV – FLOOD ESTIMATION AND FORECASTING (10 hours)

Estimation of peak flood - Flood frequency studies - Methods of flood control - Flood routing thorough a reservoir - Channel flow routing - Muskingum method - Flood forecasting and warning.

UNIT V – COMPUTER APPLICATIONS IN HYDROLOGY (8 hours)

Hydrologic models - Determination of IUH - Synthetic stream flow – Artificial Neural Networks – Basic principles – Advantages and limitations – Fuzzy sets and Fuzzy logic – Basic concepts and principles.

TEXT BOOKS

1. Raghunath .H.M, *"Hydrology : Principles, Analysis and Design"*, New Age Publications, 2006.

REFERENCES

1. Vedula .S and Mujumdar .P.P, *"Water Resources Systems"*, McGraw Hill International Book Company, 2005.

CE1148 HYDROLOGY												
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.	Mapping of instructional objectives with student outcome	1-5	2	2-4					2-4			3-5
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences andTechnical Arts (E)				Professional Subjects (P)		
		--		--		--				X		
4.	Broad area	Structural Engineering		Geotechnical Engineering		Water Resources Engineering				Geomatics Engineering		
		--		--		X				--		
5.	Approval	23rd meeting of academic council , May, 2013										

CE1149	IRRIGATION ENGINEERING	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite				
	Nil				

PURPOSE

The purpose of this course is to learn about the irrigation engineering aspects and to obtain knowledge about operation and management of irrigation water.

INSTRUCTIONAL OBJECTIVES

1.	To know the basics of irrigation and drip, sprinkler and lift irrigation.
2.	To study the relationship between soil, plant and water.
3.	To learn about importance, location and function of various conveyance and distribution systems like weirs, sluices, barrages, drops, escapes, shutters.
4.	To study the water logging problem, salinity, and drainage systems.
5.	To learn about irrigation water management on-farm development and command area development.

UNIT I – IRRIGATION **(9 hours)**

Irrigation - definition - Need - Advantages and disadvantages - Sources of irrigation - Irrigation methods - Surface and subsurface - Pressurized irrigation - Drip, Sprinkler, Lift Irrigation.

UNIT II – SOIL-PLANT-WATER RELATIONSHIP (9 hours)

Soil-Water relationship - Field capacity - Permanent wilting point – Evapotranspiration and Consumptive use - Measurements - Crop and cropping seasons - Assessment of crop water requirement - Net irrigation requirement - Duty and delta relationship.

UNIT III – CONVEYANCE AND DISTRIBUTION SYSTEM (9 hours)

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.

UNIT IV – DRAINAGE AND SALINITY (9 hours)

Water logging – Causes and control - Salinity - Reclamation - Types - Drainage systems - Types.

UNIT V – IRRIGATION WATER MANAGEMENT (9 hours)

Irrigation efficiencies - Need for optimization - Management and productivity - Participatory approach - On farm development - Command area development.

TEXT BOOKS

1. Santhosh Kumar Garg, *"Irrigation Engineering"*, Khanna Publications, Delhi,2000.

REFERENCES

1. Asawa .G.L, *"Irrigation and Water Resources Engineering"*, New Age International Publishers, 2007.

CE1149 IRRIGATION ENGINEERING												
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.	Mapping of instructional objectives with student outcome	1-5				2	5		5		5	
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences andTechnical Arts (E)				Professional Subjects (P)		
		--		--		--				X		
4.	Broad area	Structural Engineering		Geotechnical Engineering		Water Resources Engineering				Geomatics Engineering		
		--		--		X				--		
5.	Approval	23rd meeting of academic council , May, 2013										

CE1150	WATER RESOURCES ENGINEERING	L	T	P	C
	Total Contact Hours – 45	3	0	0	3
	Prerequisite				
	Nil				

PURPOSE

The purpose of this course is to get exposure about the water resources available on earth and its utilisation.

INSTRUCTIONAL OBJECTIVES

1.	To study the hydrologic cycle, precipitation and its estimation.
2.	To study the occurrence, movement and augmentation of ground water through Darcy's law, recuperation test, pumping test and artificial recharge methods.
3.	To know the importance, features and uses of gravity dams.
4.	To explore the importance of rivers, reservoirs and silt control.
5.	To learn about evapotranspiration and irrigation and design a channel through Kennedy's theory, Lacey's theory.

UNIT I – SURFACE WATER HYDROLOGY (9 hours)

Hydrologic cycle - Runoff - Computation - Infiltration - Infiltration Capacity Curve – Infiltrometers - Rain simulators - Precipitation - Rain gauge - Types – Average depth of precipitation - Estimation of missing precipitation records – PMP - Rain-gauge network –Optimum raingauge network design.

UNIT II – GROUND WATER HYDROLOGY (9 hours)

Occurrence and movement of ground water - Permeability and Transmissibility - Darcy's Law – Ground water yield - Aquifers and their types - Infiltration wells and Infiltration galleries - Measurement of yield - Recuperation test - Pumping test – Steady flow analysis only - Artificial recharge – Methods.

UNIT III – DAMS (9 hours)

Dams - Types – Factors affecting location and type of dam - Problems in dam construction - Gravity dam - Forces on a dam - Modes of failure and criteria for structural stability - Foundation Treatment - Spillway – Location and Types – Galleries - Function and types.

UNIT IV – RIVERS AND RESERVOIRS (9 hours)

Rivers - Types and characteristics – Control and training of rivers - Reservoir - Types - Storage capacity of reservoir - Storage zones - Designing reservoir capacity - Flow duration curves – Mass curves of Inflow and outflow - Reservoir Losses - Reservoir sedimentation - Silt control.

UNIT V – IRRIGATION **(9 hours)**

Definition - Crop period / Base period - Duty and Delta - Crop season - Consumptive use - Estimation - Blaney Criddle method - Pan evaporation method - Soil moisture irrigation relationship - Canal - Alignment - Distribution system - Design of Channel - Regime Channel - Kennedy's Theory - Lacey's Theory.

TEXT BOOKS

1. Raghunath .H.M, *"Hydrology"*, New Age International Publishers, New Delhi, 2007.
2. Santhosh Kumar Garg, *"Irrigation Engineering and Hydraulic Structures"*, Khanna Publishers, 2000.

REFERENCES

1. Asawa .G.L, *"Irrigation and Water Resources Engineering"*, New Age International Publishers, New Delhi, 2005.
2. Sharma .R.K, *"Irrigation Engineering and Hydraulic Structures"*, Oxford and IBH Publishing Company, New Delhi, 2002.
3. Raghunath .H.M, *"Ground Water Hydrology"*, Wiley Eastern Ltd., Second reprint, 2000.

<table>
<tr><th colspan="14">CE1150 WATER RESOURCES ENGINEERING</th></tr>
<tr><th colspan="2">Course designed by</th><th colspan="12">Department of Civil Engineering</th></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>2.</td><td>Mapping of instructional objectives with student outcome</td><td>1-5</td><td></td><td>1-2,4-5</td><td></td><td>1-2, 5</td><td></td><td></td><td></td><td></td><td></td><td>4</td></tr>
<tr><td rowspan="2">3.</td><td rowspan="2">Category</td><td colspan="2">General (G)</td><td colspan="3">Basic Sciences(B)</td><td colspan="4">Engineering Sciences andTechnical Arts (E)</td><td colspan="2">Professional Subjects (P)</td></tr>
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<tr><td rowspan="2">4.</td><td rowspan="2">Broad area</td><td colspan="2">Structural Engineering</td><td colspan="3">Geotechnical Engineering</td><td colspan="4">Water Resources Engineering</td><td colspan="2">Geomatics Engineering</td></tr>
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<tr><td>5.</td><td>Approval</td><td colspan="12">23rd meeting of academic council , May, 2013</td></tr>
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CE1151	HYDROPOWER ENGINEERING	L	T	P	C
	Total Contact Hours – 45	3	0	0	3
	Prerequisite				
	Nil				

PURPOSE

The purpose of this course is to understand the concept of hydropower projects including investigation, planning and design aspects.

INSTRUCTIONAL OBJECTIVES

1.	To learn the elements of hydropower scheme and compare with thermal and nuclear powers.
2.	To study the estimation of hydropower potential.
3.	To gain knowledge on water conductor system by studying intake structures, power canals and penstocks.
4.	To get exposure on concept of head race tunnel and surge tank.
5.	To know the features of power generation system by studying turbines, forebay and transmission system.

UNIT I – HYDROPOWER PLANT DEVELOPMENT (7 hours)

Sources and forms of energy, types of power plants, elements of hydropower scheme, Hydropower plants classification - Layout and components- Development of hydropower schemes - Comparison of Hydro, thermal and nuclear power - Survey and Investigation.

UNIT II – POWER POTENTIAL AND DIVERSION STRUCTURES (7 hours)

Estimation of Hydropower potential - Flow duration curve, firm power, secondary power, Load and Load duration curves, Load factor, firm capacity, reservoir capacity, capacity factor.

UNIT III – WATER CONDUCTOR SYSTEM (11 hours)

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.

UNIT IV – SURGE TANKS (10 hours)

Head Race Tunnel (HRT) - Types - Determination of optimum HRT size - 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.

UNIT V – POWER GENERATION SYSTEM (10 hours)

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. Arora .K.R, "*Irrigation water power and Water Resources Engineering*", Standard Publishers Distributers, Delhi, 2002.
2. Varshney .R.S, "*Hydropower Structure*", Nem Chand Brothers, Roorkee, 2001.

REFERENCES

1. Barrows .H.K, "*Water Power Engineering*", Tata McGraw Hill Publishing Company Ltd., New Delhi, 1999.

CE1151 HYDROPOWER ENGINEERING												
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.	Mapping of instructional objectives with student outcome	1-5		3,4					1,5			1,5
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences andTechnical Arts (E)				Professional Subjects (P)		
		--		--		--				X		
4.	Broad area	Structural Engineering		Geotechnical Engineering		Water Resources Engineering				Geomatics Engineering		
		--		--		X				--		
5.	Approval	23rd meeting of academic council , May, 2013										

CE1152	ADVANCED GEOTECHNICAL ENGINEERING				
	Total contact hours - 45	**3**	**0**	**0**	**3**
	Prerequisite				
	CE1018				

PURPOSE

To assess behavior of various clay minerals, analysis of dewatering in soil, and various aspects of stress analysis, tunneling and coastal structure.

INSTRUCTIONAL OBJECTIVES	
1.	To identify clay minerals and its interaction with water.
2.	Outline the design methods for dewatering, flow net analysis for soil
3.	Familiarize the stress distribution in soil and tunneling techniques.
4.	To Study and analyze the earth retaining structures and off shore structures.

UNIT I - CLAY MINERALOGY AND STRUCTURE (9hours)

Introduction - Gravitational and surface forces-Electrical charges on clay minerals-bonds-basic structural units of clay - isomorphic substitution - base exchange capacity common clay minerals (Kaolinite, Montmorillionite and illite only) - Diffuse double layer - thixotrophy - activity of soils - capillary water – soil suction -capillary potential.

UNIT II - DEWATERING AND FLOW NET (9hours)

Permeability of soil – aquifers - field methods for permeability - quick sand condition - Two dimensional flow - Laplace's equation - flow net and it's uses - construction of flow net for sheet pile wall and earth dams - phreatic lines. Dewatering – methods - flow to a slot from a single line source and two line source – fully and partially penetrating slot.

UNIT III - STRESS DISTRIBUTION (9hours)

Introduction - Newmarks chart – regular and irregular footing – Westergard's stress analysis for various loading conditions - earth pressure theories - types of retaining walls – sheet pile walls – types - pressure distribution diagrams for cantilever sheet pile walls in cohesion less soil.

UNIT IV - OFFSHORE STRUCTURES (9hours)

Origin, nature and distribution of marine soils – their engineering properties – sampling and sample disturbance – in-situ testing - Introduction of fixed and floating platforms – steel, concrete and hybrid platforms piling techniques.

UNIT V - SPECIAL STRUCTURES (9hours)

Coffer dams - Caissons and wells– Shafts – Tunnels classification – methods of tunneling - construction sequence – stress around tunnels – micro tunneling – tunnel lining - Diaphragm walls – analysis- anchors.

TEXT BOOKS

1. Shashi K. Gulhati and Manoj Datta., *"Geotechnical Engineering"*, Tata McGraw-Hill Publishing Company Limited, New Delhi, 2011.
2. Joseph .E & Bowles, *"Foundation Analysis & Design"*, McGraw Hill, 1996.

REFERENCES

1. Leonards .G.A, *"Foundation Engineering"*, Tata McGraw-Hill, 1962.
2. James K. Mitchell, *"Fundamentals of soil behavior"*, John Wiley and Sons, Inc., 1993.
3. Terzaghi & Peck, *"Soil Mechanics in Engineering Practice"*, Asia Publishing, 1967.
4. Poulos .H.G, *"Marine Geotechniques"*, Unwin Hyman, London, 1980.

CE1152 ADVANCED GEOTECHNICAL ENGINEERING												
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.	Mapping of instructional objectives with student outcome	1,2,4				1,2,3,4						2,3, 4
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences andTechnical Arts (E)				Professional Subjects (P)		
		--		--		--				X		
4.	Broad area	Structural Engineering		Geotechnical Engineering		Water Resources Engineering				Geomatics Engineering		
		--		--		X				--		
5.	Approval	23rd meeting of academic council , May, 2013										

CE 1153	**GROUND IMPROVEMENT TECHNIQUES**	**L**	**T**	**P**	**C**
	Total contact hours - 45	**3**	**0**	**0**	**3**
	Prerequisite				
	CE1018				

PURPOSE

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

INSTRUCTIONAL OBJECTIVES

1.	To develop an awareness of problematic soils and selection of ground improvement techniques based on soil conditions
2.	To understand drainage, dewatering, grouting technique in ground improvement method.
3.	To aware of the ground improvement techniques.
4.	To study the applications of geosynthetics.

UNIT I - PROBLEMATIC SOIL AND GROUND IMPROVEMENT TECHNIQUES (9hours)

Ground improvement - Role of ground improvement in foundation engineering – methods of ground improvement –geotechnical problems in alluvial, lateritic and black cotton soils – Selection of suitable ground improvement techniques based on soil conditions.

UNIT II - DEWATEREING (9hours)

Dewatering Techniques - Well points – Vacuum and electro-osmotic methods – Seepage analysis for two dimensional flow - fully and partially penetrated slots in homogeneous deposits (Simple cases only).

UNIT III - GROUND IMPROVEMENT FOR COHESIONLESS AND COHESIVE SOILS (9hours)

In-situ densification of cohesion-less soils and consolidation of cohesive soils: Dynamic compaction Vibroflotation, Sand compaction piles. Consolidation: Preloading with sand drains, and fabric drains, Stone columns - Lime piles-installation techniques only – relative merits and limitations – deep soil mixing.

UNIT V - GROUTING TECHNIQUE (9hours)

Grouting - Types of grouts – Suspension grouts - solutions grouts - Grouting equipment and method - Grouting with soil, Bentonite - cement mixes and asphalt - Grout monitoring schemes.

UNIT V - GEOSYNTHETICSAPPLICATIONS (9hours)

Geosynthetics - Types – functions of Geotextiles – Separation – Filtration – Drainage - reinforcement - Geomembranes - Containments and barriers - Application to Ground Anchors.

TEXT BOOKS

1. Purushothama Raj .P, "*Ground Improvement Techniques*", Laxmi Publications (P) Ltd.,New Delhi, 2000.

REFERENCES

1. Koerner .R.M, *"Construction and Geotechnical Methods in Foundation Engineering"*, McGraw Hill, new York, 1984.
2. Moseley .M.P, "*Ground Improvement",* Blockie Academic and Professional, Chapman and Hall, Glassgow, 1998.
3. Winterkorn .H.F and Fang .H.Y, "*Foundation Engineering Hand Book*", Van Nostrand Reinhold, 1994.

4. Koerner .R.M, "*Designing with Geosynthettics"* (Fourth Edition), Prentice Hall, New Jersey, 1999.
5. IS: 13094:1992- "*Selection of ground improvement techniques for foundations in weak soils"*.

CE1153 GROUND IMPROVEMENT TECHNIQUES												
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.	Mapping of instructional objectives with student outcome	1,2,3,4				1,2						3,4
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences andTechnical Arts (E)				Professional Subjects (P)		
		--		--		--				X		
4.	Broad area	Structural Engineering		Geotechnical Engineering		Water Resources Engineering				Geomatics Engineering		
		--		--		X				--		
5.	Approval	23rd meeting of academic council , May, 2013										

CE 1154	STRUCTURES ON EXPANSIVE SOIL	L	T	P	C
	Total contact hours - 45	3	0	0	3
	Prerequisite				
	CE1018				

PURPOSE

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

INSTRUCTIONAL OBJECTIVES

1.	To know the occurrence and distribution of expansive soils
2.	To study the properties of expansive soils
3.	To understand various methods of prediction of heave
4.	To study the design procedure for foundation on expansive soils
5.	To understand various methods of stabilization used in expansive soils

UNIT I- GEOTECHNICAL PROBLEM **(9hours)**

Occurrence and distribution - Expansive soils of India, related civil engineering problems - Environmental interaction, moisture equilibrium – Distress symptoms- Factors influencing swelling & shrinkage of soils.

UNIT II - EXPANSIVE SOIL PROPERTIES **(9hours)**

Soil structure and Clay mineralogy - field exploration – Identification of expansive soils , free swell, cation exchange capacity, expansive index test- classification using engineering index properties.

UNIT III - HEAVE PREDICTION **(9hours)**

Methods of prediction of heave - Empirical methods - double oedometer tests - soil moisture- suction - field observations - shrinkage.

UNIT IV - FOUNDATION DESIGN **(9hours)**

Recommendations for type of foundation in expansive soils - Design consideration - Individual and continuous footings, stiffened mats, under reamed piles - codal provisions.

UNIT V - STABILIZATION **(9hours)**

Soil stabilization -Method - mechanical stabilization - cement stabilization – lime stabilization - bituminous stabilization - chemical stabilization - Thermal stabilization.

TEXT BOOKS

1. John .D.N & Debora .J.M, "*Expansive Soils Problems And Practice In Foundation & Pavement Engineering",* 1992.

REFERENCES

1. Chenn .F.R, "*Foundation on Expansive Soils*"- Elsevier, 1973.
2. Parcher .J.V & Means .R.E, "*Soil Mechanics and Foundations"*, Columbus, 1968.
3. Boominathan. S,"*Lecture Notes on Structures on Expansive Soil"*, College of Engineering, Guindy, Anna University, Chennai. 1990.

CE 1154 STRUCTURES ON EXPANSIVE SOIL												
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.	Mapping of instructional objectives with student outcome	1,2,3 ,4,5				1, 3, 4						3,5
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences andTechnical Arts (E)				Professional Subjects (P)		
		--		--		--				X		
4.	Broad area	Structural Engineering		Geotechnical Engineering		Water Resources Engineering				Geomatics Engineering		
		--		--		X				--		
5.	Approval	23rd meeting of academic council , May, 2013										

	INTRODUCTION TO SOIL DYNAMICS AND MACHINE FOUNDATION	L	T	P	C
CE1155	Total contact hours - 45	**3**	**0**	**0**	**3**
	Prerequisite				
	CE1018				

PURPOSE

To assess various design dynamic properties of soil, design of foundation for common machineries and also about the measures to isolate vibration due to the operations of machines.

INSTRUCTIONAL OBJECTIVES

1.	Familiarize the student to learn wave and wave propagation and dynamic properties of soils.
2.	Familiarize the student with the procedure used for machine foundation design.
3.	Introduce the vibration isolation and screening techniques.

UNIT I - THEORY OF VIBRATION **(9hours)**

Vibration of elementary systems-vibratory motion-single degree freedom system-free and forced vibration with and without damping. Principles of vibration measuring instruments.

UNIT II - WAVES AND WAVE PROPAGATION (9hours)

Wave propagation in an elastic homogeneous isotropic medium-Rayleigh, shear and compression waves-waves in elastic half space (no theoretical treatment or derivation).

UNIT III - DYNAMIC PROPERTIES OF SOILS (9hours)

Elastic properties of soils-coefficient of elastic uniform and non-uniform compression and shear-effect of vibration dissipative properties of soils-determination of dynamic properties of soil - codal provisions – IS 5249 : 1992.

UNIT IV - DESIGN PROCEDURES FOR SIMPLE MACHINE FOUNDATION (9hours)

Design criteria – dynamic loads – simple design procedures for foundations of reciprocating and impact type machines (Treated single degree freedom only)

UNIT V - VIBRATION ISOLATION AND SCREENING (9hours)

Vibration isolation technique - foundation isolation- isolation by location-isolation by barriers active and passive isolation methods

TEXT BOOKS

1. Swamisaran, "*Soil Dynamics and Machine Foundations*", Galgotia Publications Pvt. Ltd. 2010.
2. Prakash .S, and Puri,V.K., *"Foundation for Machines"*, McGraw Hill Publishing Company, Newyork, 1988.

REFERENCES

1. Kameswara Rao, "*Dynamics Soil Tests and Applications*", Wheeler Publishing, New Delhi, 2003.
2. Kamaswara Rao, "*Vibration Analysis and Foundation Dynamics*", Wheeler Publishing, New Delhi, 1998.
3. IS 2974 Code (Part I to IV) of Practice for "*Design and Construction of Machine Foundations*", Bureau of Indian Standards, New Delhi.
4. IS 5249 Code of Practice for "*Method of test for determination of dynamic properties of soil"* Bureau of Indian Standards, New Delhi.
5. Moore .P.J, "*Analysis and Design of Foundation for Vibration*", Oxford and IBH, 2005.

CE1155 INTRODUCTION TO SOIL DYNAMICS AND MACHINE FOUNDATION												
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.	Mapping of instructional objectives with student outcome	1,2				1, 2, 3						2,3
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences andTechnical Arts (E)				Professional Subjects (P)		
		--		--		--				X		
4.	Broad area	Structural Engineering		Geotechnical Engineering		Water Resources Engineering				Geomatics Engineering		
		--		--		X				--		
5.	Approval	23rd meeting of academic council , May, 2013										

CE 1156	ENVIRONMENTAL GEOTECHNOLOGY	L	T	P	C
	Total contact hours - 45	3	0	0	3
	Prerequisite				
	CE1018				

PURPOSE

To develop an understanding of the geotechnical aspects in the disposal of waste materials and the remediation of environmentally contaminated sites.

INSTRUCTIONAL OBJECTIVES

1.	To make the student understand the interaction between waste and soil, and pollutant movement in the ground
2.	To familiarize the student to understand the role of geotechnical engineering in waste management systems.
3.	Students to gain the knowledge in waste disposal and management system and ground remediation technologies.

UNIT I - INTRODUCTION (9hours)

Introduction to environmental geotechnology – environmental cycles & interaction – soil water environment interaction – causes of soil pollution – factors governing soil pollutant interaction.

UNIT II - SOURCES OF WASTES AND CONTAMINANT TRANSPORT (9hours)

Waste characteristics - Sources and types of wastes-Contaminant transport in sub surface : advection, diffusion, dispersion-Contaminant transformation : sorption, biodegradation, ion exchange, precipitation-Ground water pollution : pollution of aquifers by mixing of liquid waste – protecting aquifers.

UNIT III - WASTE DISPOSAL METHODS (9hours)

Objectives of waste disposal facilities – site selection criteria for waste disposal-Methods of disposal : surface impoundment systems, sub-surface disposal, passive containment systems, landfills.

UNIT IV - LANDFILLS (9hours)

Landfill – types, requirements, components - Site selection – leachate and gas generation – primary and secondary leachate – leachate collection and removal system – gas collection and removal system – landfill liners – compacted clay liners, geosynthetic clay liners, geomembrane liners – landfill cover system – end uses of closed landfills.

UNIT V - GROUND REMEDIATIONTECHNOLOGIES (9hours)

Soil remediation technologies : soil washing, electrokinetic remediation, soil vapour extraction, bioremediation, stabilization and solidification. Ground water remediation technologies : Pump and treat, insitu flushing, bioremediation, air sparging, reactive well.

TEXT BOOKS

1. Hsai- Yang Fang, "*Introduction to Environmental Geotechnology,- CRC Press"*, New York, 2009.

REFERENCES

1. David. E. Daniel, "*Geotechnical practice for waste disposal*"– Chapman and Hall – London, 1993.
2. Wentz .C.A, Hazardous, "*Waste Management"*, McGraw Hill Publishing Company, Singapore, 1989.
3. Lakshmi N .Reddi and Hilary I .Inyang, "*Geoenvironmental Engineering-Principles and applications"*, Marcel Dekker, Inc. , USA, 2000.

CE 1156 ENVIRONMENTAL GEOTECHNOLOGY												
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.	Mapping of instructional objectives with student outcome	1,2,3				2, 3						3
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences andTechnical Arts (E)				Professional Subjects (P)		
		--		--		--				X		
4.	Broad area	Structural Engineering		Geotechnical Engineering		Water Resources Engineering				Geomatics Engineering		
		--		X		--				--		
5.	Approval	23rd meeting of academic council , May, 2013										

CE1157	**GEOGRAPHICAL INFORMATION SYSTEM**	**3**	**0**	**0**	**3**
	Total Contact Hours – 45				
	Prerequisite				
	Nil				

PURPOSE

To understand the basics and application of engineering geology technology

INSTRUCTIONAL OBJECTIVES

1.	To understand the GIS, background, development and components of GIS
2.	To study the data capturing for GIS techniques and data base management
3.	To study the analysis of various spatial and non-spatial data in GIS
4.	To study the generation DEM and making model
5.	To appreciate the application of GIS

UNIT I - INTRODUCTION **(9 hours)**

Definition - Historical background – Concepts - Elements of GIS – Hardware and Software-Cartography - Map and Map analysis - Co-ordinate Systems.

UNIT II - DATA MODEL **(9 hours)**

Introduction - Types of data - Spatial, Non-spatial data, Data structure –Modules-Vector data model - Raster data model - Continuous surface model- DEM and TIN

UNIT III - DATA ANALYSIS (9 hours)

Introduction - Spatial data analysis - Non-spatial data analysis –Spatial data Analysis Methods- Query- Proximity Analysis- Buffer Analysis- Overlay analysis

UNIT IV - NETWORK ANALYSIS (9 hours)

Introduction - Data capture - Generation of DEM - Parameters - Cost and Path analysis –Tracing-Routing- Applications

UNIT V - APPLICATION OF GIS (9 hours)

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 and soil

TEXT BOOKS

1. Anji Reddy .M, "*Remote sensing and Geographical information system",* B.S Publications, 2011.

REFERENCES

1. Chestern, "*Geo Informational Systems - Application of GIS and Related Spatial Information Technologies »,* ASTER Publication Co., 1992.
2. Jeffrey Star and John Estes, "*Geographical Information System - An Introduction"*, Prentice Hall, 1990.
3. Burrough .P.A*, "Principles of GIS for Land Resources Assessment"*, Oxford Publication,1980.

CE1157 GEOGRAPHICAL INFORMATION SYSTEM												
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.	Mapping of instructional objectives with student outcome	1-5			1-5	1-5			1-5		1-5	1-5
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences andTechnical Arts (E)				Professional Subjects (P)		
		--		--		--				X		
4.	Broad area	Structural Engineering		Geotechnical Engineering		Water Resources Engineering				Geomatics Engineering		
		--		--		--				X		
5.	Approval	23rd meeting of academic council , May, 2013										

CE1158	REMOTE SENSING AND ITS APPLICATIONS	L	T	P	C
	Total Contact Hours - 45	3	0	0	3
	Prerequisite				
	CE1008				

PURPOSE

The purpose of this course is to provide an understanding of physical concepts and underlying various engineering and technological applications in remote sensing. In addition, the course is expected to understand the basic principles of remote sensing and its applications.

INSTRUCTIONAL OBJECTIVES

1.	To study the basic principles of remote sensing
2.	To study the characteristics of the instrument used for remote sensing
3.	To study and understand optical remote sensing
4.	To understand the Basic concepts of Microwave remote sensing
5.	To study the different areas of applications of Remote sensing

UNIT I - BASICS OF REMOTE SENSING (9hours)

Principles of Remote sensing, History of Remote sensing, Remote sensing in India, Electromagnetic Radiation and Electromagnetic Spectrum, Thermal Emission of Radiation, Radiation Principles (Plank's Law, Stephen Boltezman law), Interaction of EMR with the Earth Surface (Wien's displacement law, Kirchoffs Law) , Spectral signature, Reflectance characteristics of Earths cover types, Remote sensing systems.

UNIT II - PLATFORMS AND SENSORS (9hours)

Platforms-Spaceborne, airborne, Remote sensing sensors- Active and passive Sensors, Across track and along the track Scanning, Optical sensors, Thermal scanners, Microwave sensing radar, satellite missions: Landsat series, SPOT series, IRS satellite series, IKNOS, Metrological satellites

UNIT III - OPTICAL REMOTE SENSING (9hours)

Classification of Remote sensor, selection of sensor parameters, spatial resolution, spectral resolution, Radiometric resolution, Temporal resolution, Optical and Infrared sensors: Quality of Image in Optical system, Imaging mode, Photographic camera, Television camera, Opto-mechanical scanners, Opto-mechanical scanners operated from satellites, Push broom cameras, Whisk broom cameras.

UNIT IV - MICROWAVE REMOTE SENSING (7 hours)

Introduction – Classification of Microwave spectrum, Airborne and Space borne radar systems basis instrumentation, System parameters - Wave length, Polarization, Resolutions, Radar geometry,Target parameters - Back scattering, Point target, Volume scattering, Penetration, Reflection, Uses

UNIT V- REMOTE SENSING APPLICATIONS (11hours)

Introduction to image Interpretation, Visual and Digital Image interpretation.Basic principles of Image Interpretation, Elements of Image Interpretation, Techniques of image Interpretation, Interpretation Keys, Applications of Remote Sensing in Natural Resource Management-Water, Forest , Soil and Land use, Agriculture, Geology, EIA(Air,water and soil pollution and quality, Solid waste management

TEXT BOOKS

1. Floyd F. Sabins, Jr: "*Remote Sensing Principles and Interpretation"*, Freeman and Co., San Franscisco, 2007.

REFERENCES

1. *"Remote Sensing and Image Interpretation"*, 6th Edition,Thomas Lillesand, Ralph W. Kiefer, Jonathan ChipmanNovember 2007, ©2008.
2. *"Manual of Remote Sensing Vol. I*&II", 2nd Edition, American Society of Photogrammetry.
3. Remote Sensing: "*The quantitative approach"*, P.H. Swain and S.M. Davis, McGraw Hill.1978.
4. Introductory Digital Image Processing: "*A remote sensing perspective"*, John R. Jensen, Prentice Hall, 2005.
5. Imaging Radar for Resource Survey*: "Remote Sensing Applications"*, W Travelt, Chapman & Hall, 1986.
6. Remote sensing Notes –Edited by "*Japan Associates of Remote sensing"*- JARS 1999.
7. *"Fundamentals of Remote sensing- George Joseph"*, University Press,2005.

CE1158 REMOTE SENSING AND ITS APPLICATIONS												
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.	Mapping of instructional objectives with student outcome	1		2	5	5			5			3,4
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences andTechnical Arts (E)				Professional Subjects (P)		
		--		--		--				X		
4.	Broad area	Structural Engineering		Geotechnical Engineering		Water Resources Engineering				Geomatics Engineering		
		--		--		--				X		
5.	Approval	23rd meeting of academic council , May, 2013										

CE1159	ROCK MECHANICS	L	T	P	C
	Total Contact Hours – 45	3	0	0	3
	Prerequisite				
	Nil				

PURPOSE

To understand the basics and application of engineering geology technology

INSTRUCTIONAL OBJECTIVES

1.	To understand the properties of rocks.
2.	To study the various types of strength of rocks.
3.	To study stress-strain relation of rocks.
4.	To understand the what is grouting, system, testing
5.	To study the application of rocks for engineers

UNIT I - INDEX PROPERTIES OF ROCKS **(9 hours)**

Introduction – Physical and Mechanical Properties of Rocks – Elastic Parameters of Rocks – Dynamic Property of Rocks – Static and Dynamic Module.

UNIT II - ROCK STRENGTH **(9 hours)**

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.

UNIT III - DEFORMABILITY OF ROCKS AND STRESS (9 hours)

Stress-Strain Behaviour – Initial Stress – Influence of Joints – Distribution of Stresses – Measurements of Initial Stresses.

UNIT IV- ROCK GROUTING (9 hours)

Introduction – Grouting – Types of Grouting – Rock Bolt – Types – Systems – Testing of Rock Bolts.

UNIT V - ROCK ENGINEERING (9 hours)

Introduction – Application – Merits and Demerits – Tunneling – Rock Openings – Rocks for Mining Subsidence, Dam, Road Cuts, Slabs and Foundations.

TEXT BOOKS

1. Jaeger .C, "*Rock Mechanics for Engineers"*, Camridge University Press, 2011.
2. Verma .B.P, "*Rock Mechanics for Engineers"*, Khanna Publication, 1997.

REFERENCES

1. Goodman .P.E, "*Introduction of Rock Mechanics"*, John Wiley and Sons, 1989.
2. Stillburg, "*Professional User Handbook for Rock Bolting"*, Tran Tech Publications, 1989.
3. Brow .E.T, Rock Characterisation, "*Testing and Monitoring*", Pergman Press, 1981.
4. Hock and Bray.J, "*Rock Slate Engineering"*, Institute of Mining and Metallurgy", 1981.

CE1159 ROCK MECHANICS												
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.	Mapping of instructional objectives with student outcome	1-5			1-5	1-5					1-5	1-5
3.	Category	General (G)		Basic Sciences(B)		Engineering Sciences andTechnical Arts (E)				Professional Subjects (P)		
		--		--		--				X		
4.	Broad area	Structural Engineering		Geotechnical Engineering		Water Resources Engineering				Geomatics Engineering		
		--		X		--				--		
5.	Approval	23rd meeting of academic council , May, 2013										

AMENDMENTS

S.No.	Details of Amendment	Effective from	Approval with date